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1 Introduction

1.1 About this Document
This User Manual provides a practical introduction for working with the web-based SonoEnergy Control Panel 9.0 which is based on the SonoEnergy Platform.

1.2 Typographic Conventions
Information about menu selection is given via the click path.

Example:
Customers -> List customer -> Edit
In this case the user should click on the function Edit in the sub menu item List customer of menu item Customers.

For file names, commands, or data fields mono spaced fonts are being used.
Labels for GUI elements are emphasized like this: Meter view, Save.
Internal and external links are identified as follows: Chapter Introduction, http://sono.danfoss.com.
Additional information is being emphasized as follows:
⚠️ This is a warning. It is being issued to avoid serious errors or malfunctions.
💡 This is a hint. Hints contain important additional information on described functionalities.
✅ This is a tip. Tips contain information for a more efficient or comfortable use of the SonoEnergy Control Panel.

1.3 Change Log SonoEnergy Control Panel User Manual
Changes Release 9.0, features
- Reimplementation of diagrams in the detail view of a meter: see Section Registerspecific information
- Revision of the register configuration to improve the usability: see Section Configuring Registers
- List of processes and alarms/events displayed in the meter detail view: see Section Detail View of a Meter
- Reimplementation of diagrams in the detail view of customer: see Section Detail View of a Customer
- List of processes and alarms/events displayed in the communication module detail view: see Section Detail View of a Communication Module
- New search functionality in device group tree: see Section Search in the Device Group Tree
- New policy for maintenance of roles: see Section Default Settings and Management
- New function to select meters across multiple pages, along with reimplementation of list view: see Section List Views >= 9.0

Changes Release 8.0, features
- New function to display parameters for estimation and validation rules in VEE list views: see Sections List View for Estimation Rules and List View for Validation Rules
- New function to assign estimation and validation rules to registers in multiple meters: see new Section Register Configuration: Assigning Estimation and Validation Rules to registers in multiple meters
- New function to display validation and estimation rules in the detail view of a meter (including minor restructuring of detail view): see Section Detail View of a Meter
- Background colors in the raw data view indicate validation status: see Section Viewing Raw Data
- Supply status (breaker status) is displayed in list view and detail view of meters, plus meter selection list for macros: see Sections Supply Status
- Visualization of raw data in the detail view of a meter: see Section Detail View of a Meter
- Country-specific formats for point of delivery: see Section Point of Delivery
- Added information on shortcut for account data: see new Section Shortcut: Editing Own Account Data
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- Added list of event and alarm codes to Online Help: see Section List of Alarm Codes
- Added illustrations and further information on validation and estimation: see Section Introduction

Changes Release 7.2, features
- New function to delete exports from the list view Export results: see new Section Deleting Exports
- Data validation using reference meters: see new Section Management of Reference Meters
- User authentication via LDAP implemented: see new Section Authentication via LDAP
- Visualization of clock shift for daylight savings time in graphs improved: see Section Diagrams
- Estimation method “BDEW Metering Code 2008” implemented: see Section Estimation Methods
- New function for customized meter data export: see Section Special Export Functions
- Date of when the documentation was produced is displayed in the footer of the Online Help
- Added filter commands for VEE list views: see new Section List Views for Estimation Rules and Validation Rules

Changes Release 7.1, features
- Added new column Group in list view for managers: see Section List View of Managers
- Added new access right for manager roles, for activation and deactivation of OBIS codes: see Section Activation and Deactivation of OBIS Codes
- Adaption of the SECP on different screen dimensions: see Section Layout SonoEnergy Control Panel
- Improved visualisation of toolbox by adding a label: see Section Detail Views
- Implemented new DCTs and macros: Get mode from AMM (macro), Request topology and Get meter schedules (DCT and macro), see Section Using Macros
- Implementation of configurable validation and estimation rules: see new Chapter VEE - Validation, Estimation and Editing
- Added a few terms for the glossary and the abbreviation list

Changes Release 7.0, features
- Implementation of the link list / shortcuts to ReportPlus dashboards: see Section Link List (My Links)
- Revision of search and filter function / icon has been added for a more intuitive use: see Sections Search and Filter
- System time displayed in SECP header, installation date displayed in SECP footer: see Section Layout SonoEnergy Control Panel
- Line charts for visualization of selected OBIS codes: see Section Customized Statistics
- Visualization of new aggregation values for minimum / maximum values and average value: see Section Customized Statistics
- Customer-specific start coordinates for map view: see Section Using Google Maps Functions
- New function to activate and deactivate SAP Profile Pushs: see Section Show Profiles pushed to SAP
- Raw data export file available for download in list view Export results: see Section Viewing, Exporting, and Editing Raw Data
- Revision of statistics overview / removed sums for consumption: see Section Overview on Frequently Used Statistics
- Restart behavior for SAP-Processes has been improved: see Section SAP Processes
- OBIS code, for which the exported meter read has been registered, has been added to meter data export: see Section Exporting Meter Data
- New view Preferences ! System Config Service has been added: see Section System Config Service
- On demand reading can optionally be immediately visualized: see new Section On demand reading (DCT)
- Reorganized listing of standard functions for meter: see Section Standard Functions for Meters in the Detail View
- Added list of monitoring values: see new Section Available Monitoring Values
- Updating names for views and columns after they have been streamlined within the SECP over the last releases: throughout the handbook
- Updated list of status icons /removed icons for offline devices: see Section List View of Meters
• Added information on values for Last dataset and Last online: see Sections Network Topology, List View of Meters, Detail View of a Meter
• Added examples for filtering date fields: see Section Filtering date fields
• Added information on function Show profiles: see Section Show Profiles
• Added information on process progress for AMR processes: see Section Process Progress
• Revision of index terms
• Updating screenshots, fixing typos
• Adaption of layout to new corporate design

Changes Release 6.2, features
• Minor layout changes for topology link: see Sections List View of Meters, List View of Communication Modules, List View of Gateways
• Added field Priority for Operational and AMR Processes: see Section Process Monitoring and List View Processes
• Implementation of dashboards for the ReportPlus module: see Chapter Module ReportPlus
• Updating list of available macros (alphabetic sorting analogous to SECP): see Section Using Macros

Changes Release 6.1, features
• Improved, highlighted links to topology information in list views for meters, communication modules and gateways: see Sections List View of Meters, List View of Communication Modules, List View of Gateways
• New filter command for whether topology information is available or not: see Sections List View Meter, List View Communication Modules, List View Gateways in the appendix
• Export of topology information as CSV file: see Section Network Topology
• Searching for empty fields possible: see new Section The Empty Search Term
• Installation date is displayed in the SonoEnergy Control Panel: see Section Layout SonoEnergy Control Panel
• Using macros / revision of list of unsupported devices: see new Section Unsupported Devices
• Adding hints on string length of device IDs
• Adding hint on error codes for raw meter data: see Section Viewing, Exporting, and Editing Raw Data
• Updating screenshots, fixing typos

Changes Release 6.0, features
• Implementation of module ReportPlus: see new Chapter Module ReportPlus
• Implementation of online help: see new Section Online Help
• New list view for export results: see new Section Export Results
• Upload filter: see new Section Uploading Filters
• Filter for process IDs and parent process IDs: see Sections Process Monitoring and List View Processes
• New consumables thermooil, steam, compressed air and nitrogen have been introduced: see Section List View of Meters
• New DCT for displaying and editing device profiles: see Sections Editing Meters and Editing Gateways
• New: Section Map View of Meters
• Updating information on available list views: see Section List Views
• Updating information on free text search: see Section Search
• Adding notes on online/offline status of devices: see Sections List View of Meters, List View of Communication Modules, List View of Gateways
• Adding information on data in process list views: see Section List View of Processes
• Updating filter commands of device lists for macros: see Section List Views Configuration - Meter/Communication
• Restructuring the change log, updating screenshots, fixing typos

Changes Release 5.2, features
• Display and edit OBIS Mapping OUT: see new Section OBIS Code Mapping OUT
• Consistent filtering of device tags: see Section Viewing Virtual Groups
• Filtering for device tags in device selection for macros: see new Section Virtual Groups and Macros
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- New Entity Device Profile (was OBIS profile) for OBIS Mapping IN: see Section OBIS Code Mapping IN
- Remodeling meter list / new filter commands: see Section List View Meter
- Adding new DCTs in list of Macros: see Section Using Macros
- Adding notes on data selection for diagrams: see Sections Configuring the Header and Customized Statistics
- Updating filter commands, adding links to filter command lists
- Fixing typos, use of language

Changes Release 5.1, features
- Standard coordinates for map filter customizable: see Section Using Google Maps Functions
- Display and edit OBIS Mapping IN: see new Section OBIS Code Mapping IN
- Improvement of macro function: see Section Using Macros
- Monitoring the execution of macros: see Section Viewing Parent-Child-Processes
- Reset-Button when tagging devices: see Section Tagging Devices
- Date field for all registers of a meter: see Section Configuring Registers
- Guidelines for passwords updated: see Section Password Management
- Complete revision and restructuring of handbook contents, new layout, migration to new publishing software
- Compilation of general information in Chapter Overview SonoEnergy Control Panel
- Standardization in the description of database entities (meters, communication modules, gateways, customers etc.)
- New: Chapter Support
- New: Chapter Advanced Topics - including sections on topics outside everyday operation, that have been scattered throughout the handbook so far.
- New: Section “Virtual Groups” - Using Device Tags
- New: Sections Process Flow during the Execution of Macros and Process Monitoring
- New: Appendix, Section Available Filter Commands has been moved to appendix from chapter on meters.
- New: List of Abbreviations, Glossary, List of Figures, Index

Changes listed as Editorial changes do not correspond to changes in the respective SonoEnergy Control Panel release, but have been made to improve structure, content and usability of the handbook.
2 Overview SonoEnergy Control Panel

2.1 Prerequisites
For using the SonoEnergy Control Panel, the following prerequisites are necessary:
- Browser
- URL of the SonoEnergy Control Panel installation
- User name and password of an active manager account

A current version of Firefox (or its equivalent Iceweasel) is the recommended browser for using the SonoEnergy Control Panel. Alternatively, Chrome, Safari or Opera may be used. The use of Internet Explorer is not recommended.

2.2 Login and Logout

![Login Screen](image)

*Figure 2.1: Login screen SonoEnergy Control Panel*

At the URL of the SonoEnergy Control Panel the login screen is displayed to the user. The user needs to choose the language of the interface and input user name and password of an active manager account. After successful login the user can access the SonoEnergy Control Panel. To log out, click on the red cross symbol in the upper right corner.

⚠️ The back button of the browser should not be used within the SonoEnergy Control Panel, as it will log out the user.
2.3 Layout SonoEnergy Control Panel

The SonoEnergy Control Panel is organized in five different areas, which are described below:

Header and Status
The Header and Status area provides information about the overall system status. Two diagrams visualize consumption values, monitoring values, statistics or the status of devices. In the right-hand area three more monitoring values are displayed. The content of the diagrams and the displayed parameters can be customized by each manager (see Sections Configuring the Header, Online Status of Devices). The system time is displayed. The user can also edit their account data (see Section Shortcut: Editing Own Account Data).

Filter Navigation
The filter navigation area provides various functionalities to search and filter the data displayed in list views (see Sections Navigation, ref:search, Filter, Using Google Maps Functions, Clipboard, Link List (My Links)).

Main Menu
The main menu shows three fixed menu items (Meter, Customer, Communication). The value of the fourth menu item varies depending on prior selections, and all remaining menu items can be accessed using the menu item More.

Sub Menu / Sub Category
In the sub menu the sub categories of a selected main menu item are on display.

Main Window
The main window displays selected list views or detail views. The list views can be customized by managers. At the bottom edge of the main window control elements for lists are available (see Sections List Views and Detail Views).

Footer
In the footer, the Installed version number and the Installation date are displayed. Also, a link to the Online Help is provided. The width of the SECP will automatically adapt when the browser window is resized, with a minimum width of 1280 pixels.
2.4  Global functionalities

2.4.1  Navigation

On the upper edge of the filter navigation three buttons Back, Home and Reset are available.

- **Back**: Returns to the previous page within the SonoEnergy Control Panel. The history is limited to the last 20 user activities.
- **Home**: Navigates back to the start screen of the SonoEnergy Control Panel (Meter view).
- **Reset**: Resets filter criteria which are currently applied.

⚠️ The back button of the browser should not be used within the SonoEnergy Control Panel, as it will log out the user.

2.4.2  Online Help

The content of the SonoEnergy Control Panel Handbook is available as context-sensitive online help. In all views of the SonoEnergy Control Panel red question marks are displayed in various areas. Clicking on these question marks will open this manual.

2.4.3  Drag and Drop

- **Table cell content** of list views can be copied to the search field or the clipboard via drag and drop.
- All lists views in the main window can be displayed in a separate widget window by “grabbing” the sub menu item and dragging it to an area outside the main window. Alternatively, the little black cross symbol in the upper right corner of the sub menu item can be clicked.

2.4.4  Clipboard

The Advanced Search panel contains also a clipboard function. The user can drag and drop content of list views into the clipboard. The content of the clipboard remains available until explicitly deleted, or the user logs out.
The clipboard function can be used to collect IDs of devices, which should be analyzed in another list view than the current one.

2.4.5 Link List (My Links)

Links to online resources can be saved within the SECP. First the user clicks on the link Filters on the bottom edge of the filter navigation. Within the widget My Links the URL is copied or typed into the input field. After clicking on the Save-symbol or pressing the ENTER-key, a pop-up opens, where the name of the link is specified. After clicking on Continue the link is saved, and will be displayed in the link list below the input field.

If the mouse is hovered over a link list entry, the respective URL is displayed as tooltip. Clicking on the link opens the URL in a separate browser tab. Clicking on the Delete icon will delete the link.

The link list is particularly useful, to save links as shortcuts to ReportPlus dashboards (see Section Dashboards).

2.4.6 Pop-ups

Pop-ups are browser windows to display additional information, for instance details on list entries. Pop-ups are displayed with a transparent gray background.
2.5 Search

2.5.1 Simple Search / Free-Text Search
The search field is located in the upper area of the filter navigation. In all list views a free-text search can be performed. For each list view, a given set of data fields will be searched. These are:

![Search field for search terms and filter commands](image)

<table>
<thead>
<tr>
<th>List view</th>
<th>Data fields</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meter -&gt; Meter view</td>
<td>Meter ID, Point of delivery, Location (Firm, City, Postcode, Street, House number), MU, Type, Group, Firmware version</td>
</tr>
<tr>
<td>Customer -&gt; List customer</td>
<td>Customer ID, Name, Company, Contract ID, Meter ID, Customer address, Language, Phone, E-Mail</td>
</tr>
<tr>
<td>Communication -&gt; Com.module View</td>
<td>Com. module ID, Gateway, Type, Group, Firmware version</td>
</tr>
<tr>
<td>Communication -&gt; Gateway view</td>
<td>Gateway-ID, Type, Group, Vendor, Model, Location, Firmware version</td>
</tr>
<tr>
<td>Alarms / Events -&gt; Event log</td>
<td>Device ID, Alarm code, Category</td>
</tr>
<tr>
<td>Tariffs -&gt; Tariff list</td>
<td>Tariff number, Tariff name, Payment method, Unit</td>
</tr>
<tr>
<td>Processes (all process lists)</td>
<td>Process ID, Process, Error, Group, Manager</td>
</tr>
</tbody>
</table>

Search terms are **case-insensitive**, that means the use of upper- or lowercase letters within the search term will return the same result. By default, search terms are connected using the logical operator **OR**.
After entering the search term, the search will be executed by clicking on the search icon next to the input field, or by pressing the Enter key.

### 2.5.2 Advanced Search

On the lower edge of the filter navigation the user can choose the **Advanced Search**. The advanced search provides an address search including a radius search.

![Advanced Search](image)

**Figure 2.7: Advanced Search**

In the Advanced Search panel also a clipboard can be found (see Section **Clipboard**).

### 2.5.3 Search in the Device Group Tree

In the area of the device group tree another search field is provided. Search strings entered here will be matched to the names of all device groups and subgroups.

After typing the search string and clicking on the enter key, all group names that contain the required string, are highlighted. Subgroups will be “expanded”.

For further information on device groups please refer to Chapter **Rights Management: Groups**.

### 2.6 Filter

In addition to the free-text search filter commands can be used to search through data sets. Filter commands allow for a more precise information retrieval.

Applying filter commands impacts the data that is displayed in list views and individual statistics.
For each list view a given set of filter terms is available. They are, except for tags, similar to column names of the lists. All available filter terms and examples for their usage can be found in the appendix (see Section Available Filter Commands).

After entering the filter command, the filter will be applied by clicking on the icon next to the input field, or by pressing the Enter key.

### 2.6.1 Filter Command Syntax

A filter command starts with the hash symbol #. The hash symbol is followed by the filter term (column name), operators and search terms. Filter commands are case-insensitive, that means the use of upper- or lowercase letters will return the same result.

**Example:**

The filter command \#city=vejle will return the same result as \#CITY=VEJLE

Search terms may contain umlaut characters.

*The maximum number of characters for a filter command is 256.000 (default value, that can be configured).*

### Combination of Filters and Search Terms

Filters can be combined to specify more complex search operations. When using more than one filter command, the commands are by default combined using the logical operator AND.

**Example:**

#status=offline #city=Eindhoven

Will return meters that are offline and are located in the city of Eindhoven (in list view Meter view).
To apply the logical operator **OR** on search terms, the pipe-symbol | should be used. The **OR** operator can not be used to combine filter commands, only search terms.

**Example:**
```
#division=power|gas #city=Eindhoven|Veldhoven #status=offline
```
Will return all power or gas meters in the cities of Einhoven or Veldhoven that are offline (in list view Meter view).

### Use of Wild Cards
For some filters the use of wild cards is possible. A wild card - the asterisk symbol * - can be substituted by any number of characters.

**Example:**
```
#surname=me*er|ma*er
```
Will return customers with a surname such as Meyer, Meier, Meister (first part of filter command) or a surname such as Maier, Mayer or Maister (second part of filter command), in list view List customer.

As a general rule, in data fields with text content the use of wild cards is allowed. For data fields with a fixed range of values, dates or numbers, wild cards can not be used.

### Relational Operators
Filters for data fields containing numbers or dates can use relational operators. The following operators can be used:

<table>
<thead>
<tr>
<th>Operator</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>=</td>
<td>Equal to</td>
</tr>
<tr>
<td>&lt;</td>
<td>Less than</td>
</tr>
<tr>
<td>&gt;</td>
<td>Larger than</td>
</tr>
<tr>
<td>&lt;&gt;</td>
<td>Not equal to</td>
</tr>
</tbody>
</table>

### The Empty Search Term
To filter for empty fields, the operator = should be used with an empty search term. To search for fields filled with an arbitrary value (i.e. that are not empty), the operator <> should be used with an empty search term.

**Example:**
```
#point of delivery=
```
Will return all meters that have no point of delivery assigned.

**Example:**
```
#point of delivery<>
```
Will return all meters that have any point of delivery assigned.

The empty search term can also be combined with other search terms.

**Example:**
```
#point of delivery=3*|
```
Will return all meters with a point of delivery starting with 3 or no point of delivery at all.

### Aliasing
For some data fields aliases are available, which are abbreviations for filter commands. All available aliases for data fields are listed in the appendix (see Section Available Filter Commands)

**Example:**
```
The alias #online is an abbreviation for the filter command #status=online.
The alias #offline is an abbreviation for the filter command #status=offline.
```
Filtering date fields
Date fields can be filtered for specific dates or periods of time. The relational operators can be applied, and to specify periods of time the tilde symbol ~ should be used. Dates are specified using the format YYYY-MM-DD HH:MM:SS, with month, day and time being optional. The following examples are provided to illustrate the use of operators:

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>#process init=2013-09</td>
<td>Returns all processes, that have been initialized between 01.09.2013 and 30.09.2013.</td>
</tr>
<tr>
<td>#prozess completed=2013-08~2013-09-15</td>
<td>Returns all processes, that have been completed between 01.08.2013 and 15.09.2013.</td>
</tr>
<tr>
<td>#last online=2013-09-14</td>
<td>Returns devices, that were on 14.09.2013 for the last time connected.</td>
</tr>
<tr>
<td>#last online&lt;2013-09-14</td>
<td>Returns devices, that were for the last time connected before 14.09.2013.</td>
</tr>
<tr>
<td>#process init=2015-01-22 14:03:30</td>
<td>Returns all processes, that were initialized at this exact date and time.</td>
</tr>
</tbody>
</table>

2.6.2 Filtering by Geographical Information
There are three different ways to filter data by geographical information:
1. Parts of addresses can be searched with the free text search (see Section Simple Search / Free-Text Search).
2. The advanced search allows for an address search including a radius search (see Section Advanced Search).
3. Optionally, the Google Maps API can be used (see Section Using Google Maps Functions).

2.6.3 Saving Filters
Filters can be saved. After typing the filter command into the search field the user clicks on the link + Save filter below the search field. A pop-up opens, where the name of the filter should be given.

> The name of the filter may not exceed 30 characters.

The filter will be saved after clicking on Resume.
To access saved filters, the user clicks on the link Filters on the bottom edge of the filter navigation. The filters will be shown under the label My filters. Hovering the cursor over the filter names opens tool tips, that provide information on the list view for which the filter was saved, and the filter command.
To execute a saved filter, the user clicks on the filter name. The view in the main window may switch to the view, for which the filter was saved.
To delete filters, the user clicks on the delete symbol next to the filter name.

2.6.4 Uploading Filters
Filter commands can be uploaded within a plain text file (*.txt). First the user clicks on the link Filters on the bottom edge of the filter navigation. Under the label Filter upload the respective file can then be selected and uploaded.
The uploaded file will be parsed and its content (after removing tab stops and line breaks) will be executed as filter command. The filter command will be displayed in the search field.
The content of the file must follow the same syntax conventions as described in previous sections.

> The uploaded file has to be in plain text format (with file name extension .txt), with UTF-8 encoding - but without BOM (Byte Order Mark). The BOM can be removed using a text editor, by selecting the option Save without BOM or the like. The file must not exceed a file size of 256 kB (default value, this can be configured).
2.7 Diagrams
In the upper right corner of all diagrams a little black arrow \( \blacktriangledown \) can be found. Clicking on it opens a menu (the toolbox) containing available tools

![Sample diagram and toolbox](image)

**Figure 2.10: Sample diagram and toolbox**

<table>
<thead>
<tr>
<th>Tool</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zoom</td>
<td>Clicking on the <em>Zoom max.</em> function opens the diagram in full screen view. To return to the SECP, the user should open the toolbox again and click on the - now visible - function <em>Zoom out</em>.</td>
</tr>
<tr>
<td>Widget</td>
<td>The <em>Widget</em> function opens the diagram as a widget, i.e. a separate window that can be positioned anywhere on the browser window and which can remain visible for further reference.</td>
</tr>
<tr>
<td>Export</td>
<td>The <em>Export</em> function exports the values displayed in the diagram to a CSV file.</td>
</tr>
<tr>
<td>Reload</td>
<td>The <em>Reload</em> function reloads the contents of the diagram with the most current data.</td>
</tr>
<tr>
<td>Save</td>
<td>The <em>Save</em> function saves the current diagram as image file (PNG format).</td>
</tr>
<tr>
<td>Print</td>
<td>The <em>Print</em> function is forwarding the diagram in PDF format to a printer. The function is only available if the diagram is in full screen mode.</td>
</tr>
<tr>
<td>Settings</td>
<td>The content of the diagram can be configured using the <em>Settings</em> function. The function is only available for diagrams in the Header and Status area (see Section <em>Configuring the Header</em>).</td>
</tr>
</tbody>
</table>

For registers containing consumption values the values displayed in diagrams are relative (i.e. the difference between two successive meter reads). For registers containing monitoring values the values displayed in diagrams are absolute (i.e. values as delivered from the meter).

For some views several diagrams are available, but only a subset is visible. In this case use the arrows to the left and the right side of the visible diagrams to browse to the remaining diagrams.
User Guide  SonoEnergy Control Panel

When Daylight Savings Time (DST) is observed, please note the following:
• When changing from DST to normal time, all values of the overlapping hour will be displayed. The extra hour will be included in the X-axis.
• When changing from normal time to DST, all values will be displayed without a gap. The missing hour is left out on the X-axis.

