



E3METER Monitoring Software²

User Manual

Data Concentrator 6.2 revA³

Riedo Networks Ltd⁴

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CHAPTER 1¹

Introduction²

Dear user, thank you for having chosen the E3METER® Monitoring System. E3 stands for Energy, Environment and Efficiency with the goal to increase productivity for your data center monitoring.³

The aim of the E3METER® products is to provide the following main functionalities:⁴

- *Capacity management* ⁵
- *Billing*
- *Safety*

1.1 How to read this User Manual⁶

This User Manual provides information about the configuration options of the E3METER® Monitoring System. For those who want to create a basic configuration it is recommended to read the following chapters in the sequence presented hereafter:⁷

- *Introduction* ⁸
- *Accessing your Data Concentrator (CTR)*
- *Initial setup*
- *Adding meters*
- *Data Concentrator pages*

For those interested in all details, we recommend reading through the entire user manual and ⁹ considering the table of contents and index in order to navigate to the specific area of interest.

1.2 Capacity management¹

Capacity management provides information about the remaining power capacity of a specific rack or data center element. By consulting historic data, this allows the user to forecast by when the available power capacity will be reached and when or where it makes sense to add further data center resources. This information allows you to optimize the installation / maintenance of your system and the involved costs.

1.3 Billing³

Electrical power consumption in an average data center represents more than 50% of the running costs. The billing functionality allows you to know how much energy was consumed by which participant and to accurately bill the respective amount of energy to each participant. The billing functionality provides the exact number of kWh consumed per unit of time.

1.4 Safety⁵

A fully configured E3METER® Monitoring System provides Alarm functionality. Alarm functionality can be configured on the measured parameters: current, temperature and humidity. When the observed parameter reaches the configured alarm threshold, the system immediately notifies the user with an event. One additional safety function consists in phase balancing. Since individual phases can be monitored and analyzed, this information can be used during commissioning or maintenance. You use this information in order to add new devices without exceeding a safety limit for a phase current, preventing from impacting on the system.

1.5 Easy installation⁷

The communication with the meters and Data Concentrator is done via powerline which does not require for additional cabling. Devices can be automatically paired with the Data Concentrator and parameters can be configured for multiple elements at once (bulk configuration/edit). The software comes pre-configured and can be upgraded automatically for both the Data Concentrator and the meters.

These elements make it a plug and play system and allow to get started quickly.⁹

CHAPTER 2¹

Accessing your Data Concentrator (CTR)²

In order to access your Data Concentrator for the first time you need to read the IP address³ of the Data Concentrator on the display on the front panel. First check how your Data Concentrator is connected. It is either connected into a network using DHCP or via static address or not yet connected to a network but directly connected to your PC. By default the Data Concentrator is configured to use DHCP / AutoIP. When the Data Concentrator is connected per AutoIP, make sure to wait for one minute after connection until you read the IP address of the Data Concentrator.

Two different network connections are shown below.⁴

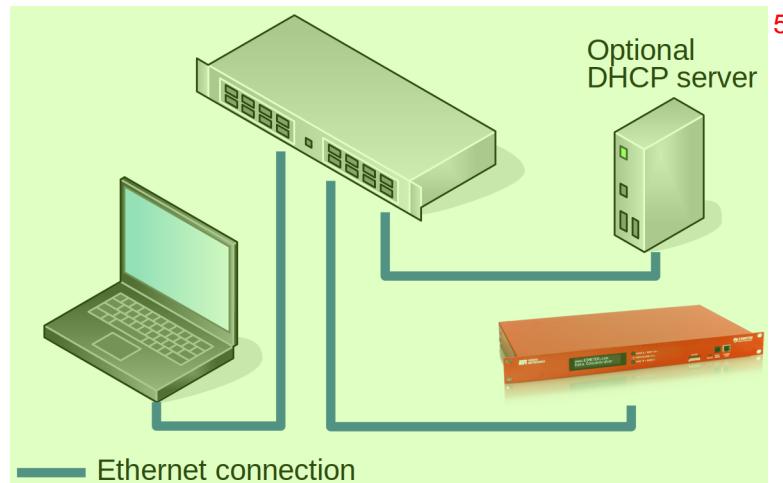


Fig. 1: Connection method 1 in a network with optional DHCP server.⁶



Fig. 2: Connection method 2 in a setup with direct connection using Auto IP. 2

Note: If the Data Concentrator is connected directly to the PC, make sure to configure 3
Link Local in the network configuration of your Linux PC or Mac network card. On your windows PC stick to the option *Automatic* to get an IP address.

Caution: The Ethernet Port of the Data Concentrator is not compatible with Power over 4
Ethernet. Please deactivate Power over Ethernet on the port of the switch / router that will be connected to the Data Concentrator **before** connecting the Ethernet cable. PoE can cause the electronic of the Data Concentrator to malfunction or even destroy it.

2.1 Connect to Data Concentrator⁵

Push the mode button on the front of the Data Concentrator until the IP address is being 6
shown. Then, open your web browser and connect to your Data Concentrator using its IP address and a secure connection (HTTPS).

The following shows a possible URL to be entered in the navigation bar 7

- <https://192.168.1.251> 8

Note: When using Zero Configuration (Bonjour), it is also possible to resolve the address with the serial number of the Data Concentrator. For this you need to enter the URL 9
<https://serial#.local> in the navigation bar. A possible URL would be <https://ctr-005756.local>.

2.2 Secure connection to web page¹⁰

The connection to the web page of the Data concentrator is secured and encrypted using 11
HTTPs. In order to achieve this, a self-signed SSL certificate needs to be accepted in your web browser. With this secured connection you can assure that your valuable data is not accessed maliciously by others. When connecting for the first time to your Concentrator web page, you will be asked to accept that SSL certificate. You need to navigate to the *advanced* section and accept the self signed SSL certificate. The following sections show

examples of how this looks like in the web browsers Chrome, Firefox, Microsoft Edge and **1**
Microsoft Internet Explorer.

Caution: When accepting the default certificate, make sure that it is issued from the
Organization Riedo Networks Ltd. **2**

Note: Customer certificates will come in a later version of the firmware. **3**

2.2.1 Self-signed Certificates **3**

The images below show the windows of the certificates for Chrome browser and Firefox. **4**

2.2.1.1 Google chrome **5**

When connecting to the IP address of the Data Concentrator, the chrome browser will notify **6**
you about a non private connection. You need to click on *ADVANCED*.

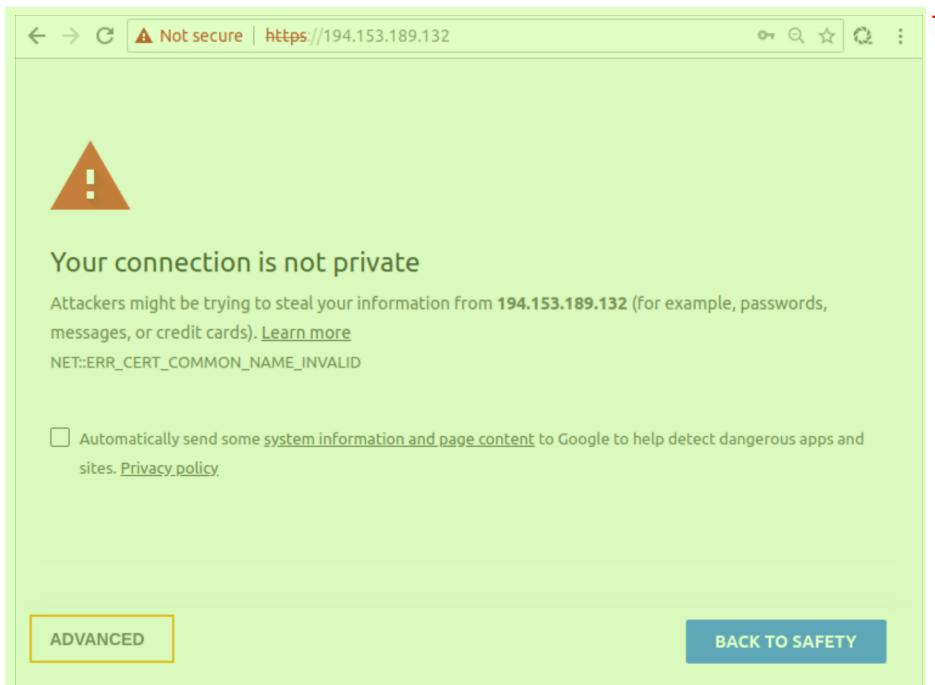


Fig. 3: Self-signed certificate in Chrome connecting via IP address to the Data Concentrator **8**

After clicking on the Advanced button you will need to click on *Proceed to IP address (unsafe)* which will connect you to the web server of your Data Concentrator. **9**

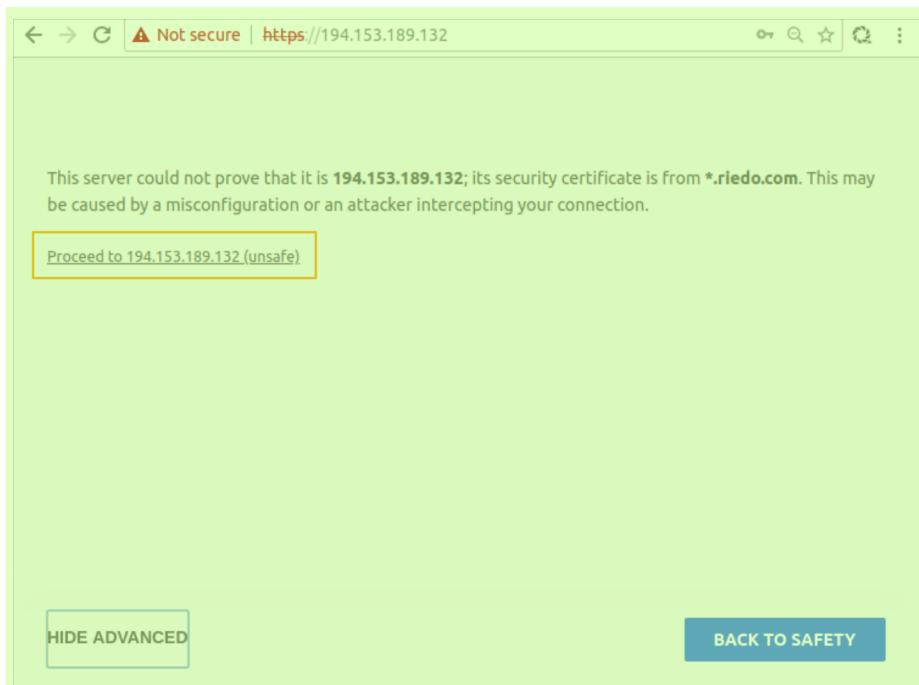


Fig. 4: Self-signed certificate in Chrome showing advanced options 2

2.2.1.2 Firefox 3

When connecting to the IP address of the Data Concentrator, firefox browser will notify you 4 about a non private connection. You need to click on *Advanced*.

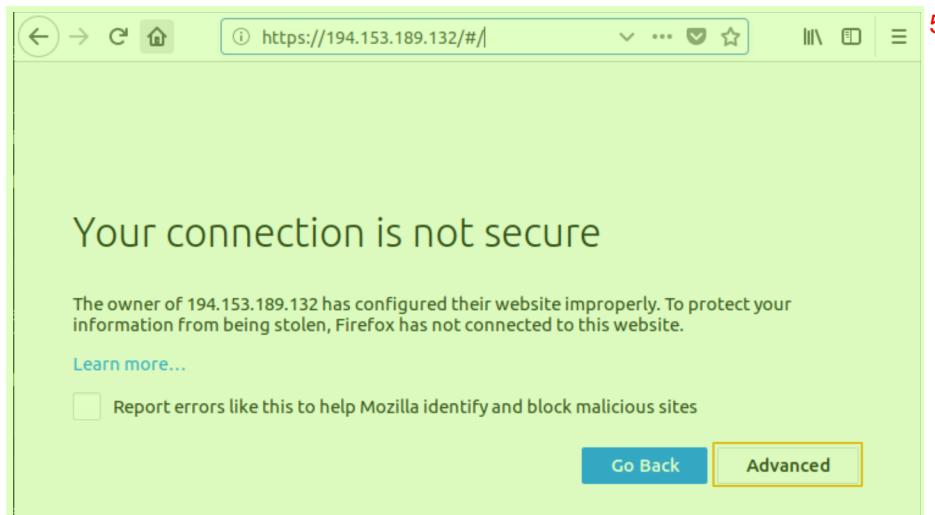


Fig. 5: Self-signed certificate in Firefox 6

After clicking on the *Advanced* button you will need to click on the *Add Exception...* button 7 in order to proceed to the web page.



Fig. 6: Self-signed certificate in Firefox showing *Advanced* options 2

In the last step you need to confirm the security exception for the IP address of the web server 3 of your Data Concentrator.



Fig. 7: Security exception in Firefox 5

2.2.1.3 Microsoft Edge 6

When accessing the Data Concentrator within Microsoft Edge you will see the picture below 7 and need to follow the steps similar to the web browsers Chrome and Firefox.

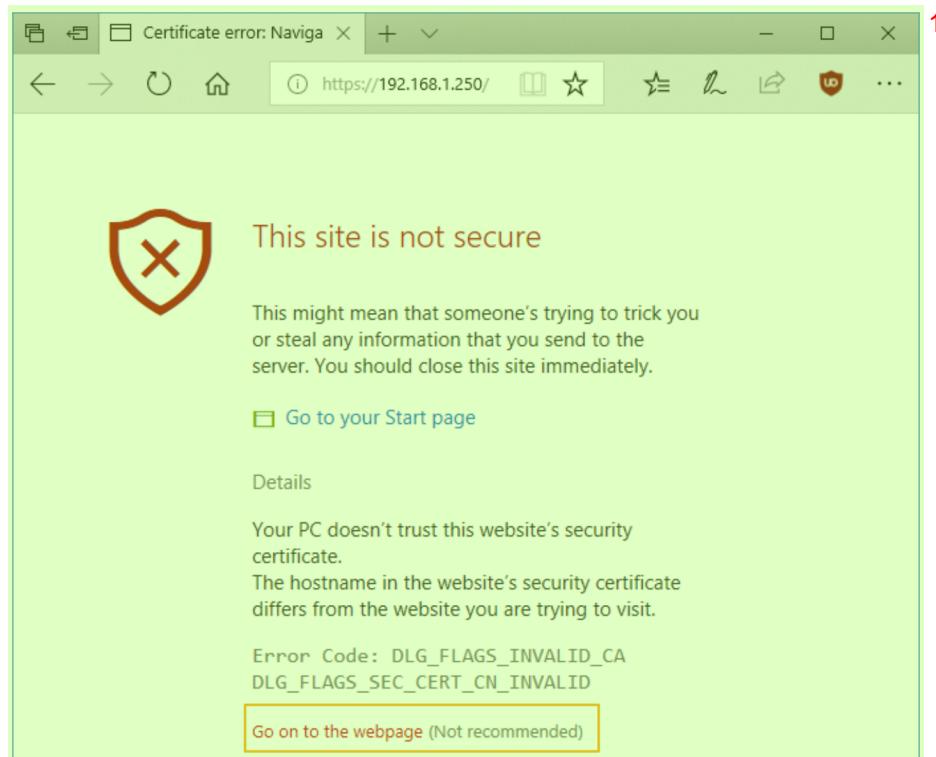


Fig. 8: Microsoft Edge security certificate 2

2.2.1.4 Microsoft Internet Explorer 3

When accessing the Data Concentrator within Microsoft Internet Explorer you will see the 4 picture below and need to follow the steps similar to the web browsers Chrome and Firefox.

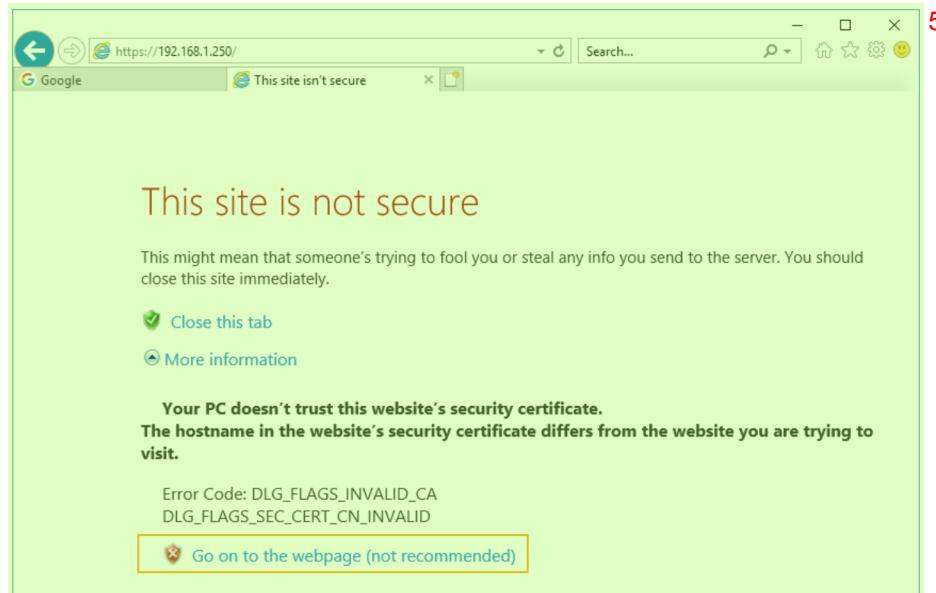


Fig. 9: Microsoft Internet Explorer security certificate 6

2.3 Welcome screen ¹

The image below shows the start screen of the Data Concentrator, asking to log in. ²



Fig. 10: Welcome screen of the Data Concentrator when no user is logged in. ⁴

As long as you are not logged into the Data Concentrator, the menus are not accessible. ⁵ Once you are logged into the Data Concentrator, your user name is shown instead of the login button.

Note: The user interface runs on the following web browsers: Google Chrome, Firefox, ⁶ Microsoft Internet Explorer (version 11), Microsoft Edge, Safari (version 7 or higher).

2.4 User login ⁷

Login is done by clicking on the *Login* button and specifying the user name and password. ⁸

The default login is **admin** and the default password is **admin** as well. ⁹

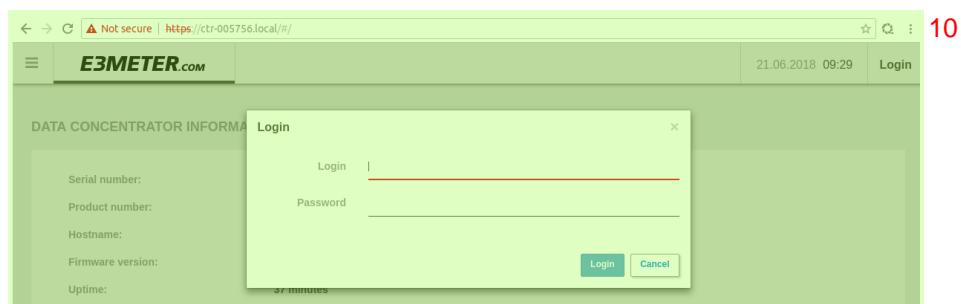


Fig. 11: Blank user login window with user name and password to be entered ¹¹

After the first login please change the password in *User login* under *Modify* as shown in the ¹² pictures below:

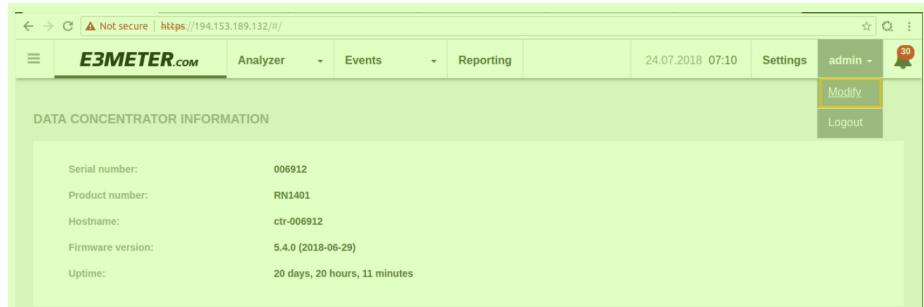


Fig. 12: Accessing User Login modification 2

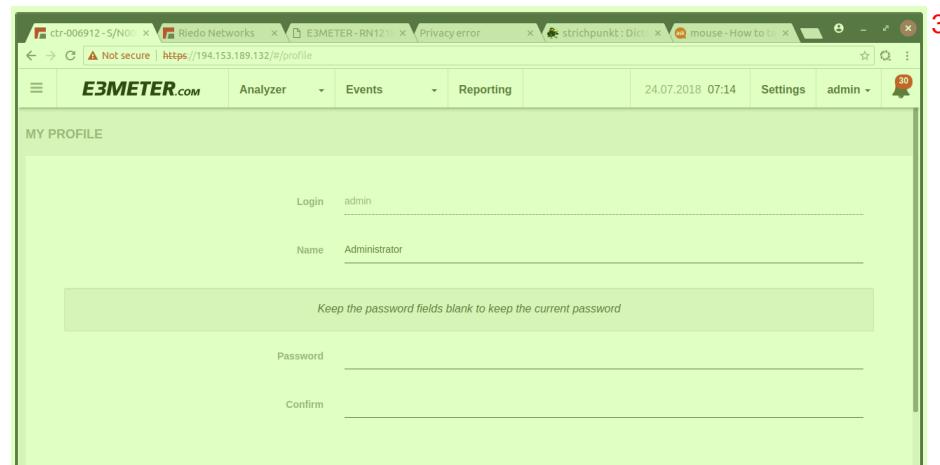


Fig. 13: Modification of user Login 4

Once a user is logged to the Data Concentrator, the name of the currently logged user is 5 shown on top right and the Menu window shows the functions available to the recent user.

