

PRODUCT MANUAL

EQmatic

Energy Analyzer, M-Bus Energy Analyzer, Modbus



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1 General

Energy measurement

The acquisition and recording of energy variables and values as well as their evaluation and their further processing are becoming increasingly important. This is not just due to rising energy costs but also due to the frequent demands for the ability to evaluate and read via a decentralized reading station. Combined with the features of the EQmatic series, convenient, cost-effective solutions for modern energy management can be realized within the building control system for the operators or users. The demands placed on recording and evaluation as well as on billing and charging in commercial and functional buildings, and also in industrial systems and residential properties have increased significantly over recent years. ABB offers a wide range of devices and solutions specially designed for these applications.

What is Automatic Meter Reading (AMR)?

Automatic Meter Reading (AMR) is the process of remotely reading data from meters. AMR allows the suppliers of electrical energy, as well as water, gas and district heating to improve the handling of their contracts and services. The ongoing costs involved in the manual reading of the meter are eliminated and the consumption data become transparent.

What is energy management?

Energy management is the overall concept which ranges from the planning of the requirement to the selection, installation and operation of energy generation systems. The objective is to provide complete coverage of the energy needs of the consumer and to use the minimum amount of energy at the given comfort or production levels (industrial and commercial). Energy management can be applied in every building where energy is required: industrial buildings, office buildings, sports halls, dwellings, apartments, etc.

Reasons for energy management:

- Assurance of the provision of an interruption-free supply of energy or power
- Retention of the voltage and current quality
- Cost-effectiveness, e.g. low prices for power and heat, energy saving
- Environmental aspects, e.g. energy saving, energy recovery
- Independence of fossil-based primary energy carriers
- Implementation of energy management guidelines and standards such as ISO 50001

What is load management?

The primary objective of load management is an economical and resource efficient use of energy provided by electrical utility companies in industry, commercial applications and domestic households for environmental cost and/or safety reasons. Load management also incorporates measures for the avoidance of circuit overloads. Cost savings can be achieved by the avoidance of load peaks or reduction of consumption during tariff times when higher power prices are charged.

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General

1.1 Using the product manual

This manual provides detailed technical information on how to install and program the device, and how it works. Explanations on how to use it are accompanied by examples.

This manual is divided into the following chapters:

Chapter 1	General
Chapter 2	Device technology
Chapter 3	Commissioning
Chapter 4	Planning and application
Chapter A	Appendix

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General

1.1.1

Notes


Notes and safety instructions are represented as follows in this manual:

Note
Tips on usage and operation

Examples
Application examples, installation examples, programming examples

Important
These safety instructions are used if there is danger of a malfunction without risk of damage or injury.

Caution
These safety instructions are used if there is danger of a malfunction without risk of damage or injury.

 Danger
These safety instructions are used if there is a danger to life and limb with inappropriate use.

  Danger
These safety instructions are used if there is an extreme danger to life with inappropriate use.

1.1.2 **Cyber security (network security)**

Businesses are increasingly confronted with Internet security risks. To increase the stability, security and robustness of its solutions, ABB has introduced official robustness tests for Internet security as part of the product development process.

The following notes are also intended to form a guide and describe mechanisms that can be used to improve network security.

Preventing access to the different media

The basis for any protection concept is the careful shielding of the system against unauthorized access.

Only authorized persons (installers, custodians, users) should be allowed to have physical access to the electrical system. The critical points in every electrical installation must be protected as well as possible during planning and installation.

In general, applications and devices should be permanently installed to prevent their easy removal and in this way prevent access to the electrical installation for unauthorized persons.

Sub-distribution units should be sealed or be in rooms to which only authorized persons have access.

Twisted pair cabling

The ends of cables should not be visible or protrude from walls, either inside or outside the building.

If available, features for protection against theft should be used.

Bus cables outdoors represent an elevated risk. Physical access should be made particularly difficult here.

IP cabling inside the building

A separate LAN or WLAN with dedicated hardware (router, switches etc.) should be used for the technical infrastructure.

It is imperative the normal security mechanisms for IP networks are used. These are examples:

- MAC filter
- Encryption of wireless networks
- Usage of strong passwords and protection of these against access by unauthorized persons

Connection to the Internet

Access to an installation from the Internet can be made possible using VPN connections. This aspect requires a router with VPN server functionality or a server.

1.2 Overview of product and functions

EQmatic series devices are compact modular DIN rail components designed to monitor and display consumption and measured values. They are used in energy management applications. They log and store consumption data for electricity, gas, water or heat meters. This means that they can help those operating purpose-built premises or commercial enterprises to implement energy management systems such as ISO 50001 or to put in place low-voltage installations compliant with VDE 0100-801. The devices have a plug and play commissioning system which automatically detects meters connected. Device access is via web browser. The user interface provides basic analysis functions such as a dashboard, historical data, instantaneous values, comparison functions, cost allocation by consumer group, and much more. In this way energy flows and costs in the building become transparent.

Functions

- Storage of meter data from up to 64 meters for up to 3 years.
- Display and evaluation of historical consumption and measured data via configurable charts
- Customizable dashboard with predefined widgets
- User addition and administration functions (simultaneous access for up to 10 users)
- Cost and consumption analysis for media such as electricity, water, heat and gas
- Display and evaluation of costs by consumer group
- Addition of cost centers and virtual meters
- Benchmarks and comparisons by periods and consumers
- Load profile display at 5 minute intervals
- Real-time data
- CO₂ emissions display
- Energy Performance Indicator (EnPI)
- Manual data export, e.g., to xls, csv, pdf, etc.
- Cyclic (e.g. monthly) export of reports to FTP server or e-mail recipients
- Provision of the data to higher-level systems via Modbus TCP
- Addition of favorites
- Notification on the failure of meters connected
- Automatic detection of ABB meters from the A and B series
- Support for ISO 50001-compliant energy management

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Device technology

2 Device technology

2.1 Device technology QA/S 3.xx.1 Energy Analyzer, M-Bus



The Energy Analyzers, M-Bus QA/S 3.xx.1, are modular DIN rail components (MDRC) in Pro *M* design for installation in distribution boards on a 35 mm mounting rail.

They are compact, web-based standalone devices for energy management applications in M-Bus networks. They log, store, display and analyze consumption data for up to 16 or 64 electricity, gas, water or heat meters. They automatically detect ABB A and B series meters during commissioning. Device access is via web browser.

The user interface provides graphic analysis features such as

- A configurable dashboard
- Display and evaluation of historical data
- Analysis of instantaneous values
- Period comparison (before/after)
- Comparison of up to 5 consumers
- Display of cost/consumption figures by consumer groups

2.1.1 Technical data

Energy Analyzer, M-Bus	M-Bus master	According to DIN EN 13757-2
	Max. number of M-Bus slaves	QA/S 3.16.1 QA/S 3.64.1 16 64
Supply	Operating voltage U_s	100 – 240 V AC, 50/60 Hz
	Power consumption at 230 V AC	< 10 W
	Current consumption at 230 V AC	< 50 mA
	Device power loss at 230 V AC	< 3 W at 230 V AC
Web server and device properties	Simultaneous access to web server	Max. 10 users
	Retrieval/storage of meter data	Every 5 minutes
	IP security	HTTPS, SSL
	Data export	JPG, PNG, CSV, XLSX, PDF
	Data transfer*	Modbus-TCP
	Report*	FTP or e-mail
	Storage capacity with up to 64 M-Bus slaves	Min. 3 years
Network	Ethernet	10/100 Mb
Connections	Operating voltage and M-Bus	Screw terminal, universal head 0.2...4 mm ² stranded 0.2...6 mm ² solid core
	Tightening torque	Maximum 0.6 Nm
	LAN	RJ45 connector for 10/100BaseT IEEE 802.3 networks, autosensing

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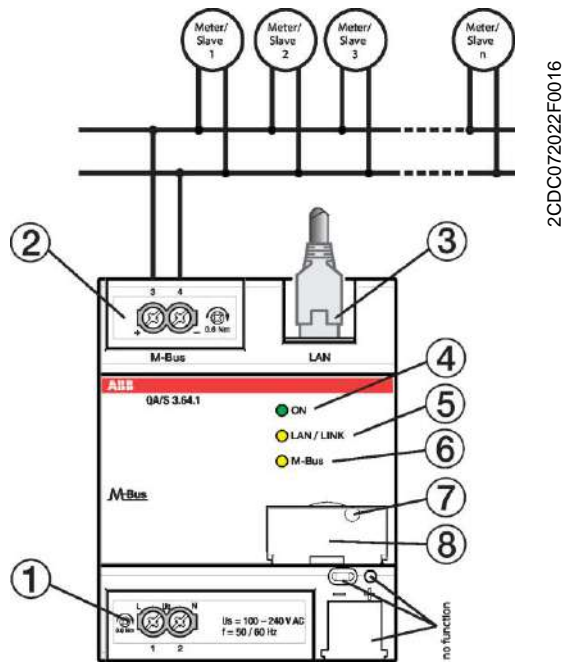
Device technology

Operating and display elements	ON LED (green)	Ready indicator
	LAN/LINK LED (yellow)	Network connection/telegram traffic indicator
	M-Bus LED (yellow)	M-Bus ready indicator
	Reset button	Rear label carrier
Degree of protection	IP 20	According to EN 60529
Protection class	II	According to EN 61140
Isolation category	Overvoltage category	III according to EN 60664-1
	Pollution degree	2 according to EN 60664-1
Temperature range	Operation	-5 °C...+45 °C
	Storage	-25 °C...+55 °C
	Transport	-25 °C...+70 °C
Environmental conditions	Humidity	Maximum 93%, moisture condensation is to be excluded
	Atmospheric pressure	Atmosphere up to 2,000 m
Design	Modular DIN rail component (MDRC)	Pro <i>M</i> design
	Dimensions	90 x 72 x 64 mm (H x W x D)
	Installation width/installation depth	4 modules with 18 mm/68 mm
Mounting	On 35 mm mounting rail	According to DIN EN 60 715
Mounting position	Any	
Weight	Approx. 0.15 kg	
Housing, color	Plastic, light gray	Halogen-free
		Flammability V-0 as per UL94
CE marking	In accordance with the EMC and Low Voltage Directives	

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Device technology

2.1.2 Connection diagram



QA/S 3.xx.1

- | | | | |
|---|--|---|-------------------------------------|
| 1 | U _s supply voltage connection | 5 | LAN/LINK LED (yellow) |
| 2 | M-Bus slaves/meters connection | 6 | M-Bus LED (yellow) |
| 3 | Ethernet/LAN connection | 7 | Reset button (behind label carrier) |
| 4 | ON LED (green) | 8 | Label carrier |

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Device technology

2.1.3 Dimension drawing

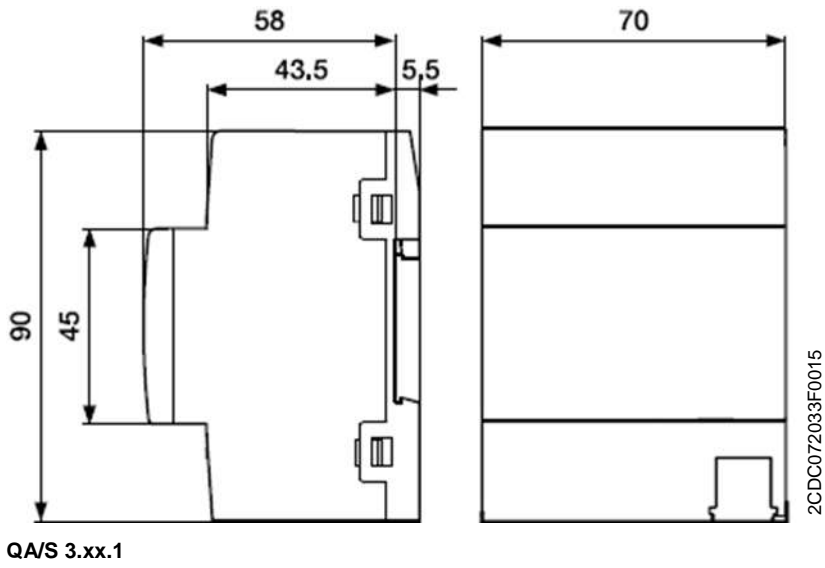


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Device technology

2.2 Device technology QA/S 4.xx.1 Energy Analyzer, Modbus



The Energy Analyzers, Modbus RTU QA/S 4.xx.1, are modular DIN rail components (MDRC) in Pro M design for installation in distribution boards on a 35 mm mounting rail.

They are compact, web-based standalone devices for energy management applications in Modbus RTU networks. They log, store, display and analyze consumption data for up to 16 or 64 electricity, gas, water or heat meters. They automatically detect ABB A and B series meters during commissioning. Device access is via web browser.

Various interfaces are available for further processing the data.