2.8  List Views
List views are displayed in the main window. The following list views are available:

<table>
<thead>
<tr>
<th>Main menu item</th>
<th>Sub menu item / List view</th>
<th>Export</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meter</td>
<td>Meter view</td>
<td>x</td>
</tr>
<tr>
<td>Customer</td>
<td>List customer</td>
<td>x</td>
</tr>
<tr>
<td>Communication</td>
<td>Com. module view, Gateway view</td>
<td>x</td>
</tr>
<tr>
<td>Tariffs</td>
<td>Tariff list</td>
<td>-</td>
</tr>
<tr>
<td>Processes</td>
<td>Operational processes, AMR processes, Inform processes, MDM processes, SAP processes</td>
<td>x</td>
</tr>
<tr>
<td>Manager</td>
<td>List of managers</td>
<td>-</td>
</tr>
<tr>
<td>Alarm/Events</td>
<td>Event log</td>
<td>x</td>
</tr>
<tr>
<td>Configurations</td>
<td>Meter, Communication</td>
<td>-</td>
</tr>
<tr>
<td>Preferences</td>
<td>OBIS-Codes, Monitor groups, OBIS code mapping IN, OBIS code mapping OUT</td>
<td>x</td>
</tr>
<tr>
<td>Imports/Exports</td>
<td>Export results</td>
<td>x</td>
</tr>
<tr>
<td>VEE</td>
<td>Estimation rules, validation rules</td>
<td>x</td>
</tr>
</tbody>
</table>

The list views display data that belongs to the group selected in the group tree in the left navigation area (below the label Device groups), limited by applied search terms or filters (see Sections Search and Filter).

List views are successively being reimplemented starting from Release 9.0. Both variants are described in the following sections.

2.8.1  List Views < 9.0
List views are configurable. Every user (manager) can customize the layout and displayed data of the lists. If the mouse pointer is hovered over column headings, a little black arrow appears after the heading. After clicking the arrow all available columns (data fields) for the respective list are shown. By selecting or deselecting the columns the content displayed in the list will be changed.
To resize columns, the mouse pointer should be placed on the border line between two columns, dragging will then change the width of the columns. The order of columns can be changed via drag and drop of the column headings.
Clicking on a column heading will sort the data ascending or descending, with the column content as sort key.

Please note, that columns Device tags are not sortable in that way.
On the bottom edge of the main window various functions to control lists are available. On the left-hand side the number of entries in the current selection is displayed, next comes a button to refresh data, plus a button to export data (see Section Exporting Data from List Views). On the right-hand side are control elements to browse through the list: buttons to navigate to the first page, one page backward or forward, to the last page and a text field to jump directly to a certain page.

All lists in the main window can be displayed in a separate widget window by “grabbing” the sub menu item and dragging it to an area outside the main window. Alternatively, the little black cross symbol in the upper right corner of the sub menu item can be clicked.

2.8.2 List Views >= 9.0

The reimplementation currently affects only the list view for meters (List View of Meters).
List Controls
Below the table are the control elements.
- Select via a drop down list, how many elements should be displayed on one page.
- Navigate to the first, last, previous, next page.
- Enter a page number and jump directly to this page.

Displayed Columns
- Click on the icon on the right side of the table header and view a list of all available columns. Clicking on the column name will hide or display the column.
- Click on the little arrow next to each column heading opens a drop down list of functions. Clicking on the function Hide Column will hide it.
- To resize columns, the mouse pointer is placed on the border between two columns, dragging will then change the width of the columns.

Sorting
- Click on a column heading to sort the data in ascending or descending order.
- Click on the little arrow next to a column heading to access these same function via the drop down menu.
- The column Device Tags can not be sorted.

Selection of Elements
- This functionality is in particular relevant for the management of VEE rules (see Register Configuration: Assigning Estimation and Validation Rules to registers in multiple meters).
- Click on checkboxes in the to select or deselect individual elements. The selection will persist when navigating to another page within this list view.
- Click on the checkbox on the left side of the table header to select or deselect all elements (not only those displayed on the current page!).
- The number of currently selected elements is displayed on the bottom of the page.
2.9 Detail Views

The detail view displays, within the main window, properties and attributes of individual objects, such as meters, customers, or communication modules. If an object is selected in the list view by clicking on entries like Meter ID, Customer ID, Com. module ID, the detail view will open.

![Figure 2.13: Detail view of a meter, with toolbox](image)

In the upper right corner of the detail view the label Tools along with a little black arrow is visible. Clicking on it opens a drop-down-list (the toolbox) containing available functions for the selected object. Some of the functions are device control transactions (DCTs). DCTs are for instance On demand read or Firmware update.

Which functions are available depends on
- the customer-specific setup of the SonoEnergy platform
- type/vendor of connected devices – not all devices can provide all functions that are supported by SonoEnergy

General functions for different types of data are described in the following sections: Standard Functions for Meters in the Detail View, Toolbox in the Detail View of a Customer, Toolbox in the Detail View of a Communication Module, Toolbox in the Detail View of a Gateway.
2.10 Using Google Maps Functions

*The functions described below are optional and are only available to customers that are using Google Maps for SonoEnergy.*

2.10.1 Filtering by Geographical Information

In the lower area of the filter navigation a location (e.g. city, street) can be typed in the text field below the small map. After pressing the Enter key the location is searched in the map, at the same time the database entries are being searched for the location.

![Using the Google Maps function](image)

Clicking on the small map opens a larger map section in a new window. All standard control elements of Google Maps can be used.

- The start coordinates for the map can be configured and will be set according to customer preferences.
- Clicking on the map will mark a location (Point A).
- Clicking on a second location (Point B) opens a rectangle between Point A and Point B.
- If the rectangle covers the required area, the selection will be saved by clicking on the Save button.
- All database entries will be filtered for locations that are within the highlighted area. This process is being repeated when a new area is selected.
- A previously selected and saved area is displayed as a yellow rectangle.
- A selected area will be discarded by clicking on the Back button.
- An active map filter will be deleted by clicking on Clear map below the little map in the filter navigation.

It can be customized per manager, which map section is displayed by default when the map is opened. In the middle of the map a red mark is displayed - the center. The manager can move the marker to a new location. After clicking on Save new map center the new center will be saved. When the map is opened the next time, it is centered on the new location.
2.10.2 Map View of Meters

In the view Meter -> Map, meters that have location data assigned are displayed in a map. Standard navigation and display functions of Google Maps can be used (Zoom In/Out, Area selection, Map or Satellite View). It is configurable, which map area will be shown initially. The respective coordinates will be set according to the customer’s preference.

Individual meters are displayed in the map by an icon symboling its division (such as power, water, gas). Hovering the mouse pointer over an icon opens a speech bubble with information on device ID, time of last meter read, tariff and meter read(s). Clicking on the icon displays the exact location of the meter, plus address information.

If a spatial area contains several meters, this area will be displayed as a cluster, i.e. a green circle displaying the number of registered meters within the cluster.
After clicking on the cluster symbol a pop-up opens. In the upper area of the pop-up the number of meters within the cluster (by division) is displayed. In the bottom area of the pop-up a table is listing device ID, last meter read and time of last meter read.

After clicking on the function *Zoom into cluster* the map will zoom in the next zoom level, at which all devices belonging to the cluster are within the displayed map section. The new map section will then display individual meters, and/or clusters containing subsets of meters.

When clicking on a device ID or icon within the cluster pop-up, the map is focused on the exact location of the respective device. At the same time the device ID, registered address and contact person (if available) will be displayed in an information bar left to the map section. When clicking on the device ID in the information bar the detail view of the meter will open (see Section *Detail View of a Meter*).
2.10.3 Setting Coordinates

The exact location of a meter or gateway may differ from the coordinates that are being retrieved based on the given address data. In this case, the coordinates can be manually corrected.

Click on the button Setting coordinates in the edit screen for meters (cf. Section Editing Meters) or gateways (cf. Section Editing Gateways).

- A pop-up opens.
- Change the position of the marker in the pop-up via drag and drop to the correct location.
- After clicking on Save the new coordinates of the marker will be retrieved and saved in the database.

⚠️ Please note, that the address data for the device (street, number etc.) will not be altered by changing the coordinates!

Figure 2.19: Map view of meters: Location details

Figure 2.20: Setting coordinates
2.11 Network Topology
The network topology provides information on the structure of connections within the (physical) network of devices (meters, communication modules, gateways). The network topology can be visualized as tree node chart or circular node chart.
After clicking the respective function in the list view or detail view of meters, communication modules or gateways a widget opens and displays an animated graph for the network topology, focused on the selected device.

The main window may be covered by the topology widget. It can be repositioned within the browser window to make the main window visible again.

If less than ten devices are shown, by default the circular node chart will be used. If more than ten devices are shown, by default the tree node chart will be used. The user can switch between both diagram types using the buttons in the lower right corner of the widget.

In the circular node chart, a little square denotes a meter, a circle denotes a communication module, and a star denotes a gateway. The larger star denotes the master gateway for the network section. The color of the symbol indicates the device status (black = online, red = offline). By clicking on the ID of a device (not the symbol!) the user can focus the diagram on the selected device.
When clicking on one of the symbols (square, circle, star) another pop-up opens, displaying the current status of the device and the time stamp for when the last connection to the device was established (Last online). For meters, additionally the time stamp for when the last dataset for any of its registers has been received is displayed (Last measurement). When clicking on the device ID that is displayed in the pop-up the detail view of the respective device will be shown in the main window.
Figure 2.22: Network Topology: Tree node chart

The **tree node chart** visualizes the hierarchical structure of the connected devices. For a large number of connected devices, this type of visualization is preferable over the circular node chart. The tree node chart is focused on the selected device. The complete tree can be moved within the widget window via drag and drop.

Every device is represented by a rectangle that is labeled with the device ID. A plus symbol “+” in the upper right corner of a rectangle indicates, that more devices are connected. Clicking on the rectangle shows connected sub-devices (or hides them). When hovering the mouse pointer over the rectangle, a pop-up appears that displays the current online-status of the device and a time stamp for when the last connection with the device has been established (**Last online**). For meters, additionally the time stamp for when the last dataset for any of its registers was received is displayed (**Last measurement**). After clicking on the device ID displayed in the pop-up the detail view of the respective device will be shown in the main window.

Topology information can be **exported** in a CSV file. After clicking on the button Export in the lower right corner of the widget, the CSV file will be available for download.

The following notation is used to display the topology information: Starting from right to the left, the parent device and connected sub-devices are listed, separated by `<--`. Devices are identified by their device ID. Every path within the network containing the device for which the topology was requested, is represented by one line in the CSV.

**Example:**

```
05C0D044FCE951 <-- 05C0D044FDCF01
05C0D044FCE94E <-- 05C0D044FDCF01
15889672 <-- 15889672 <-- 05C0D044FDCF01
15889681 <-- 15889681 <-- 05C0D044FDCF01
00000434 <-- 00000434 <-- 05C0D044FDCF01
```

If a SAP Equipment ID is assigned to a device, it will be displayed in parentheses after the device ID (**Example**: 05C0D044FCE951 (SAP143-3455564)).
2.12 Configuring the Header

2.12.1 Diagrams
The content of both diagrams in the header area can be customized by each user (manager). The user clicks on the little black arrow \( \blacktriangledown \) in the upper right corner of each diagram, which opens the toolbox. Then the function Settings should be selected.

A pop-up window appears. By clicking on the radio button the user can choose between values related to consumption (\textit{Division}) and values related to operating parameters (\textit{Monitors}) that should be displayed in the diagram. These values are then available via the drop-down list. Values for \textit{Division} include the total consumption or the consumption for individual registers of power, water or gas.

\textbf{Please note that only values from sum registers are available for display in diagrams.}

Values for \textit{Monitors} include a wide range of system monitoring parameters relevant for administrators, support, or sales (such as status of connected meters, load of the SonoEnergy platform, usage of tariffs or usage of the end user portal). A list of all available monitoring values is provided in the Appendix (see Section \textit{Available Monitoring Values}).

The time frame can be selected in the second drop-down-list.

\textbf{Only values of devices for which the manager has permissions will be displayed.}

2.12.2 System Status
On the right-hand side of the header three more values and a status message (fourth row) can be configured. After each value a little black arrow is available. Clicking on the arrow displays the function Settings. Clicking on the function opens a pop-up, which allows to select the parameter (first three rows) or the device class (fourth row) that should be monitored. For further information please refer to Sections \textit{Online Status of Devices} and \textit{Configuration of Monitor Groups}.

\textbf{Clicking the status message in the fourth row opens the Alarm/Events -> Event log for further analysis.}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{header_configuration.png}
\caption{Configuring the header}
\end{figure}
3 Meters

3.1 List View of Meters
The list view for meters (Meter -> Meter view) displays data on all meters that are registered in the system. This data can be searched and filtered, exported and edited. Available filter commands can be found in Section List View Meter in the Appendix.

![Figure 3.1: List view of meters](image)

The following data can be displayed:
Meter ID; State; Division; Point of delivery; Meter read; Management state; MU; Last online; Last dataset; Type; Group; Meter-Security-ID; SAP Equipment ID; Firmware version; Inventory state; Location; Device tags; Supply

*From Release 9.0 on, list views will be successively reimplemented, starting with the list view for meters. The new general functions are described in Section List Views >= 9.0.*

3.1.1 Division and Online Status
In the column State, the division and status of the meter are represented by the following icons. If an icon is grey, the respective meter is offline.

- ![Meter without division and register is online](image)
- ![Cooling meter online](image)
- ![Power meter online](image)
- ![Oil meter online](image)
- ![Gas meter online](image)
- ![Meter for nitrogen online](image)
- ![Water meter (cold) online](image)
- ![Meter for compressed air online](image)
- ![Water meter (hot) online](image)
- ![Meter for steam online](image)
- ![Heat meter online](image)

*The status of a device will switch from online to offline when no communication with the device has been recorded for a given time span. By default the time span is 35 hours, this value can be configured. If an user hovers the mouse pointer over a symbol, a tooltip shows the timestamp of the last communication with the meter.*
3.1.2 Meter Reads
For every device the meter read is being displayed (column Meter read). By default, this is the value of the register with the smallest OBIS ID – usually a register containing the total of consumption. It can be configured by the administrator, which register should be displayed in the column. If this register is not provided by the communication module, the value 0 will be displayed.
If a user hovers the mouse pointer over the meter read value, the OBIS Code for which the value was registered will be displayed.

3.1.3 Time Stamps
The column Last dataset displays the time, when the most current dataset for the above named register was recorded. If a new meter is being registered, the time stamp displays the time, when the initial read was registered. This initial read will be entered by the user via the SonoEnergy Control Panel or ingested via MDM/SAP.
The column Last online displays a time stamp for the point in time when the last communication with the meter was recorded.

3.1.4 Network Topology
Clicking on the function show in column Topology opens a widget displaying a visualization of the network topology for the selected meter (see Section Network Topology). The background color of the field and a hint indicate, if topology data is available (green) or not (red). The filter command #topology=yes|no can also be used to filter for devices with or without topology data.

3.1.5 Supply Status
Some meters feature a remote switch function. This enables an operator, to remotely interrupt the supply of consumables. To re-enable the supply, two steps are necessary: 1. Via remote switch the supply is enabled. 2. Locally on the meter, the supply is activated again (via a physical switch). This is a safety measure. It should prevent switching on devices accidentally via the remote switch.
The supply status of meters is indicated by the following symbols in column Supply:

- The supply is enabled via remote switch, and locally activated.
- The supply is enabled via remote switch, but still has to be locally activated.
- The supply is disabled via remote switch, and cannot be locally activated.

The status information, if the supply has been locally activated on the meter, is not automatically updated, but only after executing the DCT Breaker/Valve state (in the toolbox of the meter’s detail view).

To switch the supply on or off remotely, the DCTs Armed breaker connect and Breaker disconnect are available. Both DCTs can also be executed as macro.

3.2 Standard Functions in List View of Meters
The following function is available:

3.2.1 Manage Rules
Validation and estimation rules can be assigned to registers in multiple meters. A detailed description of this function is available in Section Register Configuration: Assigning Estimation and Validation Rules to registers in multiple meters.

3.3 Detail View of a Meter
All device-specific data for a meter will be displayed in the detail view. To access the detail view, the user clicks on the meter ID of the respective meter in the list view Meter -> Meter view.
3.3.1 Last Online
The point in time when the last communication with the meter was recorded (see Section Time Stamps) is displayed in the left upper corner of the detail view.

3.3.2 Identification
In the grey bar in the upper area of the detail view identification numbers of the device will be displayed. These are the meter ID (see Section Meter ID), and the (optional) point of delivery (see Section Point of Delivery) and SAP ID. Also, the ID of the communication module connected with the meter is displayed. Clicking on the ID opens the detail view of the respective communication module (see Section Detail View of a Communication Module).

3.3.3 Online Status, Supply Status
The online status (see Section Division and Online Status) is indicated by an icon to the left of the meter ID. If the icon is grey, the meter is offline. The supply status (see Section Supply Status) is indicated by an icon to the right of the meter ID, given the meter supports this functionality.

3.3.4 Global information
Global information of the meter (master data) are displayed in the left column of the detail view. Also, the total number of validation and estimation rules assigned to all registers of the meter is displayed (see Section Validation-and Estimation Rules).

3.3.5 Register-specific information
In the drop-down list Select register in the right area the user can select from all configured registers of the meter. Values from the selected register will then be displayed in the fields Conversion, Obis, Last dataset; Meter read, Init. meter read, CT factor, and in the diagrams in the lower area of the main window. Four diagrams display consumption values for four different periods of time for the selected register: last 24 hours, last 7 days, last 30 days, last 365 days.
One diagram is visible at the bottom of the detail view. The arrows to the left and the right side of the visible diagrams can be used to browse to the remaining diagrams.

By clicking on the little graph-symbol in the right corner of the diagram, the user can switch between display of relative values, or display of cumulated relative values.

By clicking on the zoom symbol, the diagram will be displayed as a widget outside the SECP. The widget can be resized and freely positioned on the screen.

Within the widget, more functions are available:

- The resolution of the X-axis can be changed using the slider rule above the graph.
- After clicking on the arrow above the graph the diagram can be saved as image (in PNG, JPG, SVG, PDF format), the data can be exported (in CSV, XLSX format), or the diagram can be printed.

The diagrams can display raw data, or data that has been validated and for which value replacement was executed. The latter option requires the usage of the VEE component (see Chapter VEE - Validation, Estimation and Editing). Which type of data is displayed, will be configured during project setup. If VEE data is used, always relative values will be displayed, i.e. the data will always be displayed in bar charts. If raw data is used, relative values will be displayed in bar charts, and absolute values will be displayed in line charts.

### 3.3.6 Device configuration

Device parameters are displayed in a pop-up after clicking on the button Show after Device configuration. It depends on the device type, which parameters will be displayed.

![Device parameter pop-up](image)

**Figure 3.3: Detail view of a meter: Device parameter**

Within the field Load Limitation Threshold in the device parameter pop-up the value 0 stands for Watt, the value 1 stands for Ampere.

### 3.3.7 Validation- and Estimation Rules

The total number of validation and estimation rules (see Chapter VEE - Validation, Estimation and Editing) assigned to all registers of the meter is displayed in the left column of the detail view.

After clicking on the link Show <Number> rule(s) a pop-up opens. In this pop-up, the assigned rules per register will be displayed.

On the left side, all registers configured on this meter are displayed. After selecting one of the registers, on the right side all VEE rules assigned to this register will be displayed.
3.3.8 AMR Processes and Alarms/Events
In the bottom area of the detail view two lists are displayed.

The list on the left side displays the last six AMR processes associated with the meter or the connected communication module. The following data is displayed: Process ID; Process; Status; Progress; Process Init.
A click on the list heading (AMR Processes) opens the list view for processes (see Section List View of Processes), which is filtered by the device IDs of the meter and the connected communication module (visible in the search field).
The list on the right side displays the last six alarms or events associated with the meter or the connected communication module. The following data is displayed: Level; Status; Alarm-Code; Ticket; Date
A click on the list heading (Events Alarms) opens the list view for alarms / events (see Section List View for Alarms and Events), which is filtered by the device IDs of the meter and the connected communication module.

⚠️ The lists will be updated every 10 seconds.

3.4 Standard Functions for Meters in the Detail View
The toolbox contains a drop-down list with available functions for the meter. It can be accessed by clicking on the little black arrow in the upper right corner of the detail view. Standard functions for all meters are:

3.4.1 Raw data export
Raw consumption data of the meter will be exported in CSV format (see Section Viewing, Exporting, and Editing Raw Data).

3.4.2 Raw data view
Raw consumption data of the meter can be viewed and edited (see Section Viewing, Exporting, and Editing Raw Data).

3.4.3 CSV-Import
Meter data can be imported via CSV (see Section Importing Meter Data).

3.4.4 Show Topology
The network topology of the meter will be visualized (see Section Network Topology).
3.4.5 Manage reference meter
A meter can get a reference meter for data validation assigned, the link to an existing reference meter can be deleted or the role of meter and reference meter can be switched (see Section Management of Reference Meters).

3.4.6 Processes
The view in the main window switches to Processes -> Operational Processes and the processes related to the meter will be listed. For further reference, the meter ID and the ID of the connected communication module are displayed in the search field on the left-hand side.

3.4.7 Alarms
The view in the main window switches to Alarm/Events -> Event log and the alarms or events related to the meter will be listed. For further reference, the meter ID and the ID of the connected communication module are displayed in the search field on the left-hand side.

3.4.8 Edit
An edit screen for meter data opens (see Section Editing Meters).

3.4.9 Reload page
The content of the page is being reloaded with the most current data.

3.4.10 Show Profiles
Profiles that are configured on a device can be displayed and edited. After clicking on the function, a pop-up opens, where profiles and respective push configurations (i.e. how often data will be transmitted to SonoEnergy) are displayed. New registers can be added by clicking the button Add register.

It depends on the type of the respective device, if profiles and push settings are available for display and configuration!

The upper part of the pop-up (Profile Configuration) displays information on configured profiles, with the following data:

![Figure 3.5: Pop-up profile configuration of a meter](image)
### User Guide

**SonoEnergy Control Panel**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Register</td>
<td>OBIS Code, that is assigned to the profile within SonoEnergy. (OBIS Code Mapping IN Rules will be applied here, see Section OBIS Code Mapping IN.)</td>
</tr>
<tr>
<td>Max Values</td>
<td>Maximum Number of values that will be recorded.</td>
</tr>
<tr>
<td>Interval</td>
<td>Sampling interval for measurement data on the device. Stated in seconds.</td>
</tr>
<tr>
<td>Profile</td>
<td>Vendor-specific identification (OBIS Code) for the profile.</td>
</tr>
<tr>
<td>Snapshot (as of)</td>
<td>Time stamp, for when the last profile data was transmitted from the device.</td>
</tr>
</tbody>
</table>

In the lower part of the pop-up *(Push Configuration)* the respective push configurations will be displayed, with the following data:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profile</td>
<td>Vendor-specific identification (OBIS Code) for the profile.</td>
</tr>
<tr>
<td>Interval</td>
<td>Time span, how often measurement data should be transmitted to SonoEnergy.</td>
</tr>
<tr>
<td>Jitter</td>
<td>Variation in the transmission interval (The transmission will be delayed by a randomly selected value between 0 and Jitter - if the jitter is not already automatically defined in the profile.)</td>
</tr>
<tr>
<td>Target</td>
<td>IPT Push Target. Allowed push targets are part of the project-specific SonoEnergy configuration.</td>
</tr>
<tr>
<td>Mode</td>
<td></td>
</tr>
</tbody>
</table>

To add a new register, the button *Add register* has to be clicked. The necessary input fields will be displayed in the middle of the pop-up. Changes will be saved after clicking on *Save*.

![Figure 3.6: Pop-up profile configuration: Input fields](image)

Please note the following:
- The mapping between registers and profiles is device specific and depends on the sampling interval. The mapping is configuration information stored in SonoEnergy.
- When a new register is added, it will be automatically assigned to a profile on the device.
- If parameter are already defined (as part of the profile information on the device), these predefined parameters will be used.

Configured registers can be removed by selecting the checkbox and clicking the button *Remove selected registers*.

#### 3.4.11 Push Meter Reads to SAP

Meter reads for selected registers will be pushed to SAP. After clicking on the function a pop-up opens, where the register can be selected, as well as the start and end date. The system will return a link to the respective SAP job in the process list.

#### 3.4.12 Show Profiles pushed to SAP

After clicking on the function, a pop-up opens and shows available SAP profile pushes. The following data will be displayed: **Active; SAP Profile ID; Measurement Task ID; Interval; Start; Stop**
Via the checkbox the respective profile can be activated or deactivated. Start time and end time can be edited directly in the pop-up. Data fields that have been edited will be highlighted. The function requires the connection to a SAP ISU system, via the MDUS Connector.

### 3.4.13 Device Control Transactions

Additionally a range of functions to control devices, so called Device Control Transactions (DCTs), are available via the toolbox. The range of available DCTs depends on the type of connected devices and the project configuration.

### 3.4.14 On demand reading (DCT)

Meter data is read from the meter. After clicking on the function a pop-up opens.