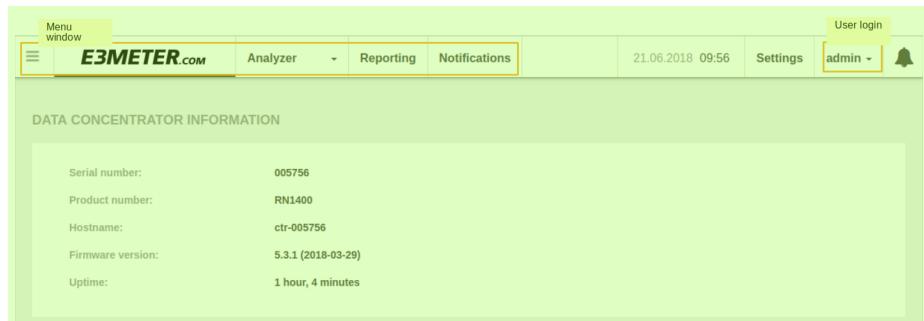


Fig. 14: Welcome screen with user *admin* currently logged in. 7

In order to change user rights you need to be logged in as Administrator. How to change user 8 rights is indicated under advanced settings, see *Changing user rights*.

2.4.1 User rights 9

The user rights are summarized in the table below. 10

Table 1: User Roles **1**

User role	view data	Generate quick report in Metering pages	Notifications/Assignment/Reporting	Configure system	Edit user 2
Administrator	YES	YES	YES	YES	YES
Super user	YES	YES	YES	NO	NO
User	YES	YES	NO	NO	NO

CHAPTER 3¹

Overview of Monitoring Software²

This chapter provides information about the software features. Both the different menus of ³ the software and the main elements of the software are explained in the next sections.

3.1 Software menu structure⁴

The diagram below gives an overview of all the software menus and sub-menus which will ⁵ be explained later on throughout the User Manual.

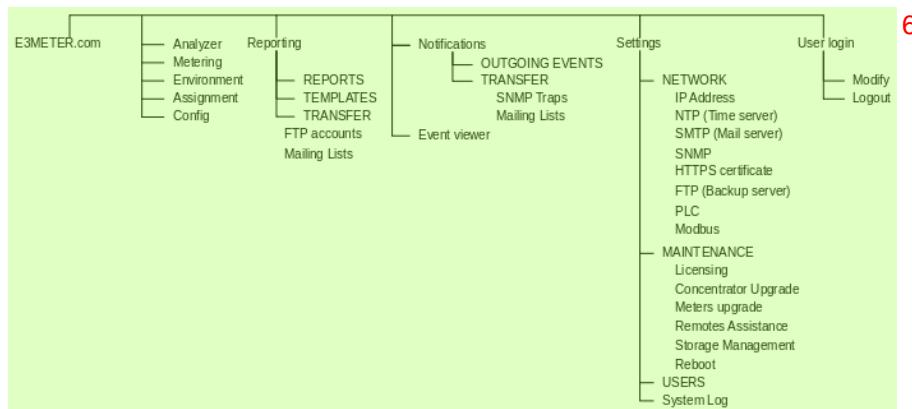


Fig. 1: Data Concentrator overall menu structure ⁷

3.2 Basic elements ¹



Fig. 2: Software basic menus ³

Note: The picture above depicts what a user with Admin user rights will see. User access ⁴ rights are defined in the previous section *User rights*.

In the picture above the basic menus of the Software are indicated after having gained access ⁵ via login. Depending on your user rights, you won't see all of the above mentioned menus and details. Starting from left to right a short overview of the menus and functionalities is given with a reference to the corresponding chapters.

Menu: Will provide you with the detailed informations or group possibilities, see *Groups*. ⁶

Data Concentrator pages: Provides the detailed information of the Data Concentrator to ⁷ analyse data or configure the system, see *Data Concentrator pages*.

Events and Notifications: Allows configuring the events and how to be notified. Furthermore allows browsing all the events from historical data with the event viewer, see *Events and Notifications*. ⁸

Reporting: Provides all the details on report generation and management of templates, see ⁹ *Reporting*.

Time window: Provides the time selection window for analysis of historical data. ¹⁰

Settings: In this menu, the different settings of the system can be edited. The settings are ¹¹ split into *Initial setup* and *Advanced setup*.

Login: The Login window allows to log into the system and is explained in *User login*. ¹²

Notification panel: Shows the last 30 events, see *Notification panel*. ¹³

CHAPTER 4¹

Initial setup²

This chapter provides information about how to get to the initial setup of a running system.³ The information present in this chapter will guide you through the configuration parameters which are mandatory for running a basic system.

For editing parameters explained within this chapter, you need to click on settings first (1.)⁴ and second click on the left menu (2.), which will reveal the different configuration parameters.

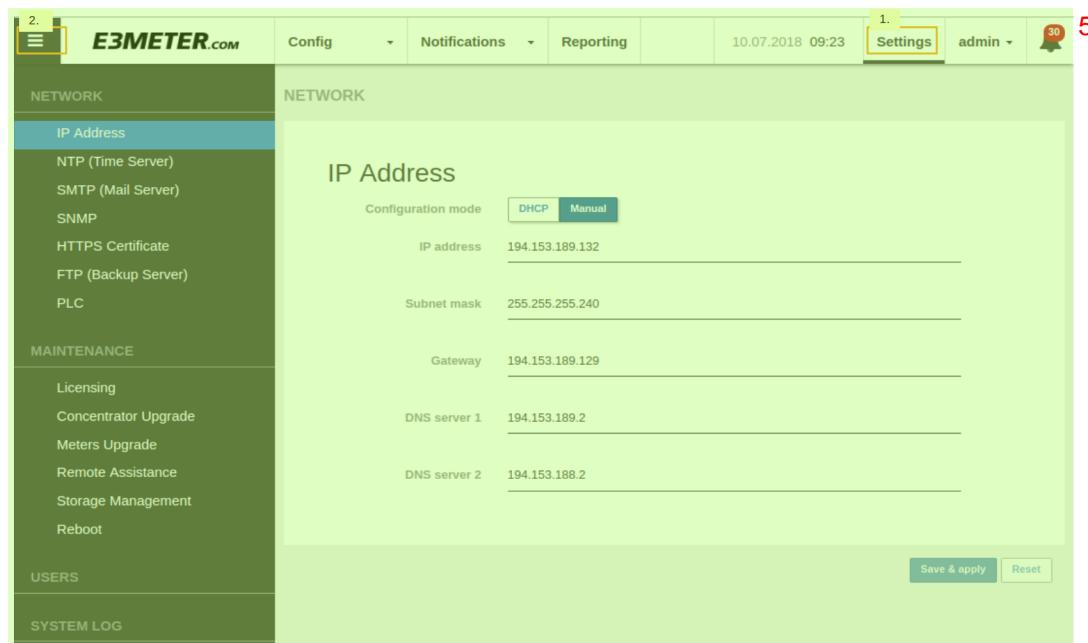


Fig. 1: Steps to follow to access initial setup⁶

Note: The advanced configuration parameters will be shown in the section *Advanced setup*.⁷

4.1 Configure IP address¹

The IP address Configuration mode of the Data Concentrator can either be configured as ² DHCP (automatic) or Manual (static).

If the IP address Configuration mode is set to DHCP, the received parameters will be displayed. ³

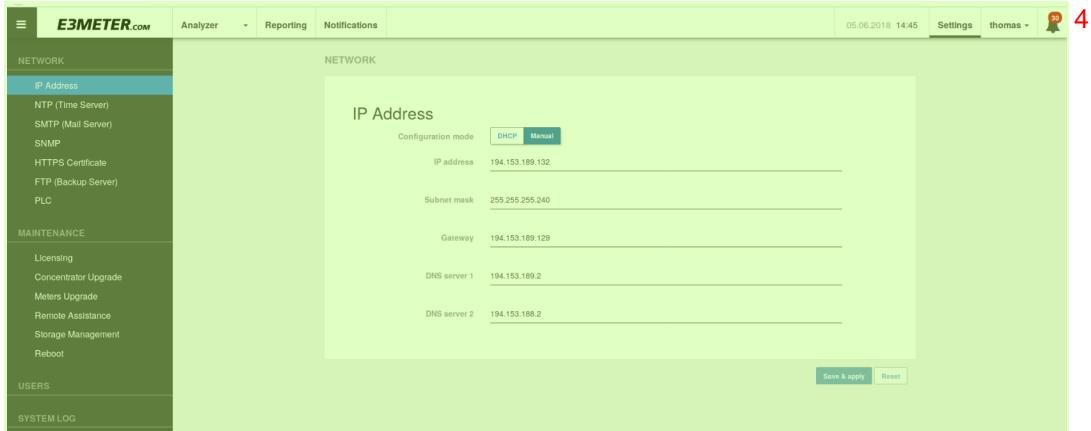


Fig. 2: IP address settings ⁵

If the IP address Configuration mode is set to Manual, all the following parameters need to ⁶ be configured:

- *IP address* ⁷
- *Subnet mask*
- *Gateway address (optional)*
- *DNS server 1 (optional)*
- *DNS server 2 (optional)*

Please ask these parameters from your network administrator. ⁸

Caution: If no DNS server is configured, as a consequence the host-names won't be ⁹ resolved and the IP addresses (instead of host-names) need to be entered for NTP (Time Server), FTP (Backup Server), etc...

4.2 Configure NTP (Time Server)¹⁰

The Data Concentrator uses a global time base (NTP) for the time base of the historical data. Without any valid NTP server, no historic data will be logged. Due to this fact it is recommended to configure multiple NTP servers so that in case one is not reachable the system will be able to switch to another time server. The NTP server can be configured either as url or IP address. ¹¹

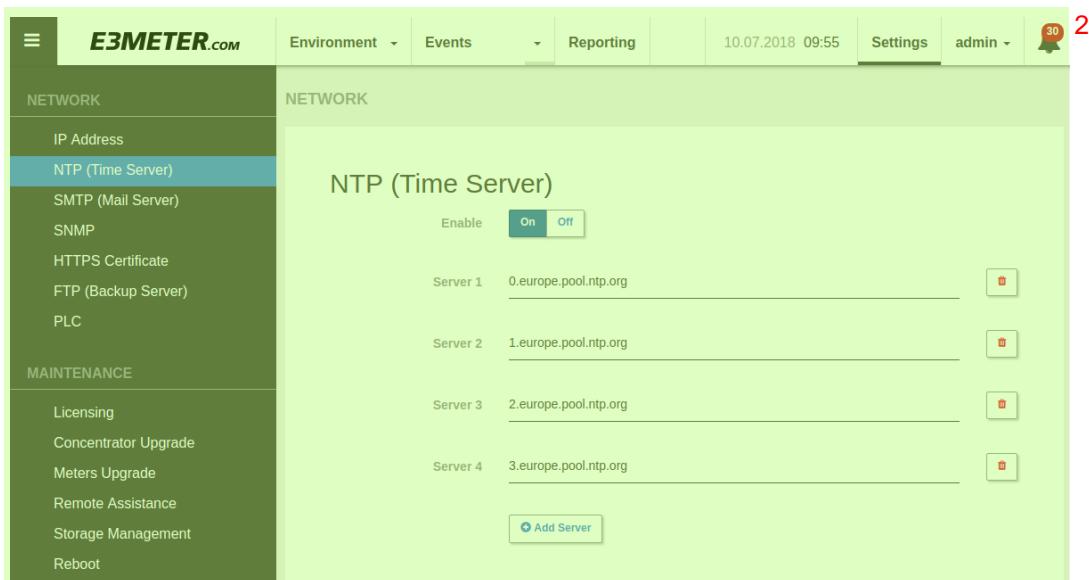


Fig. 3: NTP settings 3

Important: If the NTP server tick box is selected to be off or none is configured, the Data Concentrator won't store historic data. Only the data currently in the RAM will be shown in the Analyzer window, which is roughly the last 4 hours available in the volatile memory. When installing a Data Concentrator from scratch, ntp servers are pre-configured. Depending on your network infrastructure, these time servers that need to be reached via the internet, might be blocked. In that case, configure your own ntp server, that you can reach based on your network infrastructure.

4.3 Add license 5

E3METER® devices provide two types of license. 6

- CAL (Client Access License) 7
- Feature license

Both types of licenses can be purchased from Riedo Networks Ltd. 8

4.3.1 CAL 9

CAL are required, one per meter that is interfaced. CAL license can be purchased for 10, 50 10 and 100 meters.

4.3.2 Feature license 11

Feature licenses are available for two different features, Reporting and Alarm. 12

The Report license allows to generate the reports with the configured templates and get the 13 results.

4.3. Add license 14

Note: You can configure the entire Reporting feature to validate the formatting of your report, but the data values in the report will all be zero as long as you have no valid license for *Reporting*.¹

The Alarm license allows to generate alarms. Without a valid Alarm license, Alarms won't show the detailed information in the notification panel. Furthermore Alarms won't be sent per email neither per SNMP trap without a valid license.²

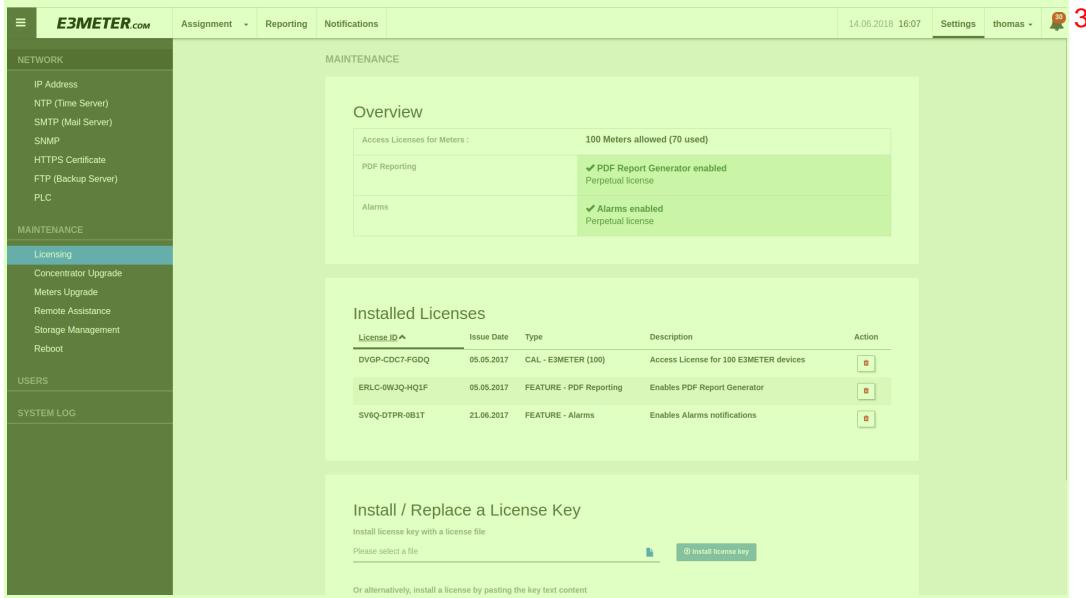


Fig. 4: License management of Data Concentrator⁴

4.4 Firmware upgrade of Data Concentrator⁵

It is possible to either automatically or manually check whether the current firmware is the latest. In the same section the Data Concentrator can be upgraded to a specific revision of the firmware. For a manual check, simply click on the Check for updates now button.⁶

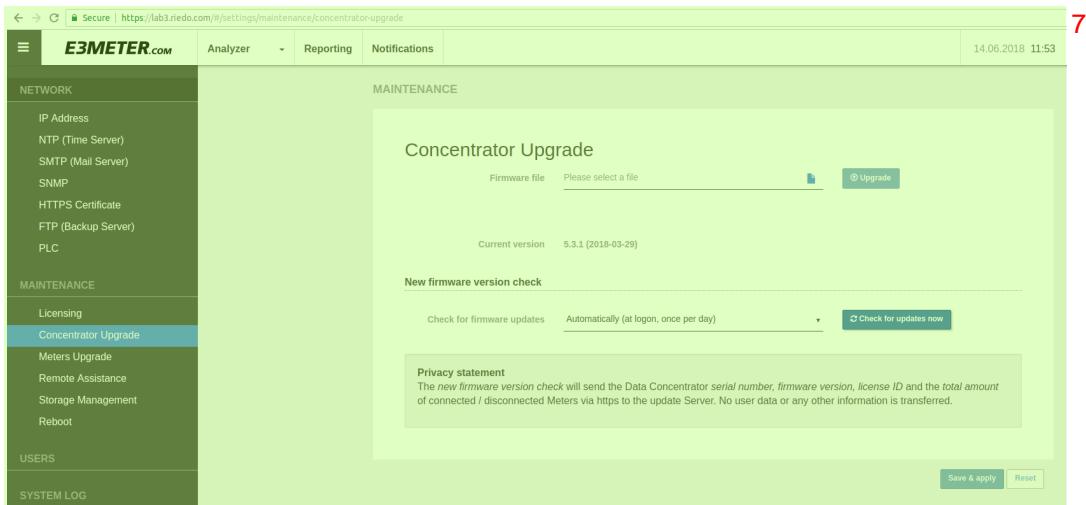


Fig. 5: Firmware upgrade of Concentrator⁸

4.5 Firmware upgrade of Meters¹

The Data Concentrator provides the functionality to automatically upgrade the Firmware of all paired meters if this functionality is configured. Clicking on the link to *Meters configuration* allows getting an overview of the meters paired to your system with information about each specific meter and the different versions and furthermore whether the Firmware is currently being updated.

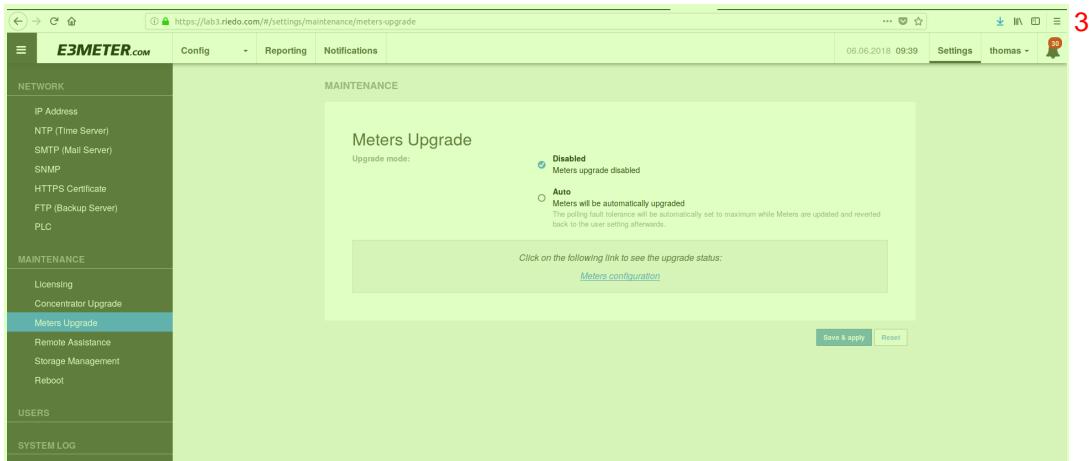


Fig. 6: Firmware upgrade of meters⁴

Attention: It is highly recommended to set the Meters Upgrade to Auto. This functionality will save you a lot of time and assure that the meters firmware is up to date. By upgrading the meters firmware automatically, you benefit from bug fixes and from new features.⁵

4.6 Remote Assistance⁶

The following image indicates, the connection for remote assistance.⁷

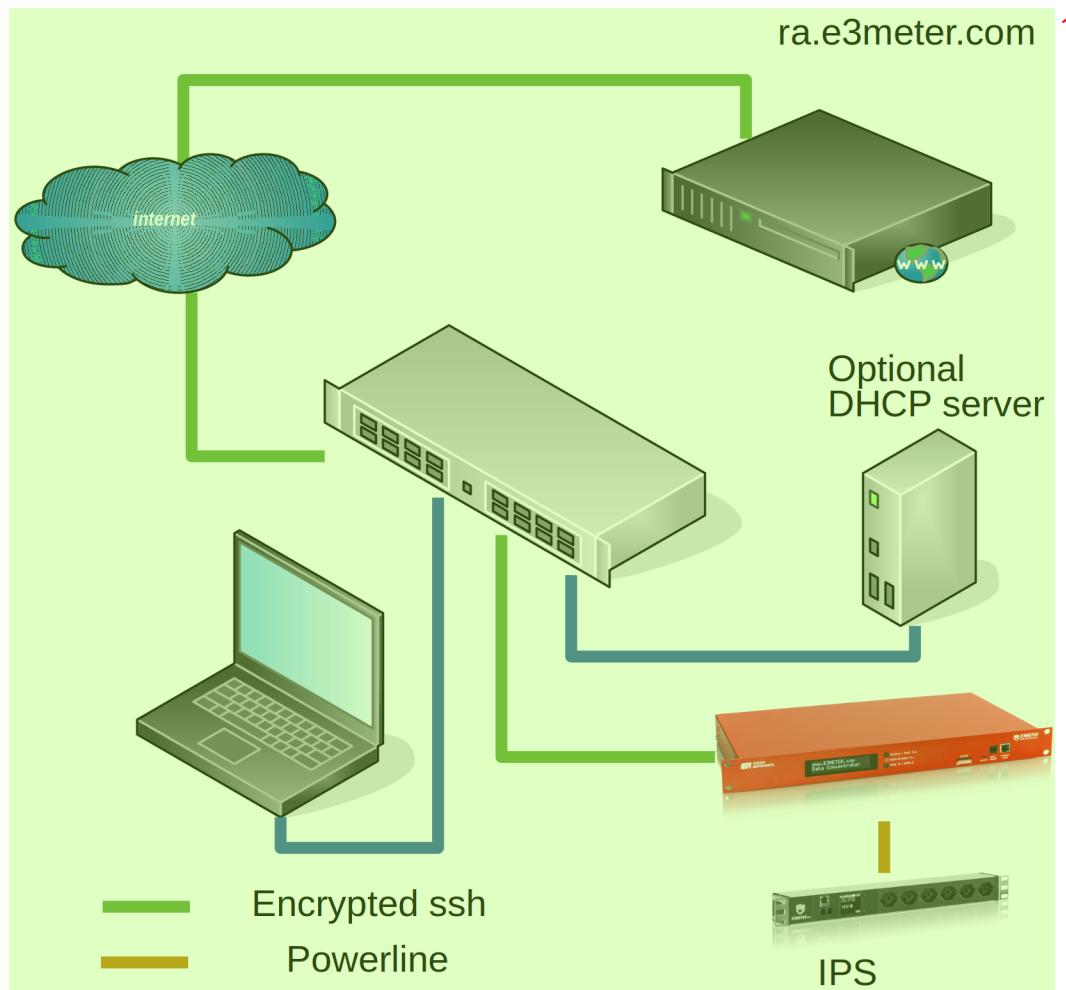


Fig. 7: Secured connection from ra.e3meter.com to the Data Concentrator for remote assistance 2

It is possible to get remote assistance from Riedo Networks Ltd in case of a problem. The advantage of the remote assistance is that Riedo Networks Ltd can access the Data Concentrator while the latter operates in the normal environment. 3

The screenshot shows the E3METER.com software interface. The top navigation bar includes 'Analyzer', 'Events', 'Reporting', '19.07.2018 07:01', 'Settings', 'admin', and a bell icon with a red '4'. The left sidebar has sections for 'NETWORK' (IP Address, NTP, SMTP, SNMP, HTTPS Certificate, FTP, PLC) and 'MAINTENANCE' (Licensing, Concentrator Upgrade, Meters Upgrade, Remote Assistance, Storage Management, Reboot). The 'MAINTENANCE' section is expanded, showing 'Remote Assistance' with a status of 'Inactive'. A tooltip explains that activating Remote Assistance creates an encrypted ssh connection between the Data Concentrator and the support server. A button labeled 'Activate' with a checkmark is visible.