The user interface provides graphic analysis features such as

- A configurable dashboard
- Display and evaluation of historical data
- Analysis of instantaneous values
- Period comparison (before/after)
- Comparison of up to 5 consumers
- Display of cost/consumption figures by consumer groups

2.2.1 Technical data

Energy Analyzer, Modbus	Modbus RTU master	According to DIN EN 13757-2
	Max. number of Modbus RTU slaves	QA/S 4.16.1 QA/S 4.64.1 16 64
Supply	Operating voltage U_s	100 – 240 V AC, 50/60 Hz
	Power consumption at 230 V AC	< 10 W
	Current consumption at 230 V AC	< 50 mA
	Device power loss at 230 V AC	< 3 W at 230 V AC
Web server and device properties	Simultaneous access to web server	Max. 10 users
	Retrieval/storage of meter data	Every 5 minutes
	IP security	HTTPS, SSL
	Data export	JPG, PNG, CSV, XLSX, PDF, JSON
	Data transfer	Modbus-TCP, REST API, web sockets
	Report	FTP or e-mail
	Storage capacity with up to 64 Modbus slaves/devices	Min. 3 years
Network	Ethernet	10/100 Mb
Connections	Operating voltage and RS-485/Modbus	Screw terminal, universal head 0.2...4 mm ² stranded 0.2...6 mm ² solid core
	Tightening torque	Maximum 0.6 Nm
	LAN	RJ45 connector for 10/100BaseT IEEE 802.3 networks, autosensing

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Device technology

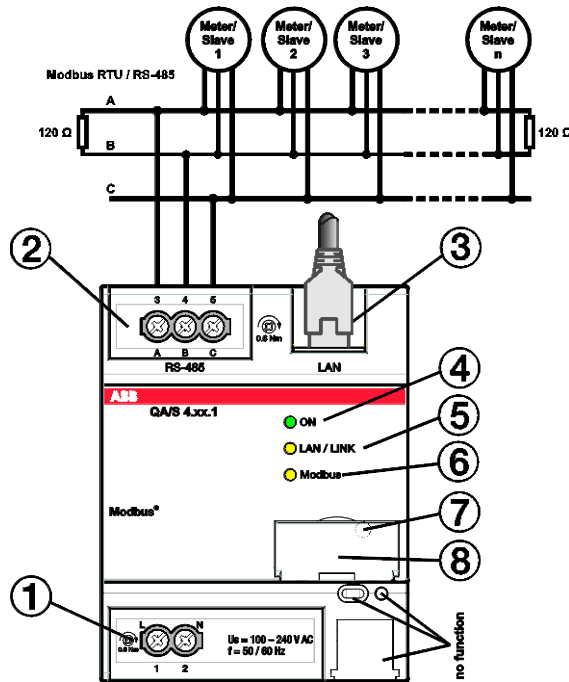
Operating and display elements	ON LED (green)	Ready indicator
	LAN/LINK LED (yellow)	Network connection/telegram traffic indicator
	Modbus LED (yellow)	Modbus ready indicator
	Reset button	Rear label carrier
Degree of protection	IP 20	According to EN 60529
Protection class	II	According to EN 61140
Isolation category	Overvoltage category	III according to EN 60664-1
	Pollution degree	2 according to EN 60664-1
Temperature range	Operation	-5 °C...+45 °C
	Storage	-25 °C...+55 °C
	Transport	-25 °C...+70 °C
Environmental conditions	Humidity	Maximum 93%, moisture condensation is to be excluded
	Atmospheric pressure	Atmosphere up to 2,000 m
Design	Modular DIN rail component (MDRC)	Pro <i>M</i> design
	Dimensions	90 x 72 x 64 mm (H x W x D)
	Installation width/installation depth	4 modules with 18 mm/68 mm
Mounting	On 35 mm mounting rail	According to DIN EN 60 715
Mounting position	Any	
Weight	Approx. 0.15 kg	
Housing, color	Plastic, light gray	Halogen-free
		Flammability V-0 as per UL94
CE marking	In accordance with the EMC and Low Voltage Directives	

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Device technology

2.2.2

Connection diagram



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QA/S 4.xx.1

- | | | | |
|---|--|---|-------------------------------------|
| 1 | U _s supply voltage connection | 5 | LAN/LINK LED (yellow) |
| 2 | RS-485 Modbus slaves/meter connection | 6 | Modbus RTU LED |
| 3 | Ethernet/LAN connection | 7 | Reset button (behind label carrier) |
| 4 | ON LED (green) | 8 | Label carrier |

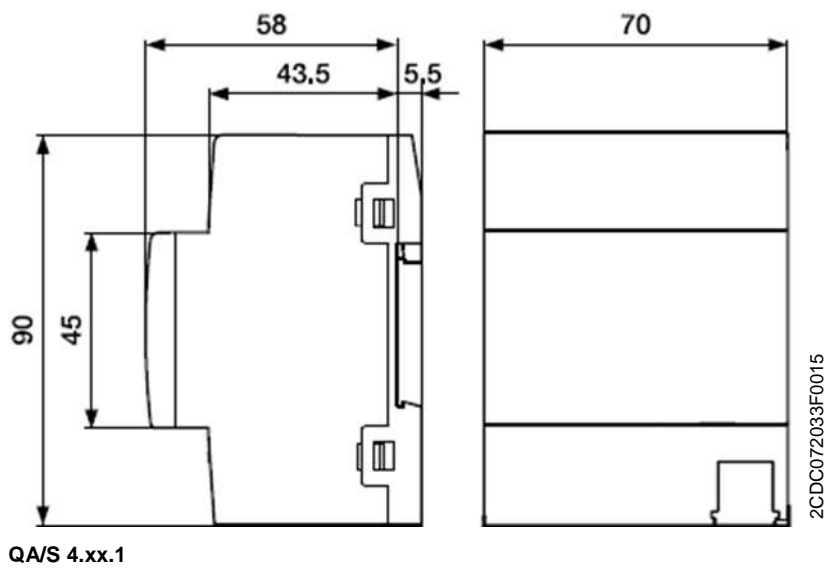
Important

The bus cable must be terminated with resistors (120 Ω, 0.25 W) at both ends so that only minimal reflections are produced. The serial communication on the RS485 interface operates most efficiently if the source and load impedance are matched at 120 Ohm. The EOL resistors are connected in parallel with terminals A and B and are included in the scope of delivery.

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Device technology

2.2.3 Dimension drawing



2.3 Mounting and installation

The device is a modular DIN rail component for quick installation in distribution boards on 35 mm mounting rails according to DIN EN 60 715.

The mounting position can be selected as required.

The electrical connection is made using screw terminals. The device connects to the bus via the screw terminal. The terminal assignment is given on the housing.

The device is ready for operation once the main voltage is applied and the initialization process has finished (green LED continuously illuminated).

The device must be accessible for operation, testing, visual inspection, maintenance and repair in compliance with DIN VDE 0100-520.

Prerequisites for commissioning

A Windows PC or laptop with a web browser (Internet Explorer, Firefox or Chrome recommended) and an Ethernet connection are required to commission the device.

Mounting and commissioning are only allowed to be carried out by electricians. The standards, directives, regulations and specifications applicable in the related country must be observed during the planning and setting up of electrical installations and security systems for intrusion and fire detection.

- Protect the device against damp, dirt and damage during transport, storage and operation!
- Only operate the device within the specified technical data!
- The device should only be operated in an enclosed housing (distribution board)!
- Disconnect the device from the supply of electrical power before mounting.



Danger

To avoid dangerous touch voltages which originate through feedback from different phase conductors, all poles must be disconnected on extending or modifying the electrical connections.

Supplied state

IP address assignment is set to automatic addressing (DHCP/AutoIP) in the factory.

Language English

Currency EUR

Cleaning

Disconnect the device from the supply of electrical power before cleaning. If devices become dirty, they can be cleaned using a dry cloth or a cloth dampened with a soapy solution. Corrosive agents or solutions must never be used.

Maintenance

The device is maintenance-free. In the event of damage, e.g. during transport and/or storage, repairs are not allowed to be made.

2.4 Display elements

Indicator LEDs are located on the front of the device.

The behavior of the display elements is described in the following table:




LED	Function	Description
 ON	ON	Operating system initialization complete. Supply voltage present. The device is ready for operation.
	OFF	No supply voltage. During operating system initialization.
	FLASHING (1 Hz)	During initialization.
	FLASHING (3 Hz)	Network settings reset and device restart.
	FLASHING (10 Hz)	Factory reset; internal error.
 LAN/Link	OFF	No supply voltage. No network connection.
	FLASHING	Network connection OK. Telegram traffic.
 M-Bus/ Modbus RTU	ON	Supply voltage OK, device ready for operation and M-Bus/RS-485 Modbus RTU-Bus is connected.
	OFF	No supply voltage. M-Bus/RS-485 Modbus RTU not connected.
	FLASHING (1 Hz)	Scanning process for slaves/devices.
	FLASHING (3 Hz)	Network settings reset and device restart.
	FLASHING (10 Hz)	Factory reset.

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Device technology

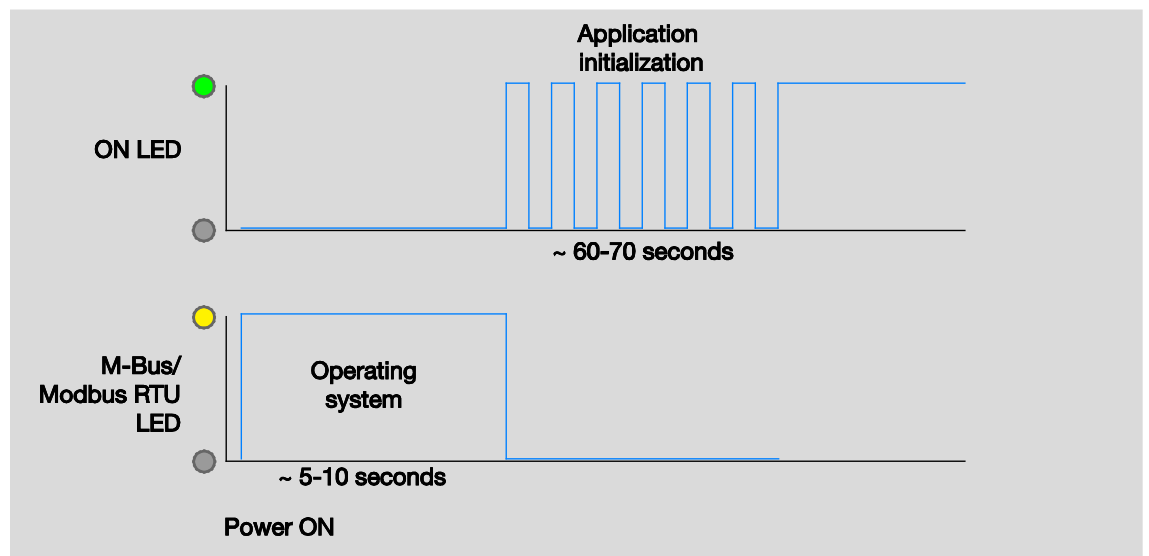
2.5 Special operating states

2.5.1 Device initialization

As soon as the mains voltage is connected, the operating system starts and the yellow M-Bus or Modbus RTU LED illuminates.

As soon as the operating system has finished loading, the yellow LED switches off and the green ON LED starts to flash while the application is loaded.

As soon as the application has finished loading, the green ON LED stops flashing and illuminates continuously. Initialization is complete and the device is ready for operation.



2.5.2 Resetting the device

There are several ways to reset the device:

1. Restart (device reset only)
2. Restart and reset the network settings
3. Reset to factory settings

Reset button

To reset the device, use the Reset button. It is behind the label carrier (for more information see: [2.1.2 Connection diagram P. 11](#)). Open the label carrier cover. Press the Reset button to reset the device as described.

Press for	Action	LED
< 2 sec.	No reaction	ON LED (green): ON M-Bus/Modbus RTU LED (yellow): ON
>2 sec. and <10 sec.	1. Restart Pressing and releasing the Reset button restarts the device.	ON LED (green): Flashing (3 Hz). M-Bus/Modbus RTU LED (yellow): ON
> 10 sec. < 20 sec.	2. Restart and reset the network settings Pressing and releasing the Reset button resets the IP address to automatic address assignment (DHCP) and restarts the device.	ON LED (green): Flashing (3 Hz). M-Bus/Modbus RTU LED (yellow): Flashing (3 Hz).
> 20 sec.	3. Restart and reset to factory settings. Pressing and releasing the Reset button deletes all user-defined settings, network settings and database entries.	ON LED (green): Flashing (10 Hz). M-Bus/Modbus RTU LED (yellow): Flashing (10 Hz).

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2.5.3 Factory settings

To reset the device to the factory settings, an administrator must have access to the user interface (for more information see: [3 Commissioning P. 23](#)). To restore the factory settings, go to System > *Erase data* or use the Reset button (for more information see [2.5.2 Resetting the device P. 20](#)).

Caution

This function allows you to delete all data and user-specific information from the system. The system is reset to its supplied state. The most recently installed system update is retained. The following data are reset to the factory settings or deleted:

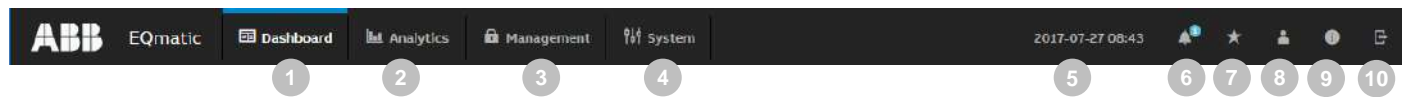
- Devices/meters added to the system, and stored meter data
- Meter configurations and metering structure configured
- Users and associated information (users and passwords are reset to the factory settings)
- All system settings
- SSL certificates (if any)

2.6 User interface

The device has a user interface for commissioning and operating purposes. To access the user interface there must be a connection to the device (for more information see: [3 Commissioning P. 23](#)). Access is via standard web browser (e.g. Chrome, Internet Explorer, Firefox, Safari).