The user needs to select the reason for the on demand read from a drop-down list. Additionally, it can be specified when the process should start (default: immediately). Via a checkbox the user can select, whether the measurement values should be displayed instantaneously.

If this is the case, another pop-up opens, where the measurement values are displayed for every register, as soon as they are received.

> **This process may take up to several minutes.**

If the checkbox is deselected (default setting), the reading process will be executed in the background. The results are available in the SECP after the process is finished.
3.5 Creating a New Meter

A new meter can be created in the system without a connection to a communication module or port, and without a connection to a contract. First the user needs to select in the device group tree in the left navigation area the device group the meter should be assigned to.

![Figure 3.10: On demand reading (DCT): Results](image)

Then the input screen *Meter -> Add meter* is selected, where the data can be entered. In the following subsections information on some of the data fields will be given.

![Figure 3.11: Creating a new meter](image)

3.5.1 Point of Delivery

A meter can be assigned to a point of delivery. The point of delivery is the physical location, where the consumable (power, water, gas, ...) is taken out or fed into the network, and where the consumption (or the input) is usually also metered.

A point of delivery has a unique identifier. The change of a meter, the change of the transmission system operator, or a change of the post code will not change the ID of the point of delivery.

The identifier format for the point of delivery is country-specific (Example: 33 digits in Germany). Within SonoEnergy, it can be configured during project setup, which format is expected for the point of delivery. If the format has been specified, the point of delivery is mandatory for all meters with inventory status installed. It is optional for meters with another inventory status, and if the format for the point of delivery is not specified.
3.5.2 Meter ID

The meter ID may not exceed 30 characters.

A new meter can only be created, when the new meter ID has been verified. After clicking on the Check button the system is checking, if the new ID is unique, i.e. not already registered in the database. If the ID is already existing, the master data of the respective meter is load into the input screen. A meter ID can be changed at a later point in time.

When a meter replacement was carried out, this should be modeled in the system by creating a new meter, never by changing the meter ID of an existing meter.

3.5.3 Connecting the Communication Module

In the next step the user selects a previously created communication module (see Section Creating a New Communication Module) and selects the port that is being used. The selected port must not be in use – it can not be used for multiple meters at the same time. The availability of the communication module and the port have to be verified by clicking the button Check.

If the combination of a communication module and port number is already in use, the port has to be disconnected from the previous meter (see Section Disconnecting Meters from Communication Module and Port). The communication module can also be connected to the meter at a later point in time (see Section Editing Meters).

3.5.4 Configuring Registers

After selecting a division (via the drop-down-list Division) the user clicks Edit in row Registers. A pop-up opens, where registers can be added and configured.

On the left side of the pop-up the registers, that are already configured, are displayed. The registers are identified by their OBIS Code. After the OBIS code the number of validation rules (column V) and estimation rules (column E) assigned to the register is displayed.

![Figure 3.12: Configuring registers](image)

On the right side of the pop-up configuration parameters for the register selected on the left side are displayed and can be edited.

Adding a register

To add a new register, in the drop down list Add register the OBIS Code of the register is selected. The register appears in the list of registers on the left side, on the right side the parameters can be configured.
Deleting a register
To delete a register, it is selected and then the button Delete Register is clicked. An X in the first column of the register list indicates, that the respective register is scheduled for deletion. After clicking on Apply the pop-up will close, with the changes scheduled to be applied.

*The changes will only be saved, after the button Save in the meter mask is clicked.*

Parameter
The initial meter read and the conversion factor are entered (see Section Conversion Factor). The initial meter read will be registered in the respective base unit. After the OBIS code has been selected this base unit will be displayed next to the input field Initial value. The date field can be used to enter a date, in case the initial meter read was sampled for a date different from the current one.

If necessary, a conversion factor can be entered for the meter (see Section Conversion Factor). The sampling interval for every register can be set calendrical or as time interval. For a sampling interval that follows the calendar, the user checks calendrical and then chooses one of the radio buttons monthly or daily. For interval sampling the user deselects the checkbox calendrical. A textfield appears, where the time interval can be entered (with seconds as unit).

Via radio button it is selected, if relative or absolute values are recorded.

*The type of the meter and its configuration determine, if a register on the meter delivers relative or absolute meters. The value given here has to match the setting on the meter, otherwise errors will occur during the processing of meter reads.*

Validation and Estimation Rules
If value replacement should take place for missing or implausible values, the respective rule is selected in the drop down list.

Validation rules are also selected in a drop down list, and added by clicking on button Add.

For further information on this topic please refer to Chapter VEE - Validation, Estimation and Editing.

Notes:
- The division of a meter and register data (except for the initial meter read) can not be edited after the register was configured. To change the division, a new meter has to be created which will replace the old meter. To change register data, the respective register needs to be deleted and then added again with new data (OBIS code, conversion factor, sampling interval).
- As long as a meter is not linked with a contract (see Section Creating a New Contract), the consumption data will only be relevant for statistics and be displayed the detail view of the meter.

3.5.5 Conversion Factor
The conversion factor is a divisor. In the case of a pulse meter for power it is the number given on the device. It indicates the number of impulses equivalent to one kWh.

<table>
<thead>
<tr>
<th>Example:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number on the meter 2000 imp/kWh --&gt; conversion factor 2000</td>
</tr>
</tbody>
</table>

*By default, the conversion factor is set to 1 when a new register is added.*

Conversion factors are used in two different ways:
1. The conversion factor will be delivered by the meter as part of the measurement data. In this case the delivered conversion factor will be used to calculate the meter read. A conversion factor that has possibly been entered via the SonoEnergy Control Panel will be ignored. This method is preferable, since conversion factors can change during runtime. Sometimes the conversion factor will be automatically adapted by the meter, in order to prevent an overflow.
2. The conversion will not be delivered as part of the measurement data. In this case the conversion factor entered via the SonoEnergy control panel will be used.
In addition also a conversion between units may be necessary. Again, both options are possible: either the conversion factor for units will be delivered as part of the measurement data, or not. In the latter case standard units will be used, which are \( kWh \) for power and \( m^3 \) for water and gas.

To sum up, the value of the meter read is always calculated as follows:

\[
\text{Meter read} = \text{measured value} \cdot \text{conversion factor} \cdot \text{conversion factor for units}
\]

### 3.6 Editing Meters

To edit meter data, the user selects the function *Edit* for the respective meter in the list view *Meter -> Meter view*.

*If the column *Edit* is not visible in the list this can changed by configuring the visible columns for the list view (please refer to Section *List Views*).*

Alternatively, the screen to edit meter data can be opened by selecting the function *Edit* in the toolbox of the detail view of the respective meter.

*Configuration parameters, that have been set in the device template of the respective device, will be displayed in gray and can not be edited.*

Various master data of the meter can be changed directly in the edit screen, for instance address data, vendor, model, inventory state, description. Specifics need to be taken into account for the following data:

<table>
<thead>
<tr>
<th>Data</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meter ID</td>
<td>The meter ID can be changed. The editing of the meter ID must not be used to model a meter replacement. In this case, a new meter should be created (and the old one deleted).</td>
</tr>
<tr>
<td>Type</td>
<td>The meter type can not be changed. If necessary, a new meter should be created (and the old one deleted).</td>
</tr>
<tr>
<td>Com. module ID</td>
<td>Communication module ID and port number can not be changed, as long as the meter is linked to a contract.</td>
</tr>
<tr>
<td>Division</td>
<td>The division of a meter can not be changed. If necessary, a new meter should be created (and the old one deleted).</td>
</tr>
<tr>
<td>Number of registers</td>
<td>The number of registers for a meter can be changed. After clicking the button <em>Edit</em> in row <em>Registers</em> a pop-up appears. Within the pop-up registers can be deleted or added. See Section <em>Configuring Registers</em>.</td>
</tr>
<tr>
<td>Initial Meter Read</td>
<td>The initial meter read for registers can be changed. After clicking the button <em>Edit</em> in row <em>Registers</em> a pop-up appears, where the initial meter read can be edited. Consumption values and accounting values will be recalculated. See Section <em>Configuring Registers</em>.</td>
</tr>
<tr>
<td>OBIS Codes for registers</td>
<td>The OBIS code for a register can not be changed. If necessary, the register should be deleted and added again.</td>
</tr>
</tbody>
</table>

*Device parameters* for a meter can be edited by clicking on the button *Edit* in the row *Meter type*. A pop-up appears, where the changes can be made.

*Within the field *Load Limitation Threshold* in the device parameter pop-up the value 0 stands for Watt, the value 1 stands for Ampere.*

Optionally, *geographical coordinates* retrieved for address data can be manually edited by using the function *Set coordinates* (click on button); for further information please refer to Section *Setting Coordinates*. 
A device profile is a data container in a device (meter, gateway / concentrator (MUC)). The device profile contains various registers, that are usually grouped by their measurement interval. The registers store consumption data and are identified by their own OBIS codes. The device profiles are addressed by vendor-specific OBIS codes. Device profiles that are configured on a device can be displayed and edited in the SonoEnergy Control Panel, by clicking the function Show Profiles in the detail view of a meter (see Section Standard Functions for Meters in the Detail View).

3.7 Importing Meter Data
Master data for meters can be imported by selecting the function CSV Import from the toolbox in the input screen Meter -> Add meter or the detail view of any meter. Prior to starting the import, the device group, where the new meter(s) should be imported to, needs to be selected in the group tree within the filter navigation. Available data fields for the CSV import file are:

- meter_id; street nr; city; postcode; street; consumable_id; inventory state; device_type_id; reporting_type; init_timestamp; port_base_id; port_id; vendor; model; calibration date; obis_code1; obis_code2; obis_code3; conversion factor1; conversion factor2; conversion factor3; init consumption1; init consumption2; init consumption3; meter area number

Of these, the following data fields are mandatory:
meter_id; consumable_id; device_type_id; init_timestamp; obis_code1; conversion factor1; init consumption1

The conversion factor is the value given by the vendor of the meter.

Example:
Number on the meter 2000 imp/kWh -> conversion factor 2000

Dates, for example init_timestamp or calibration date, should follow ISO 8601, e.g. 2015-03-21T08:15:00.
Please refer to Section CSV Import in the SonoEnergy Control Panel for further information regarding the format of the CSV file. The import pop-up contains also a link to an example file (meter_data_en.csv), that can be used as reference.
The system will return a list of imported meters, including information if the import was successful.

If device data with inactive or non-existing device types is to be imported, the system will return an error message - the respective device will not be created!

3.8 Exporting Meter Data
In the list view Meter -> Meter view information about meters can be exported in CSV format, by clicking on the export symbol below the list (see Section Exporting Data from List Views).
Available data fields (columns) for the export of meter information are:

Meter ID; Locked; Topology; State; Division; Point of delivery; Street; City; House number; Postalcode; Meter read; Obis code; Factor; Unit; Last online; Last dataset; Type; Group; Meter-Security-ID; SAP Equipment ID; Firmware version; Inventory state; Management state; Device tags; Supply
If only selected columns are being exported, the topology information will only be included if also the meter ID is part of the export. The field Topology will contain, starting from the left, the meter ID, ID of the connected communication module and ID of the connected gateway, separated by <-->.
3.9 Viewing, Exporting, and Editing Raw Data

3.9.1 Export
Raw data for individual meters can be exported in the detail view of that meter. The user should switch to the detail view by clicking on the meter ID of the respective meter in the list view Meter -> Meter view. After clicking the function Raw data export in the toolbox, a pop-up opens. In the pop-up the register, whose raw data should be exported, and the time frame can be specified. In the list view Processes -> Operational processes the user can monitor, if the export request is successful. The exported CSV file will be available for download in the list view Export Results (see also Section Export Results).

The following data will be exported: OBIS code; Reading values; Reading values timestamp; Insert time; Errorcode; Unit; Factor; Quality; Reading reason; Quality Status word; Changed.

If no data is available, a pop-up will notify the user.

3.9.2 Viewing Raw Data
To view or edit the raw data, the function Raw data view needs to be selected in the toolbox. After selecting the register and time frame, the data, as described above, will be displayed in a pop-up. Descriptions of the values in field Errorcode are available for reference in the document SonoEnergy Alarm Codes. If the field contains the value 0, no error occurred.

The background color of the fields indicate the validation status of the data (see chapter VEE - Validation, Estimation and Editing):
- Green: Data has been validated and was assessed to be plausible.
- Red: Data has been validated and was assessed to be implausible (marked with Accounting error 309000).
- No background color: Data has not been validated yet.

The raw data view can be sorted in ascending or descending order, by clicking on a column heading - just as any other list view. But the data will always be grouped by OBIS codes first, and then the selected sort criteria will be applied.
The raw meter data is visualized below the table view.

![Figure 3.15: Raw meter data graph](image)

The display area can be changed using the slider rule above the graph.
- The visible meter data range can be changed by moving this bar. The graph can be zoomed by grabbing and dragging one of the handles.
- By clicking on the zoom symbol Show all in the top right corner, the view resets itself.

A list of all registers contained in the raw meter data is shown below the graph. The register label can be clicked for hiding and showing the corresponding data curve.

### 3.9.3 Editing Raw Data
It is possible to edit data in the raw data view by double-clicking on the respective value. Edited values will be marked in the database. It will be registered which manager changed the data, and when the change was made. For gateways, this functionality works in a similar way.

### 3.10 Disconnecting Meters from Communication Module and Port
To disconnect a meter from the communication module and port, the user needs to switch to the edit screen by clicking on the function Edit (in the row of the respective meter) in the list view Meter -> Meter view. Then the button Disconnect next to the input field Com. module ID needs to be clicked.

> The meter can not be disconnected from the communication module / port, if it is still assigned to a contract. First, this needs to be changed (see Section Editing Contracts).

By default, the current date will be recorded as the date for the disconnect. If (optionally) in the input field Date a date in the past is selected for the time of the disconnect, the respective accounting data will be corrected. After the disconnect a new communication module and/or port can be connected to the meter. If the communication module is still delivering consumption data after the disconnect, the data will be recorded in the database and can be assigned to a new meter and a new contract at a later stage. In this case the date of the connection with the new meter has to correspond to the date of the disconnect with the old meter.

### 3.11 Deleting Meters
To delete a meter, the user needs to switch to the edit screen by clicking on the function Edit (in the row of the respective meter) in the list view Meter -> Meter view. Then the function Delete meter in the toolbox needs to be selected.

Meters can only be deleted by users with the appropriate access right for the device. A meter can be deleted, if it is no longer connected to a communication module and assigned to a contract. The meter can be disconnected in the current edit screen (see Section Disconnecting Meters from Communication Module and Port). The assignment to a contract can be changed within the edit screen for contracts (see Section Editing Contracts).

All consumption data recorded for the meter - also the data related to previous contracts and users - will remain in the system and be exported, or viewed by the end user via the end user portal.
4. Customers

4.1 List View of Customers

The list view for customers (Customer -> List customer) displays data on all customers that are registered in the system. This data can be searched and filtered, exported and edited. Available filter commands can be found in Section List View Customers in the Appendix.

![Figure 4.1: List view of customers](image)

The following data can be displayed:

- Customer ID
- State
- Title
- Name
- Gender
- Company
- Customer type
- No. Contracts
- Contract ID
- Meter ID
- Customer address
- Language
- Phone
- E-Mail
- Password changed
- Tags

In the column State, the status of the customer is represented by the following symbols:

- Customer has no active account for an end user portal
- Customer has active account for an end user portal

Clicking on the function More (in the row of the respective customer) will open a pop-up with further details on the customer’s housing situation.

Clicking on the function Set new in column Password will generate a new password for the end user portal and send it to the customer via email.
4.2  Detail View of a Customer

To access the detail view for customers, the user clicks on the customer ID of the respective customer in the list view Customer -> List customer. The detail view provides information about customers and their contracts.

In the lower right-hand area of the detail view all contracts of the customer and the respective tariffs are listed. For the contract that is selected (via mouse click), the consumption data for four different periods of time (yesterday, last seven days, last 30 days, last 365 days) are visualized in diagrams. To browse through the diagrams, the user should click on the arrows to the left side and the right side of the visible diagram. Below the diagram the user can select via radio buttons, if usage, load profile or cost data should be displayed.

By clicking on the little graph-symbol in the right corner of the diagram, the user can switch between display of relative values, or display of cumulated relative values.

By clicking on the zoom symbol, the diagram will be displayed as a widget outside the SECP. The widget can be resized and freely positioned on the screen.

Within the widget, more functions are available:
- The resolution of the X-axis can be changed using the slider rule above the graph.
- After clicking on the arrow above the graph the diagram can be saved as image (in PNG, JPG, SVG, PDF format), the data can be exported (in CSV, XLSX format), or the diagram can be printed.

4.3  Toolbox in the Detail View of a Customer

The toolbox in the detail view for customers contains the function Edit, which opens the edit screen for customer data.

4.4  Creating a New Customer

To create a new customer in the system, the user opens the input screen Customer -> New Customer. The mandatory fields Customer ID, Surname and First name have to be entered. If the customer status Active is set to on, E-Mail and Login will also become mandatory information.
The password for the end user portal will be sent to the customer after the function Set new in the column Password of the list view Customer -> List customer is used. The password will be sent automatically, if the customer was created via CSV import.

After clicking the button More in the input screen further information about the customer can be entered. When the new customer has been created in the system, contracts can be assigned to this user in the edit screen (see Section Editing Customer Data).

4.5 Editing Customer Data

To edit customer data, the user selects the function Edit for the respective meter in the list view Meter -> Meter view. Alternatively, the screen to edit customer data can be opened by selecting the function Edit in the toolbox of the detail view of the respective customer.

After clicking the button More, master data for the customer can be edited in a pop-up.
The edit screen displays all contracts for the customer. To add a new contract for the customer, the button *Add contract* needs to be clicked. For further information please refer to Section *Creating a New Contract*. To reset a password, the button *Set new password* is to be used. A password reset may be necessary if the customer lost the password, or for security reasons. Customers can be barred from using the end user portal by setting the customer status *Active* via the radio button to *Off*. The data in the edit screen will be saved after clicking the Save button. Changed customer data will be available in the end user portal the next time the user logs in.

> Customers may edit their own data via the end user portal. The changes are available in the SonoEnergy Control Panel after reloading the customer data.

### 4.6 Importing Customer Data

Customer data can be imported by selecting the function *CSV import* in the toolbox of the input screen *Customer -> Add customer*. Available data fields for the import file are:

- customer number
- lastname
- firstname
- active
- login
- password
- email

The login name (content of field *login*) may only contain letters and numbers and must not contain umlaut characters or other special characters. Please refer to Section *CSV Import in the SonoEnergy Control Panel* for further information regarding the format of the CSV file. The import pop-up contains also a link to an example file (*customer_data_en.csv*), that can be used as reference. The system will return a list of imported customers, including information if the import was successful.

> Customers may edit their own data via the end user portal. The changes are available in the SonoEnergy Control Panel after reloading the customer data.

### 4.7 Exporting Customer Data

In the list view *Customer -> List customer* information about customers can be exported in CSV format, by clicking on the export symbol below the list (see Section *Exporting Data from List Views*). Available data fields (columns) for the export of customer information are:

- Customer ID
- State
- Title
- Name
- Gender
- Company
- Customer type
- No. Contracts
- Contract ID
- Meter ID
- Customer address
- Language
- Phone
- E-Mail
- Password changed
- Tags

### 4.8 Deleting Customers

To delete a customer, the user needs to switch to the edit screen by clicking on the function *Edit* (in the row of the respective customer) in the list view *Customer -> List customer*. Then the function *Delete customer* in the toolbox needs to be selected.

Customers can only be deleted, if all contracts assigned to the customer have been deleted (see Section *Deleting Contracts*).
5. Communication Modules

5.1 List View of Communication Modules

The list view for communication modules (Communication -> Com. module view) displays relevant data on all communication modules that are registered in the system. This data can be searched and filtered, exported and edited. Available filter commands can be found in Section List View Communication Modules in the Appendix.

The following data can be displayed: Com. module ID; State; Battery; RSSI; #Meter; Gateway; Type; Group; Vendor; Model; SAP Material ID; SAP Equipment ID; Firmware version; Last online; Device tags

In the column State, the status of the communication module is represented by the following symbols:

- Communication module offline
- Communication module online

The status of a device will switch from online to offline when no communication with the device has been recorded for a given time span. By default the time span is 35 hours, this value can be configured. If an user hovers the mouse pointer over a symbol, a tooltip shows the timestamp of the last communication with the meter.

In column #Meter the number of meters connected to the communication module is displayed. Clicking on the function show in column Topology opens a widget displaying a visualization of the network topology for the selected communication module (see Section Network Topology). The background color of the field and a hint indicate, if topology data is available (green) or not (red). The filter command #topology-yes|no can also be used to filter for devices with or without topology data.

5.2 Detail View of a Communication Module

All device-specific data for a communication module will be displayed in the detail view. To access the detail view, the user clicks on the com. module ID of the respective communication module in the list view Communication -> Com. module view.
5.2.1 Identification, Online Status, Master Data
In the grey bar in the upper area of the detail view the ID of the communication module is displayed. The online status is indicated by an icon right of the ID. If the icon is grey, the communication module is offline. The master data of the communication module is displayed as well (Type, Vendor, Model).

5.2.2 Device Parameter
Device parameters are displayed in a pop-up after clicking on the button Show after Device configuration.

Figure 5.2: Detail view of a communication module

5.2.3 Register-specific Information
In the drop down list Select register the user can select available monitoring registers, if configured. For the selected register it will be displayed, when the last data for was recorded, plus the respective value. In four diagrams the register values for the following periods of time will be displayed: yesterday, last 7 days, last 30 days, last 12 months.

5.2.4 Network Topology
Next to the label Topology the IDs of meters, that are connected to the communication module, are displayed. If more than one meter is connected to the communication module, the complete set will be displayed in the drop down list after clicking on the little orange arrow ▼. Clicking on the meter IDs in the drop down list will open the detail view of the respective meter.

For a visualization of the network topology the function Show topology in the toolbox should be used.

5.2.5 AMR Processes and Alarms/Events
In the bottom area of the detail view two lists are displayed. The list on the left side displays the last six AMR processes associated with the communication module. The following data is displayed: Process ID; Process; Status; Progress; Process Init. A click on the list heading (AMR Processes) opens the list view for processes (see Section List View of Processes), which is filtered by the device IDs of the communication module (visible in the search field). The list on the right side displays the last six alarms or events associated with the communication module. The following data is displayed: Level; Status; Alarm-Code; Ticket; Date A click on the list heading (Events Alarms) opens the list view for alarms / events (see Section List View for Alarms and Events), which is filtered by the device ID of the communication module.

The lists will be updated every 10 seconds.
5.3 Toolbox in the Detail View of a Communication Module
The toolbox contains a drop-down list with available functions for the communication module. It can be accessed by clicking on the little black arrow in the upper right corner of the detail view. Standard functions for all communication modules are:

<table>
<thead>
<tr>
<th>Menu item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw data export</td>
<td>Raw consumption data of the communication module will be exported in CSV format (see Section Viewing, Exporting, and Editing Raw Data).</td>
</tr>
<tr>
<td>Raw data view</td>
<td>Raw consumption data of the communication module can be viewed and edited.</td>
</tr>
<tr>
<td>Show topology</td>
<td>The network topology of the communication module will be visualized (see Section Network Topology).</td>
</tr>
<tr>
<td>Edit</td>
<td>The edit screen opens (see Section Editing Communication Modules).</td>
</tr>
<tr>
<td>Reload page</td>
<td>The content of the page is being reloaded with the most current data.</td>
</tr>
</tbody>
</table>

Additionally a range of functions to control devices, so called Device Control Transactions (DCTs), are available via the toolbox.

5.4 Creating a New Communication Module
First the user needs to select in the device group tree in the left navigation area the device group the communication module should be assigned to. Then the input screen Communication -> Add com. module is selected, where the data can be entered. At this stage, the new communication module does not need to be connected to meters, customers, contracts or gateways.

The ID of the communication module has to be unique, this is verified by clicking on the button Check.

The ID of the communication module may not exceed 30 characters. The ID of the communication module is entered without a port number (911, not 911-1).

After selecting the type of the communication module, a pop-up to configure device parameters of the module opens.

Not all types of communication modules require this step. The parameters to be entered are device- and project-specific.
In the bottom area of the pop-up device jobs can be configured. Device jobs trigger the execution of various functions of the device, such as on demand read. For some device jobs, the interval for the execution can be specified. The user can select from the following values:

- periodical (specifying the interval in seconds)
- daily (specifying hour and minute)
- monthly (specifying day, hour, minute)
- one-time (specifying date, hour, minute)

The number of retries, in case of a failed execution of the device job, can be defined, as well as the timeout period (in seconds).

By selecting the checkbox *At fault create alarm* an alarm is created if the device job is not executed correctly.