Fig. 8: Activation of remote assistance 5

For this you have to activate the Remote Assistance option. This allows Riedo Networks Ltd ¹ to establish a secure connection over the internet to the Data Concentrator. This will only work if the necessary ports for the secure, encrypted connection are open. If for security reasons opening the access is not possible, the user can provide the logs to Riedo Networks Ltd, see *System Log*.

CHAPTER 5¹

Adding meters²

This chapter explains how to add meters to the system. The concept of the E3METER® consists of meters that are paired to the Data Concentrator. Pairing can be done either manually or automatically. A meter can only be paired to one Data Concentrator.³

Note: One or multiple meters can be added. The *Add meter* button is only visible if Auto Admission is not active, see *Configure PLC*.⁴

5.1 Adding IPS⁵

5.1.1 Adding meters automatically⁶

Adding meters with the auto admission method is a convenient method for pairing many meters to a Data Concentrator without having manually to enter their serial number. Automatic admission is enabled as explained in *Configure PLC* with the configuration option *Meters auto admission*.⁷

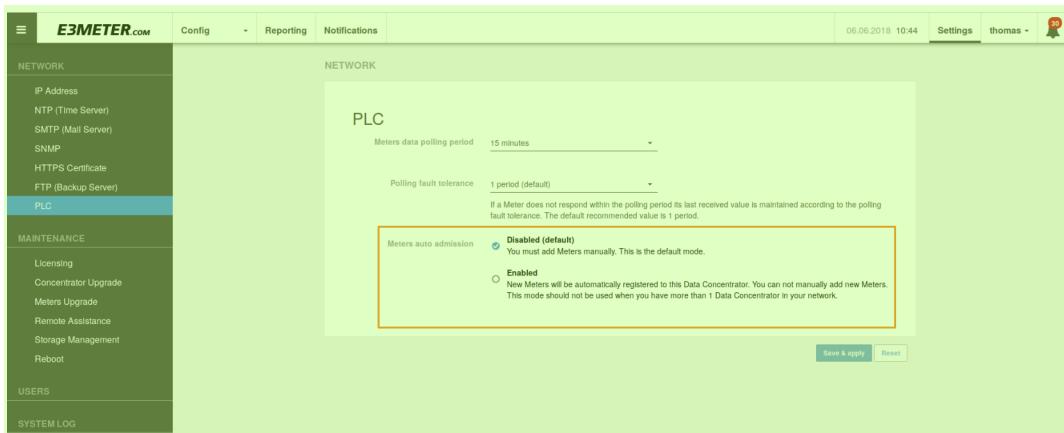


Fig. 1: Adding Meters automatically using Meters auto admission functionality. 2

Caution: In the case where multiple Data Concentrators are used in the same system, you need to be careful that meters are not automatically added to the wrong Data Concentrator. Therefore it is recommended to disable the *Meters auto admission* function by default and only enable one Data Concentrator within the same system at once for this function, which prevents from adding meters to the wrong Data Concentrator.

5.1.2 Adding meters manually 4

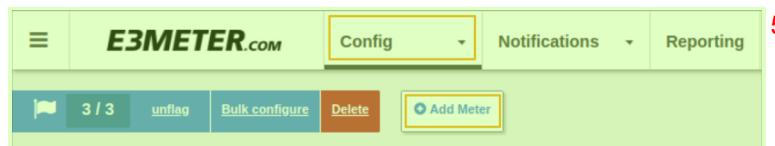


Fig. 2: Select adding meters in the Config page 6

Via the Config menu you will have the possibility to pair meters manually by clicking on the Add Meter button. This opens up a new window where meters can be added by entering their serial numbers.

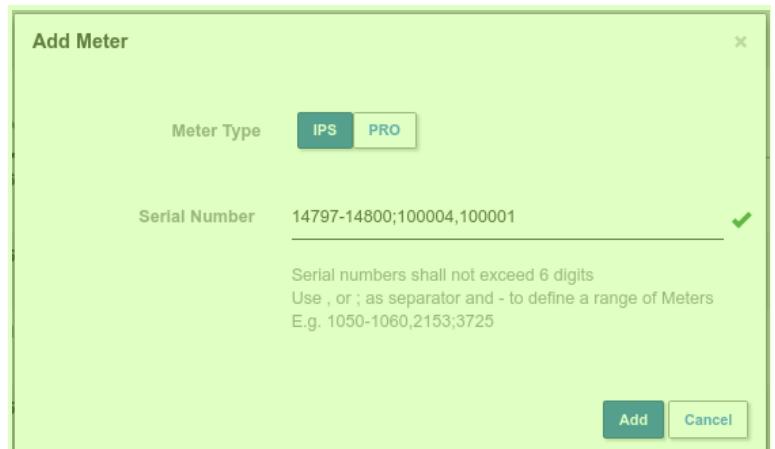


Fig. 3: Adding meters manually by defining serial numbers 9

If you have multiple meters to be added you can either separate multiple ones with comma **1**, ‘,’ or semicolon ‘;’ or define a range of serial numbers with hyphen ‘-’.

5.2 Adding PRO meters manually **2**

Within this chapter the two methods of adding PRO meters to the E3METER system are **3** explained. All PRO meters use Modbus RTU for communication. Either the PRO meters are connected directly to the CTR using a USB to RS-485 converter or over a Modbus gateway. In the case when interfacing via the gateway, the PRO meters communicate via Modbus RTU to the gateway and the gateway via Modbus TCP to the CTR.

In order to add PRO meters first click to Add Meters and then select PRO as shown in the **4** picture below. Then select the interface and Modbus address to be added.

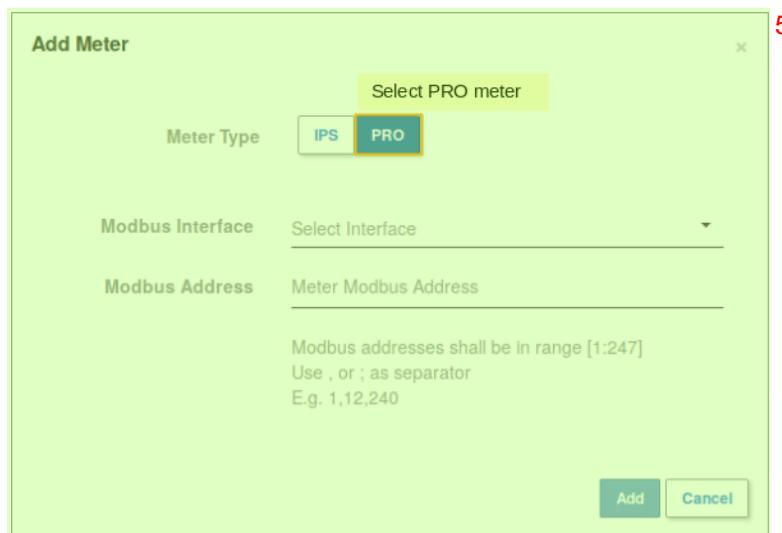


Fig. 4: Select to add PRO meter **6**

Note: PRO meters are delivered with the Modbus address configured as the last 2 digit of **7** their S/N, e.g. Meter with S/N 0257151203**98** is configured with Modbus address 98.

5.2.1 USB adapter **8**

In the Data Concentrator installation guide, information is provided about how to connect **9** the USB to RS-485 converter RN1079. If more than one converter need to be connected to the Data Concentrator it is required to connect a USB hub to the USB OTG connector and connect the multiple converters to the hub.

The PRO meters have to be connected on the USB adapter A to A (pin 22), B to B (pin 23). **10** The hardware connection diagram is shown here below.



Fig. 5: PRO meter connection per USB adapter on CTR 2

5.2.2 Modbus TCP/RTU gateway 3

For the gateway connection with the Moxa MB3180 the PRO meters have to be connected 4 on the Modbus RTU side R+ (pin 3) to A (pin 22), R- (pin 4) to B (pin 23). The hardware connection diagram is shown here below.

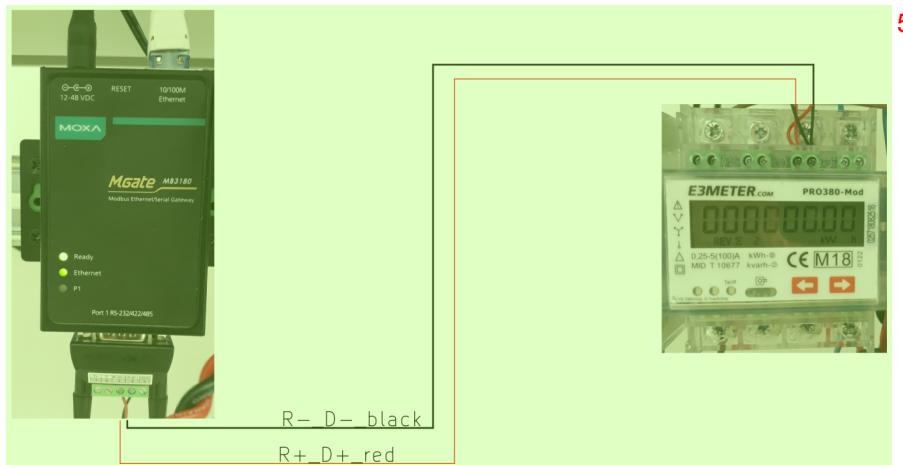


Fig. 6: PRO meter connection via gateway 6

Note: We currently only support Moxa MB3180 as a Modbus TCP/RTU gateway. 7

CHAPTER 6¹

Data Concentrator pages²

The Data Concentrator pages provide information about the meter's data values and allow³ configuring system parameters. Depending on the section that is selected within the Monitoring Software, different visualization or configuration options are shown.

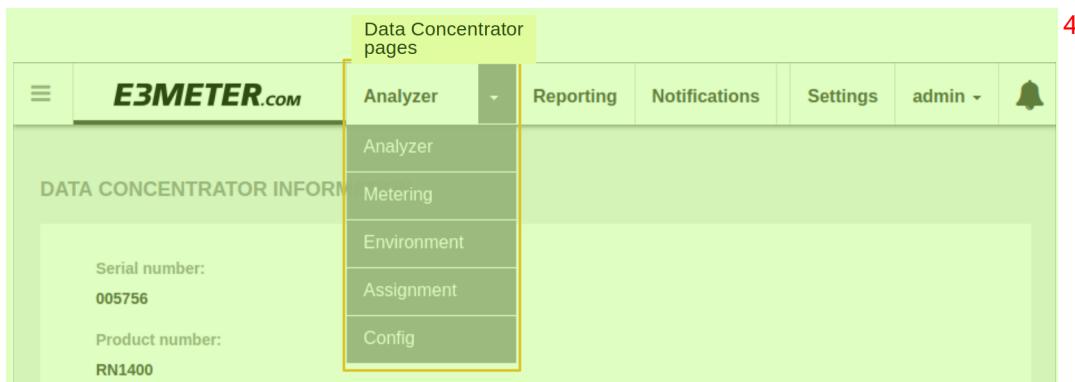


Fig. 1: Data Concentrator pages menu showing the different available pages⁵

6.1 Visualization and configuration features⁶

The following section explains the main features of the web page for visualization of data⁷ and configuration of the system.

6.1.1 Groups⁸

Meters can be grouped based on different Categories and Groups. Categories contain Groups⁹ and Groups contain meters. One meter can only be part of one Group, one Group can only be part of one Category.



Fig. 2: Menu icon 2

Groups are accessed by clicking on the Menu icon and visible on the left panel of your web browser as shown in the picture below.

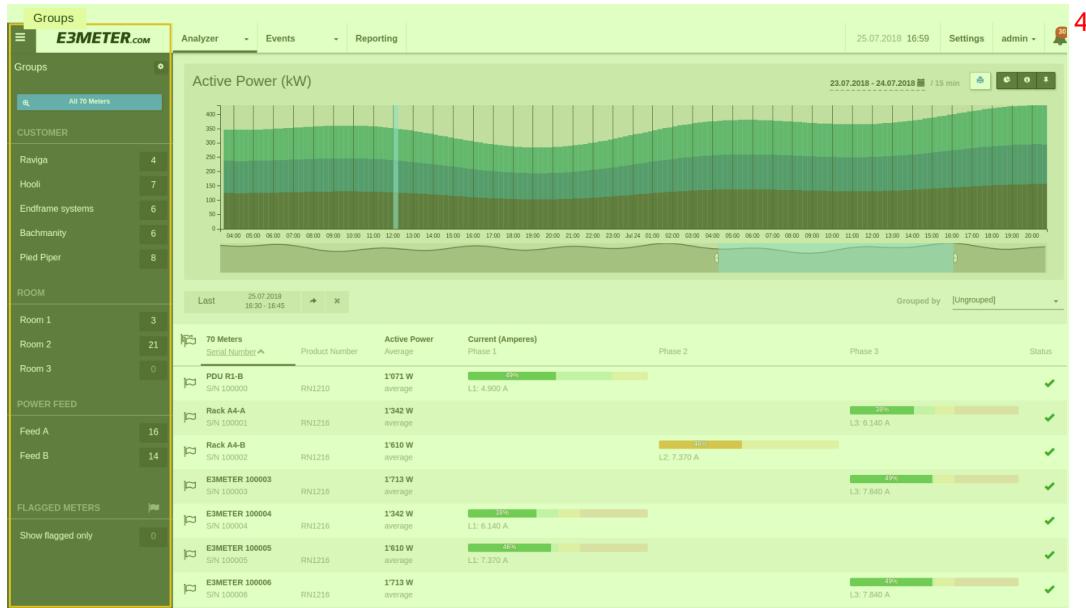


Fig. 3: Groups are shown on the left of the browser window 5

6.1.1.1 Edit groups 6

Note: When you configure a Data Concentrator from scratch, there are no categories defined. After adding new groups they are empty as well. Assigning meters to categories and groups needs to be done in the *Assignment* section.

Groups can be edited by clicking on the software setting symbol 8, which will open the following menu.

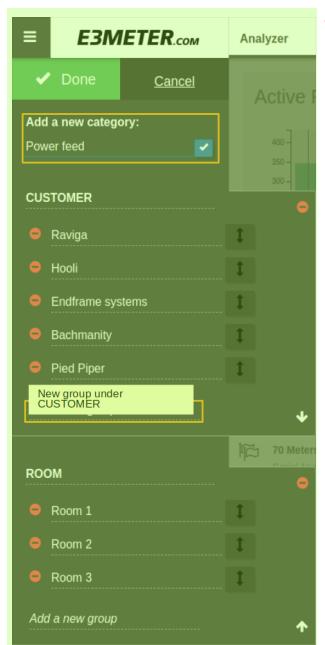


Fig. 4: *Edit groups* window 2

In the *Edit groups* window shown here above, we can see a configured category *Customer* 3 with the different groups *Hooli*, *Raviga* and so on.

Within the *Edit groups* window it is possible to: 4

- Add a category/group 5
- Rename category/group
- Reorganize the position of category/group
- Delete category/group

Add is done by entering the new information in the *Add a new category* respectively *Add a new group* field. You confirm your entry either with *Return* on your keyboard or by clicking on the CONFIRM symbol. 6

Rename is done by clicking on existing names and edit them. 7

Reorganize is done with the arrow symbols. Categories are moved either with the UP or DOWN arrow symbol. Groups instead are moved by drag and drop of the UP-DOWN arrow symbol. 8

Delete is done by clicking on the MINUS symbol, which is possible for both category and group. 9

Changes are saved by clicking on the Done button. Changes can be canceled by clicking on the Cancel button. The following picture shows the result after adding a category *Floor* with three groups. 10



Fig. 5: Resulting window after having made changes in *Groups edit window* 2

6.1.1.2 Flags 3

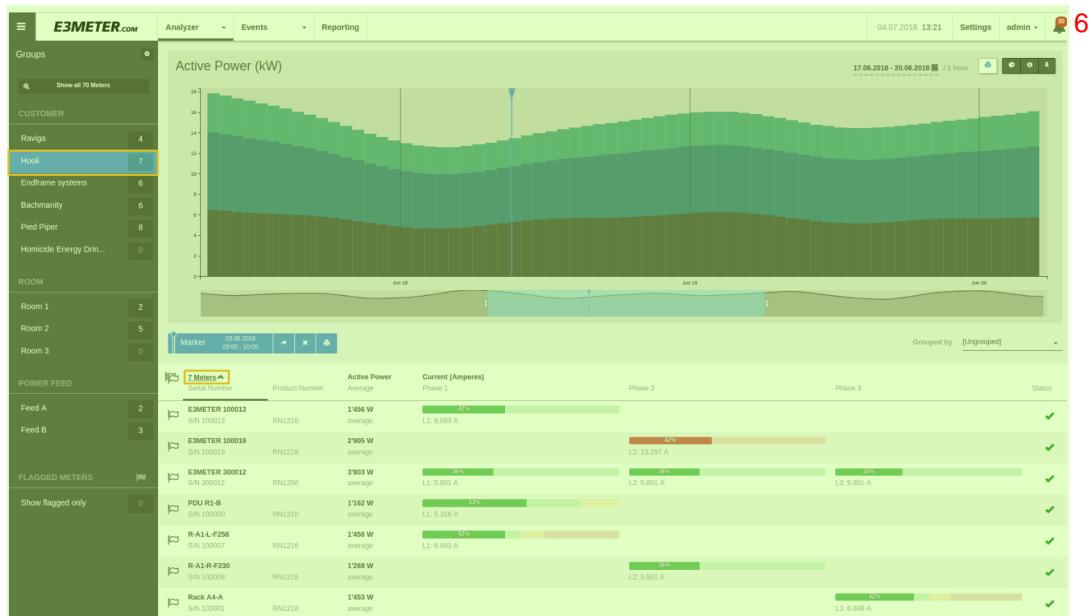
Flags are a handy method for selecting individual meters. In the list of meters, there is a flag symbol for each individual meter. By clicking on the flag, the corresponding meter is flagged and indicated with the flag filled with blue color . An active flag can be removed by clicking on the flag symbol resulting in a non-filled flag . The picture below shows an example with three meters that have been flagged.