2.6.1 Main menu structure

Users can navigate around the system using the main menu at the top of the user interface screen. Depending on the selection, a sub-menu may be displayed.



No.	Column header	Description
1	Dashboard	Customizable dashboard for displaying the most important data and measured values.
2	Analytics	Detailed analysis of costs, consumption, instantaneous values, benchmarks and comparison functions per consumer. Further processing and export of data and analyses. Automatic report function via e-mail or FTP
3	Management	Used to commission and manage the devices/meters (M-Bus or Modbus), metering structures, users, tariffs/units and data transfer.
4	System	Basic device and system settings, e.g. date, time, language etc. as well as for diagnostics purposes.
5	Date and time	Displays the current system date and time.
6	Notifications	Displays notifications, e.g. system updates etc. <ul style="list-style-type: none"> M-Bus/Modbus RTU device error: timeout/collision M-Bus/Modbus RTU error: short circuit, open circuit Update available Time synchronization: no connection to NTP server
7	Favorites	Quick access to previously configured analyses.
8	User profile	Displays user settings and information such as name, password and access rights. The user language as well as the log-out options can be set.
9	System information	Displays device information such as type, name, current firmware version and serial number.
10	Logout	Used to log out and end a session.

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Commissioning

3 Commissioning

For general information on M-Bus and Modbus RTU planning and installation, please see the *Planning and application* chapter.

Prerequisites for commissioning

- PC/laptop
- QA/S is ready for operation and LAN connection is established.
- PC/laptop and QA/S are on the same network.
- Meters are operating and connected to M-Bus or RS-485 Modbus RTU terminal on the QA/S.
- The M-Bus and Modbus devices are connected and configured according to manufacturer's instructions (e.g. speed, primary address, transformer ratios, etc.).
- The M-Bus and Modbus devices comply with the current M-Bus or Modbus standard.
- System settings (date, time, network etc.) have been made.

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Commissioning

3.1 Connecting to the device

3.1.1 Access via ABB i-bus® Tool

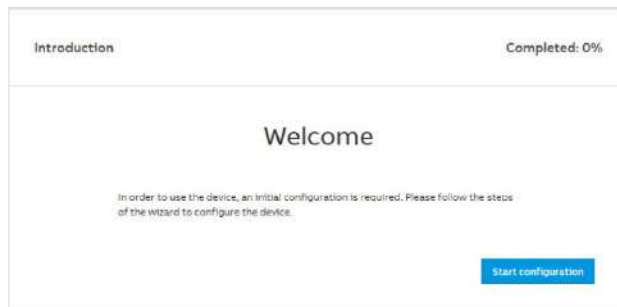
To access the device for initial commissioning, use the ABB i-bus® Tool. The ABB i-bus® Tool is a free software application that provides help with commissioning. Follow the instructions to connect to the device.

1. Download ABB i-bus® Tool and install on a Windows PC/laptop. [Download link](#)
2. Start ABB i-bus® Tool.
3. Click *Connect* and then *IP devices* and *Discovery*. The ABB i-bus® Tool automatically searches for known IP devices on the local network. Click *Refresh* to restart the process if necessary.
4. Select the relevant QA/S device from the table of devices found.
5. Select "Open Website."
The web browser opens and the Start screen appears.
6. Enter your username and password;
default in supplied state.
User: admin
Password: admin
You are now connected to the web server for the device. Follow the instructions in the commissioning wizard to proceed with commissioning.

ABB EQmatic Commissioning

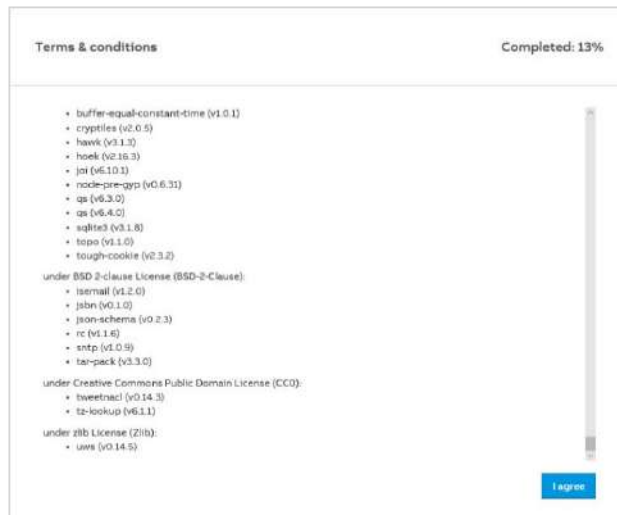
3.1.2 Commissioning wizard

Once a connection to the device is established, the commissioning wizard starts. This wizard takes you through the steps and basic settings required for initial commissioning.



The 'Introduction' screen shows 'Completed: 0%'. It features a 'Welcome' heading and a message: 'In order to use the device, an initial configuration is required. Please follow the steps of the wizard to configure the device.' A blue 'Start configuration' button is located at the bottom right.

1. Read and accept the terms & conditions.



The 'Terms & conditions' screen shows 'Completed: 13%'. It lists various dependencies and licenses:

- buffer-equal-constant-time (v1.0.1)
- cryptiles (v2.0.5)
- hawk (v1.1.3)
- hoek (v2.16.3)
- joi (v6.10.1)
- node-pre-gyp (v0.6.31)
- qs (v6.3.0)
- qs (v6.4.0)
- squire3 (v3.1.8)
- topo (v1.1.0)
- tough-cookie (v2.3.2)

under BSD 2-clause License (BSD-2-Clause):

- ismail (v1.2.0)
- jsbn (v0.1.0)
- json-schema (v0.2.3)
- rc (v1.1.6)
- sntp (v1.0.9)
- tar-pack (v3.3.0)

under Creative Commons Public Domain License (CC0):

- tweetnacl (v0.14.3)
- tz-lookup (v6.1.1)

under zlib License (Zlib):

- uws (v0.14.5)

A vertical progress bar on the right indicates 13% completion. A blue 'I agree' button is at the bottom right.

2. Change your password. This is important for device and data security.



The 'Password reset' screen shows 'Completed: 25%'. It contains two input fields: 'New password' and 'Confirm new password', both with masked characters (dots). A blue 'Next step' button is at the bottom right.

ABB EQmatic Commissioning

3. Change the network settings if necessary.

Network Completed: 38%

Automatic network configuration

Proxy URL

IP Address

* Subnet

* Standard Gateway

DHCP Server

4. Configure the date and time.

Date & time Completed: 50%

Automatic date and time

* Timezone [Detect timezone](#)

Date/time is automatically adjusted from 07:35 in Etc/UTC to 08:35 in Europe/London.

* Date and time

5. Configure the tariffs and units.

Default system settings Completed: 63%

Currency

Medium	Unit	Cost per consumption unit [EUR]	CO ₂ per consumption unit [kg]
Electricity	kWh	0	0
Water	m ³	0	0
Gas	m ³	0	0
Heat	kWh	0	0

ABB EQmatic Commissioning

- 6. Scan the bus for M-Bus or Modbus devices and slaves connected. Meters detected are listed in a table.



- 7. Done

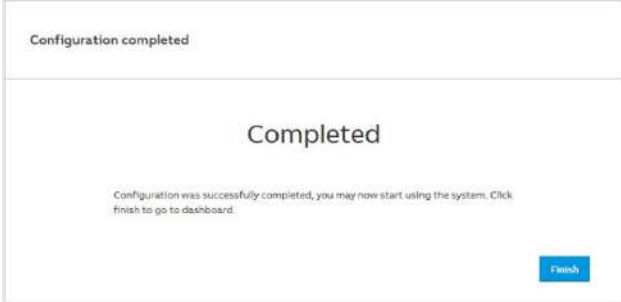


ABB EQmatic Commissioning

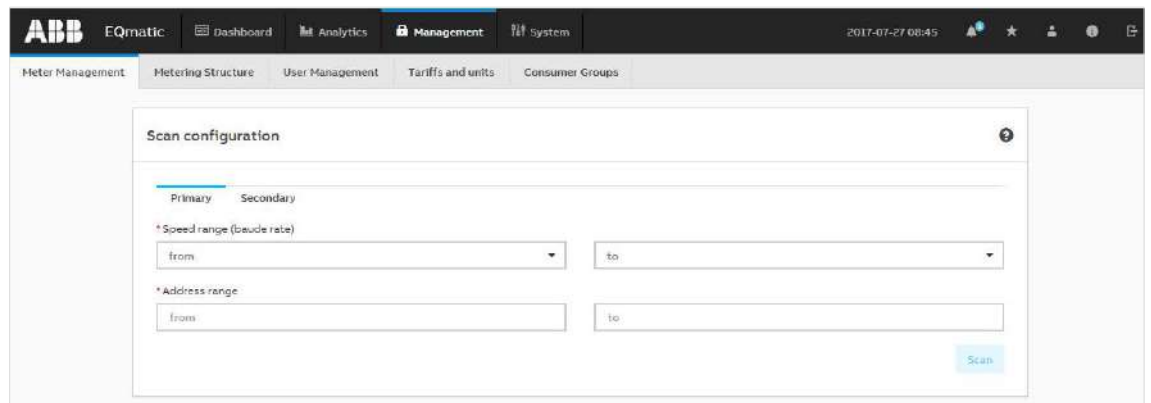
3.2 Management

The *Management* menu is used to make the following settings:

- M-Bus and Modbus RTU device configuration
- Metering structure set up
- User administration
- Tariff and unit settings
- Consumer group set up
- Data transfer to higher-level systems

3.2.1 Devices (QA/S 3.xx.1 Energy Analyzer, M-Bus)

The Meter Management menu is used to make all the settings for the detection of M-Bus devices connected. After the scan, all M-Bus devices detected are listed in a table. This step is absolutely essential during commissioning to be able to add, configure and manage devices. It is the basis for assigning devices to the metering structure later on.



The screenshot displays the ABB EQmatic Management interface. The top navigation bar includes the ABB logo, 'EQmatic', and menu items for 'dashboard', 'Analytics', 'Management', and 'System'. The date '2017-07-27 08:45' is shown in the top right. Below the navigation bar, a sub-menu is visible with options: 'Meter Management', 'Metering Structure', 'User Management', 'Tariffs and units', and 'Consumer Groups'. The main content area is titled 'Scan configuration' and features two tabs: 'Primary' (selected) and 'Secondary'. Under the 'Primary' tab, there are two sections: '* Speed range (baud rate)' and '* Address range'. Each section contains 'from' and 'to' input fields. A 'Scan' button is located at the bottom right of the form.

ABB EQmatic

Commissioning

Scan configuration

Options: Primary
Secondary

The M-Bus first needs to be scanned for the Energy Analyzer to detect connected devices. This scanning process uses either primary or secondary addressing.

Primary. If you select this option, the search for devices connected is based on their primary address. The primary addresses must be set beforehand on the relevant device (M-Bus slave).

Note
The primary address is pre-set to 0 on ABB meters in the factory. Each M-Bus device must be assigned a unique primary address. Duplicate addresses cause address conflicts!

Speed range (baud rate)

Options: 300, 600, 1200, 2400, 4800, 9600

Sets the speed range used for scanning for M-Bus devices connected. Communication with M-Bus devices is only in this range. The speed range set here must match the speed set on the M-Bus slave. Otherwise the system cannot detect any devices. The speed can be set based on meter type.

Note
ABB meters are supplied from the factory with the speed 2400. You should limit the scan range as much as possible. The wider the speed range, the longer the scanning process takes.

Address range

Options: 1...250

Sets the limits for the primary address range. This parameter is only visible if *Primary* is selected.

Note
The wider the range, the longer the scanning process takes.

ABB EQmatic





Commissioning

Secondary: If you select this option, M-Bus devices are scanned based exclusively on their secondary address. Secondary addressing extends the actual address range of 250. In this case, there is no unique addressing in the related M-Bus device. The devices respond with the information stored in bit 253. This bit usually contains serial number, version and medium. The device serial number is generally used as the secondary address. It is an 8-digit number affixed to the device.

Note

The serial number of ABB meters is on the nameplate on the front of the device, e.g. 00019468.

Scanning commands

Command	Description
	The M-Bus scan is run based on the settings made. The Stop and Pause commands appear.
	A scan in progress is stopped. Back to Scan configuration.
	Interrupts the scan in progress. The Continue command appears.
	The Continue command resumes a scan interrupted using Pause.

Note

Scanning can take several minutes depending on the scan settings and the number of M-Bus devices.

ABB EQmatic Commissioning

All meters (QA/S 3.xx.1 Energy Analyzer, M-Bus)

After a successful scan, all M-Bus devices detected are shown along with the information they provided in the *All meters* table below.