![Configuration of the communication module: Device parameters](image)

Immediately after the communication module is created, the data delivered from the module will be recorded in the database and can be assigned to a contract after the communication module has been connected with a meter (see Section *Connecting the Communication Module*).

Multiple communication modules can be created at the same time via CSV import (see section *Importing Communication Modules*).

### 5.5 Editing Communication Modules

To edit master data of communication modules, the user selects the function *Edit* for the respective communication module in the list view *Communication -> Com. module view*.

*If the column Edit is not visible in the list this can changed by configuring the visible columns for the list view (please refer to Section *List Views*).*

Alternatively, the screen to edit communication modules can be opened by selecting the function *Edit* in the toolbox of the detail view of the respective communication module.

*Configuration parameters, that have been set in the device template of the respective device, will be displayed in gray and can not be edited.*
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General information about the communication module can be edited directly in this screen.

**The ID of the communication module can not be changed. It needs to be static in order to correctly record consumption data. Also, the type of the communication module can not be changed.**

Device parameters and device jobs can be edited by clicking the button *Edit* in row *Type*. A pop-up will appear where necessary changes can be made.

### 5.6 Importing Communication Modules

Master data for communication modules can be imported by selecting the function *CSV Import* from the toolbox in the input screen *Communication -> Add com. module*. Prior to starting the import, the device group, where the new communication module(s) should be imported to, needs to be selected in the group tree within the filter navigation.

**Available data fields for the CSV import file are:**

- device_id
- device_type_id
- vendor
- model
- device description

Please refer to Section *CSV Import in the SonoEnergy Control Panel* for further information regarding the format of the CSV file. The import pop-up contains also a link to an example file (`radio_module_data_en.csv`), that can be used as reference.

The system will return a list of imported communication modules, including information if the import was successful.

**If device data with inactive or non-existing device types is to be imported, the system will return an error message - the respective device will not be created!**

### 5.7 Exporting Communication Modules

In the list view *Communication -> Com. module* view information about communication modules can be exported in CSV format, by clicking on the export symbol below the list (see Section *Exporting Data from List Views*).

**Available data fields (columns) for the export are:**

- Com.-module-ID
- State
- Battery
- RSSI
- #Meter
- Gateway
- Type
- Group
- Vendor
- Model
- SAP-Material-ID
- SAP-Equipment-ID
- Firmware-version
- Last-online
- Device-Tags

### 5.8 Deleting Communication Modules

To delete a communication module, the user needs to switch to the edit screen by clicking on the function *Edit* (in the row of the respective communication module) in the list view *Communication -> Com. module view*. Then the function *Delete com. module* in the toolbox is selected.

The system will check, if the communication module is still connected to a meter. If that is the case, the user has to disconnect the meter (see Section *Disconnecting Meters from Communication Module and Port*).

**Consumption data will be assigned to a communication module. If a communication module is deleted, for which already consumption data was recorded, this data will be permanently deleted.**
6 Gateways

6.1 List View of Gateways

The list view for gateways (Communication -> Gateway view) displays information on gateways that are registered in the system. This data can be searched and filtered, exported and edited. Available filter commands can be found in Section List View Gateways in the Appendix.

![List view of gateways](image)

The following data can be displayed: Gateway-ID; State; Type; Inventory State; Network Size; Group; Vendor; Model; SAP Material ID; SAP Equipment ID; Serial Number; Firmware version; Mode; Last online; Location; Device tags.

In the column State, the status of the gateway is represented by the following symbols:

- Gateway offline
- Gateway online

*The status of a device will switch from online to offline when no communication with the device has been recorded for a given time span. By default the time span is 35 hours, this value can be configured. If an user hovers the mouse pointer over a symbol, a tooltip shows the timestamp of the last communication with the meter.*

In addition to the Edit function (see Section Editing Gateways), the function Configure is available in this list view. When clicking this function, a pop-up to edit the local configuration of a gateway opens (for some gateway types). If it is not possible to configure the gateway, the user is notified.

In column Network Size the number of devices connected to the communication module is displayed. Clicking on the function show in column Topology opens a widget displaying a visualization of the network topology for the selected gateway (see Section Network Topology). The background color of the field and a hint indicate, if topology data is available (green) or not (red).

The filter command #topology=yes|no can also be used to filter for devices with or without topology data.
6.2 Detail View of a Gateway

All device-specific data for a gateway will be displayed in the detail view. To access the detail view, the user clicks on the gateway ID of the respective gateway in the list view Communication -> Gateway view. If configured, in the drop-down list Select register the register can be selected, whose values should be displayed in the diagrams in the lower area of the main window. Four diagrams are available, displaying values in four different periods of time: yesterday, last 7 day, last 30 days, last 365 days. For information on the functionality of diagrams please refer also to Section Diagrams.

Device parameters are displayed in a pop-up after clicking on the button Show after Device configuration. Next to the label Associated Devices the IDs of devices, that are connected to the gateway (communication modules, more gateways), are displayed. If more than one device is connected to the gateway, the complete set will be displayed in the drop down list after clicking on the little orange arrow ▼. Clicking on the IDs in the drop down list will open the detail view of the respective device.

For a visualization of the network topology the function Show topology in the toolbox should be used.

6.3 Toolbox in the Detail View of a Gateway

The toolbox contains a drop-down list with available functions for the gateway. It can be accessed by clicking on the little black arrow ▼ in the upper right corner of the detail view. Standard functions for all gateways are:

<table>
<thead>
<tr>
<th>Menu item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw data export</td>
<td>Raw consumption data of the communication module will be exported in CSV format (see Section Viewing, Exporting, and Editing Raw Data).</td>
</tr>
<tr>
<td>Raw data view</td>
<td>Raw consumption data of the communication module can be viewed and edited.</td>
</tr>
<tr>
<td>Show topology</td>
<td>The network topology of the communication module will be visualized (see Section Network Topology).</td>
</tr>
<tr>
<td>Edit</td>
<td>The edit screen opens (see Section Editing Communication Modules).</td>
</tr>
<tr>
<td>Reload page</td>
<td>The content of the page is being reloaded with the most current data.</td>
</tr>
</tbody>
</table>

6.4 Creating a New Gateway

First the user needs to select in the device group tree in the left navigation area the device group the new gateway should be assigned to. Then the input screen Communication -> Add gateway is selected, where the data can be entered.
The ID of the gateway has to be unique, this is verified by clicking on the button Check.

- The gateway ID may not exceed 30 characters.

After selecting the type of the gateway, a pop-up to configure device parameters of the gateway opens.

- Not all types of gateways require this step. The parameters to be entered are device- and project-specific.

Figure 6.3: Creating a new gateway: Device parameters

In the bottom area of the pop-up device jobs can be configured. Device jobs trigger the execution of various functions of the gateway, such as "Request topology". For some device jobs, the interval for the execution can be specified. The user can select from the following values:

- periodical (specifying the interval in seconds)
- daily (specifying hour and minute)
- monthly (specifying day, hour, minute)
- one-time (specifying date, hour, minute)

The number of retries, in case of a failed execution of the device job, can be defined, as well as the timeout period (in seconds).

By selecting the checkbox At fault create alarm an alarm is created if the device job is not executed correctly. Optionally, geographical coordinates retrieved for address data can be manually edited by clicking on the button Set coordinates; for further information please refer to Section Setting Coordinates.

Multiple gateways can be created at the same time via CSV import (see Section Importing Gateways).

### 6.5 Editing Gateways

To edit master data of gateways, the user selects the function Edit for the respective gateway in the list view Communication -> Gateway view. Alternatively, the screen to edit gateways can be opened by selecting the function Edit in the toolbox of the detail view of the respective gateway.

- Configuration parameters, that have been set in the device template of the respective device, will be displayed in gray and can not be edited.

General information about the gateway can be edited directly in this screen. Optionally, geographical coordinates retrieved for address data can be manually edited by clicking on the button Set coordinates; for further information please refer to Section Setting Coordinates.

- The ID and the type of the gateway can not be changed.
Depending on the type of the gateway, **device parameters and device jobs** can be configured by clicking on the button *Edit* in row *Gateway type*.

A **device profile** is a data container in a device (meter, gateway / concentrator (MUC)). The device profile contains various registers, that are usually grouped by their measurement interval. The registers store consumption data and are identified by their own OBIS codes. The device profiles are addressed by vendor-specific OBIS codes.

Device profiles that are configured on a device can be displayed and edited in the SonoEnergy Control Panel. The toolbox in the detail view of a gateway (see Section *Detail View of a Gateway*) contains the function *Show profiles*. After clicking on the function, a pop up opens, where profiles and respective push configurations (i.e. how often data will be transmitted to SonoEnergy) of the gateway and its connected meters are displayed. The devices can be selected in a drop-down-list. New registers can be added by clicking the button *Add register*.

### 6.6 Importing Gateways

Master data for gateways can be imported by selecting the function *CSV Import* from the toolbox in the input screen *Communication -> Add gateway*. Prior to starting the import, the device group, where the new gateway(s) should be imported to, needs to be selected in the group tree within the filter navigation.

Available data fields for the CSV import file are: `gateway_id`; `gateway_type_id`; `vendor`; `model`; `device description`; `inventory state`

Please refer to Section *CSV Import in the SonoEnergy Control Panel* for further information regarding the format of the CSV file. The import pop-up contains also a link to an example file (`gateway_data_en.csv`), that can be used as reference.

The system will return a list of imported gateways, including information if the import was successful.

*If device data with inactive or non-existing device types is to be imported, the system will return an error message - the respective device will not be created!*
6.7 Exporting Gateways
In the list view Communication -> Gateway view information about gateways can be exported in CSV format, by clicking on the export symbol below the list (see Section Exporting Data from List Views). Available data fields (columns) for the export are: Gateway-ID; State; Type; Inventory-state; Network-size; Group; Vendor; Model; SAP-Material-ID; SAP-Equipment-ID; Serial-number; Firmware-version; Mode; Last-online; Location; Device-Tags.

6.8 Deleting Gateways
To delete a gateway, the user needs to switch to the edit screen by clicking on the function Edit (in the row of the respective gateway) in the list view Communication -> Gateway view. Then the function Delete gateway in the toolbox is selected.

Information: Editing and deleting gateways has no impact on customer data or contracts. When deleting gateways, all device jobs assigned to the gateway will be deactivated, and its topology information will be deleted.
7 Tariffs

7.1 List View of Tariffs
The list view for tariffs (Tariff -> Tariff list) displays data on all tariffs that are registered in the system. Available filter commands for this list view can be found in Section List View Tariffs in the Appendix. The following data can be displayed: Tariff number; State; Tariff name; #user; payment method; Division; unit

In the column State, the status of the tariff is represented by the following symbols:

- € The tariff is active.
- ℅ The tariff is inactive.

When clicking on the function More in the row of a tariff, a pop-up opens and displays further details on the tariff. By clicking on the function Deactivate in the row of a tariff, the tariff will be deactivated. It will still be displayed in the list, but can not be used.

⚠️ A tariff that has been deactivated can not be activated again.

7.2 Creating a New Tariff
Tariffs are created using tariff templates. Tariff templates specify basic attributes of tariffs. In a tariff template it is for instance specified, if a standing charge is applied, if spot prices are to be billed, if a constant or variable commodity price (depending on the quantities purchased) are to be billed, or a combination of these.

⚠️ Tariff templates are being created by Danfoss during project setup, or on demand. In this case please contact the Danfoss support.

Available tariff templates can be found in the menu More -> Tariffs as sub categories. (If more than three tariff templates are available, they can be accessed via More -> Tariffs -> More.)
After clicking on the tariff template, an input screen opens where necessary data can be entered. A short description of the tariff is displayed in the upper part of the screen. Depending on the tariff template various parameters need to be entered. For tariffs with a variable commodity price the threshold values are entered in a separate pop-up (click on function Threshold settings). For the specification of time-variable accounting models, a calendar application is provided (click on function Apply time zones). The different prices specified in the input screen (AFPZ 1, AFPZ 2...) can be assigned to time spans for all weekdays via drag and drop. One cell in the matrix is equivalent to one hour. If a cell is allocated to a price, this value can also be allocated to neighbor cells by clicking on the cell and moving the pressed mouse pointer. Double click on an allocated cell will delete the content. If a tariff has been created, it can be used to create contracts (see Section Creating a New Contract).
7.3 Editing Tariffs

It is not possible to edit tariffs. The user can create a new tariff and link it to contracts, for which then the tariff will be changed.
8 Contracts

8.1 Creating a New Contract
To create a new contract for a customer, the edit screen for that customer is opened by clicking on the function Edit in the list view for customers Customer -> List customer. In the edit screen, the user clicks on Add new contract.

A contract consists of a tariff, a meter and a customer. A new contract can only be created, if these are already registered as objects in SonoEnergy (see Sections Creating a New Customer, Creating a New Tariff). In order to be assigned to a contract, the meter has to be connected to a communication module (see Section Connecting the Communication Module).

When selecting a tariff for the contract in the input screen, on the right-hand side of the screen details on the tariff are being displayed.

Only tariffs for which the user has permissions can be selected for contracts. See Sections Rights Management: Groups and Rights Management: Roles.

A meter can be assigned to a contract at a later point in time. The date relevant for the contract is the start date, from when on the consumption of the meter should be billed to the contract.

If the start date is later than the date, when the meter was registered in SonoEnergy, the consumption recorded for the meter before the contract start date will not be billed on the customer.

It is not possible, to assign a meter to a contract of a different division (e.g. a power meter can not be assigned to a contract for gas consumption).

8.2 Editing Contracts
To edit a contract of a customer, the edit screen for that customer is opened by clicking on the function Edit in the list view for customers Customer -> List customer. In the edit screen, the user clicks on Edit in the row of the respective contract, and switches to the edit screen for the contract.

To disconnect a meter from a contract the user clicks on the button Disconnect next to the ID of the meter. A pop-up opens, where the date for the disconnect is entered. The accounting data will be recalculated accordingly.
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The time stamp in field connected is the time, when the contract and the meter have been connected (start date). Meters can only be assigned to a contract, if they are connected to a communication module.

To switch the meter, that is assigned to a contract, the following steps are necessary:

**Step 1:** Disconnect the meter from the contract. The date of the disconnect is important!


**Step 2** (optional): If the new meter does not exist yet in the system, it needs to be created (see Section *Creating a New Meter*) and connected to a communication module (see Section *Connecting the Communication Module*).

**Step 3:** Open the edit screen for the contract again, and assign the new meter to the contract. The start date is important! Example: 2013-12-01 00:00:00

*The start date for the new meter has to be one second after the date of the disconnect from the old meter.*

To change the tariff for a contract, or the contract that is associated with a meter, the following steps are necessary:

**Step 1:** Disconnect the meter from the contract. The date of the disconnect is important!

**Step 2:** Delete the contract (see Section *Deleting Contracts*).

**Step 3:** Create a new contract (see Section *Creating a New Contract*) and connect with the meter. The start date for the new contract should be one second after the disconnect from the old contract.

![Figure 8.2: Editing a contract](image)

### 8.3 Deleting Contracts

A contract can only be deleted, if no meter is assigned to the contract. To disconnect a meter from a contract the contract needs to be edited (see Section *Editing Contracts*).

To delete a contract, the user needs to switch to the edit screen of the respective customer by clicking on the function *Edit* (in the row of the that customer) in the list view Customer -> List customer.

In the list of contracts associated with the customer, the user clicks on *Edit* for the contract that should be deleted. In the toolbox of the edit screen for the contract then the function *Delete contract* can be selected.

If a contract is deleted, its consumption data is no longer assigned to a customer. Therefore contracts should only be deleted, if it is made sure that the data is completely exported and billed.

Legal requirements regarding the settlement period need to be met here.
9 Managers

9.1 Introduction
A manager (or operator) is an user of the SonoEnergy control panel. Every manager has a (projectspecific) role, that specifies access rights on device data and device functions (see Section Rights Management: Roles). At the same time a manager belongs to a group, and can use the access rights granted by his or her role on the objects that belong to this group and its sub-groups (see Section Rights Management: Groups).

9.2 List View of Managers
The list view for managers (Manager -> List of managers) displays data on manager accounts that are registered in the system. This data can be searched and filtered. Available filter commands can be found in Section List View Managers in the Appendix.

Unlike in other list views, in the manager list view information can not be exported.

The following data can be displayed: Manager; Active; Name; Company; Role; Created; Group

The validation status of manager accounts is represented by the following symbols in column Active:

Account is validated - the manager changed the password after the first login.
Account is not validated - the manager did not yet change the password after the first login.
Account is inactive - the manager did not yet log in to the SECP or has been deactivated.

9.3 Creating a New Manager
To create a new manager, the user opens the input screen Manager -> Add manager. Within the edit screen, the manager gets assigned to a role, that specifies access rights on devices and device functions (within the manager’s group!). Master data for the manager will be entered here, mandatory information is marked with an asterisk-symbol *. After clicking on Save button, the data will be saved in the database and an email with login credentials (with automatically created initial password) will be sent to the given email address.

The initial password has to be changed at first login, in order to validate the manager account.

Figure 9.1: List view of managers
If LDAP is used for user authentication, the selected login name has to correspond to a user account on the LDAP server. If LDAP is used, also the functions for password management will be deactivated and hidden (see Section Authentication via LDAP).

### 9.4 Password Management

Passwords for a manager account should follow these guidelines:
- The password has to contain at least 8 characters.
- The password has to contain at least one lower and upper case letter, at least three numbers and at least one special character.
- Characters must not be used more than once.
- The password must not be the same as the login, user name or email address.
- The password must not be the same as one of the five previously used passwords.

These guidelines will also be displayed in the SonoEnergy Control Panel when passwords are set or changed.

It can be configured, if passwords will expire. The respective time frame is specified during project setup. In the edit screen for managers it is displayed, when the current password has been set and when it will expire.

### 9.5 Editing Managers

To edit manager data, the user selects the function *Edit* for the respective manager in the list view *Manager -> List of managers*.

The following changes can only be executed for manager accounts in a sub-group of the executing manager’s group. For their own account, a manager can only change master data and set a new password.

A manager account can be deactivated by selecting the radio button *inactive*. If an account has been deactivated, its permissions and settings will remain unchanged, but the manager can not log in to the SonoEnergy Control Panel any more.

To activate the account again, the radio button *active* has to be selected.
The role that is assigned to a manager account can be changed by using the drop down list *Manager Role*. For information on access rights for individual roles please refer to section *Configuring Access Rights*. To change the group a manager account belongs to, the function *Change group* in the toolbox (little black arrow in the upper right corner of the edit screen) has to be selected. A pop-up opens, where the current group is displayed and the new group can be selected in the group hierarchy tree. If a manager lost the password it can be reset by using the function *Set new password*. A new password will be generated automatically and sent to the manager's email address.

*If LDAP is used for user authentication, the functions for password management will be deactivated and hidden (see Section *Authentication via LDAP*).*

### 9.5.1 Shortcut: Editing Own Account Data

In addition to the edit screen for managers (see Section *Editing Managers*), a manager can also use a shortcut to edit their own account data. Clicking on the account name or the black arrow in the upper right corner of the SonoEnergy Control Panel opens a pop-up. In this pop-up, master data and password can be changed.

*If LDAP is used for user authentication, the functions for password management will be deactivated and hidden (see Section *Authentication via LDAP*).*

### 9.6 Deleting Managers

*The following function can only be executed for manager accounts in a sub-group of the executing manager's group.*

To delete a manager account, the user switches to the edit screen by clicking on the function *Edit* for the respective manager in the list view *Manager -> List view manager*. Then the function *Delete manager* in the toolbox needs to be clicked. Manager can also be removed from groups. In this case the access rights on objects within the group will be revoked, but the manager account will remain in the system. This can be achieved by using the function *Change group* from the toolbox of the edit screen, or using the group management (see Section *Editing Groups*).

### 9.7 Authentication via LDAP

It is possible, to authenticate users via LDAP. The LDAP server will be provided externally or by Danfoss. The authentication method to be used is specified when configuring the SonoEnergy system. It is not possible, to manage user accounts authenticated via SonoEnergy and user accounts authenticated via LDAP at the same time in one instance.

If users are authenticated by their LDAP accounts, the following points are important to note:

- The user is logging in with their LDAP account and LDAP password. The login screen (see Section *Login and Logout*) displays an according notice.
- LDAP accounts will be managed (created, edited, deleted) outside SonoEnergy. Third party tools may be used, depending on the company policy.
- It is not possible to change the user password via the SECP. The user needs to contact the administrator of the LDAP server, or use the appropriate (third party) tools.
- It is not possible, to generate a new password for other users/managers.

The *Authorisation*, that is the management of access rights to resources within the SonoEnergy system, is still managed within the SECP. In order to achieve this, a new manager is created in the SECP (see Section *Creating a New Manager*). Its login has to correspond to an existing LDAP login.

When creating a new user, the system checks automatically if a LDAP login exists for the selected login name.
10 Rights Management: Roles

10.1 Introduction
Access rights for managers in SonoEnergy are being specified by their role and group. The group a manager is assigned to, specifies which objects (devices and managers) are controlled by the manager (see Section Rights Management: Groups). The role specifies, what can be done with these objects, i.e. which views and functions are available for the manager to execute.
Roles (and groups) are organized hierarchically. Sub-groups can, via configuration settings, inherit all rights of its root group (but not more). This allows to model multiple independent role groups, for instance to separate sales and network operation units.
Roles and groups are project-specific.
Access rights assigned to a role can be either activated (visible and executable) or disabled (not visible, not executable). They can also get the status inactive (visible, but not executable). Please refer to Section Configuring Access Rights for further details.

10.1.1 Default Settings and Management
At project setup, the role Manager will be created, which will be used as ROOT role for the project.
Danfoss Support will configure it so that it has access rights to all functions and views that are available to the customer.
The Manager role can then be used to create and configure all other (sub)roles necessary for the operation.

⚠️ Please note, that roles and their access rights are not kept under version control by Danfoss and will therefore not be overwritten during an update. Their management and maintenance is the responsibility of the customer and/or Danfoss support, depending on the service level agreement.

10.2 Overview on Available Roles
Available roles for a project are displayed in More -> Preferences -> Manager Roles. Clicking on the “+” or “-” symbols in the role tree displays or hides sub groups. Within this overview, role names and access rights can be edited (see Sections Configuring Access Rights and Editing Roles).

Figure 10.1: Overview on available roles
10.3 Creating a New Role
A new role can be added in the input screen More -> Preferences -> Add Role.
First the user selects in the hierarchical role tree (left-hand area of the input screen) the parent role for the new role. The selected parent role will be displayed in the right-hand area of the input screen.
Now the name for the new role needs to be entered, and optionally a description. All rights assigned to the parent role will be inherited by the new role. By default, all rights will be deactivated, and need to be activated individually (see Section Configuring Access Rights).

10.4 Configuring Access Rights
Access rights granted to a role will be configured via the screen More -> Preferences -> Manager Roles. The user selects the function Edit rights next to the respective role. A new screen opens, where the access rights can be configured.

![Figure 10.2: Creating a new role](image)

Changes will be automatically applied and do not need to be saved.

At first, a list of categories for views (i.e. pages displayed in the main window of the SonoEnergy Control Panel), for which access rights can be granted, will be displayed (e.g. Customers, Tariffs, Alarms...). By clicking on the “+” symbol the views assigned to each category will be displayed, for which rights can be granted individually. Rights are granted by selecting radio buttons. Three different values for access rights are possible:

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active</td>
<td>A Objects or functions are visible and executable for the role.</td>
</tr>
<tr>
<td>Disabled</td>
<td>D Objects or functions are not visible and not executable for the role.</td>
</tr>
<tr>
<td>Inactive</td>
<td>I Objects or functions are visible, but not executable for the role.</td>
</tr>
</tbody>
</table>

For functions (sub-category items) rights have to be granted individually. The access right of the parent category will not be inherited.
For many views additional functions can be configured. The functions will be displayed, if the mouse pointer is hovered over the respective view and the link Functions is clicked. Access rights for functions are also granted individually via radio buttons, as described above.

Figure 10.3: Configuring access rights

Figure 10.4: Configuring access rights: sub-functions

Some of the functions are Device Control Transactions (DCTs). These DCTs can be made available to the role as macro (see Section Using Macros). In this case the category Configuration needs to be expanded, by clicking on the “+” symbol. After clicking the function Functions next to the view Macro, all DCTs available for macro functions will be displayed. Again, by selecting the radio buttons it can be configured for each DCT, if it is available to the role as macro.
If access rights for views or functions are deactivated in a parent role, they will not be available to sub-roles for configuration. If these access rights should be available to sub-roles, they need to be activated for the parent role. The functions will be visible again for the sub-role and can be individually activated. They will not be automatically activated!