Serial Number	Product Number	Active Power	Current (Amperes)	Phase 1	Phase 2	Phase 3	Status
E3METER 100003 S/N 100003	RN1216	1'304 W average		54%		37% L3: 5.968 A	✓
E3METER 100004 S/N 100004	RN1216	1'887 W average		54%			✓
E3METER 100005 S/N 100005	RN1216	1'452 W average		42%			✓
E3METER 100006 S/N 100006	RN1216	1'304 W average				37% L3: 5.968 A	✓
E3METER 100009 S/N 100009	RN1228	2'608 W average		37%			✓
E3METER 100010 S/N 100010	RN1210	1'180 W average			52%		✓
E3METER 100011 S/N 100011	RN1216	1'452 W average		42%			✓
E3METER 100012 S/N 100012	RN1216	1'304 W average		37%			✓

Fig. 6: Defining flags to meters 5

6.1.1.3 Group selection 3

Single or multiple groups can be selected thus reducing the number of meters to be shown 4 for data visualization and configuration. The selection is done by clicking on one or multiple groups which adds them to the selection, respectively removes them from the selection if previously already selected. After applying changes to the group selection, the data shown is a subset of the overall data. In the following example only the 7 meters assigned to the *Hooli* group are shown.


 Fig. 7: Group selection with customer group *Hooli* 7

The group selection can also be based on flagged meters. For this, you need to select *Show flagged only*. For this group selection option, the number of flagged meters is indicated.

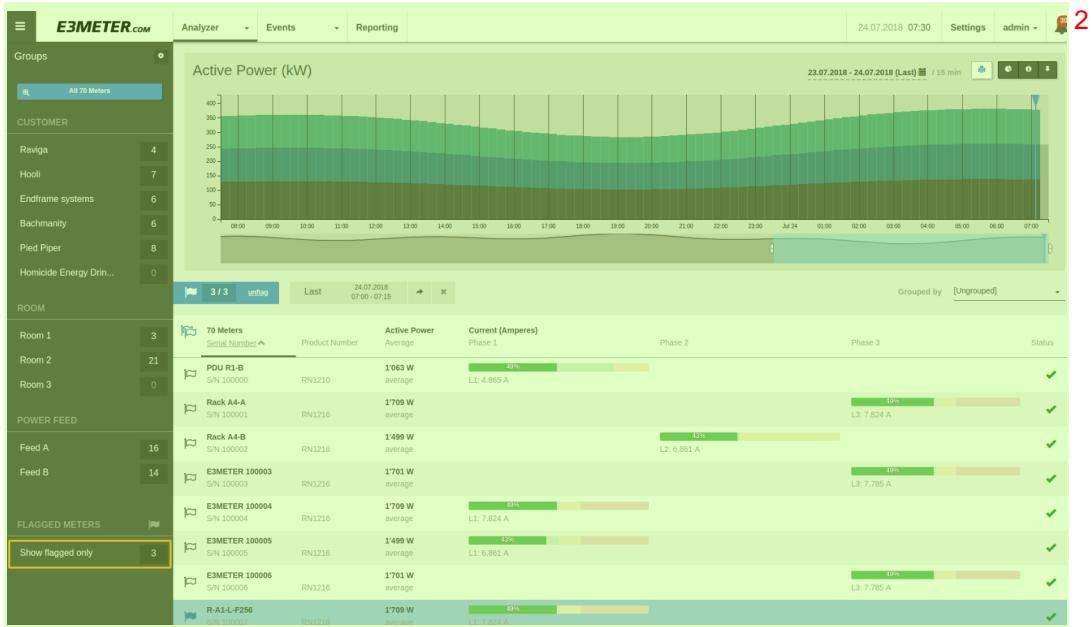


Fig. 8: Group selection for *Show flagged only*. 3

Attention: If clicking on the *Show flagged only* group selection, **only** the flagged meters 4 are shown. All previously selected groups will be removed in the Groups menu.

Once the flagged meters are selected, the group entry for the flagged meters changes to 5 *Toggle flagged only*. By clicking on it, the flagged meters will be removed from the group selection and the still active group selection will be shown.

Flagged meters and group selection can be combined. On top of the meter information 6 window the number of flagged meters that are selected over the total of flagged meters are explained.

6.1.1.4 Grouped by 7

Within the Data Concentrator pages, it is possible to group meters by category. By clicking 8 on the *Grouped by* button this will group the meters based on the selected group. For instance, they can be grouped by the customer as indicated in the picture shown below. First, all meters from customer *Raviga* are shown, second meters from customer *Hooli* and so on.



Fig. 9: Meters grouped by customer 2

6.1.2 Bar chart 3

In the bar chart, each bar indicates the power or energy measured per phase with a different 4 color per phase.

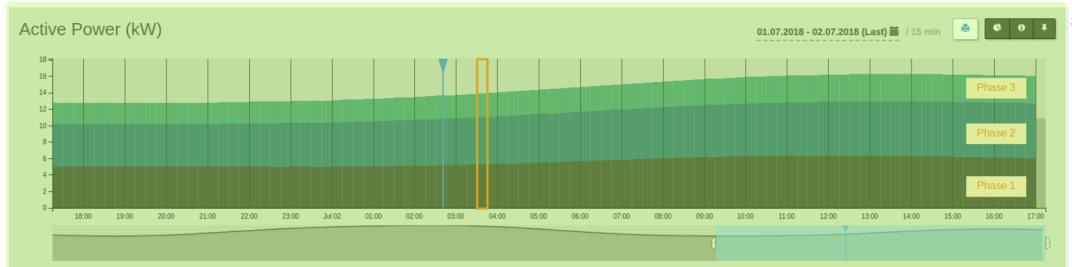


Fig. 10: Bar chart with bars indicating the measured values 6

6.1.3 Tooltip value 7

The tooltip value shows the value of the bar that you are currently pointing over in the bar chart. The tooltip value can be activated or deactivated by clicking on the info icon symbol i in the Graph elements. 9

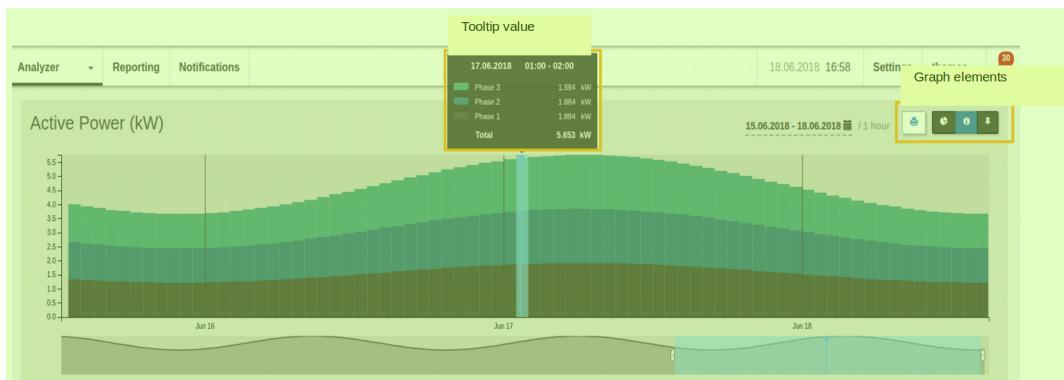


Fig. 11: Tooltip value 2

6.1.4 Marker 3

By clicking on the bar chart you activate the marker which provides the values for a specific time period of the historical data. The time period shown is based on the data polling period, see *Configure PLC* for how to configure the data polling period. In order to visualize a different time period, you can click on the bar chart which repositions the marker.

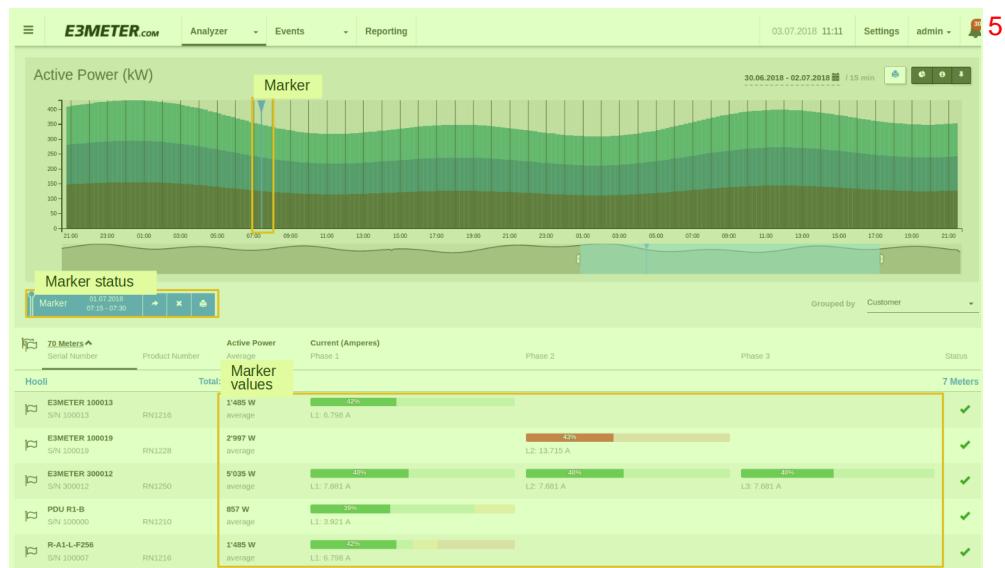


Fig. 12: Meter values corresponding to the marker position. 6

The marker status bar shows the time period to which the marker is associated and allows to do some operations. Clicking on the little arrow symbol pointing towards the right makes jump the marker to the middle of the bar chart window. Clicking on the x icon symbol will move the marker to the last received value. The printer icon will open up an export window for the marker data. Information about how to generate reports is explained in section *Reporting*.

Note: Currently the printer icon is not available for the last received value. 1

6.1.5 Phase Balance viewer 2

The phase balance viewer provides the active power per phase for all selected meters over the specified time interval. The phase balance is expressed as a ratio of the phase power divided by the sum of the power of all three phases in percent (%). This value is expressed for the time period selected in the bar chart. If the time selection is changed, the phase balance values are recalculated. The phase balance viewer can be activated or removed by clicking on the pie chart symbol  within the Graph elements. By clicking on a phase in the phase balance viewer, the corresponding phase is shown or hidden in the bar chart. 3

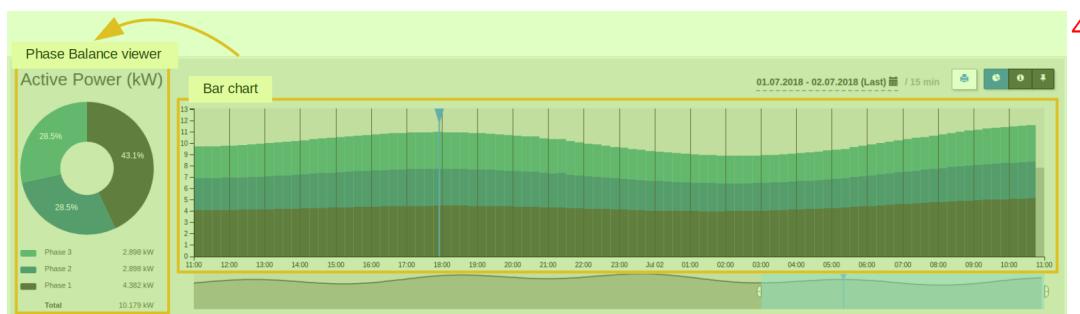


Fig. 13: Phase balance viewer and associated data 5

6.1.6 Navigation in time 6

When accessing historical data, one important element is the navigation in the time base. 7 Multiple ways are possible depending on the user interface selected. The different options are explained more in detail in the following sections.

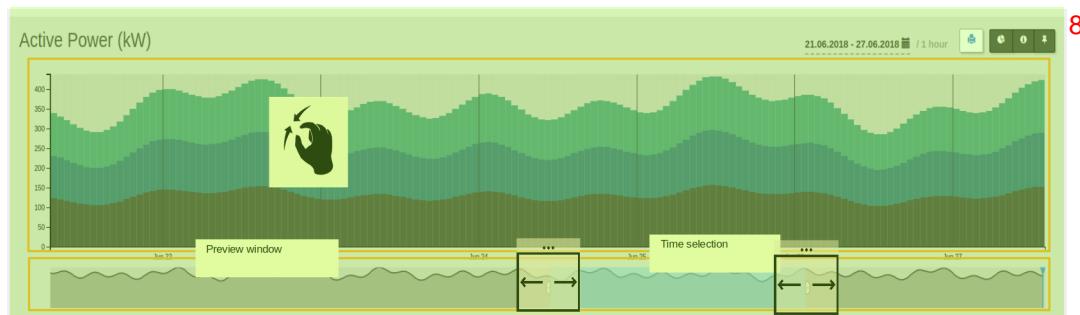


Fig. 14: Bar chart with navigation possibilities. 9

6.1.6.1 User interface 10

Navigation is achieved both by mouse interface or with touch gestures. In the table below 11 you find an overview of the different functions and their respective user interface.

Function	Mouse interface	Touch gestures
Navigate in time with zoom through bar chart	Scroll mouse wheel	Pinch / spread
Navigate in time by sliding bar chart	Click and hold to move the bar chart right and left	Select and slide bar chart right and left
Navigate in time with time selection window	Click and move border(s) of time selection window	Select and Pan
Move around time selection window	Select the time selection window and move it around	Select time selection window and Pan

6.1.6.2 Navigation in bar chart 2

As a first option for navigation in time, the time base can be squeezed or extended within the bar chart. This can be achieved either with the mouse or with touch gestures. Scrolling with the mouse wheel for the mouse interface, respectively pinching and spreading for the touch interface. While acting on the time base, the result is updated in the preview window accordingly. The portion of historical data shown in the bar chart is shown in the preview window.

6.1.6.3 Navigation in preview window 4

As a second option for navigation in time, the time selection window can be moved around within the preview window. This is achieved by moving around the entire time selection window towards the left for older data values or towards the right for newer data values. Furthermore, you can define the start and stop of the time shown in the bar chart by moving the left and right extremity of this time selection.



Fig. 15: Time selection within the preview window. 7

6.1.6.4 Time selection 8

As a third option for navigation in time, you have the possibility to click on the time selection at the top right of the bar chart and enter the time of interest for the start and stop as shown in the picture below. The basic usage is to click once on the calendar to select the start date and click a second time to select the stop date. When clicking twice on the same date, this date is selected to be shown. When clicking on a month the selection start is from the first of the month to the last day of the month available in the historical data. Dates can be entered by inserting a start date manually e.g. 1.1.2016 and 30.05.2018 on the top of the time selection window. The shortcuts on the right of the time selection window allow to select in a convenient way the predefined time periods. Once the date is selected you need to click on **Apply** Apply, and the data indicated on the bar chart will be recalculated accordingly.

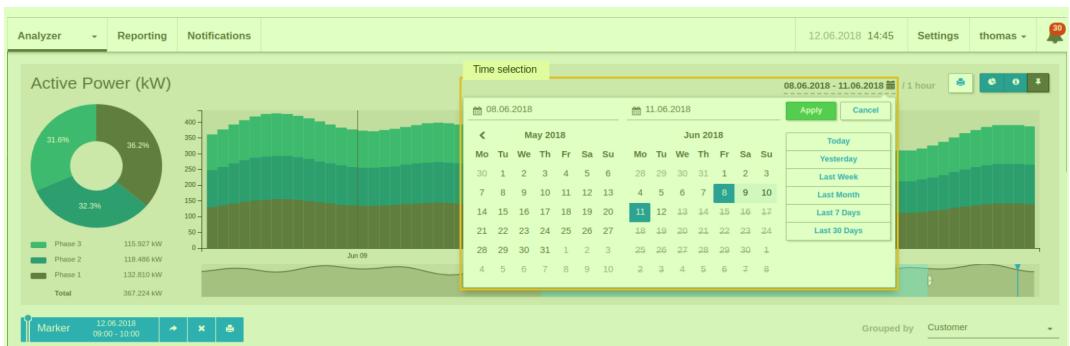


Fig. 16: Time selection 2

Note: Navigation in historical data can take some processing time because the Data Concentrator needs to load the selected data from the internal storage. 3

6.2 Analyzer⁴

The Analyzer page main usage is for capacity management of your system. It shows the Active Power and phase current(s) of the meters over the selected time interval. This page allows you to analyze the power and current as well as the phase balance. For a specific rack with a maximum allowed power rating it is important to know the current situation and whether there is still some margin. 5

Power measured is the average (RMS) Active Power. By clicking on the horizontal bargraph of the current, the thresholds for the Alarms can directly be configured. More details about Alarm configuration are explained in the *Alarms* section. 6

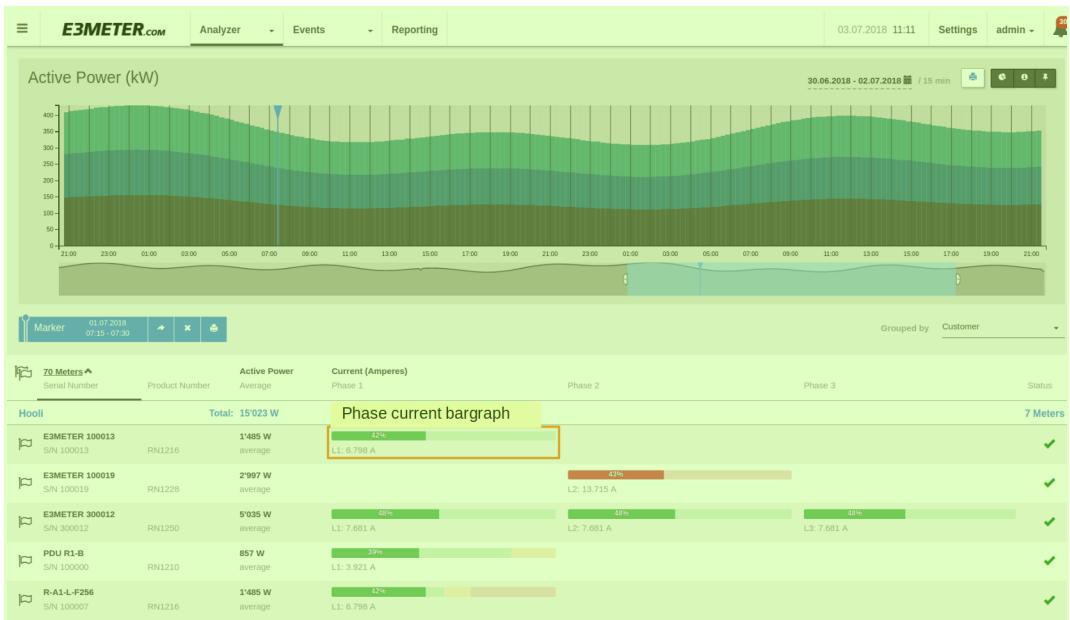


Fig. 17: Bargraph showing value of current and the alarm thresholds 8

All information that is visualized can be exported. For more information consult the Report- 9

ing section.¹

6.2.1 Residual Current Monitoring²

For selected meters with Residual Current Monitoring feature (RCM), their peak residual current values both for DC and AC RMS are shown underneath the bar chart. The residual current monitoring indicates whether there is a leakage current between the supply and the return. The thresholds are fix values and set to 6mA DC and 30mA AC RMS. If the residual current monitoring exceeds these values an alarm is generated which is shown both on the *Notification panel* and the *Event viewer*.³

The information of the Residual Current Monitoring is also retrievable via SNMP as explained under [Accessing data per SNMP](#), this information field was added to the MIB starting from software version 5.5.⁴

Below an example of RCM is shown with the value shown underneath the bar graph, the event in the Notification panel as well as the event in the Event viewer.⁵

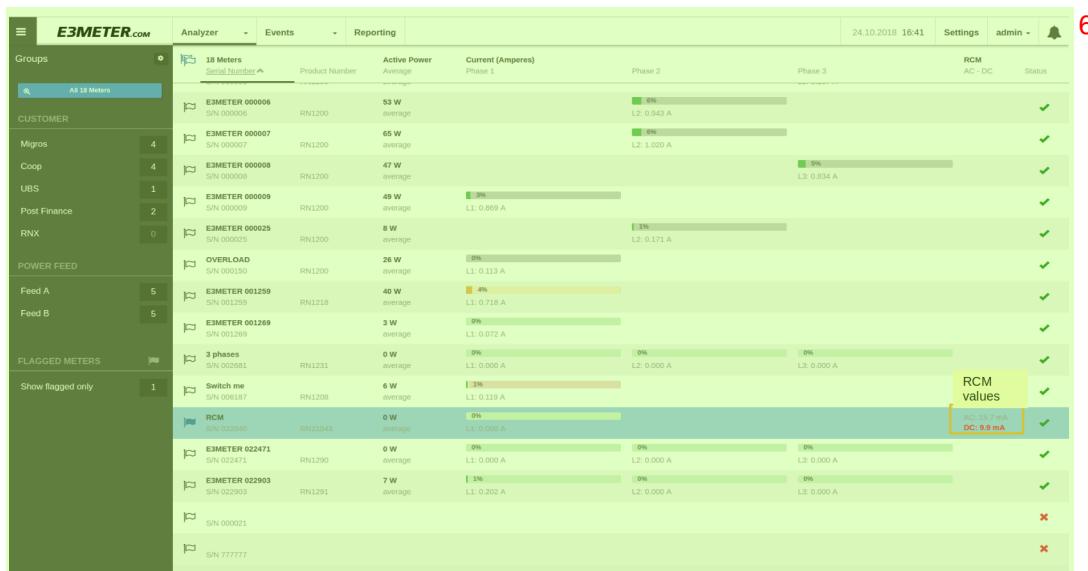


Fig. 18: RCM values underneath bar graph⁷

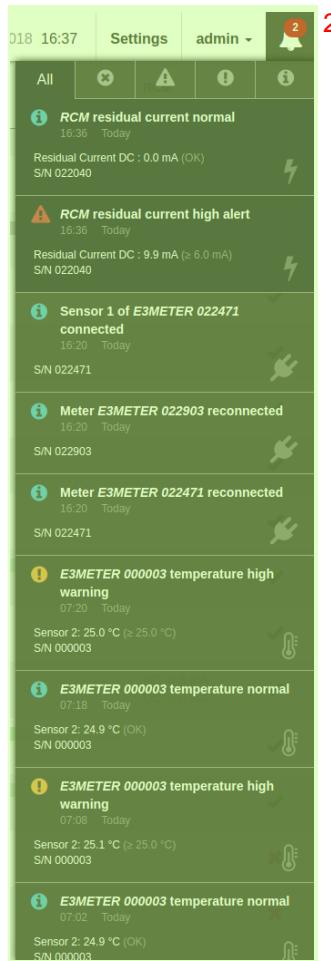


Fig. 19: Notification of RCM alarm message 3

EVENTS		
no date range set		
no date range set		
25.10.2018 16:38:47	⚠ RCM current low alert	ALARM
25.10.2018 14:10:00	⚠ Meter RCM disconnected	CONNECTIVITY
24.10.2018 16:36:35	⚠ RCM residual current high alert Residual Current DC : 9.9 mA (\geq 6.0 mA) S/N 022040	ALARM
18.10.2018 15:10:32	⚠ RCM residual current high alert	ALARM
17.10.2018 11:32:00	⚠ Meter RCM disconnected	CONNECTIVITY
16.10.2018 11:27:50	⚠ E3METER 022040 residual current high alert	ALARM