1	2	3	4	5	6	7	8	9	10	11
PRIMARY ADDRESS	STATUS	SPEED	MANUFACTURER	MEDIUM	VERSION	PLACE OF INSTALLATION	METER NAME	SERIAL NUMBER	BUILDING NODE	ACTION
1	OK	9600	ABB	Electricity	32	Consumer Box Verteiler	A41 513-100	00019468	1.1.2 Sub-Node Unterknoten	
2	OK	9600	ABB	Electricity	32	Consumer Box Verteiler	B21 313-100	00080452	1.1.1 Sub-Node Unterknoten	


No.	Column header	Description
1	Primary address ^{1), 2)}	Shows the primary address set in the M-Bus device.
2	Status ¹⁾	OK: Meter detected, configured and connected Collision: Address conflict. Devices with same primary address or identical serial number Not configured: Device is not configured. Configure using . Disconnected: Device is not available or is disconnected from the M-Bus.
3	Speed ^{1), 2)}	Shows the speed set in the M-Bus device
4	Manufacturer ¹⁾	Shows the manufacturer (max. 3 characters, e.g. ABB)
5	Medium ¹⁾	Shows which medium is measured by the M-Bus device
6	Version ¹⁾	Shows the firmware version in the M-Bus device
7	Place of installation ³⁾	Enter the place the device is installed here. This action is recommended so that the device is easier to identify and assign on configuring the metering structure. Duplicate names are allowed.
8	Meter name ^{1), 3)}	For ABB meters, the type designation is used by default as the device name after a scan. This can be overwritten. Enter a name for the device here. This action is recommended so that the device is easier to identify and assign on configuring the metering structure. Duplicate names are allowed.
9	Serial number ¹⁾	Shows the serial number (= secondary address) of the M-Bus device
10	Assignment ³⁾	Shows the assignment of the M-Bus device based on the metering structure configured
11	Action	Used to edit and configure the M-Bus device Opens the window for configuring the meter Removes the M-Bus device from the system

- 1) Sent by the M-Bus device
2) Needs to be set in the M-Bus device
3) To be entered by user

ABB EQmatic Commissioning

3.2.1.1 Meter configuration (QA/S 3.xx.1 Energy Analyzer, M-Bus)

ABB EQ A4x and B2x meters are automatically detected after a scan and do not need to be configured. Available data points, which depend on the meter type, are listed in the data points list.

If an M-Bus device is shown as *Not Configured* or *Unknown* after the scan, you must configure the device and its data points. For this purpose, click the  *Edit* button for the relevant device in All meters.

Note	
An M-Bus device is considered configured (status OK) as soon as one of the data points for consumption has been configured.	
Electricity meter:	Active energy (kWh) Active power (W)
Water meter:	Volume (m ³)
Gas meter:	Volume (m ³)
Heat meter:	Active energy (kWh)

All meters										
PRIMARY ADDRESS	STATUS	SPEED	MANUFACTURER	MEDIUM	VERSION	PLACE OF INSTALLATION	METER NAME	SERIAL NUMBER	BUILDING NODE	ACTION
1	OK	9600	ABB	Electricity	32	Consumer Box Verteiler	A41 513-100	00019468	1.1.2 Sub-Node Unterknoten	 
2	OK	9600	ABB	Electricity	32	Consumer Box Verteiler	B21 313-100	00080452	1.1.1 Sub-Node Unterknoten	 

ABB EQmatic Commissioning

The window opens with entry options for the device and its available data points:

RECORD NUMBER	VALUE	UNIT	DESCRIPTION	ACTION
0	84430	Wh	Energy Active imported Total	
1	84430	Wh	Energy Active Imported Tariff 0	
2	0	Wh	Energy Active Imported Tariff 1	
3	0	Wh	Energy Active Imported Tariff 2	
4	0	Wh	Energy Active imported Tariff 3	

Meter name

Options: Text field used to enter the meter name. For ABB meters, the type designation (e.g. A41 513-100) is used by default as the meter name. This meter name should be changed later for improved identification.

Place of installation

Options: Text field used to enter the physical place the M-Bus device is installed. This entry should be complete for improved identification in the system.

Meter measures generated energy

Options: Deactivated
Activated

Activated: You need to select this option if, for example, a meter is used in a photovoltaic system and measures the energy generated or stored. If this option is activated, the measured and metered values for the energy generated can be evaluated and displayed separately in the later analysis.

ABB EQmatic

Commissioning

3.2.1.2 Data points (QA/S 3.xx.1 Energy Analyzer, M-Bus)

If you are using ABB meters, the device detects the meters and the data points available after the scan. The data points available are listed in the *Data points overview* table.

Manufacturer-specific data points are marked as *manufacturer-specific*.

Data points overview

1	2	3	4	5
RECORD NUMBER	VALUE	UNIT	DESCRIPTION	ACTION
0	84430	Wh	Energy Active Imported Total	
1	84430	Wh	Energy Active Imported Tariff 0	
2	0	Wh	Energy Active Imported Tariff 1	
3	0	Wh	Energy Active Imported Tariff 2	
4	0	Wh	Energy Active Imported Tariff 3	


No.	Column header	Description
1	Record number	Shows the number of the related data point.
2	Value	Shows the current value of the related data point.
3	Unit	Shows the physical unit of the related data point. Some data points may not have a unit, e.g. number of power failures.
4	Description	Describes the related data point. If the data point is manufacturer-specific and needs to be configured, this situation will be shown here.
5	Action	Used to edit and configure the data point Opens the configuration window

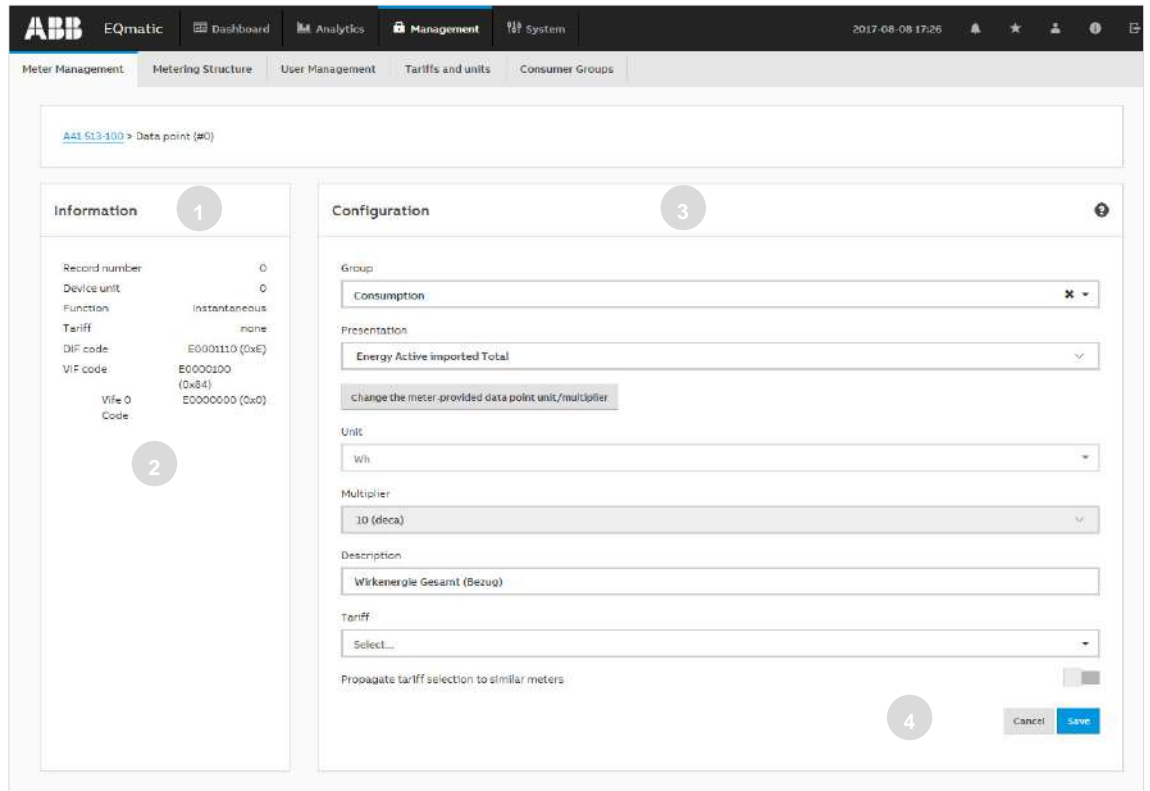
Note
Data points for devices compliant with the M-Bus standard are detected and can be given a new description if necessary. Data points that are not compliant with the M-Bus standard (manufacturer-specific) must be configured.

ABB EQmatic Commissioning

Configuration of manufacturer-specific data points

To add a manufacturer-specific data point, you need to configure it.

You can configure the required data point after opening the Configuration window using .



The screenshot shows the ABB EQmatic web interface. The top navigation bar includes 'ABB EQmatic', 'Dashboard', 'Analytics', 'Management', and 'System'. The 'Management' tab is active, and the breadcrumb trail is 'Meter Management > Metering Structure > User Management > Tariffs and units > Consumer Groups'. The main content area is titled 'A41 513-100 > Data point (#0)'. It is divided into two main sections: 'Information' (1) and 'Configuration' (3). The 'Information' section contains a table with the following data:

Record number	0
Device unit	0
Function	Instantaneous
Tariff	none
DIF code	E0001110 (0x1E)
VIF code	E0000100 (0x04)
Vif 0 Code	E0000000 (0x0)

The 'Configuration' section contains several fields: 'Group' (Consumption), 'Presentation' (Energy Active imported Total), 'Unit' (Wh), 'Multiplier' (10 (deca)), 'Description' (Wirkenergie Gesamt (Bezug)), and 'Tariff' (Select...). There is a button 'change the meter-provided data point unit/multiplier' and a 'Propagate tariff selection to similar meters' checkbox. At the bottom right, there are 'Cancel' and 'save' buttons, with a '4' indicating the save step.

On the left of this window is the data point Information field (1). Check the M-Bus-specific DIF and VIF codes for the corresponding data point (2). These are in the manufacturer's description for the related M-Bus device. To decode the data point, search for the DIF and VIF codes shown in the protocol description. In the Configuration window (3), enter the required information (e.g. Group, Type, Unit, Multiplier, Description and Tariff). Click Save (4) to apply the settings. The data point is now configured and available in the system.

ABB EQmatic Commissioning

Group

Options: Consumption
Generation
Instantaneous values
Binary
Information
Other

Type

Options: Available data types are shown depending on the group you select (e.g. Consumption). Select the required type, e.g. *Active energy* as described in the M-Bus device manual from the manufacturer.

Unit

Options: Unit (e.g. kWh) is preselected for certain groups (e.g. Consumption) and types (e.g. Active energy) and cannot be changed.

Custom unit

Only displayed if *Other* is selected in the *Group* parameter.

Options: Only displayed if *Other* is selected in the *Group* parameter. Free text entry for a user-specific unit.

ABB EQmatic Commissioning

Multiplier

Options: Used to select a multiplier if required.



A dropdown menu showing various multiplier options. The options are: 10⁹ (giga), 10⁶, 10³, 10³ (mega), 10³, 10000, 1000 (kilo), 100 (hecto), 10 (deca), 1 (none) (highlighted in blue), 0.1 (dec), 0.01 (cent), 0.001 (mill), 0.0001, 10⁻², 10⁻⁶ (micro), 10⁻⁷, 10⁻⁸, 10⁻⁹ (nano), 10⁻¹², 10⁻¹⁵, and 10⁻¹⁸ (pico).

Description

Options: For an individual description of the data point

Tariff

Only displayed if *Other* is selected in the *Group* parameter.

Options: None
Select an existing tariff
Add new tariff



A dropdown menu with a 'Select...' placeholder. The first option is 'Tariff 1', which is highlighted in blue. At the bottom right of the menu, there is a small 'Add' button.

Propagate tariff selection to similar meters

Options: Deactivated
Activated

- *Activated*: Applies the selected tariff setting to other, similar data points.

ABB EQmatic Commissioning

3.2.2 Meter (QA/S 4.xx.1 Energy Analyzer, Modbus)

Use the *Meter* menu to make all the settings for the detection of Modbus devices connected. After the scan, all Modbus devices detected are listed in a table. This step is absolutely essential during commissioning to be able to add, configure and manage devices. It is the basis for assigning devices to the metering structure later on. In the supplied state, the meter models and the register mapping are saved with data points for ABB EQ meters of type A4x, B2x and M2M.

As an alternative to a scan, devices can also be added manually to the system.

In the Management > Meter view, click the + Add button.

The window for adding a device opens.

To add a device manually, you must first create a register mapping with data points that is assigned to the meter model.

Scan configuration

To scan the bus for meters connected, you must first set the speed range (speed), address range, parity, byte size and stop bits.

In the *Management > Meter Management* view, click the + *Scanning* button.

The window for configuring the scan settings opens.

Scanning commands

Command	Description
Scan	The scan runs based on the settings made. The Stop and Pause commands appear.
Stop	A scan in progress is stopped. Back to Scan configuration.
Pause	Interrupts the scan in progress. The Continue command appears.
Continue	The Continue command resumes a scan interrupted using Pause.

ABB EQmatic

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Note
The physical address is pre-set to 1 on ABB meters in the factory. Each Modbus device must be assigned a unique address. This setting must be made in the meter/device. Duplicate addresses cause address conflicts!

Speed range (baud rate)

Options: 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200

Sets the speed range used for scanning for Modbus devices connected. Communication with Modbus devices is only in this range. The speed range set here must match the speed set on the Modbus device. Otherwise the system cannot detect any devices. The speed can be set based on meter type

Note
ABB meters are supplied from the factory with the speed set to 19200 . You should limit the scan range as much as possible. The wider the scanning range, the longer the scanning process takes.

Address range

Options: 1...247

Sets the limits for the physical address range.

Note
Scanning can take several minutes depending on the scan settings and the number of Modbus devices.