10.5 Editing Roles
Roles can be edited in the screen More -> Preferences -> Manager Roles. Here the name of a role, its description and position in the role hierarchy tree can be changed.
To edit the role, the function Edit next to the respective role needs to be clicked.
In the next screen the name of the role and the description can be edited. After clicking Save the changes will be applied.

Changing the name and the description of a role has no impact on the access right matrix.

To move the role to a new position in the role hierarchy tree, the user selects in the left-hand area of the screen the new parent role.

All sub-roles will be moved as well, which may have a huge impact on the access right matrix.
Access rights for functions, that have status active, will remain active, if these rights are available in the new parent role and are also active. Additional access rights of the new parent role will be inherited, but with status disabled (see Section Configuring Access Rights).

### 10.6 Deleting Roles

To delete a role, the role must not have any sub-roles, and no manager must be assigned to the role. Roles can be deleted in the edit screen for the role, which can be accessed by clicking Edit for the respective role in More -> Preferences -> Manager Roles. In the edit screen the function Delete role is available from the toolbox ▼. Before definitely deleting a role, the user needs to confirm.
11 Rights Management: Groups

11.1 Introduction
Groups are organizational units for objects in SonoEnergy (devices and its managers). Groups are hierarchically organized, one group can have one or more sub-groups. The group at the top hierarchy level is ROOT. Manager of a group have also access on objects of all sub-groups of this group. The functions that can be executed on these objects are specified by the manager’s role (see Chapter Rights Management: Roles). The group hierarchy tree is displayed in the area Device groups in the left-hand area of the SonoEnergy Control Panel.

11.2 Creating a New Group
To create a new group, first the parent group for the new group needs to be selected in the group hierarchy tree under Device groups. Then the input screen More -> Groups -> Add group is selected, where the new group and optionally a description can be entered. Devices can now be assigned to the new group (see Section Changing Groups of Devices), and managers (see Chapter Managers).

11.3 Editing Groups
To edit a group, it needs to be selected in the group hierarchy tree under Device groups. Then the edit screen is opened via More -> Groups -> Edit group. Here the group name and the description can be edited. In the upper area of the edit screen managers and devices that belong to the current group will be listed.

Figure 11.1: Device groups
Managers can be removed from a group. In the toolbox of the edit screen the function *Administrate manager* is selected. In a pop-up all managers of the group will be displayed. By clicking on Move, the respective manager will be moved to the parent group of the current group.

To move a group to a new position in the group hierarchy tree, it needs to be deleted and created again at its new position.
11.4 Changing Groups of Devices

To change the device group for devices, the macro Change group is available. For further information on macros please refer to Section Using Macros.

First the group, from where devices should me moved, is selected in the group hierarchy tree in the left navigation panel. If devices of multiple groups should be moved, their common parent group should be selected.

Next the screen Meter -> Meter needs to be opened, to select all meters that should be moved to a new group. In the screen Communication -> Com. module view communication modules and gateways, that should be moved, are selected.

⚠️ During this selection process the device group in the group hierarchy tree must not be changed, otherwise the current selection of devices will be discarded.

![Figure 11.4: Changing the device group: device selection](image)

![Figure 11.5: Changing the device group: executing the macro](image)
If all devices have been selected, the user switches to the screen More -> Configuration -> Macro and selects the Macro Change group. Next to the selection window the number of selected devices is displayed, and the number of devices for which the macro can be executed (in the case of the macro “Change group” both number should be equal.)

Below the selection window the text field below Current settings displays the group that is assigned to the majority of selected devices. If devices from more than one group are selected, the text field is highlighted, and a little red arrow is visible next to the text field. Clicking on the arrow opens a pop-up with the respective devices, that may be deselected if necessary.

In the drop down list New Settings the new group, where the devices should be moved to, can be selected. After clicking on Execute, the macro will be executed and the devices will be moved.

The executing manager has to have access rights to the old and the new group of all devices!

11.5 Deleting Groups
A group can only be deleted, if it contains no devices or managers. If necessary, devices or managers need to be moved to another group beforehand (see Sections Changing Groups of Devices and Editing Groups).

To delete a group, the user switches to the edit screen More -> Groups -> Edit group. If not done already, the group to be deleted is selected from the group hierarchy tree. Then the function Delete group is selected from the toolbox.

11.6 “Virtual Groups” - Using Device Tags
All devices in SonoEnergy can get one or more tags assigned, and be organized in “virtual groups”. A virtual group is a set of devices sharing the same device tag.

A device can belong to multiple virtual groups, i.e. can have several tags (in contrast to device groups, every device can only belong to one device group!).

Virtual groups can be used to organize devices by arbitrary administrative or technical categories, independent of access rights.

“Virtual groups” are one way to view data and have no impact on rights management. The set of devices displayed in a virtual group may differ for individual managers - depending on the access (or viewing) rights of the respective manager.

11.6.1 Tagging Devices
To assign a device tag to a device, the user clicks in list views on the function Add tag or on an already existing tag within the column Device Tag.

A pop-up appears. Within the pop-up, the user can select via a drop-down-list from tags already registered in the system.

Alternatively, a new tag can be entered by clicking on the function Enter New Tag, also in the drop-down-list. After clicking the function, a text input field appears where the new tag can be entered. By clicking on the Reset-Button next to the text field, the input will be discarded, and the drop-down-list is displayed again.
Figure 11.6: Tagging devices

Figure 11.7: Adding a new tag

Figure 11.8: Viewing virtual groups Tags already assigned to devices are displayed in the upper area of the pop-up. If necessary, they can be deleted by clicking on the red cross symbol. Changes will be saved by clicking on the button Add tag.

Multiple devices can be tagged at the same time by using the macro Add Device Tag. First the user selects in More -> Configurations -> Meter all meters, and in More -> Configurations -> Communication all communication modules and gateways, that should get tagged. Next, in More -> Configurations -> Macro the function Add device tag is selected in the selection box. In the drop-down-list in the lower area of the window one of the existing tags can be selected (or a new tag can be entered), which will be assigned to all selected devices after clicking on Execute.

In a similar way the function Delete Device Tag can be used to remove tags from multiple devices. For further information on how to use macros please refer to Section Using Macros.

11.6.2 Viewing Virtual Groups

To view all devices of a virtual group, the user needs to filter, in the respective list views, for the device tag.

Example:

#tag=demotag

In list views for meter, gateways, communication modules and customers the filter term for device tags is tag. If objects of different types share a device tag, the filter command only needs to be typed in once. If the user then switches between different list views, the filter remains active, as long as it is displayed in the search field. For further information on how to use the filter function please refer to Section Filter.
11.6.3 Virtual Groups and Macros

The device selection lists for macros (see Section Using Macros) can also be filtered by Device tags, using the filter term tag. After selecting the displayed results, macros can be executed on devices of a virtual group.

Please note, that columns Device tags are not sortable in ascending or descending order by clicking on the column heading, unlike other columns in list views (see Section List Views).
12 Statistics

12.1 Overview on Frequently Used Statistics
SonoEnergy provides diagrams to visualize consumption values and monitoring values. The view More -> Statistics -> Overview displays diagrams for the consumption values of all divisions that are used in the system (e.g. Power, Gas, Water, Heat...), with four different time frames for each (yesterday, last 7 days, last 30 days, last 365 days).

![Figure 12.1: Statistics: Overview](image)

Using the arrows to the left and the right of the diagrams the user can switch between the different divisions. For general information on the functionality of diagrams please refer to Section Diagrams.
12.2 Customized Statistics
The view More -> Statistics -> Individual allows for the visualization of individually selected data series.

With radio buttons, the user can select whether consumption values or monitoring values shall be visualized. Depending on this selection, in the drop down list then the available OBIS codes can be selected. Only OBIS codes that are configured in the system are available.

For divisions, the aggregation method will be selected in a second drop-down list. The following values are available:
- Consumption
- Minimum
- Maximum
- Average
- Daily Average

The time frame, for which values should be plotted, is specified in the date fields in the upper right-hand area.

After clicking the button Load the data will be visualized.

In most cases, the diagrams will be shown as bar charts. For some OBIS codes, however, the default will be a line graph. When hovering the mouse pointer over a data point in the graph, the respective value will be displayed.

The data will be limited by selected device groups or the region selection.

Please take into account the following hints:

- Only values from sum registers are available for display in diagrams.
- For registers containing consumption values the values displayed in diagrams are relative (i.e. the difference between two successive meter reads). For registers containing monitoring values the values displayed in diagrams are absolute (i.e. values as delivered from the meter).
- When the selected register / OBIS code, the time frame or the aggregation method has been changed, the diagram needs to be reloaded by clicking the Load button. If filter criteria for devices are changed (region selection, device group), the diagrams will be automatically reloaded as soon as the filter is applied.
12.3 Reference Load Profiles

Reference load profiles are important for the value replacement, which needs to be applied in case of missing or implausible meter reads. If value replacement is necessary, the missing data will be calculated on the basis of reference load profiles.

By default, the reference load profiles for power, gas and water consumption of private households (single family) will be displayed. On request, different load profiles, for instance for other housing situations, can be displayed.

The data for reference load profiles (time and meter read) is provided as CSV-file to Danfoss. Consumption values should be in the base unit of the respective division (Power: kWh, Gas: m³, Water: m³). Please refer to section CSV Import in the SonoEnergy Control Panel for further details regarding the format of CSV files. Sample files can also be provided by Danfoss.

The data will be imported by Danfoss; there is no import function for reference load profiles in the SonoEnergy Control Panel.

![Figure 12.3: Statistics: Reference load profiles](image-url)
13 Processes

13.1 List View of Processes

List views for processes are available at More -> Processes. List views for five different types of processes are available: Operational processes, AMR processes, Inform processes, SAP processes (optional), and MDM processes (optional). Three process types are visible at the same time as sub category items, the remaining two can be accessed via More -> Processes -> More.

Available filter commands for list views of processes can be found in Section List View Processes in the Appendix.

![List view Operational Processes](image)

Figure 13.1: List view Operational Processes

The status of processes is represented in column Status by the following symbols.

- Process is ready for execution.
- Process is currently being executed.
- Process has been successfully finished.
- Process execution failed.
- Process has been deactivated.
- Process has been deleted.

The process status will also be displayed as tooltip when moving the mouse pointer over the status symbol.

**In case the process execution failed, it is possible that associated devices remain locked. In this case the local support or the Danfoss support should be contacted.**
Amongst others, the following information on processes is provided:

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process init</td>
<td>Point in time, when process was initiated.</td>
</tr>
<tr>
<td>Process start</td>
<td>Point in time, when process was started within the system.</td>
</tr>
<tr>
<td>Process stop</td>
<td>Point in time, when execution of process failed.</td>
</tr>
<tr>
<td>Process completed</td>
<td>Point in time, when execution of process was successfully finished.</td>
</tr>
<tr>
<td>Interval</td>
<td>Duration between two consecutive executions of a process, in seconds.</td>
</tr>
<tr>
<td>Period</td>
<td>Specifies, how many times a process should be repeated (-1 infinite, 0 none, 1 one time, 2 two times ...)</td>
</tr>
<tr>
<td>Retries</td>
<td>Number of remaining retries to execute the process.</td>
</tr>
<tr>
<td>Priority</td>
<td>Priority of the process. Possible values: normal and high. Only available for Operational and AMR Processes. The priority is set in the DCT creating the process.</td>
</tr>
</tbody>
</table>

Please refer to Section Filtering date fields for more information on how to filter date fields.

The following functions are available for all processes:

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restart</td>
<td>The process will be restarted. Processes can be restarted if they are in status erroneous or if they have been finished successfully. For some processes a restart is not possible, in this case the user will be notified when attempting the restart.</td>
</tr>
<tr>
<td>Deactivate</td>
<td>The process will be deactivated. The status will switch to orange and in the column Process stop a time stamp will be set.</td>
</tr>
<tr>
<td>More</td>
<td>Detailed information about the process is displayed in a pop-up, including possible error messages.</td>
</tr>
</tbody>
</table>

13.1.1 Operational Processes
For operational processes, the following data can be displayed, filtered and exported: Process ID; Process; State; Progress; Process init; Process completed; Process start; Process stop; Group; Error; Interval; Period; Retries; Priority; Manager

13.1.2 AMR Processes
For AMR Processes, the following data can be displayed, filtered and exported: Process ID; Device; Process; State; Progress; Process init; Process start; Process completed; Process stop; Group; Error; Interval; Period; Retries; Max retries; Priority; Manager

13.1.3 Inform Processes
For Inform Processes (notification processes), the following data can be displayed, filtered and exported: Process; State; Progress; Process init; Process completed; Process start; Process stop; Group; Error; Interval; Period; Retries; Manager

13.1.4 SAP Processes
For SAP Processes, the following data can be displayed, filtered and exported: Process SAP Job Interface; SAP Job UUID; Device ID; SAP Equipment ID; SAP AMS ID; State; Progress; Process init; Process confirmed; Process start; Process stop; Group; Process description; Process parameter; Point of delivery; Error;
Error code; Interval; Period; Retries; Manager; Confirm. state; SAP Job Confirm.Interf.Name

For SAP Processes, the additional function Resend (in column Confirmation sending) is available, which can be used to resend the confirmation for a process. If the respective process is a subprocess, the confirmation will only be sent for the subprocess, not for the parent process.

When restarting SAP-process, the following should be noted:

- If a ReplicationRequest or a RegisteredNotification are restarted and the processes are a part of a bulk, only the subprocess will be restarted.
- Restarting a MeterReadingDocumentResultCreateRequest will not restart the parent process MeterReadingDocumentCreateRequest (or a complete bulk), but trigger a new meter reading.
- There is no time delay when restarting Meter Reading Requests - the operative child processes will be immediately executed. The process will be created again, in order to trigger a new meter read. This is important when fault clearance was carried out for devices.

### 13.1.5 MDM Processes

* MDM processes are an optional function, depending on project setup.

For MDM Processes, the following data can be displayed, filtered and exported: Process; Device ID; State; Progress; Process init; Process complete; Process start; Process stop; Group; Error code; Interval; Period; Retries; Confirm. state

### 13.2 Process Flow during the Execution of Macros

During the execution of a macro the following jobs are created:

1. One macro process for a group of devices.
2. One operational process per device.
3. One AMR process per operational process.

**Example:**

The Macro Firmware Update is executed for 50 devices. Created processes include one macro process, 50 operational processes, and 50 AMR processes.

*Figure 13.2: Process flow while executing macros (Example)*
13.3 Process Progress

13.3.1 Operational Processes
• On creation of an operational process, the progress is 0% (Initialized).
• Once the corresponding AMR process is created, the progress of the operational process changes to 50%.
• Once the AMR job is completed (success or failure), the progress of the operational process changes to 100% with the respective status of failed or passed based on the status of the corresponding AMR process.

Macro Process (operational)
The progress of the macro process depends on the number of completed operational processes. If 25 out of 50 operational processes created during the macro execution are completed, the progress of the macro process would be 50%.

13.3.2 AMR Processes
• On creation of an AMR process, the progress is 0% (initialized).
• After the SonoEnergy Core has sent a request to the Device Connector or (for DLMS) directly to the plugin, the progress is 50%.
• After the SonoEnergy Core receives the reply from the Device Connector or the plugin, that the process was finished (successfully or unsuccessfully), the progress is 100%.

The following needs to be considered:
If the Device Connector or the plugin can not communicate with the meter, the request may be repeated (depending on the configured number or retries, see value in column Retries, see also Section Advanced Options). In this case the progress remains at 50%.

For periodically executed jobs (see Section Advanced Options) the following is important:
• If an execution interval was not successfully finished, the progress remains at 50%.
• If the job switches to the next execution interval, time and status information of the current process will be displayed.
• The progress and the error description of the previous interval however will still be displayed, until the next reply from the Device Connector or the plugin is received - either the progress will be set to 100%, or the error description will be updated.

In some cases, deviations from this behavior are possible. Please ask the Danfoss support should questions arise.

Firmware Update
Progress and status of AMR processes in general relate to the communication with the meter - not to the actions executed on the meter. The firmware update is an exception. For firmware updates, the progress of the AMR process is updated based on the progress of the process that is being executed on the device.

<table>
<thead>
<tr>
<th>Example 1: SCM Firmware Update (Slave)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firmware upload to a master is completed successfully ........................................................... 30%</td>
</tr>
<tr>
<td>Firmware is relayed successfully from the master to the slave ..................................................... 95%</td>
</tr>
<tr>
<td>Firmware activated on the slave ................................................................................ 98%</td>
</tr>
<tr>
<td>Process completes in SonoEnergy ....................................................................................... 100%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Example 2: SCM Firmware Update (Master)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firmware is initialized to be uploaded ............................................................................ 10%</td>
</tr>
<tr>
<td>Progress while uploading ................................ ................................ .................................... 10% - 90%</td>
</tr>
<tr>
<td>Firmware activated on the master ................................................................................ 95%</td>
</tr>
<tr>
<td>Process completes in SonoEnergy ....................................................................................... 100%</td>
</tr>
</tbody>
</table>
13.4 Process Monitoring

13.4.1 Filter Search
The status of processes can be monitored in the list views. Filters can be applied to retrieve a list of relevant processes and their current status. Please refer to Section List View Processes in the Appendix for a list of available filter commands.

Example:
#process=Firmware* #process init>2014-01-01 retrieves a list of processes with a name starting with "Firmware" that have been initialized after Jan 1st 2014.

Example:
#parent process ID=OP.400 retrieves a list of child processes created by process OP.400.

13.4.2 Viewing Parent-Child-Processes
In addition to the use of filters, SonoEnergy provides direct links from parent processes (e.g. the macro process) to created child processes. This feature allows to conveniently monitor the progress of related processes.
After the execution of a macro has been started, its corresponding operational jobs can be viewed.
First, the user needs to click on the function More in the row of the respective (macro) process in the list view. A pop-up with detailed process information opens.

![Figure 13.3: Viewing parent-child-processes: Details on parent process](image)

At the bottom of the pop-up the number of created child jobs is displayed - this is a link. After clicking on the link, the pop-up closes and the list view displays the operational processes created by the parent process (the respective filter command is visible in the search field).
To follow the process flow further, again the function More for the listed operational child processes opens the pop-up with detail information. For each operational process the parent process and the created child process (i.e. the corresponding AMR process) are linked.
**Figure 13.4:** Viewing parent-child-processes: List of linked child processes

**Figure 13.5:** Viewing parent-child-processes: Details on child process
14 Alarms and Events

14.1 List View for Alarms and Events
In the list view More -> Alarms/Events -> Event log information about alarms and events generated by the system is displayed. This information can be viewed, filtered or exported in CSV format (see Section Exporting Information on Alarms and Events). Available filter commands can be found in Section List View Alarms and Events in the Appendix.

Figure 14.1: List view alarms and events

By default, the alarms and events displayed are limited to 60 days in the past. This can be changed. A time stamp in the upper left corner of the main window displays the start date, from when on the alarms will be listed. Clicking on the time stamp copies the time stamp into the search field, where it can be edited by the user.

Alarms and events will be archived after a time span that has been specified during project setup. After that, they are no longer accessible from the SonoEnergy Control Panel.

The following data can be displayed in the list: Device ID; Level; Alarm Code; Date; Category; State; Device group; Ticket; Informed; Alarm(s)
In the control area below the list, it is possible to set the number of entries displayed on a page (default value 14) by using the drop down list next to the export button. A second drop down list allows to specify whether the listed data should be grouped (possible values: without grouping, Device Id & Alarm Code, Device ID).

In column Level the severity of the alarm or event is indicated:

<table>
<thead>
<tr>
<th>Alarm level</th>
<th>Symbol (in SECP)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><img src="image" alt="Information" /></td>
<td>Information</td>
</tr>
<tr>
<td>2</td>
<td><img src="image" alt="Warning" /></td>
<td>Warning</td>
</tr>
<tr>
<td>3</td>
<td><img src="image" alt="Critical" /></td>
<td>Critical</td>
</tr>
</tbody>
</table>
Alarms and events are organized in eight different categories. Depending on project setup, the categories may not be visible in all projects.

<table>
<thead>
<tr>
<th>Cat.</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Accounting error</td>
<td>Category for alarms indicating that meter reads are implausible.</td>
</tr>
<tr>
<td>2</td>
<td>Device offline</td>
<td>Category for alarms indicating that devices are offline.</td>
</tr>
<tr>
<td>3</td>
<td>Platform</td>
<td>Category for alarms reported by the SonoEnergy server (e.g. operating system problems).</td>
</tr>
<tr>
<td>4</td>
<td>Protocol-Error</td>
<td>Category for alarms at the device API of SonoEnergy, indicating communication problems with devices (connection error or syntax error).</td>
</tr>
<tr>
<td>5</td>
<td>SAP API Error</td>
<td>Category for alarms at the SAP API of SonoEnergy (connection error or syntax error).</td>
</tr>
<tr>
<td>6</td>
<td>Devices</td>
<td>Category for alarms forwarded from connected devices.</td>
</tr>
<tr>
<td>7</td>
<td>UAA API Error</td>
<td>Category for alarms at the UAA API of SonoEnergy (connection error or syntax error).</td>
</tr>
<tr>
<td>8</td>
<td>Import</td>
<td>Category for alarms during data import processes.</td>
</tr>
</tbody>
</table>

If the mouse pointer is hovered on a value in column *Alarm Code*, a tooltip appears displaying a description for the alarm code.

*The list of all alarms and events is available in the Appendix (see Section List of Alarm Codes), or in the separate document “SonoEnergy Alarm Codes”.*

After clicking on the function *More* in the row of each alarm, a pop-up appears providing detailed information about the respective alarm.

![Figure 14.2: Detail information on alarms and events](image)

In the control area of the pop-up a user can browse through alarm detail information. By using the drop down list in the upper area of the pop-up, the information can also be sorted.
14.2 Toolbox in the List View for Alarms and Errors
The toolbox is accessed by clicking on the little black arrow ▼ in the upper right corner of the list view. It provides the following functions:

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Close alarm</td>
<td>The status of selected alarms will be set to Solved.</td>
</tr>
<tr>
<td>Reopen alarm</td>
<td>The status of selected alarms will be set to Open.</td>
</tr>
<tr>
<td>Select all</td>
<td>All list entries on the current page will be selected.</td>
</tr>
<tr>
<td>Select entire list</td>
<td>All list entries will be selected.</td>
</tr>
<tr>
<td>Deselect all</td>
<td>All list entries will be deselected.</td>
</tr>
</tbody>
</table>

14.3 Documenting the Handling of Alarms and Errors
SonoEnergy provides a function to document the handling of alarms and events. To close alarms, i.e. setting their status from open to solved, the respective alarm(s) are selected in column Selection. (If necessary, the functions Select all or Select entire list in the toolbox can be used.) After clicking the function Close alarm a pop-up opens. The user enters a comment (e.g. the reason for closing the alarm, steps for fixing the error) and a ticket number (as reference to an external tracking system). After clicking on Continue the status will be changed, comment and ticket number saved. The ticket number will be displayed in column Ticket in the list view, the comment can be viewed when clicking on the function More of the respective alarm.

The procedure to reopen alarms, i.e. changing the status back to open, is similar, by using the function Reopen alarm.

14.4 Online Status of Devices
During project setup the value of the time span, after which a device is marked offline (i.e. the time span, during which no data from connected devices is recorded). In this case an alarm is generated and displayed in the list view for alarms and errors. The respective device will be marked by a gray status icon in its list view or detail view. As soon as incoming data is registered again, the device status will switch back to online.

An overview on how many devices are currently online or offline, and its implication on the overall system status, is available in the header and status area (see Section Configuring the Header).

The color of the status bar indicates the following status values:

<table>
<thead>
<tr>
<th>Colour</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td>More than 99% of all devices are online.</td>
</tr>
<tr>
<td>Yellow</td>
<td>At least 90%, but less than 99% of all devices are online.</td>
</tr>
<tr>
<td>Red</td>
<td>Less than 90% of all devices are online.</td>
</tr>
</tbody>
</table>

The percentage values for a status change are specified during project setup.
14.5 Configuration for Alarms and Events

In global and individual settings it can be specified, how users (managers) shall be informed about alarms and errors.

- By default, E-Mail is available. Additional communication channels (SMS, Web service, Telephone Call) will be activated by Danfoss upon customer request.

The communication channel to be used is set by alarm category, alarm level, and, in individual settings, by device group. The communication channel is selected by clicking the appropriate checkbox. Multiple communication channels can be selected per alarm.

Global settings will be specified in More -> Alarms/Events -> Settings global.

In More -> Alarms/Events -> Settings individual the communication channel for alarms in different device groups can be specified.

If for an alarm the checkbox Global has been selected, the settings will be applied as specified in the global settings. To apply individual settings, the checkbox Global needs to be deselected beforehand.