Fig. 20: RCM current high alert as seen in Event Viewer 5

6.3 Metering 6

The Metering page provides an overview of the total Active Energy, Reactive Energy (L) and Reactive Energy (C). The Energy shown is the total of the Energy consumed since the meter has been installed and up to the time selected. The phase balance viewer is useful in terms of analyzing the energy consumption per phase. 7

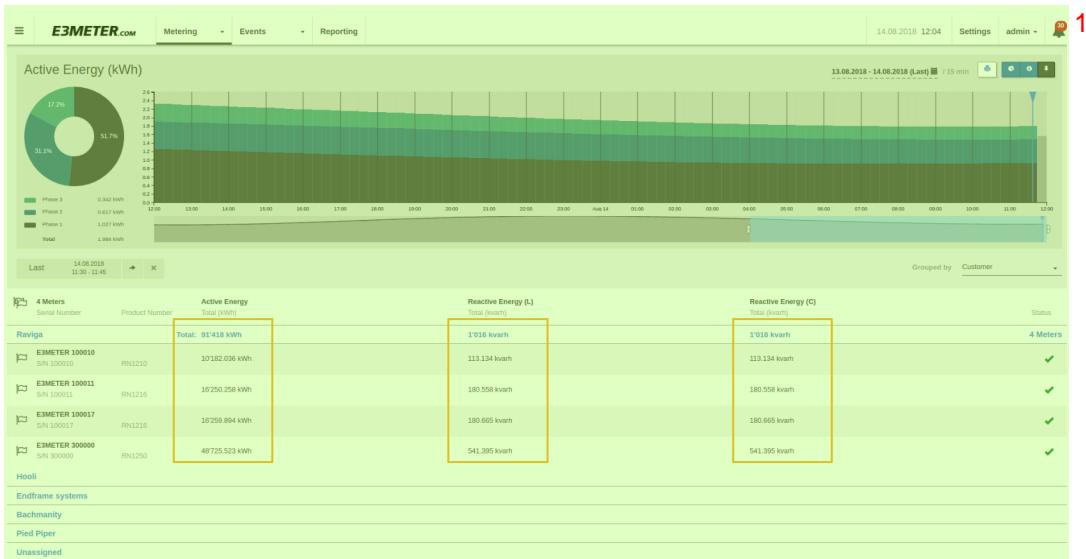


Fig. 21: Metering showing the energy consumption for the selected meters 2

With metering it is possible to bill the corresponding amount of energy to each specific 3 customer.

Note: For PRO meters only the active Energy is available within the Data Concentrator 4 software.

6.4 Environment 5

The Environment page provides an overview of the environmental data which are temperature and relative humidity per meter. In the preview window the temperatures maximum and minimum are shown for the selected meters. As a result the temperature minimum and maximum envelope is shown. Underneath the diagram for each meter the calculated average values for the defined period are shown both for temperature and relative humidity. By clicking on horizontal bargraph of the temperature or relative humidity, the thresholds for the Alarms can directly be configured. More details about Alarm configuration are explained in the *Alarms* section.

The analysis of the temperature envelope is useful in terms of safety, since the difference 7 between the indicated minimum an maximum values compared with the thresholds, shows the margin in terms of the temperature.



Fig. 22: Environment showing maximum and minimum temperatures for selected meters **2** and the corresponding average values of the meters in the selected time frame **1**

Within the temperature envelope curve, a color code is used. In case two or more sensors are **3** selected, light blue is the indication for the maximum and minimum of only one sensor, dark blue for the remaining sensors.

Note: In case there is only one single temperature sensor selected, the envelope is indicated **4** in dark blue.

Attention: It is not possible to visualize a graph of the relative humidity. Only the **5** computed average values per sensor are indicated in the bar graph.

6.5 Assignment **6**

The Assignment page shows the assignment of meters to the categories and groups. Here it **7** is also possible to edit the assignment for each individual meter.

Groups		Assignment	Reporting	Notifications	20.06.2018 15:32		Settings	thomas -
All 70 Meters		70 Meters	Product Number	Customer	Room	Power Feed	Building	Floor
CUSTOMER								
Coop	7	ESMETER 30008 S/N 300008	RN1200	Lidl	[Unassigned]	Feed B	[Unassigned]	[Unassigned]
Migros	4	ESMETER 30009 S/N 300009	RN1264	Biedronka	[Unassigned]	Feed A	[Unassigned]	[Unassigned]
Aldi	6	ESMETER 30010 S/N 300010	RN1250	Biedronka	[Unassigned]	Feed A	[Unassigned]	[Unassigned]
Lidl	6	ESMETER 30011 S/N 300011	RN1264	Aldi	Room 2	Feed B	[Unassigned]	[Unassigned]
Biedronka	8	ESMETER 30012 S/N 300012	RN1250	Coop	Room 2	Feed B	BMR	
WWZ	0	ESMETER 30013 S/N 300013	RN1264	[Unassigned]	[Unassigned]	[Unassigned]	[Unassigned]	Assignment to Floor category
ROOM		ESMETER 30014 S/N 300014	RN1250	[Unassigned]	[Unassigned]	[Unassigned]	[Unassigned]	First
Room 1	3	ESMETER 30015 S/N 300015	RN1264	[Unassigned]	[Unassigned]	[Unassigned]	[Unassigned]	Second
Room 2	21							Ground
Room 3	0							

Fig. 23: Assigning meters to exemplary category *Floor* 2

This assignment is shown in the *Groups* menu where it can be used to create a group selection 3 according to Group information.

It is possible to assign multiple meters at once. For detailed information please consult *Bulk Assignment*. 4

6.6 Configuration 5

Under the Config page, the status of each meter is indicated with the detailed information. 6 More importantly in the Config page, it is possible to delete specific sensors, set relay status and assign the phase for the measurement. For a mono-phase meter, it is possible to configure which phase it is connected to (L1, L2 or L3).

Config	Events	Reporting		31.10.2018 13:39	Settings	thomas	1	
						Grouped by Customer		
Add Meter								
	Label	Serial Number Product Number	Hardware Connection	Firmware Progress	Sensor 1	Sensor 2	Relay Status	Phase
			Connection type					
Raviga								4 Meters
	E3METER 100010	S/N 100010 RN1210	E PLC	4.2 (sim)	Delete	Delete sensor	L2	
	E3METER 100011	S/N 100011 RN1216	E PLC	4.2 (sim)	Delete	Delete	L1	
	E3METER 100017	S/N 100017 RN1216	E PLC	4.2 (sim)	Delete	Delete	L1	
	E3METER 300000	S/N 300000 RN1250	E PLC	4.2 (sim) Upgrading to version new-firmware.bin	Delete	Delete	3-phase	
Hooli								7 Meters
	E3METER 100013	S/N 100013 RN1216	E PLC	4.2 (sim)	Delete	Delete	Assign phase	
	E3METER 100019	S/N 100019 RN1228	E PLC	4.2 (sim)	Delete	Delete	Delete	
	E3METER 300012	S/N 300012 RN1250	E PLC	4.2 (sim) Upgrading to version 2.5	Delete	Delete	Relay status	3-phase
	PDU R1-B	S/N 100000 RN1210	E PLC	4.2 (sim) Upgrading to version new-firmware.bin	Delete	Delete	On Off	L1
	R-A1-L-F256	S/N 100007 RN1216	E PLC	4.2 (sim)	Delete	Delete	Delete	L1
	R-A1-R-F230	S/N 100008 RN1216	E PLC	4.2 (sim) Upgrading to version new-firmware.bin	Delete	Delete	Delete	L2
	Rack A4-A	S/N 100001 RN1216	E PLC	4.2 (sim)	Delete	Delete	Delete	L3
Endframe systems								6 Meters
	E3METER 100004	S/N 100004 RN1216	E PLC	4.2 (sim) Upgrading to version 2.5	Delete	Delete	Delete	L1

Fig. 24: Configuration of meters 2

Hint: When removing a sensor from a meter, the system generates an event. Under the Config page, you have the possibility to delete a specific sensor which has the effect that no event will be generated if this specific sensor is removed from the meter. This method allows removing intentionally a sensor and not generating an event, whereas a broken sensor connection to the meter will be signaled with an event. 3

It is possible to configure multiple meters at once. For detailed information please consult 4 *Bulk Configuration*.

In the configuration page under the Hardware column, starting with software version 5.5, the Connection information was added which indicates how a meter is connected to the Data Concentrator. A meter can be connected either via PLC, Ethernet or Modbus physical connection where the latter is only possible for PRO meters. 5

Note: In the case of Modbus connection we have the information #01:006 for example. 6 Where the first 2 digits after the '#' indicate the Modbus interface as explained under *Modbus TCP/RTU gateway*. The 3 digits after the ':' indicate the Modbus address. This is indicated in the picture shown here below.

The screenshot shows the 'Config' tab of the E3METER Monitoring Software. At the top, there are buttons for 'unflag', 'Bulk configure', 'Delete', and 'Add Meter'. Below this, a table lists three meters. The first meter, PRO025496389656, has its 'Modbus connection details' row highlighted with a yellow background. The table columns are: Label, Serial Number / Product Number, Hardware Connection, and Firmware Progress.

Label	Serial Number Product Number	Hardware Connection	Firmware Progress
PRO025496389656	S/N 025496389656 PRO1-Mod	1 Modbus connection details Modbus #01:003	
PRO025728299290	S/N 025728299290 PRO380-Mod	1.04 Modbus #01:051	1.18 (slim)
PRO025742626362	S/N 025742626362 PRO380-Mod	1.04 Modbus #01:050	1.18 (slim)

Fig. 25: Modbus Connection information shown under the configuration page 2

6.7 Alarms³

Alarms are configured under the Analyzer or Environment page within the bar graph by ⁴ clicking on it. You will find detail information about Alarm configuration in the *Alarms* chapter.

CHAPTER 7¹

Reporting

The Reporting feature allows generating customized reports as PDF or CSV export, based ² on the recorded values of the meters. Information about energy consumption, peak power and other parameters will be reported over a user specified time interval.

This concept is shown in the picture below. ³

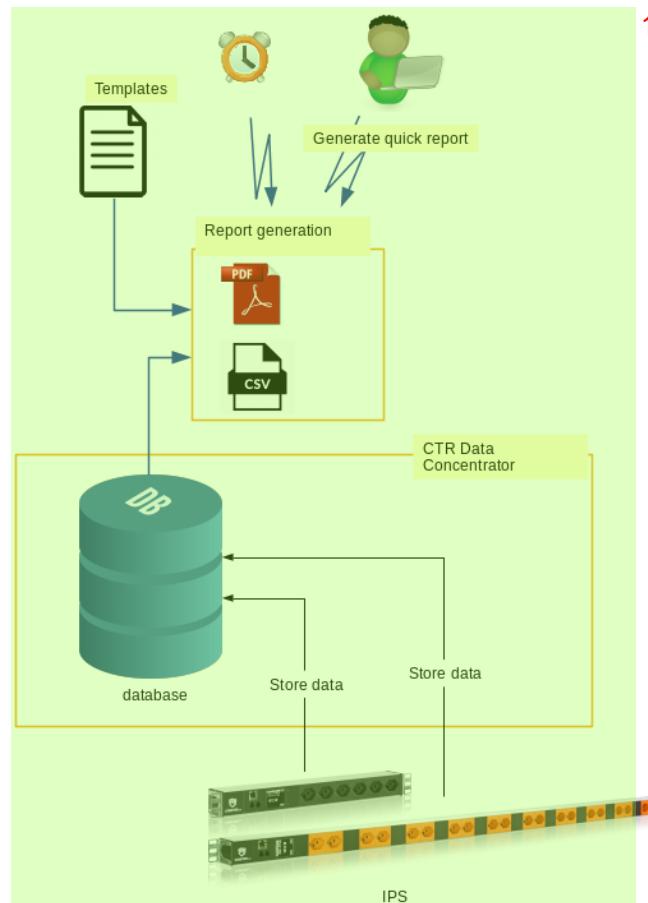


Fig. 1: Reporting concept showing the data flow 2

Other than scheduled reports, a user can generate a quick report. When the report is scheduled, the CSV export or the PDF output is sent automatically to the defined mailing list and / or FTP server. 3

7.1 Generating Quick reports 4

In the *Analyzer*, *Metering* and *Environment* pages *quick reports* can easily be generated. 5 Below is explained how to generate a quick report for data of the displayed time period and marker data.

- Quick report of the data corresponding to the displayed time period in the graph 6
 1. Click on the printer button 7 8 on top of the bar chart 9
 2. In the opened window chose a template 10
 3. The report can be previewed or directly downloaded 11
- Quick report of the data corresponding to the marker position 12
 1. Place the marker 13
 2. Click on the printer button 14 on top of the meters list 15
 3. In the opened window chose a template 16

4. The report can be previewed or directly downloaded **1**

Note: The Quick reports contain all the visible meters (i.e. Group filters are taken into **2** account).

7.2 Templates **3**

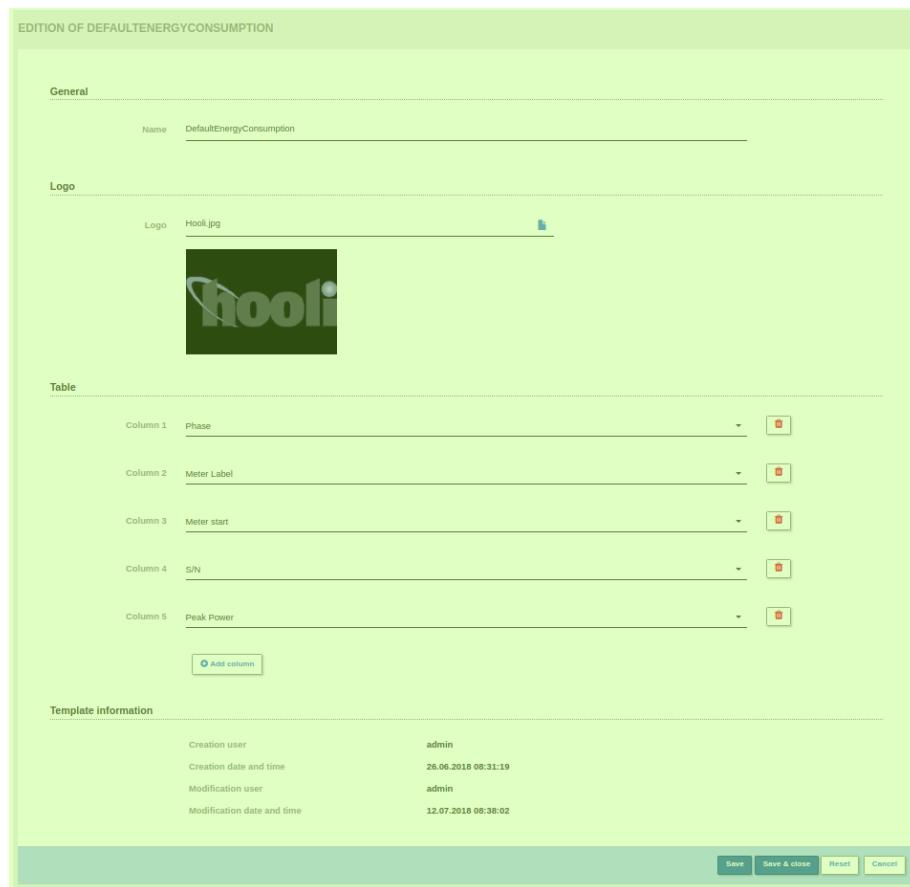
All the existing templates are listed in the Templates window. You can copy, edit or delete **4** PDF templates.

The screenshot shows the E3METER.com software interface. The top navigation bar includes 'Analyzer', 'Events', 'Reporting' (which is highlighted in green), '12.07.2018 08:38', 'Settings', 'admin', and a bell icon with a red '5' notification. On the left, a sidebar has 'REPORTS' at the top, followed by 'TEMPLATES' (which is also highlighted in blue), 'TRANSFER', 'FTP Accounts', and 'Mailing Lists'. The main content area is titled 'TEMPLATES' and displays a table with two rows. The columns are 'Name' (with a dropdown arrow), 'Type', and 'Creation date'. The first row contains 'Default PDF template', 'PDF', and '24.02.2016 01:00:00'. The second row contains 'DefaultEnergyConsumption', 'PDF', and '26.06.2018 08:31:19'. To the right of the table is a button labeled 'Add new template' with a plus sign. Below the table are three small icons: a blue square, a blue pencil, and a red square.

Name	Type	Creation date
Default PDF template	PDF	24.02.2016 01:00:00
DefaultEnergyConsumption	PDF	26.06.2018 08:31:19

Fig. 2: Templates window **6**

When you click either on Add new template or edit for an existing template the template **7** editor will open which will look as in the image shown below.

Fig. 3: Edit of a template for PDF report 2

The template editor allows adding new customized PDF templates with: 3

- Uploading a custom logo (.jpg or .jpeg format) 4
- Selecting the columns of the template report

Note: CSV export provides all available fields. The CSV template can't be customized. 5

7.3 Transfer 6

Within Transfer all FTP accounts and mailing lists are available. It is possible to add, edit 7 and remove FTP accounts and mailing lists.

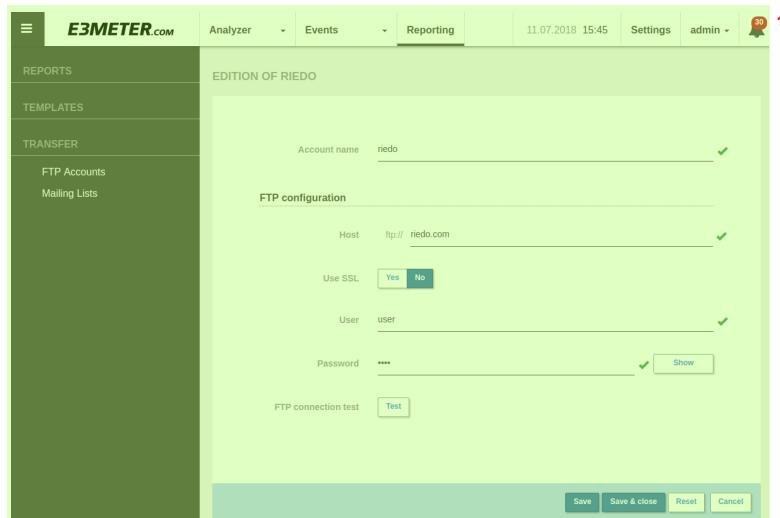


Fig. 4: Configuration of FTP account 2

Note: Only one single FTP account can be added. 3



Fig. 5: Configuration of mailing list 5

Note: A mailing list can contain one or several email addresses. 6

The mailing list is accessed either by clicking on **Add Mailing list** or clicking on the edit  symbol 

In the opened edit window for the mail list you have to enter the individual email address(es)  8 for your mailing list.

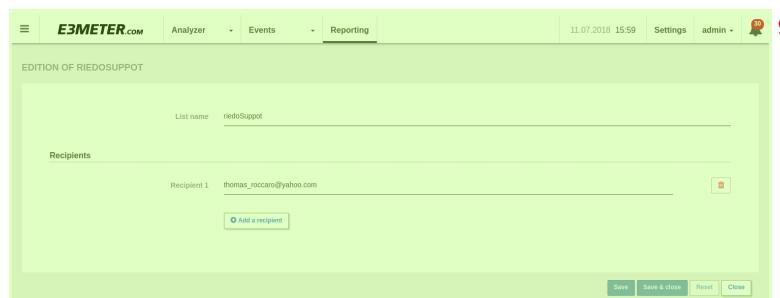


Fig. 6: Edit email parameters for a new email list. 10

7.4 Reports¹

All the existing reports are listed in the Reports window and their status is shown in the column **Enabled**. You can add new reports, preview, copy, edit or remove reports. When adding a new report, you have to fill in the Report settings and the Report contents. In the Report contents you can select meters, categories or groups. When disabling a report, it won't be scheduled and sent.