ABB EQmatic Commissioning

Meters (QA/S 4.xx.1 Energy Analyzer, Modbus)

After a successful scan, all Modbus devices detected are shown along with the information they provided in the *Meters* table below.

1	2	3	4	5	6	7	8	9	10	11
PRIMARY ADDRESS	STATUS	SPEED	MANUFACTURER	MEDIUM	VERSION	PLACE OF INSTALLATION	METER NAME	SERIAL NUMBER	BUILDING NODE	ACTION
1	OK	19200	ABB	Electricity	768		B21 112-100	00305184	ABB 521 112-100 (#00305184)	

No.	Column header	Description
1	Primary address ^{1), 2)}	Shows the primary address set in the device.
2	Status ¹⁾	<p>OK: Meter detected, configured and connected. System ready for operation.</p> <p>NOT CONFIGURED: Device model is linked to register mapping, however at least 1 data point is not configured. Configure using .</p> <p>NOT IDENTIFIED - Register mapping defined but meter model unknown or - Register mapping defined but linked with wrong meter model.</p> <p>DISCONNECTED: - Device not connected to bus or has no power supply Data points incorrectly configured in register mapping or not available in device - Collision: Address conflict. Devices with same primary address and speed</p>
3	Speed ^{1), 2)}	Shows the speed set in the device
4	Manufacturer ¹⁾	Shows the manufacturer (max. 3 characters, e.g. ABB)
5	Medium ¹⁾	Shows the medium to be measured on the device
6	Version ¹⁾	Shows the firmware version in the device
7	Place of installation ³⁾	Enter the place the device is installed here. This action is recommended so that the device is easier to identify and assign on configuring the metering structure. Duplicate names are allowed.
8	Meter name ^{1), 3)}	For ABB meters, the type designation is used by default as the device name after a scan. This can be overwritten. Enter a name for the device here. This action is recommended so that the device is easier to identify and assign on configuring the metering structure. Duplicate names are allowed.
9	Serial number ¹⁾	Shows the serial number (= secondary address) of the device
10	Building node ³⁾	Shows the assignment of the device based on the metering structure configured
11	Action	<p>Used to edit and configure the device</p> <p> Opens the window for configuring the meter</p> <p> Removes the device from the system</p>

- 1) Is sent by the Modbus device
 2) Needs to be set in the Modbus device
 3) To be entered by user

Note
The serial number of ABB meters is on the nameplate on the front of the device, e.g. 00019468.

ABB EQmatic Commissioning

3.2.2.1 Meter configuration (QA/S 4.xx.1 Energy Analyzer, Modbus)

To add or configure new devices, it is necessary to define the meter model as well as the register mapping and related data points.

General procedure to add to the system a new Modbus device that is not yet saved in the system:

1. Add meter model



2. Select register mapping or configure new mapping



3. Configure data points for register mapping



4. Start scan or add device manually

Here the register mapping and device model can be added in any order.

1. Add meter model

To add one or more device models, open the *Management > Meter > Meter models* menu and add a new meter model using the "+ Add" button. The following window then opens:

The screenshot shows a web-based configuration window titled "Meter model". It features a header with a question mark icon. The main content area includes three labeled input fields: "Product name" (marked with a red asterisk), "Minimum readout interval [s]", and "Register mapping configuration" (marked with a red asterisk). Each field has a placeholder text: "Type value...", "Type number...", and "Select..." respectively. At the bottom right, there are two buttons: "Back" and "Save".

Enter the product name or type designation (e.g. B23 112-100) and select a register mapping (e.g. ABB EQ meters) in the *Register mapping configuration* parameter, and save your settings. Optionally, you can also create a new register mapping for the device model in the same window.

ABB EQmatic Commissioning

2. Register mapping

To configure a new register mapping, open the *Management > Meter > Register mapping* menu and add a new register mapping using the "+ Add" button.

Register Mapping Configuration

* Parent register mapping
ABB EQ-Meters (v768)

* Register Mapping Name
ABB EQ-Meters

* Medium
Electricity

Manufacturer
ABB

Version
768

Invalid value
0xFFFF

Register Read Limit
125

[Back](#) [Update](#) [Save as new](#)

Normally you will find the register mapping for the data points in the technical data or in the manufacturer's description for the related device.

Example for Modbus mapping from a data sheet:

Data point	Start register address	Size (number of registers)	Resolution	Unit	Data type
Active energy	0x5000	4	0.01	Kwh	Unsigned
Power	0x6000	2	0.01	W	Unsigned
Voltage L1	0x7000	2	0.1	V	Unsigned
Product name	0x7500	6	-	-	String
Serial number	0x8500	4	-	-	Unsigned

Add to the parameters in the window the specific information for the register mapping (e.g. register mapping name: ABB EQ meters) and save the settings.

Note
Several versions of a register mapping can exist or be added.

ABB EQmatic Commissioning

3. Configure data points for register mapping

Now define the required data points in the register mapping and configure.



After you click "+" (Add new data point), a new window opens:

Data point configuration

* Start register address
Type value...

Hexadecimal Octal Binary Decimal

* Register data type
Unsigned 64-bit (UINT64)

* Group
Consumption

* Data Point Value
Active Imported Power Max Tariff 1

* Unit
kW

* Multiplier
1 (none)

Description
Type value...

Most significant byte first (MSB) Least significant byte first (LSB)

Most significant word first (MSW) Least significant word first (LSW)

Cancel Save

ABB EQmatic

Commissioning

Configure the required data points in the form according to the manufacturer's description and save the settings.

Note	
For correct operation, as a minimum the data point for the product name and one of the following data points for consumption must be configured	
Electricity meter:	Active energy (kWh) Active power (W)
Water meter:	Volume (m ³)
Gas meter:	Volume (m ³)
Heat meter:	Active energy (kWh)

4. Scan

After a successful scan, meter models configured as in the previous instructions are detected and marked in the table with the status OK. The system is now ready for operation.

Should one of the following status messages appear in the table after the scan, the meter model or register mapping with data points must be configured, corrected or added.

NOT CONFIGURED

Meter model is linked to register mapping, however at least 1 data point is not configured. Configure.

NOT IDENTIFIED

- Register mapping is defined, however meter model unknown or
- Register mapping is defined, however it is linked to the wrong meter model.

DISCONNECTED

- Device not connected to bus
- Data points incorrectly configured in the register mapping or not available in the device
- Collision: Address conflict. Devices with same primary address and speed.

OK

Meter detected, configured and connected. System ready for operation

ABB EQmatic Commissioning

As an alternative to a scan, meters can also be added manually to the device. For this purpose you must specify the device-specific information in the window on the *Management > Meter > Meters* menu after clicking the *Add* button:

The screenshot shows a 'Meter configuration' dialog box with the following fields and controls:

- Meter models:** A dropdown menu with 'Select...' as the current selection.
- *Address:** A text input field with the placeholder 'Type meter address...'.
- *Baudrate:** A dropdown menu with 'Select...' as the current selection.
- *Bytesize:** A dropdown menu with 'Select...' as the current selection.
- *Parity:** A dropdown menu with 'Select...' as the current selection.
- *Stop bits:** A dropdown menu with 'Select...' as the current selection.
- Installation:** A text input field with the placeholder 'Installation place...'.
- Meter Name:** A text input field with the placeholder 'Meter name...'.
- Serial number:** A text input field with the placeholder 'Type serial number...'.
- Meter measures generated energy:** A toggle switch currently in the 'off' position.

At the bottom right of the dialog, there are two buttons: 'Cancel' and 'Save'.





ABB EQmatic

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3.2.2.2 Data points (QA/S 4.xx.1 Energy Analyzer, Modbus)

If you are using ABB meters, the device detects the meters and the available data points after a successful scan. The data points are visible if you open the *Edit* function for the required meter in the table of meters detected. The data points can be edited as required.

Overview of data points

Data points				
1	2	3	4	5
RTU REGISTER ADDRESS	VALUE	UNIT	DESCRIPTION	ACTION
0x5000	27.43	kWh	Active Imported Energy Total	
0x5B00	227	V	Voltage L1	
0x5B0C	0	A	Current L1	
0x5B14	0	kW	Active Imported Power Total	


No.	Column header	Description
1	RTU register address	Shows the register address for the related data point.
2	Value	Shows the currently measured value for the data point.
3	Unit	Shows the physical unit of the related data point. Some data points may not have a unit, e.g. number of power failures.
4	Description	Describes the related data point. If the data point is manufacturer-specific and needs to be configured, this situation will be shown here.
5	Action	Used to edit and configure a data point  Opens the configuration window

ABB EQmatic

Commissioning

3.2.3 Set up metering structure

This function is used to specify the required metering structure for the building or infrastructure. This makes navigation easier during subsequent analysis. Data aggregation or totals settings are also made here. There are various options available.

1. Manual structure
2. Automatic structure



ABB EQmatic

Commissioning

3.2.3.1 Manual structure

The manual structure allows you to set up a custom topology. With a manual structure, physical meters are assigned to a logical metering structure. This structure can be used, for example, to show consumption figures and costs for a cost center or organization. The *virtual meter* and *metering point* structural elements are provided for this purpose.



Virtual meter (group)

A virtual meter summarizes consumption and/or measurement data from meters assigned below the first level in the tree structure. Data points or values that can be physically added together (e.g. energy in kWh, power in W) are added together in the root node. This means that you can display the overall consumption and costs for all the sub-meters via the root node.

A meter cannot be assigned directly to a virtual meter.

Example (see graphic/screenshot):

$$\begin{aligned} \text{Total } 1.0 &= 1.1 + 1.2 \\ 500 \text{ kWh} &= 350 \text{ kWh} + 150 \text{ kWh} \end{aligned}$$

Metering point

A metering point only ever consists of one M-Bus device which is assigned to it. The relevant medium for the assigned M-Bus device is represented by a symbol (see: Medium).

If a higher-level metering point is serving as a primary meter, the nodes assigned below it must belong to the same medium.

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Difference

A difference meter is a mathematical meter. No physical meters can be assigned to a difference meter. It calculates the difference between a higher-level node and one or more lower-level nodes. It is only shown if a structure has a metering point (higher-level node) with one or more lower-level metering points as well as physical meters assigned to the metering points. It is enabled via the *Edit* sub-menu. Once enabled, the node is shown in the *Analytics* menu in the structure added, and is available for the analysis function with its calculated data.

Example (see graphic/screenshot):

Difference 1.1.3 = 1.1 - (1.2 + 1.3)



Medium

This symbol indicates which meter for a particular medium is assigned to the node.

If the symbol is light gray, there is a medium assigned to the node, but no physical meter as yet.

If the symbol is dark gray, there is no physical meter assigned to the node as yet.

 Electricity

 Water

 Gas

 Heat


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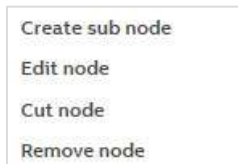
Commissioning

Configuring a manual structure

Click a node to open the sub-menu. The node settings are made here. See also *Edit*.

Mouseover

Move your mouse over the nodes to show the  button. Click the button to display the node configuration options.



Options: Create sub node
 Edit node
 Cut node
 Remove node

Create sub node

Creates a sub node for the current node.

Options: Node type
 Name

- *Node type*: Used to select the node type

Options: Virtual meter
 Metering point

- *Virtual meter*: If you select this option, a virtual meter node is created (see also description of *Virtual meter*).
- *Metering point*: If you select this option, a metering point is created (see also description of *Metering point*).
- *Name*: Used to name the node.

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Edit node

Opens the window for a editing node.

Edit node - 1.1.1 Sub-Node | Unterknoten

1 Node is related to nodes that are bound to medium of type - Electricity. Only meters of that medium can be assigned to the node.

***Node type**

Metering point

***Node name**

1.1.1 Sub-Node | Unterknoten

Meter

Electricity, ABB, B21 313-100, Consumer Box | Verteiler, #00080452

***Medium**

Electricity

Consumer group

Fan | Ventilator (Electricity)

Meter data points

TARIFF	METER TARIFF DATA POINT	ASSIGNED TARIFF
0	Energy Active imported Tariff 0	Tarif 1
1	Energy Active imported Tariff 1	Tarif 1
2	Energy Active imported Tariff 2	Tarif 1
3	Energy Active imported Tariff 3	Tarif 1
4	Energy Active exported Tariff 0	default tariff
5	Energy Active exported Tariff 1	default tariff
6	Energy Active exported Tariff 2	default tariff
7	Energy Active exported Tariff 3	default tariff

Cancel Save

- Options:
- Node type
 - Node name
 - Meter
 - Medium
 - Consumer group
 - Meter data points

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- *Node type*: Used to select the node type
Options: Virtual meter
 Metering point
 - *Virtual meter*: If you select this option, a virtual meter node is created (see also description of Virtual meter).
 - *Metering point*: If you select this option, a metering point is created (see also description of Metering point).
- *Name*: Used to name the node. Only shown until you select a *Metering point*.
- *Meter*: This parameter links the node to a physical meter. Meters are only displayed for selection if they have been added to the system via *Meter management* and correctly configured. You can only ever assign one meter to a node.
- *Medium*: Used to enter and set the medium you want to acquire via the metering point.
- *Consumer group*: Used to select and assign a consumer group (see also description of *Consumer group*). You can either select a consumer group (provided it has been added previously) or create a new one.
- *Meter data points*: Used to select and assign a data point (consumption/generation) to a tariff. You can either select a tariff (provided it has been added previously) or create a new one.