14.6 Exporting Information on Alarms and Events

In the list view More -> Alarms/Events -> Event log information about alarms and events can be exported in CSV format, by clicking on the export symbol below the list (see Section Exporting Data from List Views).

Available data fields (columns) for the export are: Device-ID; Level; Alarm-code; Date; Category; State; Device-group; Ticket; Informed; Alarm(s); Comment

Before exporting the data, in the drop down menu next to the export button the user can select if the data should be grouped.

- The column Comment will only be exported, if no grouping has been selected.
15 Importing Data

15.1 CSV Import in the SonoEnergy Control Panel

Data can be imported via the SonoEnergy Control Panel in CSV format. The following guidelines on the format of CSV files should be regarded:

- Data fields should be separated by a semicolon.
- Content of data fields should be enclosed by quotation marks. An empty pair of quotation marks ("") should be used for empty data fields.
- The content of data fields must not contain a semicolon.
- Post decimal positions are separated by a decimal point (".").
- Lines need to end with a line break.
- The first line contains the column labels and must not differ from the defaults.

To import data sets into a specific device group, the group is selected in the group hierarchy tree in the filter navigation area. The function CSV Import is available via the toolbox in the input screen of the respective database objects. Which data fields can be imported is described in these sections:

- Importing Meter Data
- Importing Customer Data
- Importing Communication Modules
- Importing Gateways

If device data with inactive or non-existing device types is to be imported, the system will return an error message - the respective device will not be created! (Available device types can be configured in SonoEnergy).

Within the SonoEnergy Control Panel, also sample import files are provided, please refer for details to the sections mentioned above.

Figure 15.1: CSV Import (Example meter data)
15.2 Special Import Functions
Via Import/Export -> Imports it is possible to import a shipment file. After clicking on button Search a local file can be selected for upload, which is imported after clicking on Submit.

15.3 Import via Backend Interface
To integrate the data import into the process chain, several backend import interfaces can be used. These interfaces include for instance an MDUS API or an UAA API. Data format and interface are specified during project setup. In addition, the semi automated import of firmware files, security key files and security certificates is supported. Further information is provided by the Danfoss support or the project management.
16 Exporting Data

The following sections describe standard export functions of the SonoEnergy Control Panel. For advanced reporting functions please refer to chapter Module ReportPlus.

16.1 Exporting Data from List Views

16.1.1 Preparing the CSV Export

Data displayed in almost all List Views can be exported in CSV format.

<table>
<thead>
<tr>
<th>Main menu item</th>
<th>Sub menu item / List view</th>
<th>Export</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meter</td>
<td>Meter view</td>
<td>x</td>
</tr>
<tr>
<td>Customer</td>
<td>List customer</td>
<td>x</td>
</tr>
<tr>
<td>Communication</td>
<td>Com. module view, Gateway view</td>
<td>x</td>
</tr>
<tr>
<td>Tariffs</td>
<td>Tariff list</td>
<td>-</td>
</tr>
<tr>
<td>Processes</td>
<td>Operational processes, AMR processes, Inform processes, MDM processes, SAP processes</td>
<td>x</td>
</tr>
<tr>
<td>Manager</td>
<td>List of managers</td>
<td>-</td>
</tr>
<tr>
<td>Alarm/Events</td>
<td>Event log</td>
<td>x</td>
</tr>
<tr>
<td>Configurations</td>
<td>Meter, Communication</td>
<td>-</td>
</tr>
<tr>
<td>Preferences</td>
<td>OBIS-Codes, Monitor groups, OBIS code mapping IN, OBIS code mapping OUT</td>
<td>x</td>
</tr>
<tr>
<td>Imports/Exports</td>
<td>Export results</td>
<td>x</td>
</tr>
<tr>
<td>VEE</td>
<td>Estimation rules, validation rules</td>
<td>x</td>
</tr>
</tbody>
</table>

In preparation for the export, the set of data can be limited by selecting a device group in the group hierarchy tree, or by applying filter criteria (see Section Filter).

If the query output is larger than the data displayed on one page, the data displayed on all remaining pages will also be exported.

To export the data, the user clicks on the export button in the bottom area of the list view.

A pop-up opens, and the user can select between two options:
- Data from all available columns of the list will be exported.
- Only data from the currently visible columns of the list will be exported.

Independent of this selection, only data of objects displayed with a (possibly) active filter is exported. In case of inconsistencies the user should check, which filter and limitations are currently active.
The exported CSV file is available for download in the list view Import/Export -> Export results (see Section Export Results).

For information which data fields can be exported in the respective list views, please refer to the following sections:

- Exporting Meter Data
- Exporting Customer Data
- Exporting Communication Modules
- Exporting Gateways
- Exporting Information on Alarms and Events

16.1.2 Export Results

The list view More -> Imports/Exports -> Export results all CSV-exports from list views are available for download (see Section Preparing the CSV Export), as well as raw data exports for meter, communication modules and gateways.
The following data can be displayed: **Report name; Format, created, User**

After clicking on the function *Download* in the row of the respective report it will be downloaded. 

*All reports generated within a manager’s group or its subgroups will be displayed in the list.*

For information on how to handle exported CSV files please refer to Section *Handling of Exported CSV Files.*

### 16.1.3 Deleting Exports

All exports will accumulate in the list view *Imports/Exports -> Export results.* To delete exports, i.e. to remove them from the list view and in the file system, the function *Delete export* in the toolbox is available.

![Deleting exports](image)

*Figure 16.3: Deleting exports*

First the export files that should be deleted need to be selected, either by manually selecting them in the checkboxes in column *Selection*, or by using the functions *Select all* (all exports in the current view will be selected) or *Select entire list* (all exports will be selected) in the toolbox.

Next the user clicks on function *Delete export.* The system requires a confirmation, after that the exports will be deleted. A pop-up will give information if the files were successfully deleted.

### 16.2 Exporting Data from Diagrams

Via the function *Export* in the toolbox of all diagrams the data displayed in the respective diagram can be exported in CSV format (see also Section *Diagrams*).

### 16.3 Exporting Network Topology Information

Topology information on devices can be exported in CSV format using the function *Export* in the network topology widget. Please refer to section *Network Topology* for details.
16.4 Special Export Functions

Further export functions are available via More -> Imports/Exports -> Exports. For each function a short explanation is displayed, a date field to select the time frame for the data export, the selected group (if applicable), and a button to start the export.

The number of available functions, and if they can be executed, is depending on the project setup and permissions of the executing manager.

16.4.1 Export Meter Reading

Description: All accounting related meter reads for a selected month will be exported in CSV format. Meters without any accounting data in the given month are not included in the export.

User Input: Enter the month (YYYY-MM) in the date field, alternatively select the month in the calendar pop-up. Click on button CSV Export.

Output: CSV file for download.

Exported data fields: Point of delivery; Meter number; OBIS code; Meter reading time; Current meter reading; Status

16.4.2 Export Meter Reading by Email

To open the exported file a password has to be provided. The password can be requested from project management or support.

Description: All meter reads for a selected month will be sent via email, in compressed ZIP format.

User Input: Enter the month (YYYY-MM) in the date field, alternatively select the month in the calendar pop-up. Click on button CSV Export.

Output: ZIP-compressed CSV file via email.

Exported data fields: Point of delivery; Meter number; OBIS code; Meter reading time; Current meter reading; Status
16.4.3 Export Key File
Description: Security key data for a user-defined list of meters will be exported in CSV format.
User Input: First, a list of meters for which security keys should be exported, needs to be uploaded. The list should contain meter IDs, separated by line breaks. Click on button Search to upload the list of meters. Click on button Export to start the process.
Output: CSV file for download.

16.4.4 Export Gas Valve Switch Counter
Description: Number of switching operations for gas meter valves will be exported in CSV format.
User Input: Click on button CSV Export.
Output: CSV file for download.
Exported data fields: SAP Equipment ID; Serial ID; Meter ID; Count of valve operations.

16.4.5 Meter Data Export
Description: The meter data export allows the customized export of meter data in XML format, for post processing by third parties. For information on the XML format for in- and output file and the configuration of the export please refer to Chapter Meter Data Exporter of the SonoEnergy Admin Guide.
User Input: First, a XML file specifying the filter criteria for the exported meter data is uploaded. Click on button Search to upload the list of meters. Click on button Export to start the process.
Output: XML file on a specified location in the file system (configurable)
Exported data fields: Depending on filter criteria.

16.5 Export via Backend Interface
To integrate the data export into the process chain, several backend export interfaces can be used. Data format and interface are specified during project setup. Further information is provided by the Danfoss support or the project management.

16.6 Handling of Exported CSV Files
To view and edit exported CSV files in spreadsheet programs, the steps as described below should be followed.

16.6.1 LibreOffice Calc / OpenOffice Calc
2. Select file and open.
3. Text import:
   • Select Unicode (UTF-8).
   • Select Semicolon as delimiter.
   • Select quotation marks as text qualifier.
4. Click on OK.
16.6.2 MS Excel (Versions 2003 - 2006)
1. Menu selection: Data -> External Data -> Import Text File.
2. Select file and open.
3. Text Import Wizard:
   • Data format UTF-8.
   • Delimiter Semicolon.
   • Text qualifier quotation marks.
   • Every column needs to be set to data format Text.
   • Clicking Finish.
4. Clicking on OK.

16.6.3 MS Excel (Versions starting 2007)
1. Menu selection: Data -> Get External Data -> Text.
2. Select file and open.
3. Text Import Wizard:
   • Data format UTF-8.
   • Delimiter Semicolon.
   • Text qualifier quotation marks.
   • Every column needs to be set to data format Text.
   • Clicking Finish.
4. Clicking on OK.
17 VEE - Validation, Estimation and Editing

17.1 Introduction

Within SonoEnergy, customized rules for validation and value replacement of data can be applied. It works like this:

- Validation and estimation rules are specified by users in the SECP, given the respective permissions. For the specification of rules a range of rule templates (i.e. mathematical methods) for validation and value replacement is available (see Sections Estimation Methods and Validation Methods). A scripting interface allows to add customized rule templates (see Section "VEE LUA Scripting" of the SonoEnergy Admin Guide).

- To create a new rule, the user selects such a template and sets its parameters (see Sections Adding Estimation Rules and Adding Validation Rules).

- The new rule is now available in the system, and can be assigned to individual registers (see Section Register Configuration: Assigning Estimation and Validation Rules to individual registers), or to registers in multiple meters (see Section Register Configuration: Assigning Estimation and Validation Rules to registers in multiple meters).

- Available rules can be viewed in list views (see Sections List View for Estimation Rules and List View for Validation Rules).

- Rules assigned to a meter can be viewed in the detail view of the respective meter (see Section Validation- and Estimation Rules).

SonoEnergy does also support the data validation by using a reference meter, see Section Management of Reference Meters.

The validation status of data is indicated in the raw data view - by different background colors for data fields (see Section Viewing Raw Data).

The principle for data validation and estimation is outlined by the following diagrams:

Step 1: Validation

Data sets will be checked for plausibility, according to specified rules. In the example pictured below, consecutive values are only allowed to differ to some extent. Four implausible values were identified, and one value is missing.

![Figure 17.1: Data set before validation (simplified illustration)](image-url)
Step 2: Estimation
For implausible values and the missing value an estimation will be executed, in the example pictured below via linear interpolation.

The validation will be applied to consumption values, i.e. relative values. Estimation will be applied to corresponding accounting values, i.e. absolute values. Implausible values that were identified during the validation will be flagged in the database (not deleted).
17.2 List View for Estimation Rules

In list view VEE -> Estimation Rules available estimation rules are displayed. Filter commands for this list view can be found in Section List Views for Estimation Rules and Validation Rules in the Appendix.

The following data can be displayed in the list: Name; Method; Description; Created at; User

By clicking on the function More, the parameter values for the respective estimation rule will be displayed in a pop-up.
17.3 Adding Estimation Rules
New estimation rules can be added in the screen VEE -> Add estimation rule.

For the new rule, a name is entered. Then the user selects from available templates (see Section Estimation Methods) the estimation method that shall be applied in this rule. Depending on the selected method, parameter have to be specified. In field Description the user can optionally provide a description for the new rule.

17.4 Estimation Methods
In this section, standard methods for value replacement that are implemented in SonoEnergy will be described, as well as the required parameters. Data that has been calculated by estimation methods will be flagged in the database.

Please note, that it is possible to provide customized estimation methods (rule templates) via a scripting interface (see Section “VEE LUA Scripting” in the SonoEnergy Admin Guide).

17.4.1 Linear Interpolation
Missing values will be calculated by linear interpolation. If more than a specified number of values is missing, no interpolation will take place.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>maxGap</td>
<td>Maximum gap size. If more than the specified number of consecutive accounting values is missing, no interpolation will take place.</td>
</tr>
</tbody>
</table>

17.4.2 Reference Profile
Missing values will be calculated based on historical accounting data. Missing values will be replaced by the average value over the last four weeks for the respective point in time. No parameters are required for this method.
17.4.3 BDEW-Metering Code 2008
Missing values will be replaced by values from a reference meter (see Section Management of Reference Meters).
If no data from a reference meter is available, values will be calculated either by linear interpolation, or by using a reference profile. The method used for the calculation depends on the number of missing consecutive values.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>maxGap</td>
<td>Maximum gap size. If less than the specified number of consecutive accounting values is missing, interpolation will take place. If equal or more values are missing, a reference profile will be used.</td>
</tr>
</tbody>
</table>

17.5 List View for Validation Rules
In list view VEE -> Validation Rules available validation rules are displayed. Filter commands for this list view can be found in Section List Views for Estimation Rules and Validation Rules in the Appendix.

The following data can be displayed in the list: Name; Method; Description; Created at; User
By clicking on the function More, the parameter values for the respective validation rule will be displayed in a pop-up.
17.6 Adding Validation Rules

New validation rules can be added in the screen VEE -> Add validation rule.
For the new rule, a name is entered. Then the user selects from available templates methods (see Section Validation Methods) the validation method that shall be applied in this rule. Depending on the selected method, parameters have to be specified.

Some of the required parameters (see Section Validation Methods) can be absolute values or percentages. If the last character of the input is %, the value will be treated as percentage. Otherwise it will be used as absolute value, in the unit of the respective register.

In field Description the user can optionally provide a description for the new rule.

17.7 Validation Methods

In this section, standard methods for data validation that are implemented in SonoEnergy will be described, as well as the required parameters. If data is being identified as possibly incorrect, it will be flagged in the database (Accounting Error 309000). The validation rule which led to the detection of the error will also be recorded.

Please note, that it is possible to provide customized validation methods (rule templates) via a scripting interface (see Section “VEE LUA Scripting” in the SonoEnergy Admin Guide).

17.7.1 Consecutive Zeros

It is checked, if a dataset contains consecutive zeros.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>max</td>
<td>If the number of consecutive zeros is equal or more than the specified value, the data will be flagged.</td>
</tr>
</tbody>
</table>
17.7.2 Min/Max
It is checked, if the values exceed an upper or lower limit.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>min</td>
<td>Lower limit. If the value is lower, the data will be flagged. Absolute value.</td>
</tr>
<tr>
<td>max</td>
<td>Upper limit. If the value is higher, the data will be flagged. Absolute value.</td>
</tr>
</tbody>
</table>

17.7.3 Unreliable Constant Values
It is checked, if a number of consecutive values is constant, or changes only marginally.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper Limit</td>
<td>If a value is higher than its predecessing value, and the difference between both is equal or lower than the given upper limit, the value is considered “constant”. Absolute value.</td>
</tr>
<tr>
<td>Options</td>
<td>If the number of consecutive values that are considered “constant” is equal or larger than the specified value, the data will be flagged.</td>
</tr>
</tbody>
</table>

17.7.4 Reference Meter
It is checked, if consumption values from meter and reference meter differ. Consumption values from registers with the same OBIS code of the meter and the reference meter will be compared. See also Section Management of Reference Meters.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>maxUp</td>
<td>The upper limit specifies how much higher the consumption value can be than the reference value. Absolute value or percentage.</td>
</tr>
<tr>
<td>maxDown</td>
<td>The lower limit specifies how much lower the consumption value can be than the reference value. Absolute value or percentage.</td>
</tr>
<tr>
<td>Threshold</td>
<td>The check will only be executed, if the consumption value is larger than the specified threshold. Absolute value.</td>
</tr>
</tbody>
</table>
17.8 Register Configuration: Assigning Estimation and Validation Rules to individual registers

For every register of a meter, it can be configured, which validation or estimation rules should be applied. First, the user opens the edit screen for meter (either in the list view of the meter, by clicking function Edit in the row of the meter, or in the detail view by clicking on the function Edit in the tool box).

In the edit screen, the function Edit in row Registers is clicked. The pop-up for register configuration opens (see also Section Configuring Registers).

On the left side of the pop-up the configured registers are displayed. The registers are identified by their OBIS Code. After the OBIS code the number of validation rules (column V) and estimation rules (column E) assigned to the register is displayed.

On the right side of the pop-up the parameters and rules for the register selected in the left side are displayed and can be edited.

If value replacement should take place for missing or implausible values, the respective rule is selected in the drop down list. Validation rules are also selected in a drop down list, and added by clicking on button Add.

If the meter has a reference meter assigned (see Section Assigning a reference meter) also validation rules based on the method Reference meter can be assigned. If the meter has no reference meter, these validation rules won’t give any results.

After clicking on button Save the changes will be scheduled - but they will only be saved if the button Save in the meter mask has been clicked.

To assign validation and estimation rules to registers in multiple meters, the function Manage rules in the list view of meters is available (see Section Manage Rules).
### 17.9 Register Configuration:

**Assigning Estimation and Validation Rules to registers in multiple meters**

To assign validation and estimation rules to registers in multiple meters, in the list view for meters (see Section List View of Meters) the function Manage rules is available.

First the meters, for which registers should be configured, need to be selected in the list view. Two methods are available:

- Select the meters individually by clicking the checkboxes in front of the respective meters. The selection will persist when browsing to another page in the list view.
- Select all meters by clicking on the checkbox on the left side of the table header. (The set of meters may need to be limited in advance by selecting a device group or applying other filters.)

Then, click on the function Manage rules in the right upper corner of the list view. A pop-up opens.

![Figure 17.11: Assigning estimation and validation rules to multiple meters](image)

The pop-up displays in a select box on the left side all registers, that are configured in *at least one of the selected meters* (union of sets). The number given in parentheses after the OBIS code is the number of meters, for which the respective register is configured.

The total number of meters that will currently be edited is displayed in the pop-up heading.

On the right side of the pop-up (lower area), available validation and estimation rules are displayed, in one drop down list each. Also on the right side of the pop-up (upper area), the validation rules assigned to the register selected on the left side are listed.

The workflow to assign rules is the following:

A register is selected in the select box on the left side. The **validation rules** already assigned to that register are displayed on the right side.

*The selected register may be configured for one or more meters. Each of these configured registers with the same OBIS code can have already validation rules assigned. This is indicated by the “No. of affected registers”. The minimal number is 1, the maximal number is the total number of meters, for which the register has been configured.*

---

**Example:**

No of affected meters 2 of 4 means, that the selected register has been configured for four of the meters selected in the list view. In two cases, the register got the displayed validation rule assigned already.

The following options are available for assigning validation rules:

1. Assign to all registers a validation rule already assigned to a subset: Clicking on symbol assigns the respective rule all configured registers.
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2. Delete validation rules: Clicking on symbol \( \square \) removes the assigned rule for all configured registers.
3. Assigning a new validation rule: The new rule is selected in the drop down list in the lower area of the pop-up. After clicking on Add this rule is assigned to the register selected on the left side, for all meters where it is configured. The newly assigned rule will be listed above the drop down list.

Estimation rules are available in the undermost drop down list. The number given in parentheses after the rule name is the number of affected registers (see hint above).

- If for the selected register on all meters the same estimation rule has already been assigned, this rule will be displayed in the drop down list.
- If for the selected register on none of the meters any estimation rule has been assigned, the drop down list will display the value No rule.
- If for the selected register on all meters different estimation rules have already been assigned, the drop down list will display the value Multiple rules - perform no change.

If the user selects one of the available estimation rules, it will be assigned to all configured registers, after the changes have been saved.
By clicking on button Save, the changes will be saved, and the pop-up is closed.
After clicking on button Reset all settings will be reset to the status when the pop-up was opened.
After clicking on button Back, the pop-up will close, and no changes will be made.

17.10  Management of Reference Meters

17.10.1  Concept
To validate measurement values, a meter can get a so called reference meter assigned. The consumption values of both meter and reference meter will be compared, in order to assess the data quality. The reference meter will be installed at the same physical location as the meter and records the same consumption data. Meter and reference meter will get different points of delivery assigned (current status in Germany).
A reference meter can but does not necessarily be flagged as such. It is possible, that the roles of meter and reference meter will be switched.
To compare consumption values of meter and reference meter, the respective registers of the meter need to have a validation rule with method Reference meter assigned.

17.10.2  Assigning a reference meter
In the detail view of a meter, via the toolbox the function Manage reference meter is selected.

Figure 17.12: Assigning a reference meter
A pop-up opens. In the pop-up, the user enters the Meter ID of the meter, that should become the reference meter. After clicking on Continue, a logical link between meter and reference meter will be created, and the validation can take place.

17.10.3 Switching and Disconnecting Meters and Reference Meters
In the detail view of a meter, via the toolbox the function Manage reference meter is selected. A pop-up opens. In the pop-up, meter ID of both the meter and its reference meter are displayed. After clicking on the button Disconnect, the logical link between meter and reference meter will be deleted, and the validation will no longer take place. After clicking on the button Switch, the roles of meter and reference meter will be switched.

![Figure 17.13: Switching or disconnecting meter and reference meter](image-url)
18 Advanced Topics

18.1 Configuration of OBIS Codes

18.1.1 Activation and Deactivation of OBIS Codes

OBIS codes can be activated or deactivated via More -> Preferences -> OBIS-Codes. In this view, a list of OBIS codes, that are available in the system, is displayed. This list can be filtered or exported.

![Figure 18.1: Configuration of OBIS-Codes](image)

The following data can be displayed: Active; OBIS code; OBIS code Counter; OBIS comment

The following functions can only be executed, if the user’s role has the respective permission. (See Section Configuring Access Rights, the right for Preferences -> OBIS-Codes -> Obiscode activation/deactivation has to be set.)

To activate an OBIS code, the checkbox in column Active is selected for the respective OBIS code. If an OBIS code is activated, it can be selected within input screens and pop-ups of the SonoEnergy Control Panel. To deactivate an OBIS code, the respective checkbox needs to be deselected. Deactivated OBIS codes are not available within the SonoEnergy Control Panel.

OBIS codes can only be deactivated, if they are currently not used for any device.

18.1.2 OBIS Code Mapping IN

In the SonoEnergy Control Panel, it is possible to define mapping rules between externally used OBIS Codes and OBIS Codes used within the SonoEnergy System (for mapping in opposite direction see Section OBIS Code Mapping OUT). The list view More -> Preferences -> More -> OBIS code mapping IN displays all mapping rules specified so far. The information can be filtered or exported.
The following data can be displayed: OBIS code name SonoEnergy; OBIS code SonoEnergy; Device type; OBIS code external; Description; Device profile

Mapping rules are defined by device type. To add a new mapping, the function *Add OBIS mapping IN* in the tool box ▼ is selected. A pop-up opens, where the mapping can be specified.

First, the device type is selected via a drop-down-list. Next, the device profile can be selected via a second drop-down-list (if applicable and defined in the system). A device profile is a data container on devices, where various consumption data can be stored. It is being addressed via vendor specific OBIS codes. Then the external OBIS code for incoming data is entered into a text field (*OBIS Code external*). In the last drop-down-list the respective SonoEnergy-internal OBIS code is selected. Optionally, a description or a comment on the mapping can be entered. After clicking on *Continue* the new mapping rule is saved.
A new mapping rule will be immediately displayed in the list view OBIS Code mapping IN, but will only take effect after after the cache of the executing service (Southbound Service) has been reloaded. The schedule for reloading is configured during the project setup. Mappings can be deleted by using the function Delete in the respective row in the list view.

18.1.3 OBIS Code Mapping OUT
Similar to the OBIS Code Mapping IN, mapping rules between OBIS codes used within SonoEnergy and OBIS codes used externally can be defined.

The list view More -> Preferences -> More -> OBIS code mapping OUT displays all mapping rules specified so far. The information can be filtered or exported.

The following data can be displayed: OBIS code name SonoEnergy; OBIS code SonoEnergy; Connector; OBIS code external; Description

Mapping rules are defined by connector type. To add a new mapping, the function Add OBIS mapping OUT in the tool box ▼ is selected. A pop-up opens, where the mapping can be specified.

Via drop-down-lists the respective SonoEnergy-internal OBIS code and the connector type are selected. The external OBIS code is entered into a text field (OBIS Code external). Optionally, a description or a comment on the mapping can be entered. After clicking on Continue the new mapping rule is saved.
18.2 Configuration of Monitor Groups

Monitor groups are a set of related monitoring values.