Note: For CSV export no preview is available.³



Fig. 7: Report window ⁵

All the enabled reports will be generated automatically according to the configured Scheduling interval and sent to the recipients defined in Transfer. These reports are called **scheduled reports**.

Note: For PDF reports, a separate page is generated for each group, with the total calculated per group.⁷

A report is based on settings which define the scheduling and transfer as shown below.⁸

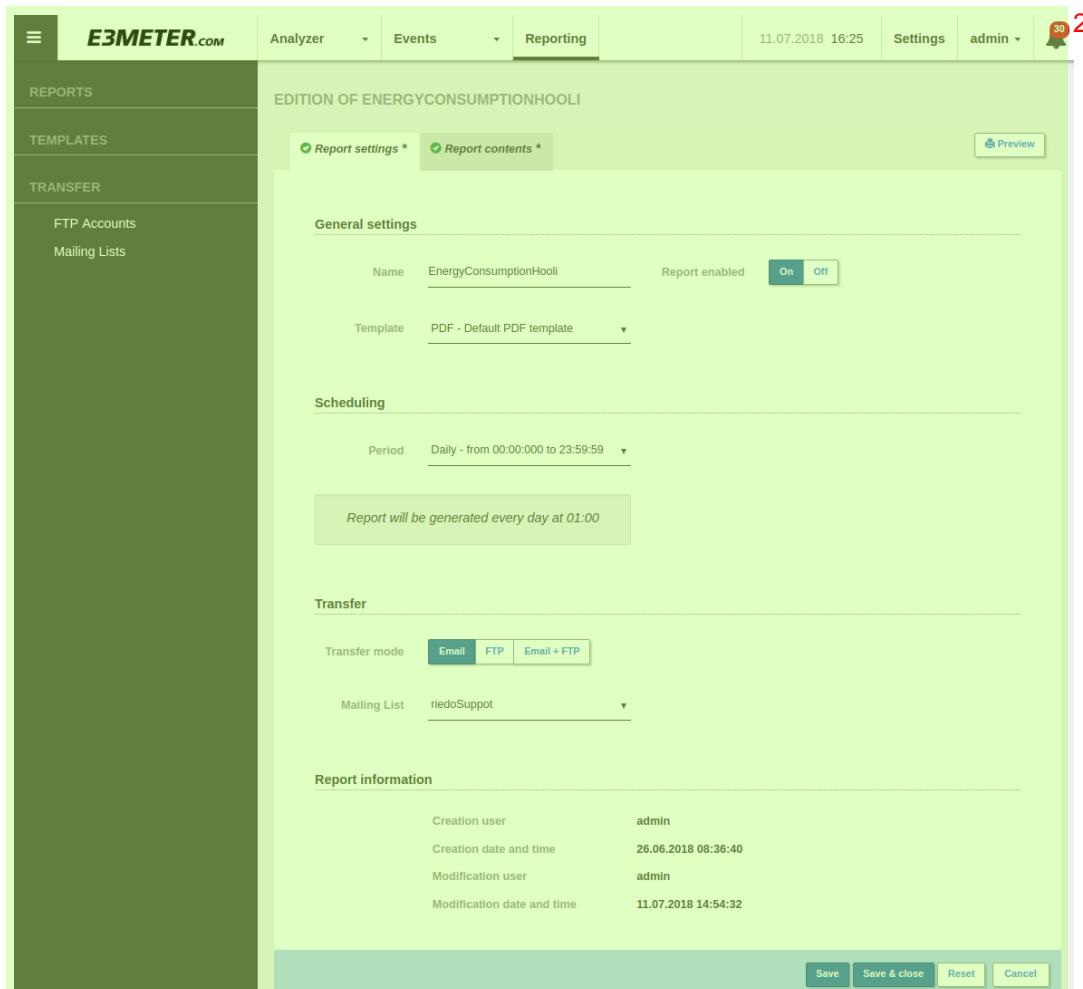


Fig. 8: Example for settings of report 3

The content of a report needs to be defined stating which categories and groups are used for 4 the report.

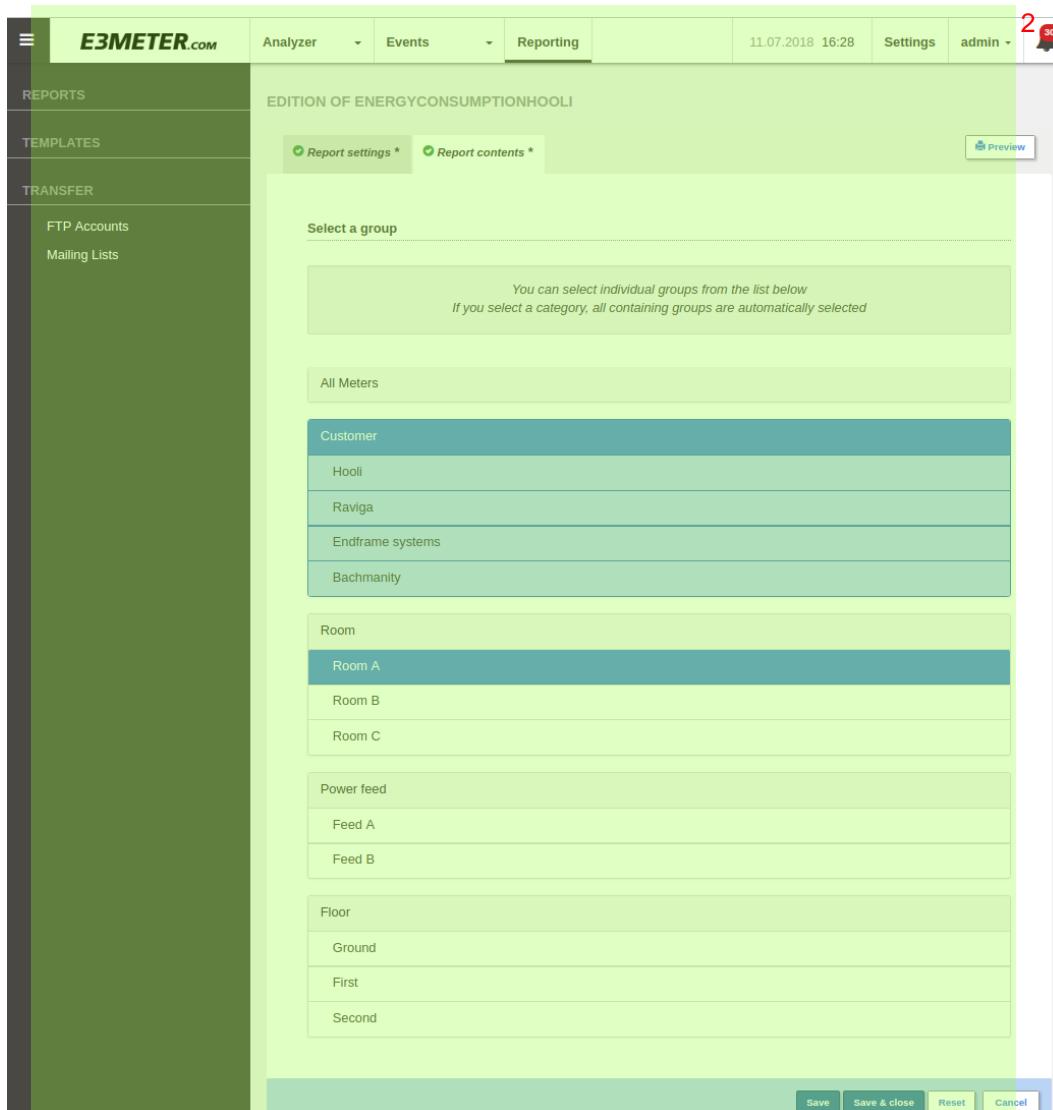


Fig. 9: Example for content of report 3

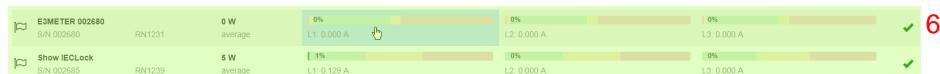
CHAPTER 8¹

Alarms²

8.1 Setting thresholds³

Alarm thresholds can be configured on current, temperature and relative humidity.⁴

Click directly on a meter's bar chart in the meters list (in *Analyzer* or in *Environment*) to ⁵ configure alarms.



The alarm configuration dialog is opened (example of a 16A meter): ⁷

The figure shows a screenshot of a 'Alarm configuration of all Phases for Meter E3METER 002680' dialog. The dialog has a title bar with the text 'Alarm configuration of all Phases for Meter E3METER 002680' and a red number '9'. Below the title are four horizontal sliders for setting thresholds: 'Alert Lo' (set to 0.2), 'Warn Lo' (set to 0.5), 'Warn Hi' (set to 8A), and 'Alert Hi' (set to 16A). Underneath the sliders are two checkboxes: 'Alarms enabled' (checked) and 'Configure all phases' (checked). At the bottom of the dialog are three buttons: 'Clear fields', 'Save alarms' (highlighted in green), and 'Cancel'.

In this dialog the alarms for each meter can be configured: ¹¹

- Setting up to 4 thresholds: ¹²

- Alert Lo (low) ¹³
- Warn Lo (low)
- Warn Hi (high)
- Alert Hi (high)

- Alarms can be enabled or disabled. ¹⁴

- In case of 3-phase meters the configuration can be done for each phase individually or **1** for all 3 phases together.
- With *Clear fields* the alarms are removed. **2**
- *Save alarms* saves the new or changed configuration. **3**

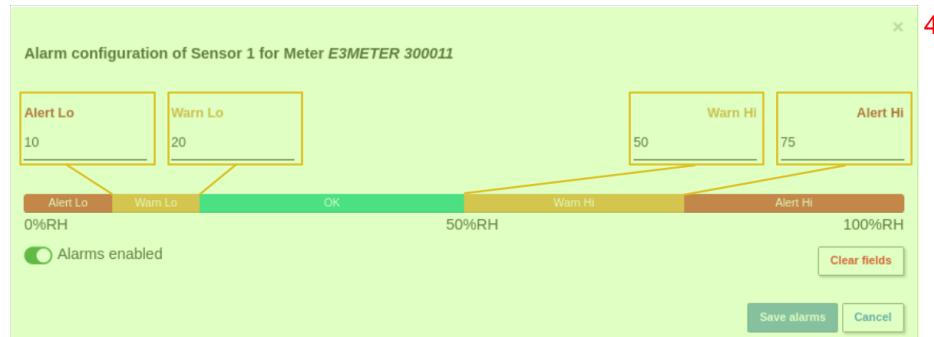


Fig. 1: Alarm levels and where the defined threshold is associated **5**

Note: If you want to omit a specific alarm threshold, simply don't fill in the value which **6** leaves that alarm threshold unconfigured.

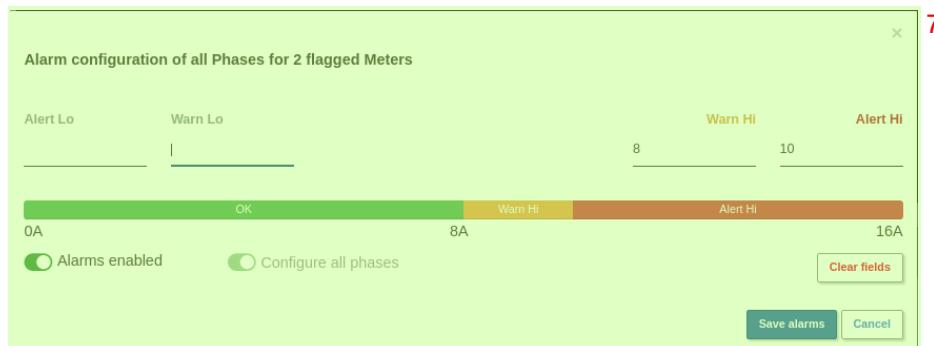


Fig. 2: Alarm threshold levels Alert Lo and Warn Lo not set **8**

Compared to when all alarm thresholds are set **9**

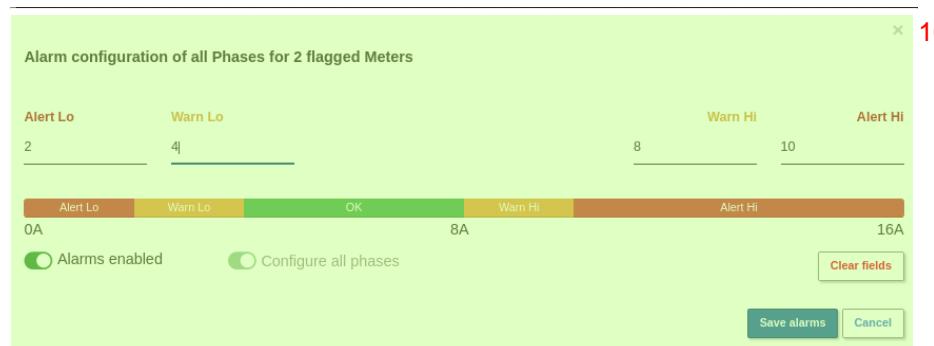


Fig. 3: All four alarm threshold levels set **11**

By flagging several meters, you can perform a bulk configuration for all flagged meters. See [1](#)
Bulk alarm setting.

CHAPTER 9¹

Events and Notifications²

9.1 Concept³

The system generates events and notifications when pre-configured thresholds are reached.⁴
The main concept is summarized in the picture shown below.

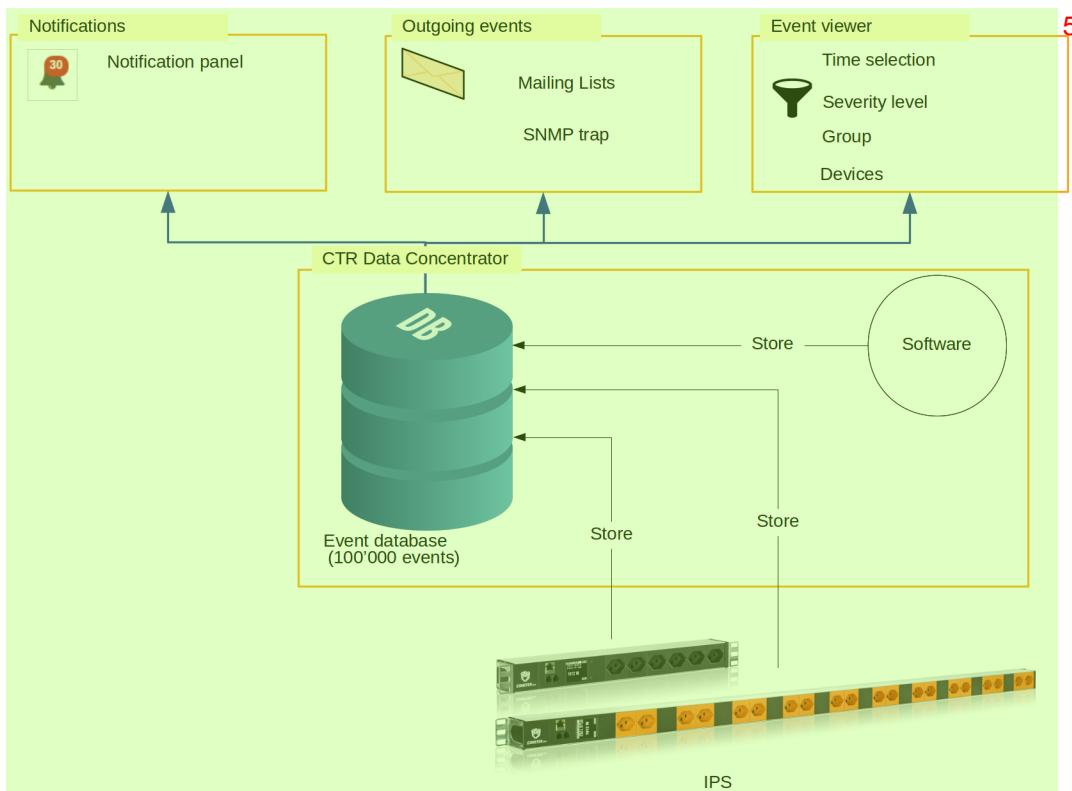


Fig. 1: Event and notification concept.⁶

The Data Concentrator software and each meter generate events which are stored in the data⁷

base of the Data Concentrator for a maximum of 100'000 events. The oldest events will be overwritten with the newest ones, once the data base is completely filled. Based on the event database you can either get event information on the notification panel, configure outgoing events or have a look on all events in the event viewer. Details will be explained in the following sections.

9.2 Notification panel²

Clicking on the notification icon  opens the notification panel (see example below) which displays a list of the latest events.

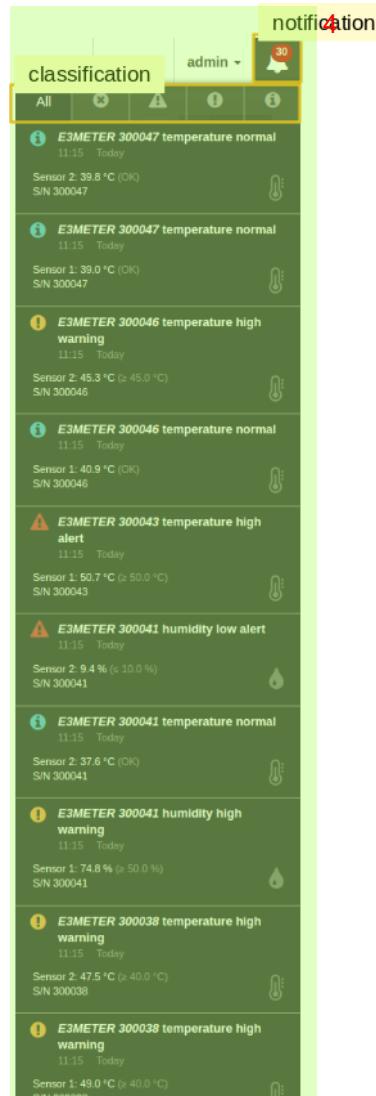


Fig. 2: Notification panel with events classification⁵

The number in red above the notification icon is called event counter and indicates the quantity of new events. All the new events appear with a darker background color in the notification panel.

Clicking on the notification icon again closes the notification panel and clears the event⁷

counter. 1

The following event types can occur and will be displayed in the notification panel: 2



Information (e.g. current normal) 3



Warning (e.g. temperature low warning) 4



Alert (e.g. current high alert) 5

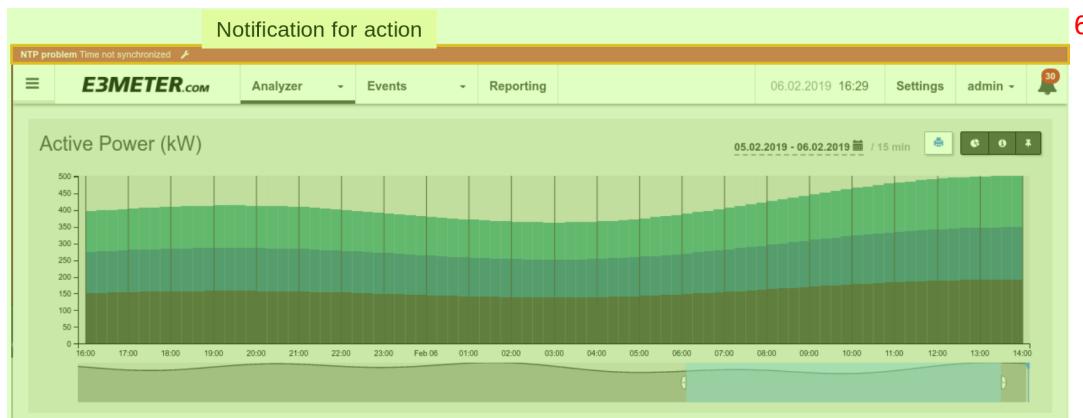


Fig. 3: Action notification explaining the actions that need to be taken. 7

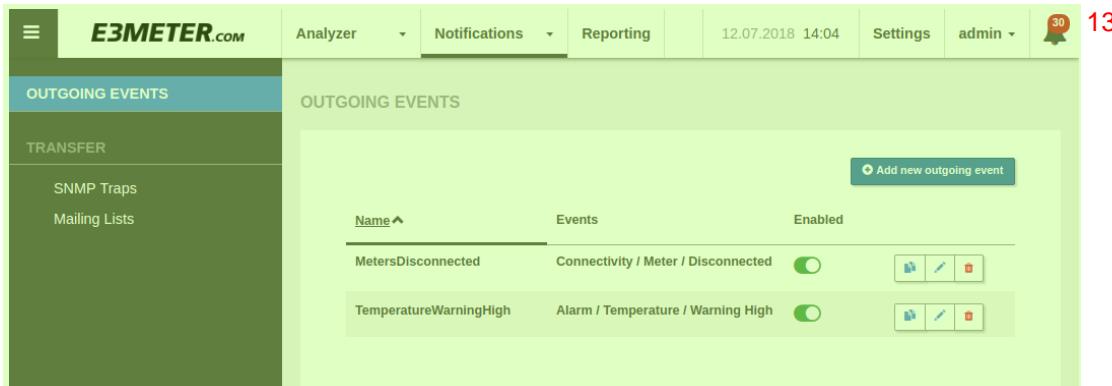
If the system detects a problem that requires an action to resume proper function, the problem 8 is described in the top of the web-interface. It also provides direct links where the problem can be solved.