Cut node

You can cut a node from the structure and paste it at a different place in the structure (or drag and drop it). The node in the metering structure is disconnected from the M-Bus devices assigned to it. You can choose whether to transfer with the node all the data collected up to now by the meter assigned.

Options: Move node with data
 Move node without data

- *Move node with data*: Transfers the node to the required position in the structure, with all the data saved up to now, and pastes it in a new position via the "Paste" window.
- *Move node without data*: Transfers the node without any of the data saved up to now. An image of the original node with the date at the time of moving is created and the node is shut down. The node and the meter data saved up to now are therefore available for the analysis of historical data up to the time the node was moved. You can no longer assign devices to a node that has been moved or shut down.

Caution

After the move there are no longer any data for an analysis or for the display of the node.

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Remove node

Deletes the node from the system. You can choose whether the data collected up to now from the assigned meter are also to be deleted.

Options: Remove node with data
 Remove node without data

- *Remove node with data*: Deletes the node and the data saved up to now from the system.

Caution

After deletion there are no longer any data for an analysis or for display.
The data are permanently deleted.

- *Remove node without data*: Deletes the node without all the data saved up to now. An image of the original node with the date at the time of deletion is created and the node

1.2 Consumer area (2017-08-10 19:34) 

is shut down.

The node and the meter data saved up to now are therefore available for the analysis of historical data up to the time the node was deleted. You can no longer assign devices to a node that has been deleted or shut down.

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3.2.3.2 Automatic structure

The automatic structure is suitable if only sub-meters are used. If you select this option, a window for configuring the root node opens. Here, you must enter e.g. the name of the building to which the meters are assigned.



Detected and configured M-Bus devices are then automatically displayed in a flat (non-nested) list under the root node.

Note

The root node is a virtual meter. Data points or values that can be physically added together (e.g. energy in kWh, power in W) are added together in the root node. So the root node can display the overall consumption and costs for all the sub-meters for a building. The automatic structure does not take the logical and/or electrical installation of the meters into account. Use the manual structure if you are using both main and sub-meters.

Click a node to open the *Edit node* window so you can add to its configuration.

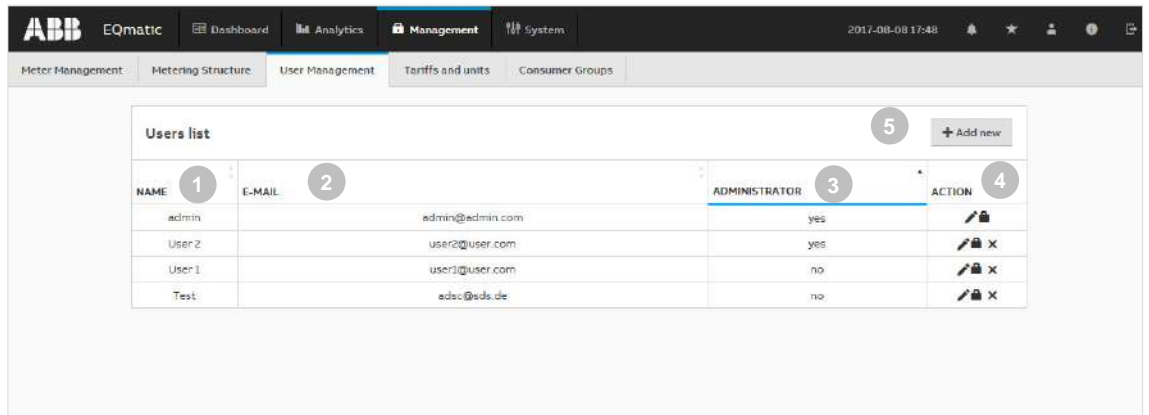


The system is ready for operation and the analysis functions and dashboard can be used.

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3.2.4 Users

In User Management you can add, configure and delete users. You can also assign users different access rights. This function limits user access to the areas authorized. You can add as many users as you wish. Up to 10 users can access the system at any one time.



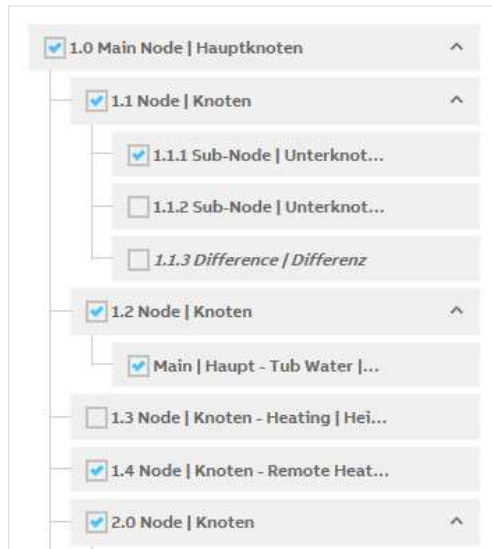
No.	Column header	Description
1	Name	Displays the name of the user. The software is supplied with the "admin" user, which cannot be deleted or renamed.
2	E-mail	Displays the user's e-mail address. This is required to send users a message about resetting the password if the "password is forgotten."
3	Administrator	Indicates whether the user has administrator rights (full access).
4	Action	Used to edit and configure users Opens the configuration window Opens the window for changing the password Deletes the user from the system
5	Add new	Opens a window where you can add a new user

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Administrator

Full access to device settings. You can add several administrators. Administrators can add users and assign them access rights to parts of the metering structure.

On assigning access rights within the metering structure, you need to select the required nodes in the metering structure so they are available to the related users.



User

Restricted device access via the *Dashboard* and *Analytics* menu commands and parts of the metering structure that the administrator has enabled for the related user.

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3.2.5 Tariffs and units

The tariff settings are used to configure tariffs. This information is necessary for the subsequent calculation and display of costs. Refer to your latest bill, or your contract, for details of your current tariff.

One tariff is pre-configured per medium from the factory; the costs per unit are set to "0."

You can add further tariffs.

NAME	MEDIUM	COST PER UNIT	CO ₂ FACTOR	ACTION
Tariff 1	Electricity	0.25 [EUR / kWh]	0.149 [CO ₂ / kWh]	
Default tariff	Electricity	0.25 [EUR / kWh]	0.149 [CO ₂ / kWh]	
Default tariff	Water	0 [EUR / m ³]	0 [CO ₂ / m ³]	
Default tariff	Gas	0 [EUR / kWh]	0 [CO ₂ / kWh]	
Default tariff	Heat	0 [EUR / kWh]	0.1259 [CO ₂ / kWh]	

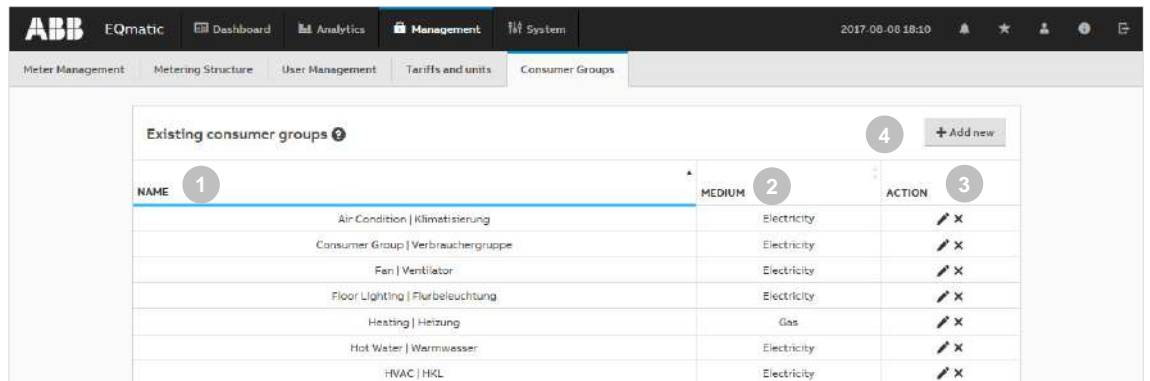
No.	Column header	Description
1	Add new	Opens a window where you can add a new tariff.
2	Name	Displays the name of the tariff configured.
3	Medium	Displays the medium for the tariff configured.
4	Cost per unit	Shows the configured cost of each unit for the tariff.
5	CO₂ factor	Shows the configured CO ₂ conversion factor for the medium and unit. Conversion factors are provided by e.g. environment agencies and industry associations.
6	Action	Used to edit and configure a new tariff Opens the configuration window Deletes the tariff from the system

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Commissioning

3.2.6 Consumer groups

Consumer groups are used to evaluate costs and consumption by applications on the *Analytics > Percentage Split* menu. For example, you can display electrical energy costs by consumer groups such as lighting, sockets, air conditioning etc. It is a prerequisite for the usage of this feature that a separate meter is installed and assigned to a consumer group via the *Management > Metering Structure* menu.

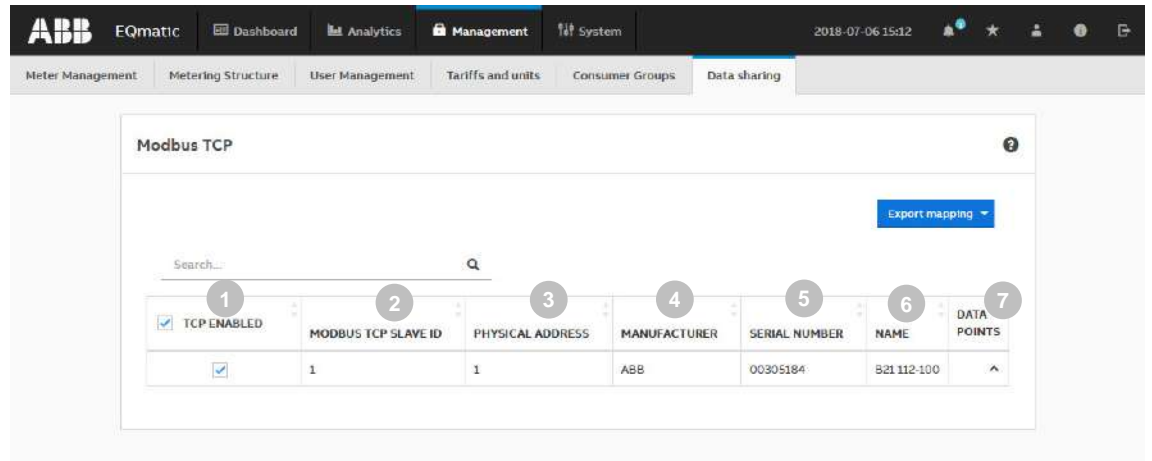


No.	Column header	Description
1	Name	Displays the names of the consumer groups configured.
2	Medium	Displays the medium assigned to the consumer group.
3	Action	Used to edit and configure consumer groups Opens the configuration window Deletes a consumer group from the system
4	Add new	Opens a window where you can add a new consumer group.

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3.2.7 Data transfer via Modbus TCP

The data transfer via Modbus TCP function* is available for forwarding and using measured data in higher-level systems (e.g. building management systems, SCADA etc.).



No.	Column header	Description
1	TCP enabled	Click the checkbox (checkmark appears) to activate the joint use of data via Modbus TCP.
2	Modbus TCP slave ID	Modbus TCP address; is assigned automatically
3	Physical address	Device address for the meter
4	Manufacturer	Manufacturer of the meter
5	Serial number	Serial number of the meter
6	Name	Name/type of the meter
7	Data points	Click the button to display all available data points for the related meter

Client-server communication is established via Modbus TCP. This communication requires a TCP connection to be set up between a client (e.g. a PC) and the server (e.g. the Energy Analyzer QA/S x.yy.1). For this purpose, the devices must be in the same address range.

The TCP port 502 reserved for Modbus is used for communication. The port is enabled if at least one device is selected on the *Management > Data sharing* menu in the table by selecting the checkbox.

Note
If there is a firewall between the server and client, it must be ensured the TCP port configured is opened.

* Available for QA/S 3.xx.1 Energy Analyzer, M-Bus from version 2.0.0

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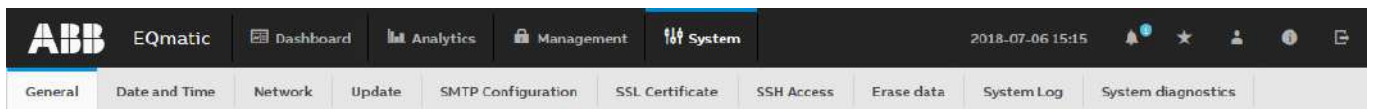
Commissioning

3.3 System settings

Basic settings are made in the system settings.

The following settings are available:

- General settings
- Date and time
- System network settings
- Update
- SMTP configuration
- SSL certificate
- SSH access
- Erase data
- System log
- System diagnostics

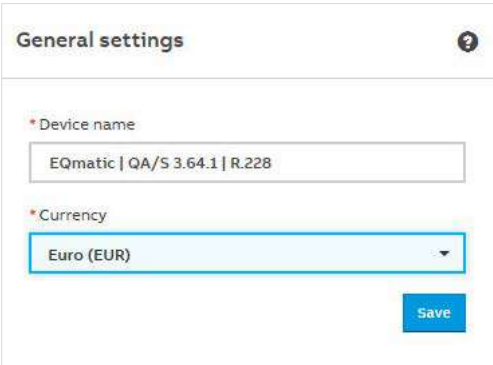


* From version 2.0.0 for QA/S 3.xx.1 Energy Analyzer, M-Bus language settings are made via the user settings. In older versions, the language is set via System > Language

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3.3.1

General settings



General settings

* Device name
EQmatic | QA/S 3.64.1 | R.228

* Currency
Euro (EUR)

Save

Device name

For assigning a device name.