A list of all available monitoring values and their respective groups is provided in the Appendix (see Section Available Monitoring Values).

Monitor groups can be activated or deactivated via More -> Preferences -> Monitor Groups. In this view, a list of all monitor groups available in the system is displayed. They can be filtered or exported.

The following data can be displayed: Active; Monitor Group; Comment.
18.3 Using Macros

18.3.1 Introduction
A macro is a predefined series of commands. The commands may for instance be a Device Control Transaction (DCT). As a macro, the series of commands can be executed for multiple devices simultaneously. Available macros can be accessed at More -> Configurations -> Macro.

Information: Macros are part of the customer-specific configuration of SonoEnergy. Which macros are available and executable for the manager, depends on installed devices, the project setup and configuration options within the SonoEnergy Control Panel (see Section Configuring Access Rights).

A selection of possible macros may include: Activate channel, Add Device tag, Armed breaker connect, Breaker disconnect, Change group, Deactivate Channel, Delete certificate chain, Delete CRL, Delete Device tag, Delete root CA certificate, Firmware update, Generate password, Get buffered values, Get meter schedules, Get mode from AMM, Get register value, Load limitation, On demand reading, Power status verification, Request CSR, Request error-log, Request firmware version, Request topology, Reset key, SCM firmware update, SCM mode update, Set budget, Set MBUS key, Set register value, Set time of use, Update device registers, Upload CRL distribution points, Upload certificate chain, Upload root CA certificate.

18.3.2 Executing Macros
Before executing a macro, the user selects in More -> Configurations -> Meter all meters, and in More -> Configurations -> Communication all communication modules and gateways, for which the macro should be executed.

The devices displayed in the lists can be limited by selecting a group in the group hierarchy tree (in the filter navigation panel to the left). To select all devices in a list, the function Select all in the upper right corner of
the main window can be used. To deselect all devices again, the function Deselect all (which appears at the same position) can be used.

The devices in the list can also be filtered, for instance by device tag, in order to execute the macro on devices of a virtual group (see Section Virtual Groups and Macros). A complete list of available filter commands for this view is given in Section List Views Configuration - Meter / Communication in the Appendix.

⚠️ *During the selection process the group in the group hierarchy tree should not be changed, otherwise the current selection will be discarded.*

After switching to the More -> Configurations -> Macros view the macro to be executed is selected from the list in the upper area of the screen. Next to the selection window it is displayed, how many devices have been selected, and for how many of these the selected macro can be executed.

Clicking on the value in the second row (unsupported devices) opens a pop-up, where the IDs of the respective devices and a reason, why the macro is not supported, will be displayed (see Section Unsupported Devices).

ℹ️ *If the macro can not be executed for all selected devices, it will still be executed for the subset.*

Depending on the selected macro, additional parameters have to be specified in the lower area of the screen. For instance, to execute the macro On demand reading, a reason needs to be selected. After clicking on button Execute the macro will be executed.

✔️ *For almost all macros the execution time can be scheduled (input field Scheduled execution time). Further configuration is possible by using Advanced Options (see Section Advanced Options).*

After clicking on the Execute, also a pop-up is opened, that informs about generated processes and contains a link to the process list view.
For details on processes during the execution of macros and their monitoring, please refer to Sections *Process Flow during the Execution of Macros* and *Viewing Parent-Child-Processes*.

A detailed example on how to use macros is given in Section *Changing Groups of Devices*, for the macro *Change group*.

18.3.3 Advanced Options

Using the Advanced Options in the lower area of the screen, the repeated execution of a macro and the expected behaviour after a failed execution can be configured.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Executions</td>
<td>Specifies the number of executions. By default, a value between 1 and 10 is allowed. The upper limit can be configured.</td>
</tr>
<tr>
<td>Interval</td>
<td>Duration between two consecutive executions of the macro, with four possible values: 15 minutes, 1 hour, 1 day, 30 days. An interval starts after the successful execution of a macro, or after the last failed retry.</td>
</tr>
<tr>
<td>Retries</td>
<td>Number of retries, should the execution of a macro fail. By default, a value between 0 and 3 is allowed. The upper limit can be configured.</td>
</tr>
</tbody>
</table>

**Example:**

By setting Executions to 5, Interval to 1 hour, and Retries to 2, the macro should be hourly repeated for five times. The maximum number of attempts to execute the macro will be 15 times during that time span.

Advanced Options are available for all macros, which are a DCT (that is, all except for *Change group*, *Update device registers*, *Add device tag*, *Remove device tag*). In order to use Advanced Options, the respective access rights for the user role have to be configured (Selection Preferences -> Manager Roles -> Configuration -> Macros -> Functions -> Advanced Options, see also Section *Configuring Access Rights*).

18.3.4 Unsupported Devices

After a macro has been selected and the number of unsupported devices is being displayed, these devices can be further examined.

Clicking in the row with the given number of unsupported devices (right to the selection window for macros) opens a pop-up. The pop-up displays the IDs of the respective devices plus the cause why the macro will not work.

![Figure 18.9: Using macros: List of unsupported devices](image)
After clicking the function *Show list of devices* the view of the pop-up changes. Only device IDs will be displayed. The device IDs will be already selected in order to make it easy to copy and paste them.

After clicking on *Show reasons* the pop-up switches back to the original view.

✓ The list of device IDs may for instance be copied to the search field, in order to execute a free text search for the IDs in the list views of meters, communication modules or gateways.

![Figure 18.10: Using macros: List of unsupported devices II](image)

### 18.4 Data Handling for Consumption Data

#### 18.4.1 Data Handling for Incoming Data

Should errors occur during the data input, they will be recorded in the error log. The log entries can be accessed via More -> Alarms/Events -> Event log.

By default, all meter readings marked as flawed, will remain in the system and will be displayed for instance in diagrams. If required, they can be hidden in the diagrams. Duplicate entries, that are identified by identical time stamps and consumption values, will be discarded. If two values for the same time stamp are received, only the first incoming value will be saved.

#### 18.4.2 Data Handling after User Activities

Depending on the number of impacted data sets, the processes described below may take some time. Therefore the respective devices will be locked, and a process is created to coordinate the execution. If this process is finished, the devices will be automatically unlocked and are available for user activities. During the lock time, the user can still edit/work with all remaining, unlocked devices.

Processes will be executed by default in 60 second steps. If the system load is temporarily too high, the priority of the execution will lowered.

**Creating a New Communication Module**

When creating a new communication module (see Section *Creating a New Communication Module*) no changes will be made in existing data sets. As soon as a communication module is physically connected to the system, incoming data will be received, but not saved in the database.

It can be monitored at More -> Alarms/Events -> Event log that data is being received.

As soon as the communication module is registered in the system, the data will be recorded in the database - but it will not immediately be visible in the SonoEnergy Control Panel or the End User Portal. Only if the communication module is connected with a meter, (see Section *Connecting the Communication Module*), the data will be displayed in the SECP.
Connecting Meter and Communication Module
If a meter is connected with a communication module (see Section Creating a New Meter), the start date (connection date) is important. The registered consumption values for the communication module, stored in the common data storage, will be assigned to the meter starting with the connection date (also dating back, if necessary). The current meter read will be updated according to incoming data from the communication module.

Disconnecting Meter and Communication Module
If a communication module is disconnected from a meter (see Section Disconnecting Meters from Communication Module and Port), date of the disconnect as specified is important. Consumption data will be disassociated from the meter ID and stored in the common data storage, starting from the date of the disconnect. The meter count of the disconnected meter will be updated accordingly. The “disassociated” consumption data can be assigned to a new meter.

Assigning a Meter to a Contract
If a meter is assigned to a contract (see Section Editing Contracts), the already recorded consumption data for the meter will be flagged with customer-, contract- and tariff-ID, if necessary dating back to a given connection date. The consumption data for the customer will be updated. In the End User Portal, the changes are immediately visible (new meter ID, new meter read). The precalculation of costs will be made based on the new tariff.

Removing a Meter from a Contract
If a meter is disconnected from a contract (see Section Editing Contracts), the consumption data for the meter will be cleared from the customer-, contract-, and tariff-ID, if necessary dating back to a given date. Starting from this date, the consumption data is only assigned to a meter. The consumption data of the customer (or the contract respectively) will be updated.

18.5 System Config Service
Starting with SonoEnergy Release 7.0, the SonoEnergy Config Service is used as a central component to provide configuration values for other SonoEnergy components. Step-by-step the configuration management of the various SonoEnergy components (e.g. services, plugins) will be migrated to the new config service. To manage and edit the configuration values in the SonoEnergy Config Service, a command line tool is used.
Within the SonoEnergy Control Panel, a new view has been added at Preferences -> System Service Config. It displays the configuration parameters and the values set for this specific SonoEnergy instance.

⚠️ Please note that only configuration values of components that have already been migrated into the config service can be displayed!
On the left side of the main window a tree structure displays the hierarchical structure of the configuration parameters. The parameters and their values are displayed in a frame on the right hand side of the main window.

The root element of the tree is Configuration. Its subelements represent the different SonoEnergy components. Within their subelements the parameters are displayed, with relating parameters grouped into a subtree. By clicking on the elements of the tree subelements can be displayed or hidden, and parameters can be displayed.
# 19 Support

## 19.1 Error Handling

In following errors or problems that may occur when working with the SonoEnergy Control Panel are described, and possible solutions. In case of problems, please try to solve them with the help of this information. If this is not possible, please contact project management or support (see Section How to Get Support).

### 19.1.1 SonoEnergy Control Panel

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible cause</th>
<th>Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>The URL of the SonoEnergy Control Panel can not be accessed.</td>
<td>The Portal is currently not available.</td>
<td>Send error report to Danfoss.</td>
</tr>
<tr>
<td>Browser issues a warning regarding the security certificate.</td>
<td>The certificate used by SonoEnergy is not included in the browser’s list of known certificates.</td>
<td>Accept the certificate, even if it is considered insecure. This has no impact on the security of the SSL encryption.</td>
</tr>
</tbody>
</table>
| A manager cannot log in. | Wrong credentials. | Check user name and password. If the password has been forgotten, another manager can create a new password (see Editing Managers). Title:  
| | | |
| | The manager account has been deactivated. | Account can be reactivated from a manager of a higher-level group (see Editing Managers). |
| Available functions have been changed, or less functions are available. | The role of the manager has been changed. | Role can be changed back by manager of a higher-level group (see Editing Managers). |
| | Permissions of the manager’s role have been changed. | Permissions can be configured by manager of a higher-level group (see Configuring Access Rights). |
| The manager can’t access some devices. | The manager’s group has been changed. | Group the manager belongs to can be changed by manager of a higher-level group (see Editing Groups) |
| | Devices have been moved to a different group. | Manager of a higher level group can change the group of the manger account (see Editing Groups), or move devices back into previous group (see Changing Groups of Devices). |
| A group is no longer displayed in group hierarchy tree. | Group has been deleted. | If necessary create new group (see Creating a New Group). |
| | The manager’s account has been removed from the group. | Manager of a higher-level group can change the group of the manager account back (see Editing Groups). |
19.1.2 Accessibility of Meters
If problems occur in communication with meters, the following methods for error analysis can be used:

- Checking description in error logs: Filter List View for Alarms and Events for respective Meter ID. Description of alarms may provide hints on the cause of the problem (e.g. Unable to connect to meter device! –> Check credentials.)
- Checking the device configuration in Detail View of a Meter and Detail View of a Communication Module:
  - connection parameter (e.g. Port, IP address)
  - device type
  - device parameter
- Checking process lists: Are processes executed correctly? (see Section Processes)

19.2 How to Get Support
In the following the different types of customer support are described briefly. For a detailed description on the cooperation between Danfoss and customer please refer to the service level agreement (SLA). Should questions arise, please contact the project management or Danfoss support.

> By default, the Danfoss support is available for Second- and Third-Level-Support.

19.2.1 Support E-Mail
For e-mail support, contact sono.support@danfoss.com. Mail correspondence sent to this address will be forwarded to the responsible team members.

19.2.2 Local support
For all projects the local Danfoss office is available. The call can be forwarded to the responsible team member, following a defined escalation plan.
20 Appendix

20.1 Available Filter Commands

In the following available filter commands for each view are listed. Examples for filter commands are provided, aliases, whether the OR Operator can be used (OR), and whether wildcards can be used (W*card).

A detailed explanation on filter command syntax, along with many examples, is provided in Section Filter.

The filter term is usually similar to the column heading of the column that should be searched (except for device tags).

Please note, that within the SECP the pipe symbol ("|") should be used for the logical OR.

20.1.1 List View Alarms and Events

<table>
<thead>
<tr>
<th>Name</th>
<th>Example</th>
<th>Alias</th>
<th>OR</th>
<th>W*card</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device ID</td>
<td>#device id=5001*</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Level</td>
<td>#level=warning</td>
<td>#warning #critical #info</td>
<td>x</td>
<td>-</td>
<td>Allowed values: warning, critical, info</td>
</tr>
<tr>
<td>Alarm Code</td>
<td>#alarm code=308903</td>
<td></td>
<td>x</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Category</td>
<td>#category=accounting error</td>
<td></td>
<td>x</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>State</td>
<td>#state=open</td>
<td></td>
<td>x</td>
<td>-</td>
<td>Allowed values: open, solved</td>
</tr>
<tr>
<td>Informed</td>
<td>#informed=1</td>
<td></td>
<td>x</td>
<td>-</td>
<td>Allowed values: 1.0</td>
</tr>
<tr>
<td>Ticket</td>
<td>#ticket=15</td>
<td></td>
<td>x</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

20.1.2 List View Communication Modules

<table>
<thead>
<tr>
<th>Name</th>
<th>Example</th>
<th>Alias</th>
<th>OR</th>
<th>W*card</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Com. Module ID</td>
<td>#com.moduleid=5008*</td>
<td></td>
<td>x</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>State</td>
<td>#state=online</td>
<td>#online #offline</td>
<td>x</td>
<td>-</td>
<td>Allowed values: online, offline</td>
</tr>
<tr>
<td>Battery</td>
<td>#battery&gt;2</td>
<td></td>
<td>x</td>
<td>-</td>
<td>Operators &lt;,&gt; allowed</td>
</tr>
<tr>
<td>RSSI</td>
<td>#rssi&gt;2</td>
<td></td>
<td>x</td>
<td>-</td>
<td>Operators &lt;,&gt; allowed</td>
</tr>
<tr>
<td>Type</td>
<td>#type=SonoSelect</td>
<td></td>
<td>x</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Firmware Version</td>
<td>#firmware version=1.2.3</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Vendor</td>
<td>#vendor=danfoss*</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Model</td>
<td>#model=SonoSelect 10</td>
<td></td>
<td>x</td>
<td>x</td>
<td>See Section Filtering date fields for further examples</td>
</tr>
<tr>
<td>Last online</td>
<td>#last online=2012-09-14</td>
<td></td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Device tags</td>
<td>#tag=demo</td>
<td></td>
<td>x</td>
<td>x</td>
<td>Allowed values: yes, no (filters for devices with or without topology information)</td>
</tr>
<tr>
<td>Topology</td>
<td>#topology=yes</td>
<td></td>
<td>x</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>
### 20.1.3 List View Gateways

<table>
<thead>
<tr>
<th>Name</th>
<th>Example</th>
<th>Alias</th>
<th>OR</th>
<th>W*card</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gateway-ID</td>
<td>#gateway-id=1234</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>State</td>
<td>#state=online</td>
<td>#online</td>
<td>x</td>
<td>-</td>
<td>Allowed values: online, offline</td>
</tr>
<tr>
<td>Type</td>
<td>#type=SonoCollect</td>
<td></td>
<td>x</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Vendor</td>
<td>#vendor=danfoss*</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Model</td>
<td>#model=110*</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Location</td>
<td>location=<em>ulvehavevej 61</em></td>
<td></td>
<td>x</td>
<td>x</td>
<td>“Location” is combined from Postcode, City and Street</td>
</tr>
<tr>
<td>City</td>
<td>#city=vejle</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Street</td>
<td>#street=ulvehavevej*</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Postcode</td>
<td>#postcode=7100*</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Firmware version</td>
<td>#firmware version=1.2.3</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Mode</td>
<td>#mode=slave</td>
<td>#slave</td>
<td>x</td>
<td>-</td>
<td>Allowed values: slave, standalone, master</td>
</tr>
<tr>
<td></td>
<td></td>
<td>#stand-alone</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>#master</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Last online</td>
<td>#last online=2012-09-14</td>
<td></td>
<td>-</td>
<td>-</td>
<td>See Section Filtering date fields for further examples</td>
</tr>
<tr>
<td>Device tags</td>
<td>#tag=demo</td>
<td></td>
<td>x</td>
<td>x</td>
<td>Allowed values: yes, no</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(filters for devices with or without topology information)</td>
</tr>
<tr>
<td>Topology</td>
<td>#topology=yes</td>
<td></td>
<td>x</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

### 20.1.4 List View Meter

<table>
<thead>
<tr>
<th>Name</th>
<th>Example</th>
<th>Alias</th>
<th>OR</th>
<th>W*card</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meter ID</td>
<td>#meter id=viMeter25</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>State</td>
<td>#state=online</td>
<td>#online</td>
<td>x</td>
<td>-</td>
<td>Allowed values: online, offline</td>
</tr>
<tr>
<td></td>
<td></td>
<td>#offline</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Division</td>
<td>#division=power</td>
<td></td>
<td>x</td>
<td>-</td>
<td>Allowed values: all divisions available in the system</td>
</tr>
<tr>
<td>Point of delivery</td>
<td>#point of delivery=DE123*</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Location</td>
<td>location=<em>ulvehavevej 61</em></td>
<td></td>
<td>x</td>
<td>x</td>
<td>“Location” is combined from Postcode, City and Street</td>
</tr>
<tr>
<td>City</td>
<td>#city=vejle</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Street</td>
<td>#street=ulvehavevej*</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Postcode</td>
<td>#postcode=7100*</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Meter read</td>
<td>#meter read&lt;1</td>
<td></td>
<td>x</td>
<td>x</td>
<td>Operators &lt;,&gt; allowed</td>
</tr>
<tr>
<td>MU</td>
<td>#mu=kWh</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------</td>
<td>----------------</td>
<td>---</td>
<td>---</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Last online</td>
<td>#last online= 2012-09-14</td>
<td>-</td>
<td>-</td>
<td>See Section Filtering date fields for further examples</td>
<td></td>
</tr>
<tr>
<td>Last dataset</td>
<td>#last dataset= 2012-09-14</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td>#type=demo</td>
<td>x</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group</td>
<td>#group=testgroup</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meter-Security-ID</td>
<td>#meter-security-id= 282*</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SAP Equipment ID</td>
<td>#sap equipment id= 214</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Firmware version</td>
<td>#firmware version= 1.2.3</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inventory state</td>
<td>#inventory state= in storage</td>
<td>x</td>
<td>-</td>
<td>Allowed values: in storage, quality control, disposed, uninstalled, installed, unknown</td>
<td></td>
</tr>
<tr>
<td>Management state</td>
<td>#management state= connected</td>
<td>x</td>
<td>-</td>
<td>Allowed values: connected, registered, entrance, move out</td>
<td></td>
</tr>
<tr>
<td>Device tags</td>
<td>#tag=private</td>
<td>x</td>
<td>-</td>
<td>Allowed values: yes, no (filters for devices with or without topology information)</td>
<td></td>
</tr>
<tr>
<td>Topology</td>
<td>#topology=yes</td>
<td>x</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply</td>
<td>#supply=on</td>
<td>x</td>
<td>-</td>
<td>Allowed values: on, off, ready</td>
<td></td>
</tr>
</tbody>
</table>

### 20.1.5 List View Customers

<table>
<thead>
<tr>
<th>Name</th>
<th>Example</th>
<th>Alias</th>
<th>OR</th>
<th>W*card</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>#name=sabine</td>
<td></td>
<td>x</td>
<td>x</td>
<td>“Name” is a combination of Firstname and Surname</td>
</tr>
<tr>
<td>State</td>
<td>#state=active</td>
<td>#active #inactive</td>
<td>x</td>
<td>-</td>
<td>Allowed values: active, inactive</td>
</tr>
<tr>
<td>Customer type</td>
<td>#customer type= private</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Customer ID</td>
<td>#customer id=125*</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Meter ID</td>
<td>#meter id=viMeter25</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Contract ID</td>
<td>#contract id=666*</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Company</td>
<td>#company=danfoss</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
</tbody>
</table>
## List View Processes

<table>
<thead>
<tr>
<th>Name</th>
<th>Example</th>
<th>Alias</th>
<th>OR</th>
<th>W* card</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process</td>
<td>#process=sap*</td>
<td>#inactive, #ready, #executing, #erroneous, #successful, #deleted</td>
<td>x</td>
<td></td>
<td>Allowed values: inactive, ready, executing, successful, erroneous, deleted. Aliases only available for AMR processes, operational processes and inform processes.</td>
</tr>
<tr>
<td>State</td>
<td>#state=successful</td>
<td>X</td>
<td></td>
<td></td>
<td>Operators =, &lt;, &gt; allowed</td>
</tr>
<tr>
<td>Progress</td>
<td>#progress&gt;0</td>
<td>X</td>
<td></td>
<td></td>
<td>Operators =, &lt;, &gt; allowed</td>
</tr>
<tr>
<td>Retries</td>
<td>#retries&gt;1</td>
<td>X</td>
<td></td>
<td></td>
<td>Retrieves all processes that have been initiated in September 2012. See Section Filtering date fields for further examples.</td>
</tr>
<tr>
<td>Process init</td>
<td>#process init=2012-09</td>
<td>X</td>
<td></td>
<td></td>
<td>Retrieves all processes that have been initiated in September 2012. See Section Filtering date fields for further examples.</td>
</tr>
<tr>
<td>Process completed</td>
<td>#process completed=2012-08~2012-09-15</td>
<td>X</td>
<td></td>
<td></td>
<td>Retrieves all processes that have been completed between 1st Aug 2012 and 15th Sep 2012.</td>
</tr>
<tr>
<td>Process start</td>
<td>#process start&gt;2012-09-15</td>
<td>X</td>
<td></td>
<td></td>
<td>Retrieves all processes that have been started after 15th Sep 2012.</td>
</tr>
<tr>
<td>Priority</td>
<td>#priority=high</td>
<td>X</td>
<td></td>
<td></td>
<td>Allowed values: normal, high. Available only for Operational and AMR processes.</td>
</tr>
<tr>
<td>Process ID</td>
<td>#process id = OP.4*</td>
<td>X</td>
<td></td>
<td></td>
<td>Available only for Operational and AMR processes.</td>
</tr>
<tr>
<td>Parent Process ID</td>
<td>#parent process id=OP.400</td>
<td>X</td>
<td></td>
<td></td>
<td>Retrieves all child processes generated by the parent process. Available only for Operational and AMR processes.</td>
</tr>
</tbody>
</table>
### 20.1.7 List View Tariffs

<table>
<thead>
<tr>
<th>Name</th>
<th>Example</th>
<th>Alias</th>
<th>OR</th>
<th>W*card</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Division</td>
<td>#division=power</td>
<td></td>
<td>x</td>
<td>-</td>
<td>Allowed values are all divisions registered in the system.</td>
</tr>
<tr>
<td>State</td>
<td>#state=active</td>
<td>#active</td>
<td>x</td>
<td>-</td>
<td>Allowed values: active, inactive</td>
</tr>
<tr>
<td>Tariff name</td>
<td>#tariff name=<em>linear</em></td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Tariff number</td>
<td>#tariff number=<em>linear</em></td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
</tbody>
</table>

### 20.1.8 List Views Configuration - Meter / Communication

<table>
<thead>
<tr>
<th>Name</th>
<th>Example</th>
<th>Alias</th>
<th>OR</th>
<th>W*card</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device ID</td>
<td>#device id=<em>3894</em></td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>State</td>
<td>#state=online</td>
<td>#online</td>
<td>x</td>
<td>-</td>
<td>Allowed values: online, offline.</td>
</tr>
<tr>
<td>Location</td>
<td>#location=<em>vejle</em></td>
<td>#city=vejle</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td>#postcode=7100            #street=ulvehavevej#house number=61</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group</td>
<td>#group=network*</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Last online</td>
<td>#last online=2012-09-14</td>
<td></td>
<td>-</td>
<td>-</td>
<td>See Section Filtering date fields for further examples.</td>
</tr>
<tr>
<td>Type</td>
<td>#type=danfoss*</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>SAP Equipment ID</td>
<td>#sap equipment id=124*</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Device tags</td>
<td>#tag=demo</td>
<td></td>
<td>x</td>
<td>x</td>
<td>Allowed values: all divisions available in the system. Filter command works only for meters.</td>
</tr>
<tr>
<td>Division</td>
<td>#division=power</td>
<td></td>
<td>x</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

### 20.1.9 List View Managers

<table>
<thead>
<tr>
<th>Name</th>
<th>Example</th>
<th>Alias</th>
<th>OR</th>
<th>W*card</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manager</td>
<td>#manager=muster*</td>
<td></td>
<td>x</td>
<td>x</td>
<td>Allowed values: active, inactive, validation in progress.</td>
</tr>
<tr>
<td>Active</td>
<td>#active=active</td>
<td>#active</td>
<td>x</td>
<td>-</td>
<td>Allowed values: active, inactive, validation in progress.</td>
</tr>
<tr>
<td>Name</td>
<td>#name=mustermann*</td>
<td>#firstname=ma* #surname=muster*</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Company</td>
<td>#company=danf*</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Role</td>
<td>#role=manager</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Created</td>
<td>#created=2012-09-14</td>
<td></td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>
20.1.10 List Views for Estimation Rules and Validation Rules

<table>
<thead>
<tr>
<th>Name</th>
<th>Example</th>
<th>Alias</th>
<th>OR</th>
<th>W*card</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>#name=Reference1*</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Method</td>
<td>#method=Referenceprofile</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Description</td>
<td>#description=<em>Interpolation</em></td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Created</td>
<td>#create at &gt; 2015-02-01</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Retrieves all rules, that have been created after Feb 1st, 2015. See Section Filtering date fields for further examples.</td>
</tr>
</tbody>
</table>

20.2 Available Monitoring Values

All monitoring values available within the SonoEnergy Control Panel are listed below. The table headings are the respective monitor groups, that can be activated or deactivated within the SECP (see Section Configuration of Monitor Groups).