9.3 Notifications 9

Notifications will send automatically events based on the selected type of events and method 10 of transfer.

9.3.1 Outgoing Events 11

All the existing Outgoing Events are listed in the window shown below. You can copy, edit 12 or delete templates. Also it is possible to Enable/Disable an outgoing event.



An outgoing event can contain one or several events. If it contains more than one event you **1** can see them by placing the mouse cursor on the indication (+1) as in the example below.



A new outgoing event can be easily configured. See events configuration example below: **3**

The screenshot shows the 'NEW OUTGOING EVENT' configuration dialog. It includes sections for 'General settings' (Name: Test Events, Enabled: On), 'Events' (Events: System, NTP: ALL, Alarm: Select Type: Current selected, Select State: ALL), and 'Transfer' (Transfer mode: SNMP Trap selected, Email, Email + SNMP Trap). The 'SNMP Trap destination' section is also visible.

Events notification can be transferred by SNMP Traps, emails or both together. **5**

9.3.2 Transfer **6**

Before an event notification can be sent, the transfer needs to be configured here. **7**

You can configure multiple SNMP Trap destinations and mailing lists. They are then all **8** listed here. You can add edit and remove SNMP Trap destinations and mailing lists.

After configuration of a new SNMP Trap you can test it by sending a test trap. **9**

NEW SNMP TRAP DESTINATION 2

Name	Name
Destination Host	IP address or hostname
Community	Community
Version	v2c
Test	<input type="button" value="Send test trap"/>

A mailing list can contain several recipients, see example below. 3

NEW MAILING LIST 4

5

List name	customer x
Recipients	
Recipient 1	test@test.com
Recipient 2	test2@test.ch
<input type="button" value="Add a recipient"/>	

9.4 Event viewer⁶

The event viewer allows to view all events of the Data Concentrator data base. It is possible 7 to select a portion of events based on

- Severity level 8
- Group
- Devices
- Time range

Time	Event Description	Category
25.06.2018 23:15:00	E3METER 300000 temperature high alert	ALARM
25.06.2018 23:00:00	E3METER 100003 temperature high alert Sensor 1: 51.1 °C (> 50.0 °C) S/N 100003	ALARM
25.06.2018 23:00:00	E3METER 100003 temperature high alert	ALARM
25.06.2018 21:15:00	Meter E3METER 300000 disconnected S/N 300000	CONNECTIVITY
25.06.2018 21:15:00	Sensor 2 of E3METER 300000 disconnected S/N 300000	CONNECTIVITY

Fig. 4: Event viewer example with selection criteria applied 3

In the picture shown above different selection criteria is applied. Per event it is possible to click on it and see the detailed information. You find for instance the detailed temperature information as well as the temperature threshold level. 4

CHAPTER 10¹

Advanced setup²

10.1 Configure SMTP (mail server)³

The Data Concentrator is capable to send notifications per email hence the configuration of⁴ the mail server per SMTP is necessary.

SMTP can be enabled or disabled, Server can be configured insecure or secure.⁵

For the detailed settings of the mail server please refer to your Internet service provider or⁶ IT administrator.

Once all parameters are set you have the possibility to test the SMTP configuration by clicking-⁷ on the Test button for the Mail server test on the bottom of the SMTP (mail server) configuration page. This will open a window asking you to select an email address to which a test email will be sent. If you receive that email on the specified address this confirms that the settings are correct. Should you have trouble receiving the test mail, check first your SPAM folder and then check the mail server configuration again.

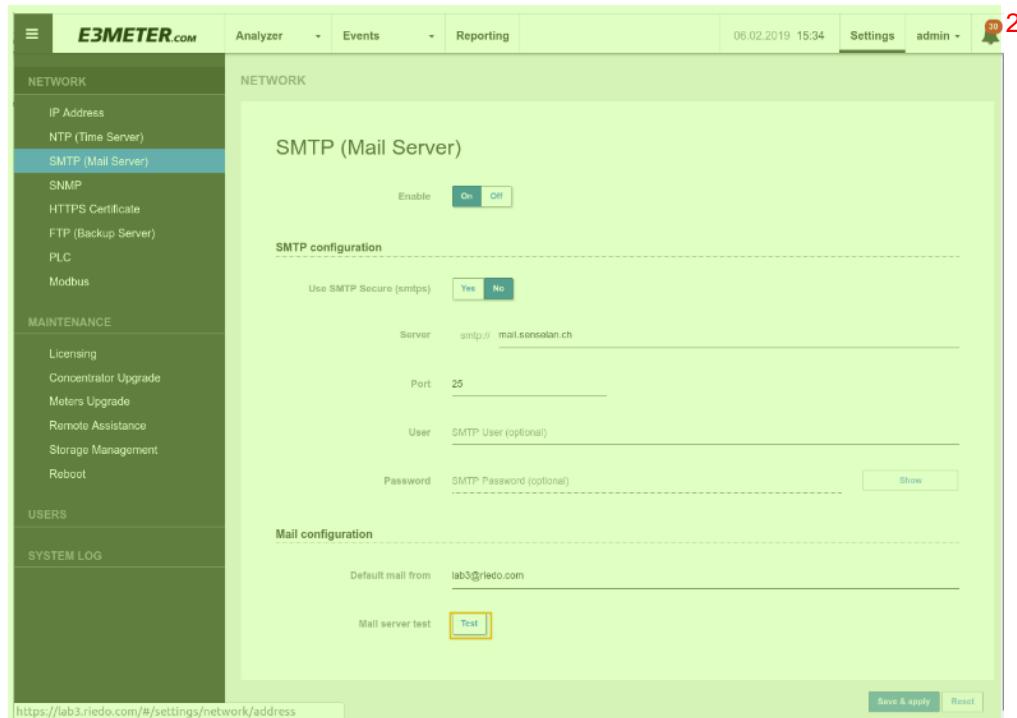
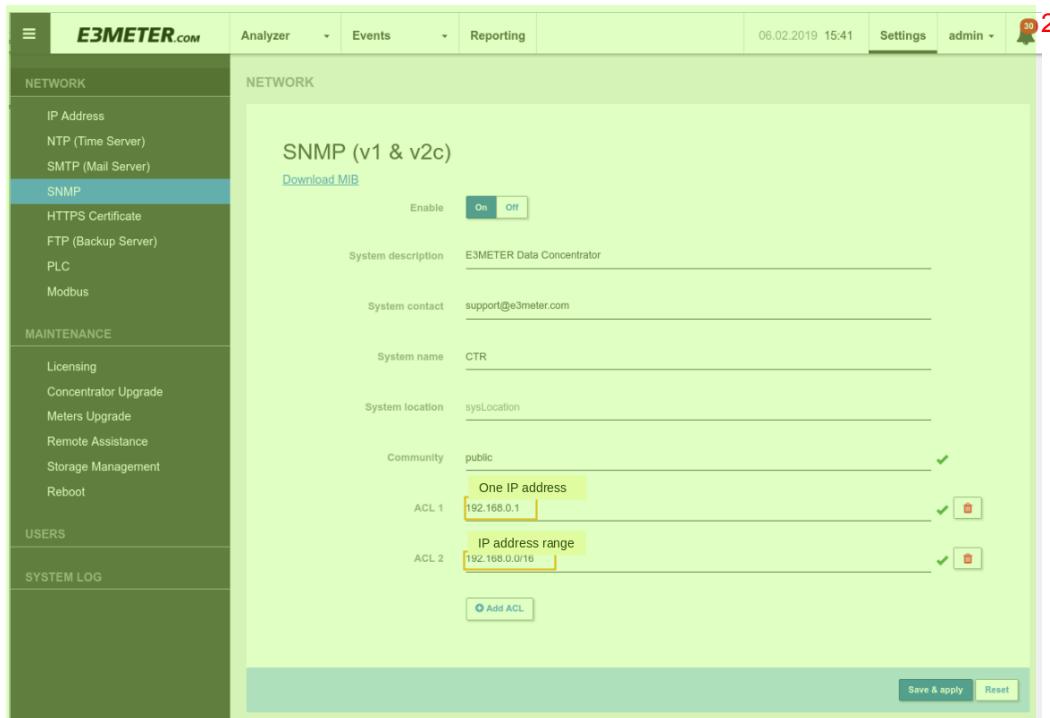


Fig. 1: SMTP setting 3

10.2 Configure SNMP⁴

SNMP is used to gather data from the E3METER® Monitoring System other than over the E3METER® Monitoring Software. It is necessary to download the MIB (Management Information Base) of the Data Concentrator which is the definition of the available data for the Data Concentrator. 5

With ACL (Access Control List) it is possible to define access restrictions per specific IP address or range of IP addresses as indicated in the picture below: 6

Fig. 2: SNMP setting 3

The first address for access control shows one single IP address, namely 192.168.0.1. The second example shows access control restriction for a range of IP addresses in the range of 192.168.0.0 to 192.168.255.255. The latter notation used is the CIDR Subnet Mask notation. 4

10.3 Configure FTP (Backup Server) 5

You have the possibility to backup data of the Data Concentrator over an FTP backup server. 6 This has the big advantage that in case a Data Concentrator has a failure and needs to be restored or you have to restore data on a new Data Concentrator, you can restore it from a previous backup.

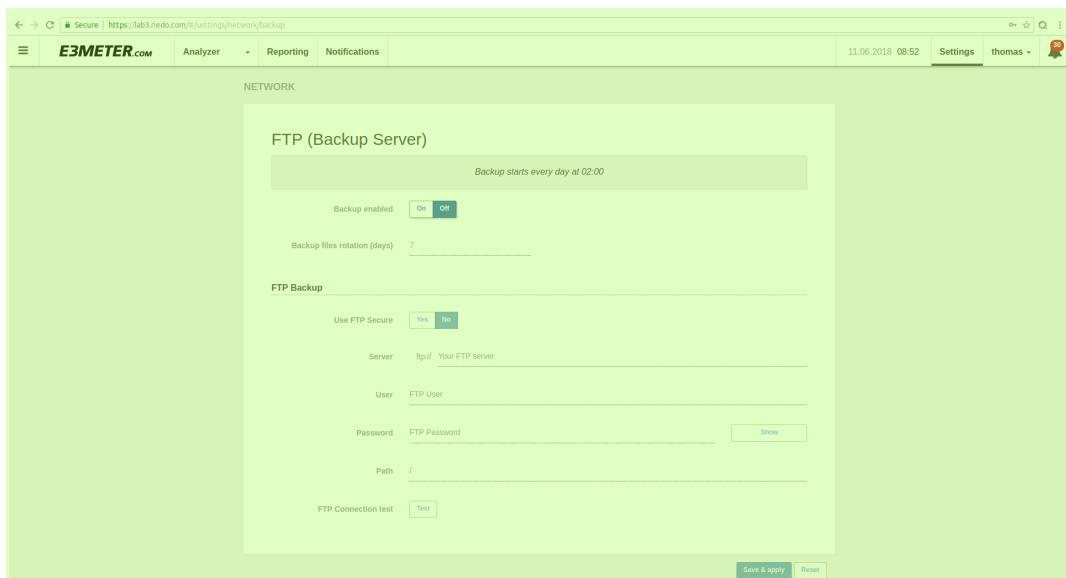


Fig. 3: FTP (Backup Server) settings 2

10.4 Configure PLC 3

The PLC allows configuring some system parameters as shown in the picture below: 4

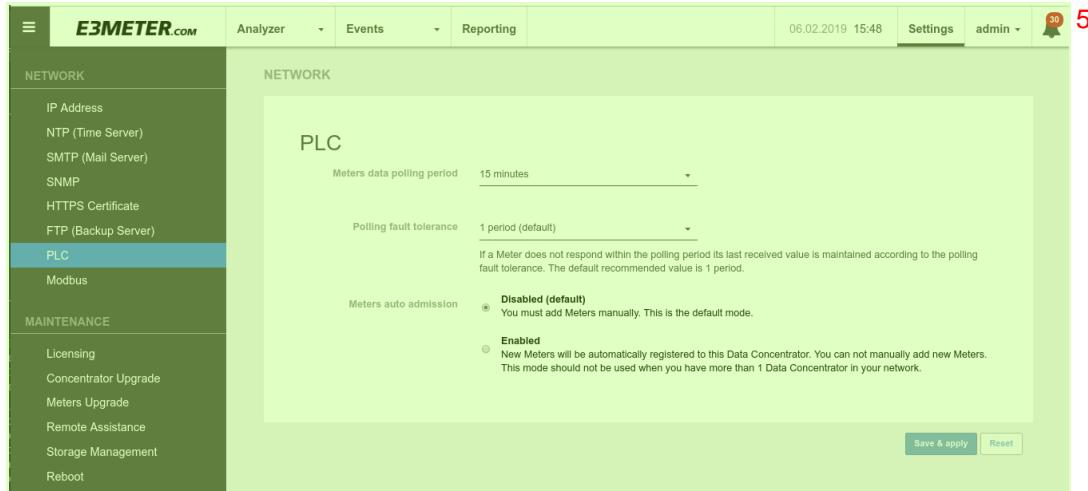


Fig. 4: PLC setting 6

The Meters data polling period can be configured in what time interval data is being calculated. The allowed values are 5 minutes, 15 minutes, 30 minutes or 60 minutes. Each meter calculates the power and energy consumption instantly and provides the data after the completion of the configured data polling period. That way a user can assure that all meters provide data with the same data polling period. 7

The data polling period has an influence on the maximum number of meters that the system can interface with as indicated in the table here below: 8

Table 1: Maximum node numbers 1

Data polling period	maximum # of meters	2
5 min	50	
15 min	200	
30 min	400	

Attention: Changing the data polling period, deletes the complete history of the Data Concentrator. The concentrator warns about this fact and asks you for confirmation. 3

The polling fault tolerance is the number of periods the Data Concentrator tolerates not having received the data. Allowed values are 1, 2 and 3 periods. The default and suggested number for the polling fault tolerance is 1 period. 4

Note: Data polling period is used on all meters which defines what time period the different data is being calculated. This is basically the time tick where all of the values across different meters are based on. 5

Meters auto admission can be configured to be disabled or enabled. In the *Adding meters* chapter you find the different methods that exist and also how to use the Auto admission feature and why caution needs to be taken. 6

PLC frequency band can be configured to be either FCC or CENELEC-B 7

10.5 Configure Modbus 8

There exist multiple ways to interface PRO meters. They are explained within *Adding PRO meters manually*. 9



Fig. 5: Modbus settings 11

10.5.1 USB adapter 12

Direct connection is established with a RN1079 USB to RS-485 adapter. The Data Concentrator will automatically detect an adapter connected to the CTR. It is only possible to remove 13

a USB Adapter from the configuration, when the adapter is not physically connected anymore to the CTR. By doing so all associated meters to the selected adapter will be removed from the Data Concentrator.

10.5.2 Modbus TCP/RTU gateway²

In order to use a gateway one needs to click on the Add gateway button as shown in the previous picture here above. This opens the following configuration window. Enter the IP address of the gateway and give it a name. The default port for Modbus is 502.

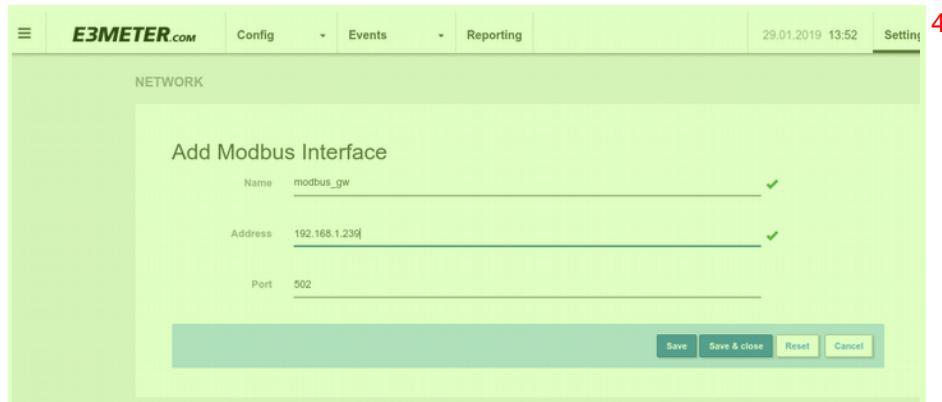


Fig. 6: Modbus Gatway Configuration window ⁵

10.5.3 Configuration parameters on the Moxa MB3180 gateway⁶

On the gateway both the Modbus RTU and Modbus TCP parameters need to be configured.⁷ The Modbus RTU parameters need to be configured in a specific way. The Modbus TCP parameters need to reflect your network settings. The configuration can be done either by the Moxa MGate Manager or by the web interface of the MB3180 knowing it's IP address. The advantage of the MGate Manager is that it can discover any MB3180 when it is connected to the same network.

In the following section the necessary steps for configuring the Modbus TCP/RTU gateway⁸ are described.

1. Install and power gateway
2. Download reference configuration of Moxa gateway from Riedo Networks website
The reference configuration can be downloaded from our website under the section support: www.riedonetworks.com/support.
3. Start the MGate Manager
4. Click on Off-Line-Configuration, Select the MB3000 series and MB3180 model

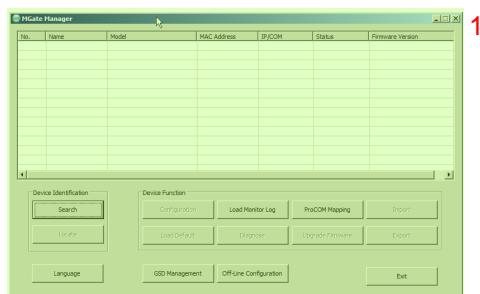


Fig. 7: Click on Off-line Configuration 2

5. Load the existing configuration, downloaded previously from the Riedo Networks Ltd 3 website

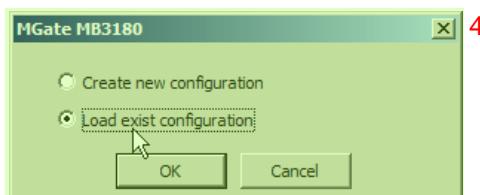


Fig. 8: Select and load the reference configuration 5

6. Edit the network parameters of the reference configuration and store it on your Computer. 6

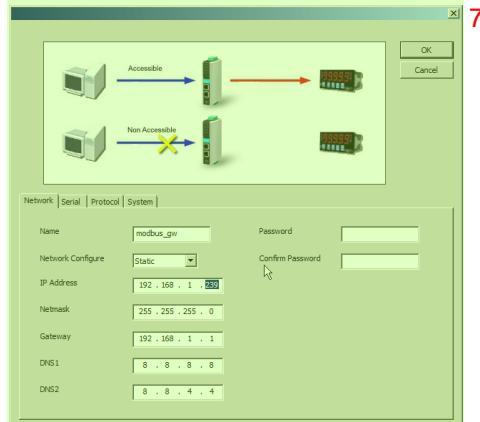


Fig. 9: Change the network parameters 8

7. Search for your MB3180 on the network by hitting Search, Broadcast search. Make 9 sure you select your gateway by verifying the MAC address

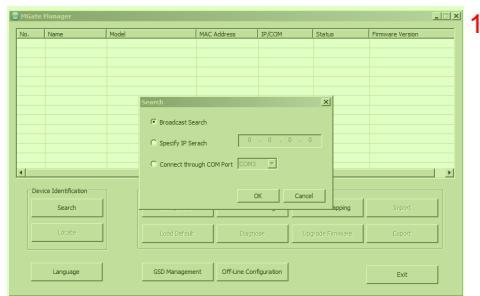


Fig. 10: Search your gateway 2

8. Select your gateway, previously identified 3

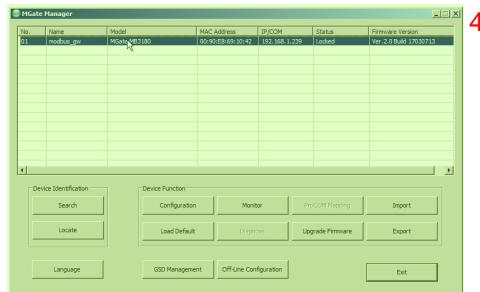


Fig. 11: Select your gateway, previously identified 5

9. Select import and the previously changed configuration file and confirm with OK 6

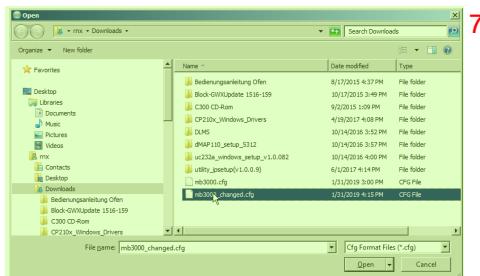


Fig. 12: Import the changed configuration on the gateway 8

10. Add the modbus TCP/RTU gateway in the Data Concentrator as explained in the above 9 section *Modbus TCP/RTU gateway*.

Note: As previously mentioned, it is also possible to make the changes via the web interface. Please read the Moxa MB3180 user manual for the necessary configuration steps.

10.6 Storage Management 11

In the Storage Management you can have a look at the internal storage, the type, model and 12 size as well as the status. You can format or check the storage.