Currency

For setting the currency for the cost calculation and display.

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3.3.2 Language

The following language settings are available:

- German
- English
- French
- Spanish
- Italian
- Dutch
- Polish
- Russian
- Dansk
- Finnish (Suomalainen)



The screenshot shows a web interface titled "Language settings" with a help icon. Below the title is a dropdown menu labeled "Language" with a red asterisk indicating it is required. The dropdown menu is currently set to "English". To the right of the dropdown is a blue "Save" button.

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3.3.3 Date and time

You can select whether the date and time are set automatically or manually.

Automatic date and time on

The screenshot shows the 'Date and time' configuration interface. At the top, the title 'Date and time' is followed by a help icon. Below this, the 'Automatic date and time' toggle switch is turned on (blue). Underneath, there is a 'Timezone' dropdown menu set to 'Europe/Berlin (UTC+2:00)' with a 'Detect timezone' link. Below that is a 'Time synchronization server (NTP)' field containing 'pool.ntp.org' and a 'Change the server' link. A 'Save' button is located at the bottom right.

Automatic date and time off

The screenshot shows the 'Date and time' configuration interface. At the top, the title 'Date and time' is followed by a help icon. Below this, the 'Automatic date and time' toggle switch is turned off (grey). Underneath, there is a 'Timezone' dropdown menu set to 'Europe/Berlin (UTC+2:00)' with a 'Detect timezone' link. Below that is a 'Date and time' section with two input fields: the first contains '2017/08/08' and the second contains '18:24'. A 'Save' button is located at the bottom right.

Automatic date and time (Off/On)

Options: Off
 On

Off: For setting the time manually. Set the required time in the *Date and time* field and save the settings.

On: Use "Change the server" to change the server. Enter the new address/URL for the time server in the *Time synchronization server (NTP)* field and save the settings.

Timezone

To set the time zone in which the device is located, select the required time zone from the menu. Optionally, the device can detect and set the time zone itself. Use "Detect timezone" to detect the time zone. The time zone will be set automatically.

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3.3.4 Network

Use the network settings to select automatic or manual addressing.

System network settings ?

Automatic network configuration

Proxy URL ?

IP Address

* Subnet

* Standard Gateway

DNS Server ?

Save

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Commissioning

Automatic network configuration (Off/On)

Use this parameter to set the network configuration. The device is supplied from the factory configured for DHCP.

Options: Off
 On

Off: You must enter the device's network settings manually.

Caution

It will no longer be possible to access the device if the entry is wrong. A reset will be required in this case (see description of *Reset button*).

On: Automatic network configuration is activated. The device's network settings are assigned automatically by a DHCP server in the network or by a router with DHCP functionality.

If no automatic assignment of the network settings takes place via DHCP, then a standard network setting in the auto IP range will be used:

IP address:
169.254.1.0 – 169.254.254.255

Subnet mask:
255.255.0.0


Standard gateway:
0.0.0.0

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3.3.5 Update

Various options are available for updating the device or the firmware to the latest version.

1. Manual update
2. Automatic update

The current version and other device-specific information can be retrieved using the  *About* command on the main menu.

Manual update

- The update packages are available on the following [download link](#)
- Save the latest firmware version to your PC/laptop.
- Open the user interface
- Go to System > Update > Manual update > Select package
- Follow the instructions
- The device will reboot after the update. This may take a few minutes. As soon as the process is complete, you will have to log in again.

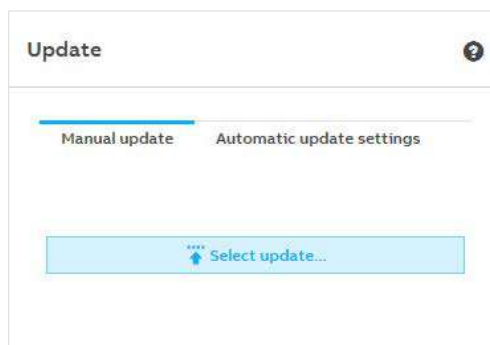

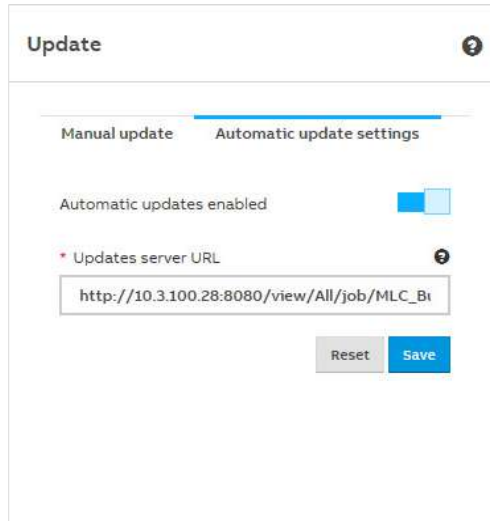


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Automatic update

The  *Notifications* icon in the menu bar will inform you when a new update becomes available. Click the notification and follow the instructions.

The device will reboot after the update. This may take a few minutes. As soon as the process is complete, you will have to log in again.



The screenshot shows the 'Update' settings page. It features two tabs: 'Manual update' and 'Automatic update settings'. The 'Automatic update settings' tab is active. Under this tab, there is a toggle switch for 'Automatic updates enabled' which is currently turned on. Below this is a text input field for 'Updates server URL' containing the text 'http://10.3.100.28:8080/view/All/job/MLC_Bi'. At the bottom right of the settings area are 'Reset' and 'Save' buttons.

Automatic updates enabled (Off/On)

Use this parameter to activate the notification about available updates.

Update server url

Used to enter an alternative update server. Enter the server address/URL in the field and save the settings.

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3.3.6 SMTP configuration

These settings configure the SMTP server. These settings are required so that the device can send messages, notifications (e.g. when the password is reset) and automatic reports via e-mail to users or recipients.

You can configure the settings manually or by pre-selecting an e-mail service provider.

SMTP Configuration ?

E-mail provider

* "From" E-mail

Login

Password

* SMTP server address

* Security

* Port

Note

The settings you need are available from the related provider.

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3.3.7 SSL certificate

SSL stands for "secure sockets layer." Using an SSL certificate will encrypt the data transmitted to the computer on opening a website, for example.

SSL certificates can be used to encrypt data for web pages or e-mails, for example. When you retrieve your e-mails from your provider and the connection is SSL encrypted, for example, no third parties can read the data while you retrieve your e-mails.

The following options are available for handling SSL certificates:

1. Upload certificate
2. Generate certificate
<https://ssl-trust.com/>
3. Delete certificate

SSL Certificate ?

Generate certificate | Upload certificate

Right after a successful certificate installation all users of the system would be redirected to HTTPS version of the system. The users that do not have an uploaded certificate installed would be presented with a warning about untrusted/unknown certificate (including the current user; that usually can be bypassed in a few clicks depending on the browser, though assumes the user is an "experienced" one). It's highly recommended to pre-install the uploaded certificate to the users' systems/browsers to avoid confusion.

Enable for whole subnet

Additional host names / IPs to include into the certificate

+ Add

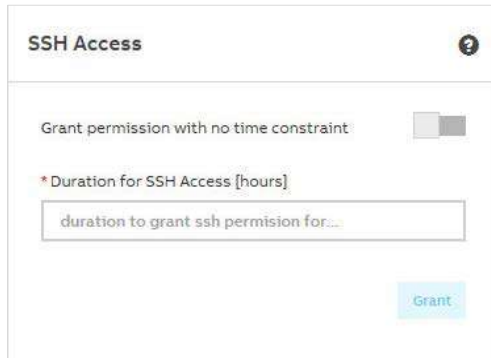
Generate

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3.3.8 SSH access

A secure network connection to the web server can be established using SSH (Secure Shell). This access can then be used for servicing and maintenance purposes.



The screenshot shows a web interface titled "SSH Access" with a help icon. It contains a toggle switch for "Grant permission with no time constraint" which is currently turned off. Below it is a text input field labeled "* Duration for SSH Access [hours]" with the placeholder text "duration to grant ssh permission for...". A "Grant" button is located at the bottom right of the form.

Grant permission with no time constraint

If you active this function using the slider, SSH access is permanently available.

Duration for SSH access [hours]

You can restrict access to a certain number of hours using this parameter.

Options: 1...168 hours

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3.3.9 Erase data

This function allows you to delete all saved data and user-specific information from the system. The system is reset to its supplied state. The most recently installed system update is retained. The following data are reset to the factory settings or deleted:

- Devices or M-Bus or Modbus devices (meters)
- All meter data saved
- Meter configurations and metering structure configured
- Users and associated information (users and passwords are reset to the factory settings)
- All system settings
- SSL certificates (if any)

Press the "Erase user-sensitive data" button to reset the device to its supplied state.

Caution

This action cannot be undone. All data will be permanently deleted.

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3.3.10 System log

The System log function is used for diagnostics on the system or M-Bus devices connected. All relevant information about M-Bus or Modbus devices connected is logged with the date/time. It is logged when an M-Bus or Modbus device is added, configured, disconnected or deleted from the system.

Further information is recorded via the system log function if changes are made:

IP network settings

Date/time (Manual | Automatic)

Reset to factory settings

Device restart

Firmware update

Meter/device has been assigned to a new node

Node has been deleted/added from/to metering structure



User added/deleted

User logged in/logged out

You can also restrict the system log to a period using the calendar settings and export it as a file (e.g. xlsx).

System Log

Export ▾

Filter

TIMESTAMP	ACTION
2017-07-14 09:42:17	Meter A41 513-100 #00019468 status configured.
2017-07-14 09:42:12	Meter A41 513-100 #00019468 status disconnected.
2017-07-14 09:25:53	Meter A41 513-100 #00019468 status configured.
2017-07-14 09:25:49	Meter A41 513-100 #00019468 status disconnected.
2017-07-13 11:25:32	Meter A41 513-100 #00019468 status configured.
2017-07-13 11:25:28	Meter A41 513-100 #00019468 status disconnected.
2017-07-12 15:33:45	Meter A41 513-100 #00019468 status configured.
2017-07-12 15:33:40	Meter A41 513-100 #00019468 status disconnected.
2017-07-06 09:09:57	Meter B21 313-100 #00080452 status configured.
2017-07-06 09:09:52	Meter B21 313-100 #00080452 status disconnected.

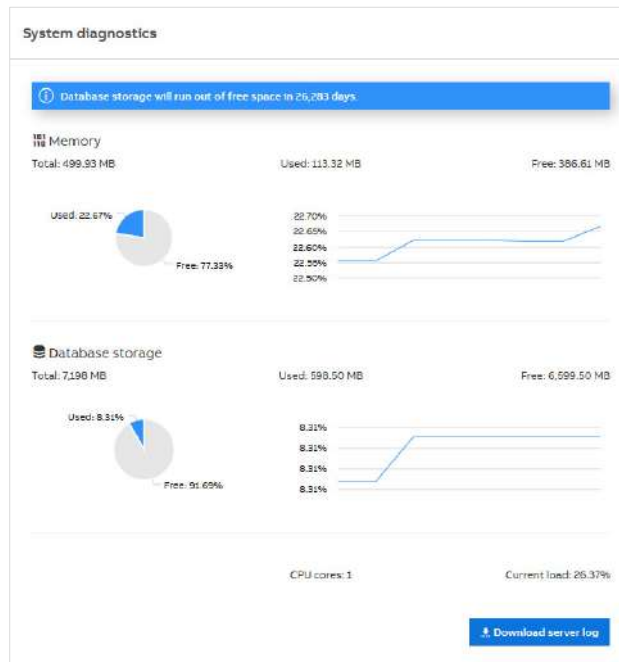
Load more...

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3.3.11 System diagnostics

The System diagnostics* function provides information on the device performance and the actual device status and is used for general diagnostics. The following information is available:

- Memory
- Database storage
- CPU utilization



* Available for QA/S 3.xx.1 Energy Analyzer, M-Bus from version 2.0.0

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3.4 Dashboard

The dashboard provides a rapid overview of costs and consumption figures in the building. In the dashboard you can configure user-defined views using widgets. A widget is a graphic display element which is also configurable.

Note

Data for evaluation and analysis are not yet available after commissioning. This means that the dashboard is empty at that point. Make sure M-Bus or Modbus devices connected are configured and at least one meter is assigned to the metering structure.