User related monitoring
- How many customers are online?
- User logins
- How many customers logged in since last measurement?
- How long are customers online on average?
- How long are customers online on average since last measurement?

Customer related monitoring
- Registered customers
- Registered customers (approved)
- Registered customers (inactive)
- Registered customers (removed)
- Registered customers (blocked)
- Customers with logins (active)
- Customers with logins (inactive)

Operational processes monitoring
- Operational processes – Errors
- Operational processes – Waiting
- Operational processes – Active

AMR processes monitoring
- AMR Processes – Device
- AMR Processes – Error
- AMR Processes – Waiting
- AMR Processes – Active

Inform processes monitoring
- Inform processes – Errors
- Inform processes – Waiting
- Inform processes – Active
**Inventory state meter**
- Meter online by Inventory state
- Meter online In Storage
- Meter online En route
- Meter online Installed
- Meter online Removed
- Meter online Disposed

**Management state meter**
- Meter online by management state (sum)
- Meter online Registered
- Meter online Connected
- Meter online Move-in
- Meter online Move-out

**Gateway monitoring online**
- Gateway online per device type (sum)
- Gateway online SonoCollect 110
- Gateway online Demo

**Gateway monitoring offline**
- Gateway offline per devicetype (sum)
- Gateway offline SonoCollect 110
- Gateway offline Demo

**Com. Module monitoring online**
- Com. Module online per device type (sum)
- Com. Module online M-Bus
- Com. Module online Danfoss
- Com. Module online wireless M-Bus

**Com. Module monitoring offline**
- Com. Module offline per device type (sum)
- Com. Module offline M-Bus
- Com. Module offline Danfoss
- Com. Module offline wireless M-Bus

**Meter monitoring online**
- Meter online per device type (sum)
- Meter online M-Bus
- Meter online SonoSelect 110
- Meter online SonoSafe 110
- Meter online SonoMeter 30
- Meter online SonoMeter 500
- Meter online wireless M-Bus
- Meter online Demo
- Meter online SonoMeter 1100
- Meter online virtual motor
Meter monitoring offline
- Meter offline per device type (sum)
- Meter offline M-Bus
- Meter offline SonoSelect 110
- Meter offline SonoSafe 110
- Meter offline SonoMeter 30
- Meter offline SonoMeter 500
- Meter offline wireless M-Bus
- Meter offline Demo
- Meter offline SonoMeter 1100
- Meter offline virtual motor

Message monitoring
- Message counter (SBS)
- Number of AMR processes run (SBS)
- Number of AMR processes successfully (SBS)
- Number of AMR processes faulty (SBS)
- Success rate AMR processes (SBS)
- Meter reads count (SBS)
- Meter reads target count MAX (based on interval / register)
- Meter reads target count MIN (based on interval / register)

Meter count monitoring
- How many meters are registered in SonoEnergy? (Sum)
- How many real meters are registered in SonoEnergy? (without type DEMO 199)
- How many active meters are registered in SonoEnergy? (without type DEMO 199, in inv.state installed, qua.con)
- How many meters per inventory state are registered in SonoEnergy? (installed)
- How many meters per inventory state are registered in SonoEnergy? (uninstalled)
- How many meters per inventory state are registered in SonoEnergy? (quality control)
- How many meters per inventory state are registered in SonoEnergy? (disposed)
- How many meters per inventory state are registered in SonoEnergy? (in storage)

Meter per division monitoring online
- Meter online per division (sum)
- Meter online power
- Meter online HKV
- Meter online cooling
- Meter online heat
- Meter online gas
- Meter online water cold
- Meter online water hot

Meter per division monitoring offline
- Meter offline per division (sum)
- Meter offline power
- Meter offline HKV
- Meter offline cooling
- Meter offline heat
- Meter offline gas
- Meter offline water cold
- Meter offline water hot
Tariff monitoring (schemes)

- Contracts per tariff schema (sum)
- Contracts per tariff schema linear
- Contracts per tariff schema thresholds
- Contracts per tariff schema bestprice
- Contracts per tariff schema linear 2PZ
- Contracts per tariff schema threshold 2PZ
- Contracts per tariff schema bestprice 2PZ
- Contracts per tariff schema linear 3PZ
- Contracts per tariff schema threshold 3PZ
- Contracts per tariff schema bestprice 3PZ
- Contracts per tariff schema local
- Contracts per tariff schema bestprice TR

Alarm monitoring

- Alarms (all)
- Alarms (inform)
- Warnings
- Alarms (critic)

License

- License (Meters)

20.3 List of Alarm Codes

In the Online Help of the SonoEnergy Control Panel (that is, the HTML version of the User Manual at hand), the list of alarm codes will be displayed here. Outside the SonoEnergy Control Panel, please use the document “SonoEnergy Alarm Codes”, which is available separately. Further information on alarms and events can be found in Chapter Alarms and Events.

20.4 Available Device Control Transactions

Which Device Control Transactions (DCTs) are available in the SonoEnergy Control Panel (for instance via functions in the tool boxes), depends on the type of connected devices, the project setup and the permissions of the currently logged in manager. Danfoss provides for every project a matrix displaying supported DCTs for all connected devices.

Please contact the project management or support for further information.

20.5 Project-Specific Settings

A large number of parameters within the SonoEnergy Control Panel and the connected devices are configuration options or will be customized. This includes:

- IDs for types of meters, types of communication modules, types of gateways
- (dynamic) device parameters for meter, communication modules, gateways
- available DCTs
- supported device status
- alarm and error codes that are being used
- available tariff templates
- mapping of OBIS codes

Please contact the project management or support for further information.
# 21 List of Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMI</td>
<td>Advanced Metering Infrastructure</td>
</tr>
<tr>
<td>AMM</td>
<td>Advanced Meter Management</td>
</tr>
<tr>
<td>AMR</td>
<td>Automated Meter Reading</td>
</tr>
<tr>
<td>API</td>
<td>Application Programming Interface</td>
</tr>
<tr>
<td>APN</td>
<td>Access Point Name</td>
</tr>
<tr>
<td>CAM</td>
<td>Conservation Adjustment Mechanism</td>
</tr>
<tr>
<td>CHP</td>
<td>Combined Heat and Power</td>
</tr>
<tr>
<td>COSEM</td>
<td>Companion Specification for Energy Metering</td>
</tr>
<tr>
<td>CSV</td>
<td>Comma Separated Values</td>
</tr>
<tr>
<td>CT</td>
<td>Current Transformer</td>
</tr>
<tr>
<td>DCT</td>
<td>Device Control Transaction</td>
</tr>
<tr>
<td>DEMS</td>
<td>Decentralized Energy Management System</td>
</tr>
<tr>
<td>DLMS</td>
<td>Device Language Message Specification</td>
</tr>
<tr>
<td>DMS</td>
<td>Distribution Management System</td>
</tr>
<tr>
<td>DSO</td>
<td>Distribution System Operator</td>
</tr>
<tr>
<td>EAN</td>
<td>International Article Number</td>
</tr>
<tr>
<td>EDIFACT</td>
<td>Electronic Data Interchange For Administration, Commerce and Transport</td>
</tr>
<tr>
<td>EDM</td>
<td>Energy Data Management</td>
</tr>
<tr>
<td>FAN</td>
<td>Field Area Network</td>
</tr>
<tr>
<td>GPL</td>
<td>Gas Pressure Level</td>
</tr>
<tr>
<td>GPRS</td>
<td>General Packet Radio Service</td>
</tr>
<tr>
<td>HAN</td>
<td>Home Area Network</td>
</tr>
<tr>
<td>HCA</td>
<td>Heat Cost Allocator</td>
</tr>
<tr>
<td>HSM</td>
<td>Hardware Security Module</td>
</tr>
<tr>
<td>IPT</td>
<td>IP Telemetry</td>
</tr>
<tr>
<td>LDAP</td>
<td>Lightweight Directory Access Protocol</td>
</tr>
<tr>
<td>M-BUS</td>
<td>Meter-Bus</td>
</tr>
<tr>
<td>MDM</td>
<td>Meter Data Management</td>
</tr>
<tr>
<td>MDUS</td>
<td>Meter Data Unification and Synchronization</td>
</tr>
<tr>
<td>MOC</td>
<td>Meter Operation Center</td>
</tr>
<tr>
<td>MUCONS</td>
<td>Metered Services Consumption Report Message</td>
</tr>
<tr>
<td>MUC</td>
<td>Multi Utility Communication Controller</td>
</tr>
</tbody>
</table>
### Abbreviation Explanation

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>NIS</td>
<td>Network Information System</td>
</tr>
<tr>
<td>NMS</td>
<td>Network Management System</td>
</tr>
<tr>
<td>NOC</td>
<td>Network Operation Center</td>
</tr>
<tr>
<td>OBIS</td>
<td>Object Identification System</td>
</tr>
<tr>
<td>OMS</td>
<td>Open Metering Standard</td>
</tr>
<tr>
<td>OSGP</td>
<td>Open Smart Grid Protocol</td>
</tr>
<tr>
<td>OTAP</td>
<td>Over The Air Provisioning</td>
</tr>
<tr>
<td>PKI</td>
<td>Public Key Infrastructure</td>
</tr>
<tr>
<td>PLC</td>
<td>Power Line Communication</td>
</tr>
<tr>
<td>SCADA</td>
<td>Supervisory Control and Data Acquisition</td>
</tr>
<tr>
<td>SCM</td>
<td>Smart Communication Module</td>
</tr>
<tr>
<td>SECP</td>
<td>SonoEnergy Control Panel</td>
</tr>
<tr>
<td>SFTP</td>
<td>Secure File Transfer Protocol</td>
</tr>
<tr>
<td>SML</td>
<td>Smart Message Language</td>
</tr>
<tr>
<td>SNMP</td>
<td>Simple Network Management Protocol</td>
</tr>
<tr>
<td>TOU</td>
<td>Time of Use codes</td>
</tr>
<tr>
<td>UAA</td>
<td>Universal AMI Adapter</td>
</tr>
<tr>
<td>UTILMD</td>
<td>Utilities Master Data message</td>
</tr>
<tr>
<td>VEE</td>
<td>Validation, Estimation and Editing</td>
</tr>
<tr>
<td>VT</td>
<td>Voltage Transformer</td>
</tr>
</tbody>
</table>
## Glossary

<table>
<thead>
<tr>
<th>Term</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Access Point Name (APN)</strong></td>
<td>Access point within a wireless network, that allows access to an external packet-oriented network.</td>
</tr>
<tr>
<td><strong>Accounting value</strong></td>
<td>Term of the SonoEnergy core. Includes values which are important for accounting and billing purposes.</td>
</tr>
<tr>
<td><strong>Active Power</strong></td>
<td>See Real Power.</td>
</tr>
<tr>
<td><strong>Advanced Meter Management (AMM)</strong></td>
<td>Advanced Meter Management is a functional unit within the AMI. When SonoEnergy is used as an AMM system it communicates with MUCs, meters, or head-end systems. SonoEnergy manages these devices and their configurations and converts data to standard formats before sending it to applications such as MDM systems.</td>
</tr>
<tr>
<td><strong>Advanced Metering Infrastructure (AMI)</strong></td>
<td>Advanced metering infrastructure is an architecture for automated, two-way communication between smart utility meters and a utility management infrastructure. Its components include meters, gateways, communication technologies, server of head-end-systems and IP-T servers as well as the AMM systems.</td>
</tr>
<tr>
<td><strong>Alarm</strong></td>
<td>Event which causes an action. The alarm may be a trigger to generate a notification e-mail, a SNMP trap or to start another process.</td>
</tr>
<tr>
<td><strong>Apparent Power</strong></td>
<td>The apparent power ( S ) is the total of power in an electrical AC circuit. It is calculated from Real Power ( P ) and Reactive Power ( Q ) and given in Voltamperes (VA).</td>
</tr>
<tr>
<td><strong>Automated Meter Reading (AMR)</strong></td>
<td>Automated Meter Reading is a technology to collect meter data from devices and transfer it to the utility (one-way communication).</td>
</tr>
<tr>
<td><strong>Comma Separated Values (CSV)</strong></td>
<td>File format to store tabular data in plain-text form.</td>
</tr>
<tr>
<td><strong>Communication Module</strong></td>
<td>The communication module is a device to allow two-way communication between measuring units (meters) and the management infrastructure. It stores values and is responsible for communication towards gateways. The communication module can be part of a smart meter or a separate device. The term Functional Module may be used as synonym.</td>
</tr>
<tr>
<td><strong>Conservation Adjustment Mechanism (CAM)</strong></td>
<td>Conservation Adjustment Mechanism is a charge on gas bills that is used to fund gas efficiency programs.</td>
</tr>
<tr>
<td><strong>Current Transformer (CT)</strong></td>
<td>When current in a circuit is too high to apply directly to measuring instruments, a current transformer(CT) produces a reduced secondary current proportional to the primary current in the circuit, which can be connected to measuring and recording instruments.</td>
</tr>
<tr>
<td><strong>Device</strong></td>
<td>A device is an abstract SonoEnergy object. Each physical or virtual device or component in the system is represented by a Device within SonoEnergy. Depending on the device it contains for instance settings, Device Control Transactions, registers, monitors, actors, sensors.</td>
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## Term Explanation

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<td>Device Control Transaction (DCT)</td>
<td>A Device Control Transaction is an action to control the behaviour of a meter (e.g. switch on/off, on-demand read, connect and disconnect). It can trigger one or more device jobs.</td>
</tr>
<tr>
<td>Device Job</td>
<td>A device job is created by SonoEnergy core process and assigned to one device.</td>
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<tr>
<td>Device Profile</td>
<td>A device profile is a data container in a device (meter, gateway / concentrator). The device profile contains various registers, that are usually grouped by their measurement interval. These registers store consumption data and are identified by their own OBIS codes. Device profiles are addressed by vendor-specific OBIS codes.</td>
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<tr>
<td>Distribution Management System (DMS)</td>
<td>Network management system of the network operator.</td>
</tr>
<tr>
<td>Distribution System Operator (DSO)</td>
<td>Company that is licensed to distribute electricity from the transmission grid to homes and businesses.</td>
</tr>
<tr>
<td>Dynamic Pricing</td>
<td>See Spot Price</td>
</tr>
<tr>
<td>Electronic Data Interchange For Administration, Commerce and Transport (EDIFACT)</td>
<td>Standard for electronic communication across all industries.</td>
</tr>
<tr>
<td>Estimation</td>
<td>See Value Replacement.</td>
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<tr>
<td>Event</td>
<td>Events are notifications about activities and status changes within the system. Events can be generated by meters, communication modules, gateways or SonoEnergy and are gathered and stored in gateways.</td>
</tr>
<tr>
<td>Four Quadrant Meter</td>
<td>A four quadrant meter is able to measure and record active and reactive energy for both directions of the energy flow.</td>
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<tr>
<td>Functional Module</td>
<td>See Communication Module.</td>
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<tr>
<td>Gateway</td>
<td>Communication device between meter (or communication module respectively) and AMI. The term Smart Communication Module may be used as a synonym.</td>
</tr>
<tr>
<td>Gateway Administrator</td>
<td>As defined in the Protection Profile for Smart Metering Gateways the gateway administrator is an authority, that installs, configures, monitors and controls a smart meter gateway.</td>
</tr>
<tr>
<td>General Packet Radio Service (GPRS)</td>
<td>General Packet Radio Service is a packet-switching technology that enables data transfers through cellular networks.</td>
</tr>
<tr>
<td>Hardware Security Module (HSM)</td>
<td>A hardware security module is a physical computing device that manages digital keys for strong authentication and provides crypto processing without revealing decrypted data. In the field of smart metering, it can also be attached to meters or gateways.</td>
</tr>
<tr>
<td>Initial Meter Read</td>
<td>Value on the meter at the beginning of the measurement.</td>
</tr>
<tr>
<td>International Article Number (EAN)</td>
<td>13-digit barcode for the identification of products.</td>
</tr>
<tr>
<td>Inverter</td>
<td>Electrical power converter that changes direct current (DC) to alternating current (AC).</td>
</tr>
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<tr>
<td>IP Telemetry (IPT)</td>
<td>Standardized protocol which enables incoming and outgoing connections via GPRS by means of an external server.</td>
</tr>
<tr>
<td>Load Shedding</td>
<td>Load Shedding is an intentionally engineered electrical power shutdown over different parts of the distribution region. Load shedding is a last-resort measure to avoid a total blackout of the power system.</td>
</tr>
<tr>
<td>Macro</td>
<td>Predefined series of commands; process or action for mass processing.</td>
</tr>
<tr>
<td>Manager</td>
<td>In the context of SonoEnergy a manager is the user of the operator portal / SonoEnergy control panel. There are different roles for managers, with each role having specific rights assigned.</td>
</tr>
<tr>
<td>Meter</td>
<td>A meter is a measuring unit. In the context of SonoEnergy it is always connected with a communication module.</td>
</tr>
<tr>
<td>Meter Data Management (MDM)</td>
<td>Meter Data Management is a functional unit within the AMI. It includes management and storage of meter data, its validation and preparation for billing and analysis.</td>
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<tr>
<td>Meter Data Unification and Synchronization (MDUS)</td>
<td>Interface specification for web services by SAP.</td>
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<td>Meter index</td>
<td>See Meter read.</td>
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<tr>
<td>Meter read</td>
<td>Value which is measured on the meter.</td>
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<td>Meter-Bus (M-BUS)</td>
<td>Meter-Bus is a European Standard for remote reading of consumption meters.</td>
</tr>
<tr>
<td>Metered Services Consumption Report Message (MSCONS)</td>
<td>Standardized format for exchange of consumption data and associated technical data, where the supply is recorded using meters. It is based on the EDIFACT standard.</td>
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<tr>
<td>Monitoring value</td>
<td>Term of the SonoEnergy core. Identified by OBIS codes or other identifiers.</td>
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<td>Northbound API</td>
<td>The Northbound API connects to and communicates with the Meter Operation Center (MOC) and Meter Data Management (MDM).</td>
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<tr>
<td>OBIS code</td>
<td>Codes for data in DLMS/COSEM compliant metering equipment. The concept of OBIS codes is based on a hierarchical structure of different value groups.</td>
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<tr>
<td>OBIS-ID</td>
<td>SonoEnergy-internal representation of OBIS-Codes in form of an (up to) four-digit number.</td>
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<tr>
<td>Operator</td>
<td>See Manager.</td>
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<tr>
<td>Plausibility Check</td>
<td>A plausibility check is performed to identify missing or implausible values (meter reads).</td>
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<tr>
<td>Plugin</td>
<td>In the context of SonoEnergy a plugin is a conversion tool. It converts vendor-specific protocols / data formats to standardized formats for further processing within SonoEnergy.</td>
</tr>
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<td>Power Factor</td>
<td>The power factor is defined as the ratio of the real power P flowing to the load, to the apparent power S in the circuit.</td>
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<td>Power Line Communication carries data on a conductor that is also used simultaneously for AC electric power distribution to consumers.</td>
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<td><strong>Profile</strong></td>
<td>Collection of meter reads based on time, i.e. a time series of one or more registers. Profiles are identified by OBIS codes.</td>
</tr>
<tr>
<td><strong>Protection Profile for Smart Metering Gateways</strong></td>
<td>The Protection Profile is a security standard for smart meter gateways (communication modules). It is issued by the German Bundesamt für Sicherheit in der Informationstechnik.</td>
</tr>
<tr>
<td><strong>Reactive Power</strong></td>
<td>Reactive Power (Q) continually bounces back and forth between source and load, due to the reactive properties of the load. The Reactive Power is given in var.</td>
</tr>
<tr>
<td><strong>Real Power</strong></td>
<td>The portion of power flow that, averaged over a complete cycle of the AC waveform, results in net transfer of energy in one direction. Real power is also referred to as active power and is given in Watt (W).</td>
</tr>
<tr>
<td><strong>Register</strong></td>
<td>A register provides measurement values like consumption, supply of power, or power quality values. Registers are identified by OBIS Codes.</td>
</tr>
<tr>
<td><strong>Role</strong></td>
<td>The role of a user (manager) specifies the permissions for operations within the SECP. Each manager is assigned to one of a hierarchical set of roles.</td>
</tr>
<tr>
<td><strong>S0-interface</strong></td>
<td>The S0-interface is a hardware interface for transmission of measurement data.</td>
</tr>
<tr>
<td><strong>Smart Communication Module (SCM)</strong></td>
<td>See Gateway.</td>
</tr>
<tr>
<td><strong>SNMP trap</strong></td>
<td>SNMP traps enable an agent to notify the management station of significant events by way of an unsolicited SNMP message.</td>
</tr>
<tr>
<td><strong>SonoEnergy Control Panel (SECP)</strong></td>
<td>The SonoEnergy control panel is an internal operator portal for SonoEnergy. It is used to manage the AMI infrastructure, handle measurement data from meters, and provide statistics and reports.</td>
</tr>
<tr>
<td><strong>Southbound API</strong></td>
<td>The Southbound API communicates with meters and device specific plugins. It receives meter readings and forwards commands from the SonoEnergy core to meters and gateways.</td>
</tr>
<tr>
<td><strong>Spot Price</strong></td>
<td>Current price at which a particular supply can be bought or sold at a specified time and place.</td>
</tr>
<tr>
<td><strong>Switching point</strong></td>
<td>Point in time at which the system switches tariffs.</td>
</tr>
<tr>
<td><strong>Tag</strong></td>
<td>Keyword which can be used optionally to describe devices.</td>
</tr>
<tr>
<td><strong>Time of Use codes (TOU)</strong></td>
<td>Time of Use codes are configuration tables for a meter. They contain time-based tariff information for the measured product.</td>
</tr>
<tr>
<td><strong>Universal AMI Adapter (UAA)</strong></td>
<td>Universal AMI adapters are ports between AMM and MDM. UAAs transform the collected raw meter data to common data formats for further processing and interpretation.</td>
</tr>
<tr>
<td><strong>Utilities Master Data message (UTILMD)</strong></td>
<td>Standardized format for exchange of master data of devices, which is based on the EDIFACT standard.</td>
</tr>
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## Term Explanation

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<td>Validation</td>
<td>See Plausibility Check.</td>
</tr>
<tr>
<td>Validation, Estimation and Editing (VEE)</td>
<td>Standardized set of rules for validation, plausibility checks and value replacement for metering data.</td>
</tr>
<tr>
<td>Value Replacement</td>
<td>Value Replacement is a collection of methods to replace missing or implausible values (meter reads).</td>
</tr>
<tr>
<td>Voltage Transformer (VT)</td>
<td>A Voltage Transformer (VT) is a transformer used in power systems to step down extra high voltage signals and provide a low voltage signal, for metering or operating a protective relay.</td>
</tr>
<tr>
<td>Z-Wave</td>
<td>Z-Wave is a wireless communications protocol designed for home automation, specifically to remotely control applications in residential and light commercial environments. It is developed by the Z-Wave Alliance.</td>
</tr>
<tr>
<td>ZigBee</td>
<td>Specification for a suite of high level communication protocols using small, low-power digital radios.</td>
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