Caution: If you want to check the storage, this will stop the storage of data into the internal memory (history and events) for the time of the check (about 30 seconds). 1

10.7 Reboot²

In the Reboot menu you find the possibility to reboot the Data Concentrator. 3

Attention: Make sure you confirm a reboot only in the case you intentionally want to reboot. Only with user rights *Administrator* you have the possibility to reboot the Data Concentrator. 4

10.8 Changing user rights⁵

Within the settings menu USERS only a user with the role Administrator can change user information. 6

- Add a user
- Remove a user
- Change the password or other information of a user
- Change the role of a user which changes the user rights

7

10.9 System Log⁸

The system log shows the latest system events. It is possible to download the logs which can then be sent to Riedo Networks Ltd in case of an issue that might need analysis. In case *Remote Assistance* over a secured connection is not possible, still the system events can be compressed and sent to Riedo Networks Ltd by clicking on  9, located on the bottom right of the SYSTEM LOG page of the settings.

CHAPTER 11¹

Bulk modification²

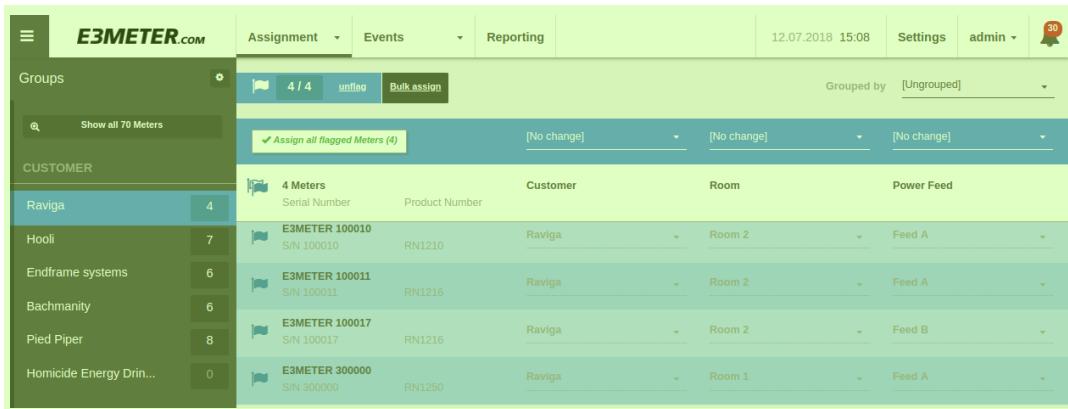
Bulk modification is a useful feature to change configuration parameters of multiple meters ³ at once.

Note: First, one needs to flag multiple meters to see the bulk modification possibility. ⁴ Otherwise the bulk modification won't be shown.

Bulk modification is available for Assignment, Configuration and Alarm. In the following ⁵ sections, the different possibilities are explained in detail. Bulk modification will be applied **only** on the flagged meters. It is not possible to bulk configure meters based on a category or group.

11.1 Bulk Assignment⁶

Bulk assignment is done by clicking on Bulk assign  on top of the Assignment page. ⁷ Once having clicked to Bulk assign the categories are greyed out and can't be edited individually anymore.

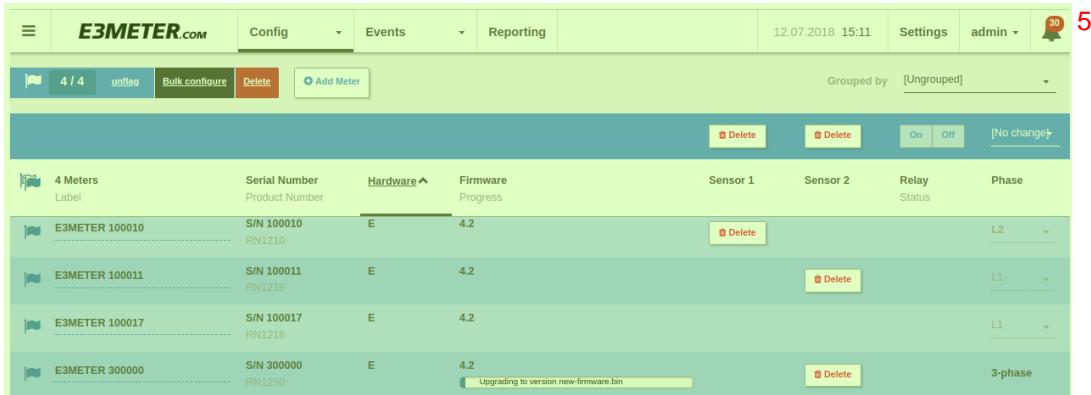


The screenshot shows the 'Assignment' tab of the software interface. On the left, there's a sidebar with 'Groups' and a search bar for 'Show all 70 Meters'. Below that is a 'CUSTOMER' section with a table of companies and their meter counts. The main area shows a table of '4 Meters' with columns for Serial Number, Product Number, Customer, Room, and Power Feed. The first three rows belong to 'Raviga' (S/N 100010, 100011, 100017) and the last one to 'Homicide Energy Drin...' (S/N 300000). A green button at the top says 'Assign all flagged Meters (4)'.

Fig. 1: Bulk assign of four flagged meters in the Assignment page. 2

11.2 Bulk Configuration³

In the configuration window parameters like deleting a sensor or association of a phase to the meter can be done in a bulk operation. For this you need to click on Bulk config which will then show the options of the parameters to be configured all at once. 4



The screenshot shows the 'Config' tab with a 'Bulk config' button highlighted. The main area displays a table of '4 Meters' with columns for Label, Serial Number, Product Number, Hardware, Firmware, Sensor 1, Sensor 2, Relay Status, and Phase. The fourth meter (S/N 300000) has a progress bar indicating 'Upgrading to version new-firmware bin'.

Fig. 2: Bulk configuration of four flagged meters. 6

11.3 Bulk alarm setting⁷

Bulk alarm setting is done by clicking on any of the bar charts after having flagged multiple 8 meters as shown in the picture below. 9



Fig. 3: Clicking on one alarm bargraph of two flagged meters in order to access bulk alarm 10 setting

This opens the alarm configuration window which indicates that bulk alarm setting is done **1** by stating how many meters are flagged; 2 flagged meters in the example shown below.

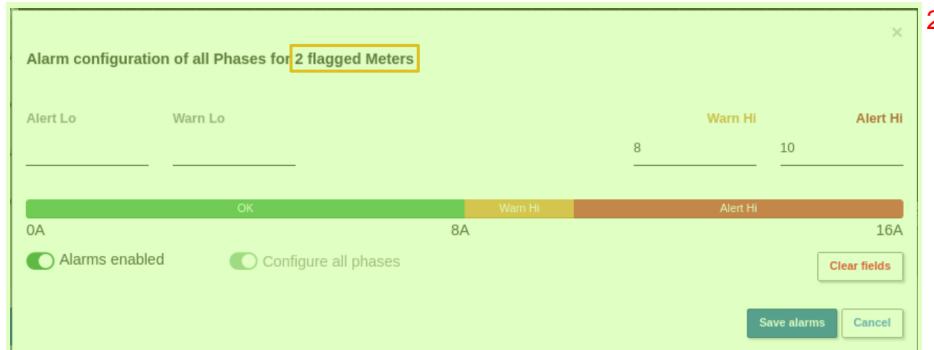


Fig. 4: Setting alarms of two flagged meters in bulk alarm setting **3**

11.3.1 Combination of different features **4**

When configuring meters with different features like for instance their rated current this **5** will be indicated. In the example below three meters are selected with two different types of rated current 10A and 16A.



Fig. 5: Bulk alarm setting for meters with different current ratings **7**

An example of how the bulk alarm setting looks like for two meters of type RN1216 and one **8** meter of type RN1210 is shown in the picture below.



Fig. 6: Bulk alarm setting for meters with different current ratings, shown with separate **10** windows for the different rated currents

The different parameters are shown in different windows for the configuration. You will **11** have to configure the alarm for the two different types of meters in the separate windows and confirm with save.

CHAPTER 12¹

Technical support²

- Visit web page www.riedonetworks.com/support ³
- Call +41 26 505 50 00

CHAPTER 13¹

Legal notice

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²

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Riedo Networks Ltd ³
Route de la Fonderie 6
1700 Fribourg
Switzerland

Every effort has been made to ensure that the information in this User Manual is accurate. ⁴
Anyway, the information in this manual is subject to change without notice and should not
be construed as a commitment by Riedo Networks Ltd. Riedo Networks Ltd assumes no
responsibility or liability for any errors or inaccuracies that may appear in this manual.

For the latest product updates, consult the Riedo Networks Ltd web site at ⁵
www.riedonetworks.com.

CHAPTER 14¹

Annex²

14.1 Time granularity in bar chart³

The granularity of the bars shown in the bar chart corresponds to the data polling period⁴ when showing data of a short time period. When showing longer time periods it shows the following granularities 1 hour, 1 day, 1 week depending on the overall time shown.

14.2 Synchronous polling⁵

The E3METER® system allows to interface with meters either per PLC (Power Line Communication), Ethernet or via RS485. With the communication per PLC or Ethernet the Data Concentrator (CTR) synchronizes the time base and polls data from the meters (IPS). This allows making sure that the IPS is synchronized with the CTR and to the Epoch as symbolized in the picture below with the little clock symbol and the green check mark. The advantage of the E3METER® system lies in the fact, that each IPS aggregates data within the data polling period. Once the data polling period is over, e.g. with a period of 15 minutes, the CTR polls the aggregated data of all IPS from the last polling period. In the picture below this is shown for the interval from minutes 45 to 00. Per data polling period, the aggregated data provides the average values as well as the minimum and maximum occurred during the interval. All E3METER® use the proprietary communication protocol and poll data in a timely manner. Meters other than E3METER® are not synchronized and provide only instantaneous measurement values once they are polled.

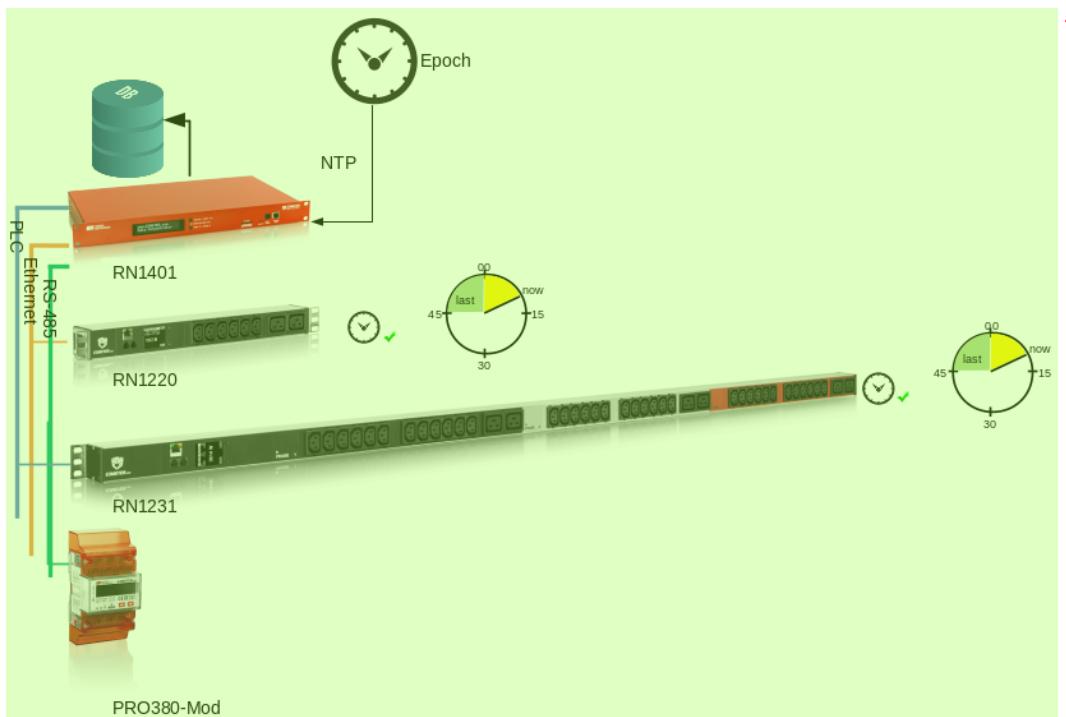


Fig. 1: Synchronous polling for E3METER® system 1

14.3 Accessing data per SNMP³

The data provided by the Data Concentrator can be accessed either via the webpage of the Data Concentrator or access made to the Concentrator per SNMP. When accessing per SNMP the Meter data of the last polling period can be accessed. When accessing to data of the Data Concentrator via it's own web interface, the stored data is being accessed allowing to show the historic data. Within this chapter the latter option is described. This section covers how to the average power of the last data polling period of one specific Data Concentrator using SNMP.

4

14.3.1 Download MIB browser⁵

Go to <http://www.ireasoning.com/downloadmibbrowserfree.php> and download a version of 6 the MIB browser. There exist other tools but this user manual shows how to use the MIB browser.

The Data Concentrator Data structure is defined with MIB (Management Information Base). 7 For more information go to https://en.wikipedia.org/wiki/Management_information_base. As a first step one needs to download the MIB information from the Data Concentrator as explained in *Configure SNMP*. The MIB shows the detailed structure of accessible data with the corresponding description.

14.3.2 Open MIB browser⁸

After starting the MIB browser, select the MIB for the E3METER® ‘e3meter-ctr.mib’.9

Once the MIB for E3METER® is loaded, make sure the following basic MIB are already 1 loaded when using iReasoning MIB Browser. For this, access Tool/Options/MIB Files and verify that you have the following MIB. Without these, the data structure won't be resolved properly.

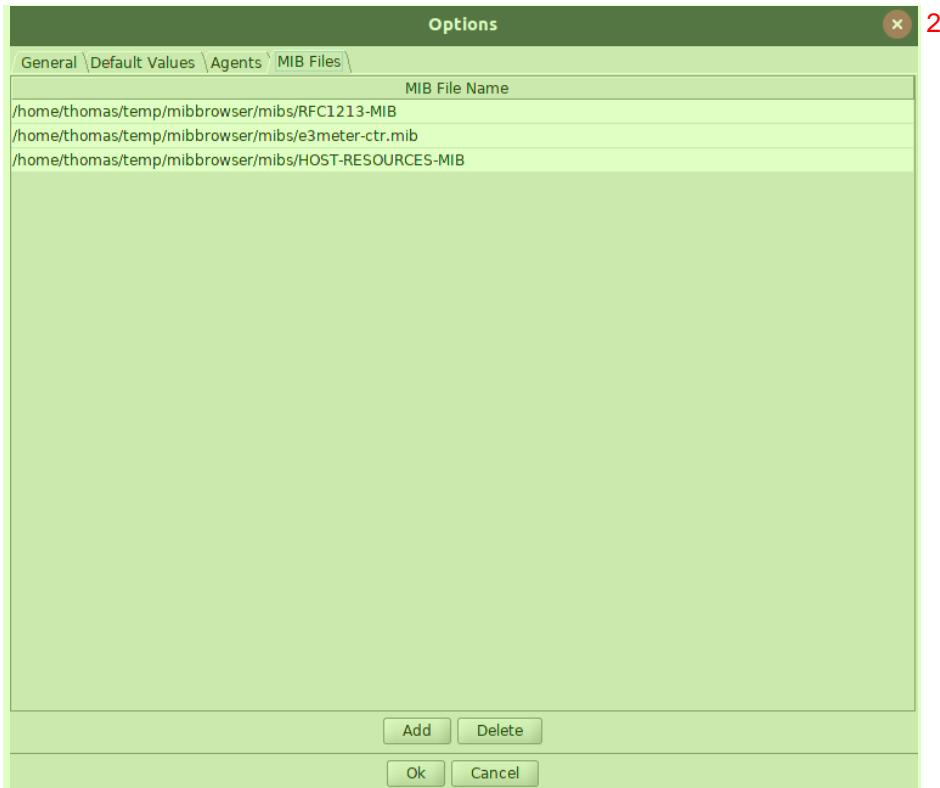


Fig. 2: List of basic MIB and e3meter-ctr.mib in MIB browser 3

14.3.2.1 Connect to Data Concentrator 4

Please make sure to connect to the correct Data Concentrator and select the correct port and 5 SNMP version as shown in the picture below.

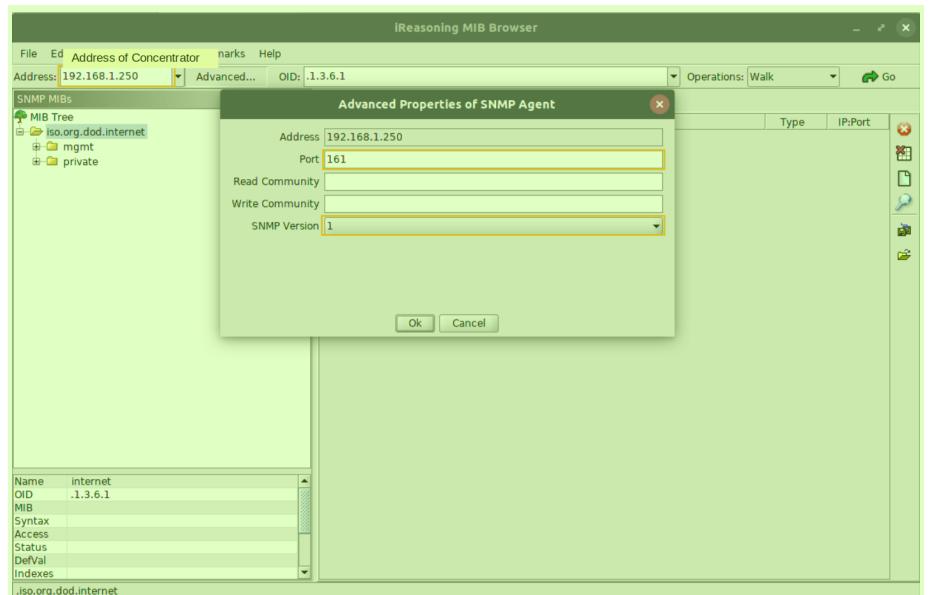


Fig. 3: MIB browser showing detailed connection parameters 2

Caution: Make sure that you have enabled SNMP and that the Access Control Field 3 (ACL) grants you with access to the Data Concentrator. For instance 192.168.1.0/24 in the SNMP ACL field in the example shown throughout the chapter.

14.3.2.2 Accessing average power 4

In order to access the average power of the last data polling period, select the ‘e3IpsPAvg’ 5 and click on the Menu ‘Operations/Get Bulk’. This will have the result to show the average power of the last polling period. In order to know the polling period duration, you can access ‘e3IpsPeriodDuration’ and in order to know the start of the polling period, access ‘e3IpsPeriodStart’. In the picture below the average power values are indicated.

The average power per meter over the last data polling period is gathered in the picture shown 6 below.

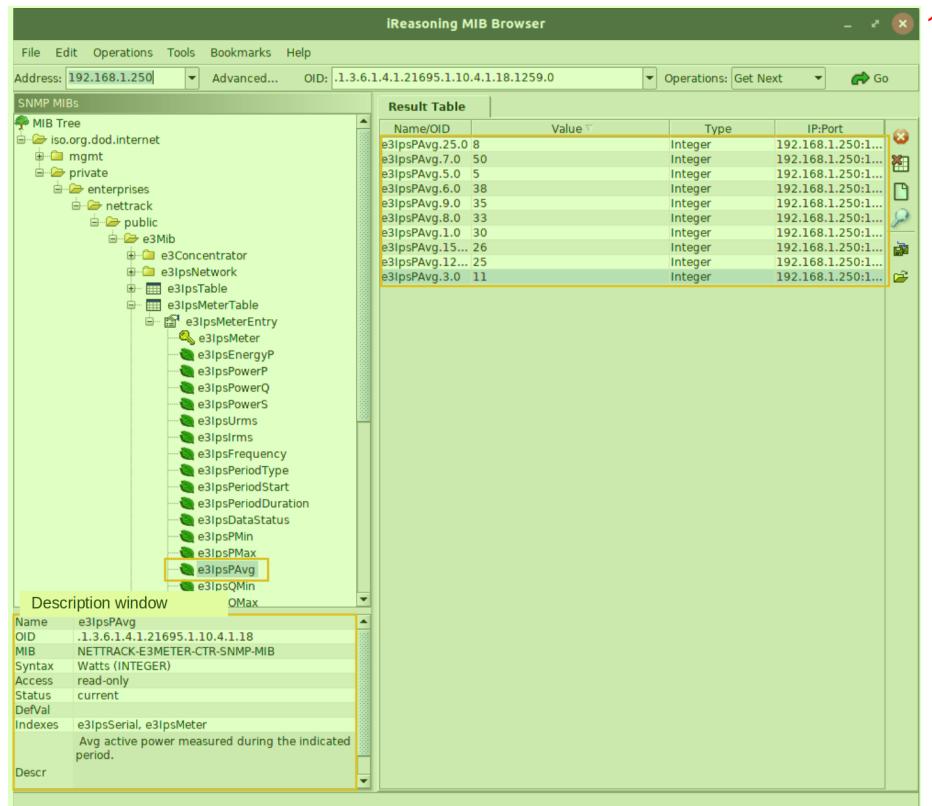


Fig. 4: Average power of all associated IPS accessed per SNMP **2**

CHAPTER 15¹

Revision log²

Revision	Date	Changes	3
A	19.01.2021	New version for software version 6.2	

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