Example dashboard

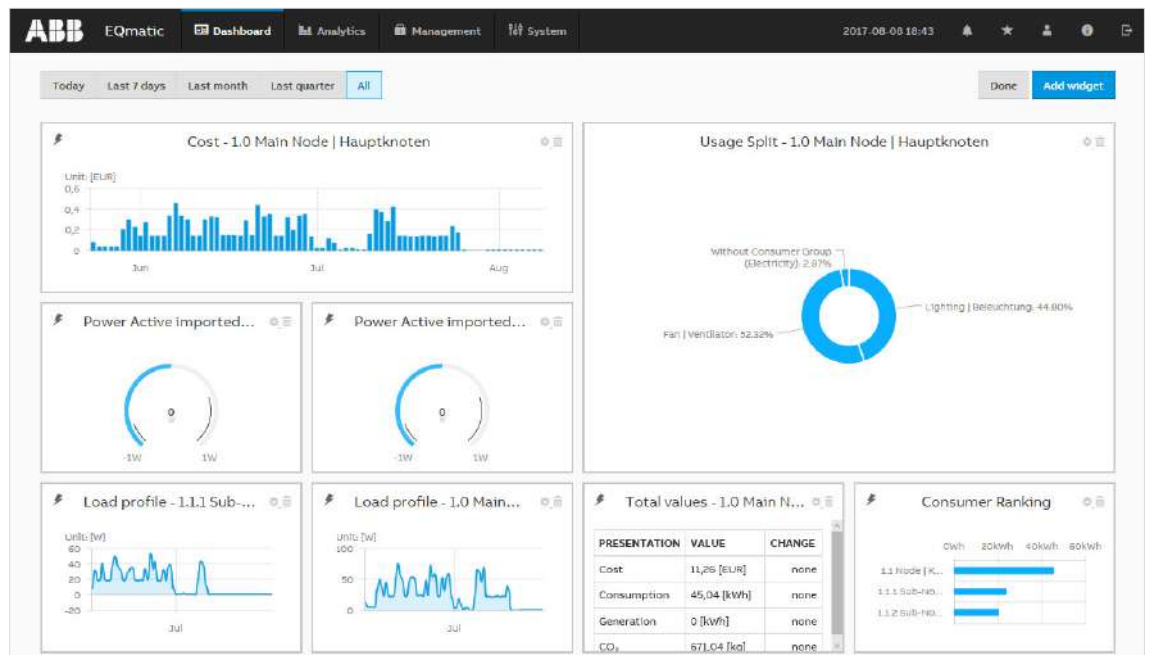
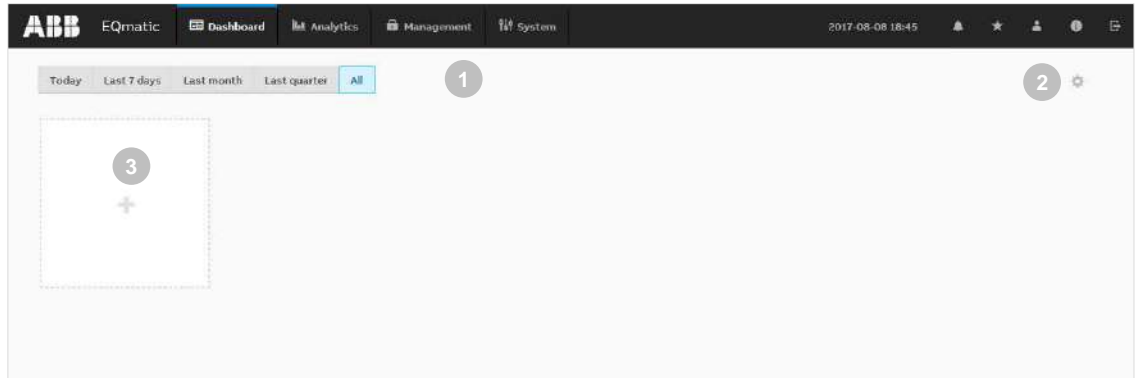


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3.4.1 Navigation



No.	Heading	Description
1	Presets	Used to select and display current day, week, month, year, all. Presets are shown dynamically, depending on the measuring period.
2	Edit	Activates the edit mode: <ul style="list-style-type: none"> Add widget Assign widget using drag & drop Enlarge/reduce widget Configure widget Delete widget Save
3	Add widget	Used to add and configure a widget. Only shown in edit mode.

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3.4.2 Widgets

"Widgets" are used to configure and lay out the dashboard.

The following widgets are available:


- Instantaneous values
- Percentage split
- Historical data
- Consumer ranking
- Total values



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3.4.3 Adding a widget


To add a widget to the dashboard, activate the edit mode  and click the "Add widget" button.

The window containing available widgets opens.

Select the widget you require and make your settings. Save the widget and settings using the "Save" button. The widget will now be displayed on the dashboard.

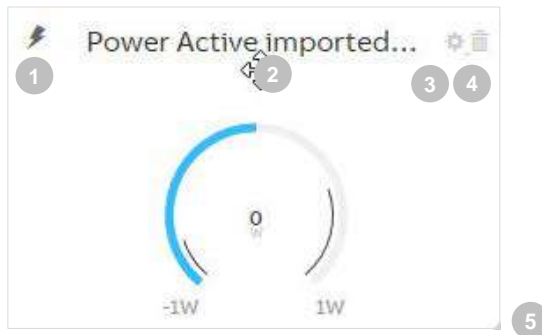
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3.4.4 Configuring a widget

To configure widgets, activate the edit mode using the  button

Options:

- Assign widget using drag & drop
- Enlarge/reduce widget
- Configure widget (opens a configuration window)
- Delete widget







No.	Heading	Description
1	Medium	This symbol shows the selected medium in the widget
2	Cross-hair 	Used to arrange the widget on the dashboard via drag & drop
3	Edit 	Opens a window where you can configure the widget
4	Delete 	Deletes widgets from the dashboard page
5	Customize 	Used to enlarge/reduce the widget via drag & drop

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3.4.4.1 **Instantaneous values widget**

Used to display measured values, e.g. power, current, voltage etc. in real time.

The following options are available to configure the widget

Options: Building node
 Medium
 Value to display
 Chart type

Building node: Used to select the meter and/or building section depending on the metering structure configured

Medium: Used to select from the available media.

Options: Electricity
 Water
 Gas
 Heat

Value to display: Used to select from the available data points. The choice of data points is dependent on the meter assigned and its properties.

Chart type: Used to select the required chart type for instantaneous values in the widget.

Options: Serial chart
 Gauge chart
 Value

3.4.4.2 **Percentage split widget**

Used to display the relative distribution of total cost, income or CO₂ emissions. The values are displayed according to the selected period (day, month, etc.) and available consumer groups.

The following options are available to configure the widget

Options: Building node
 Value to display

Building node: Used to select the meter and/or building section depending on the metering structure configured.

Value to display: Used to select from the available values.

Options: Cost
 Income
 CO₂

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3.4.4.3 **Historical data widget**

Used to display historical total cost/consumption data for a selected node or meter, by medium. The values are displayed according to the selected period (day, month, etc.).

The following options are available to configure the widget

Options: Building node
 Value to display
 Medium
 Chart type

Building node: Used to select the meter and/or building section depending on the metering structure configured.

Value to display: Used to select the required data type.

Options: Cost
 Consumption
 Generation
 Income
 CO₂
 Load profile

Medium: Used to select from the available media

Options: Electricity
 Heat
 Gas
 Water

Chart type: Used to select the required chart type for the total cost.

Options: Line
 Column
 Smoothed line

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3.4.4.4 **Consumer ranking widget**

Used to display the highest consumers in an installation, by medium. A maximum of 5 consumers are displayed in the widget.

Options: Electricity
 Water
 Gas
 Heat

3.4.4.5 **Total values widget**

Used to display typical total values for a medium. The values and the relative changes between the current period and the previous period are displayed.

The following options are available to configure the widget

Options: Building node
 Medium
 Values to display

Building node: Used to select the meter and/or building section depending on the metering structure configured.

Medium: Used to select from the available media

Options: Electricity
 Water
 Gas
 Heat

Values to display: Used to select the total value to be displayed in the widget.

Options: Cost
 Consumption
 Generation
 Income
 CO₂ emissions

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3.5 Analytics

The analysis functions are used for the detailed examination and representation of costs, consumption figures and other measured values. The following analyses can be performed.

- Historical data
- Usage split
- Instantaneous values
- Benchmark - interval
- Benchmark - consumer
- Reports

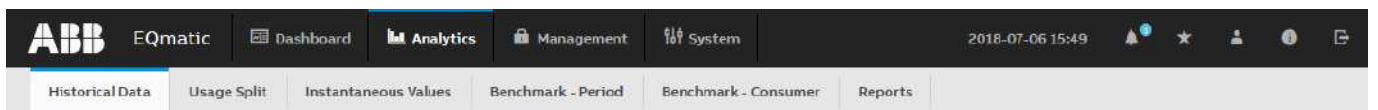


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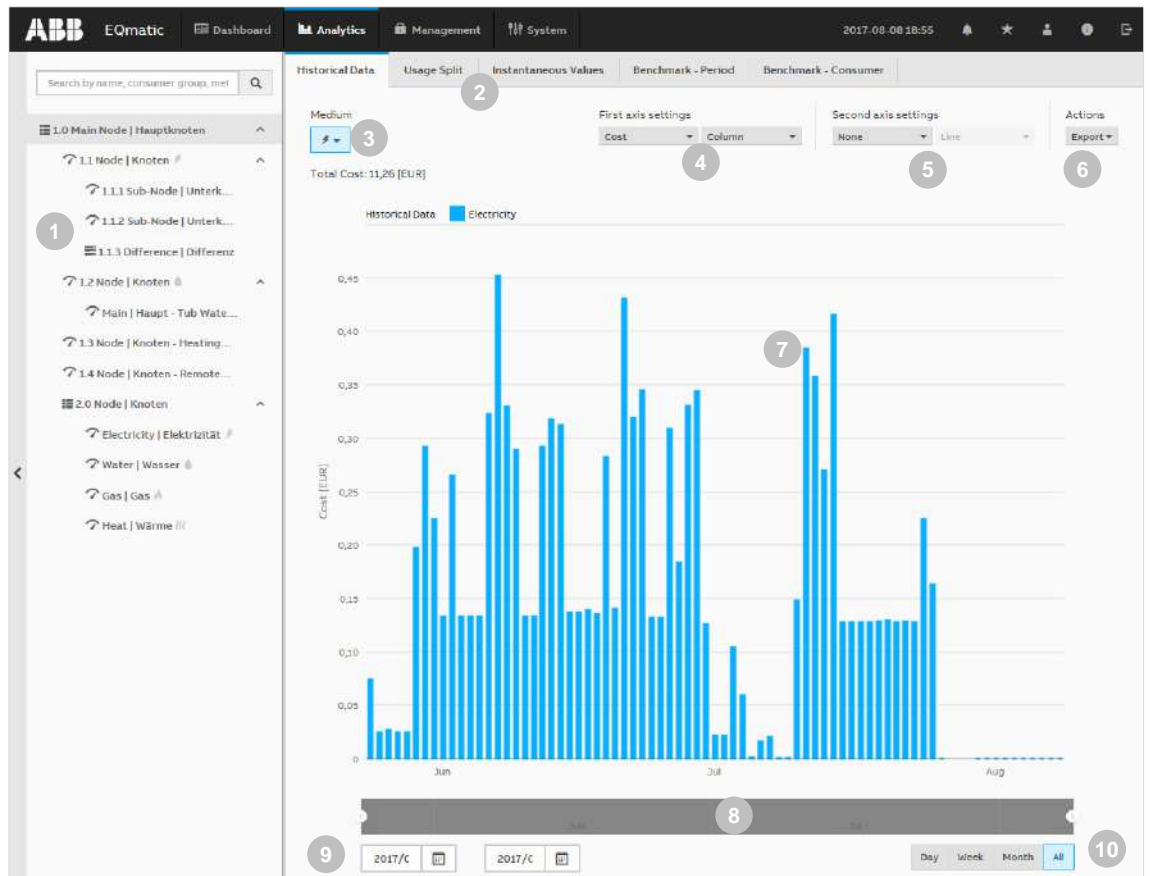
Commissioning

3.5.1 Historical data

Used for the analysis and display of historical measured data.

Note
<p>Measured data for evaluation are not yet available to the system after commissioning. The device saves data every 5 minutes, so measured data will be available after 5 minutes at the earliest. The display of historical data also depends on the magnitude of the connected load and the meter's transmission behavior/resolution.</p> <p>The following prerequisites must be met to display measured data:</p> <ul style="list-style-type: none">• Devices are configured and ready for operation.• Metering structure (see <i>Management > Metering Structure</i>) is configured. <p>At the maximum system capacity, historical data can be stored for up to 3 years.</p>

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
No.	Column header	Description
1	Metering structure	Used to navigate and select a consumer or node. The metering structure must first be configured in Management > Metering Structure. Click the  icon to show or hide the metering structure.
2	Analysis functions	Menu for selecting the required analysis function
3	Media	Displays the media available in the system. Depending on the M-Bus/Modbus devices connected, the media electricity, water, gas and heat are displayed here. The M-Bus/Modbus devices must be assigned to a metering structure for this purpose. If M-Bus/Modbus devices have been assigned to consumer groups (e.g. lighting, electrical sockets, air conditioning, etc.), they can be opened using the  sub-menu.
4	First axis settings	Used to select the required unit (e.g. costs, consumption, load profile, etc.) and to display it on the chart (e.g. column chart, line chart, load profile, etc.)
5	Second axis settings	Used to select the required unit (e.g. costs, consumption, etc.) and to display it on the chart (e.g. column chart, line chart, etc.)
6	Actions	Used to select further data processing options (e.g. Save as image, Export to .xlsx, csv, Save as favorite, Print chart)
7	Chart area	Used to display the data graphically. Click and drag or click a value on the chart to zoom.
8	Slider	Used to limit and move the required period.
9	Calendar function	Used to enter the required period (from/to).
10	Presets	Used to select and display current day, week, month, year, all. Presets are shown dynamically, depending on the measuring period: Day: always visible; Week: after 2 days: Month: after 7 days: Year: after 6 months: All: Always visible

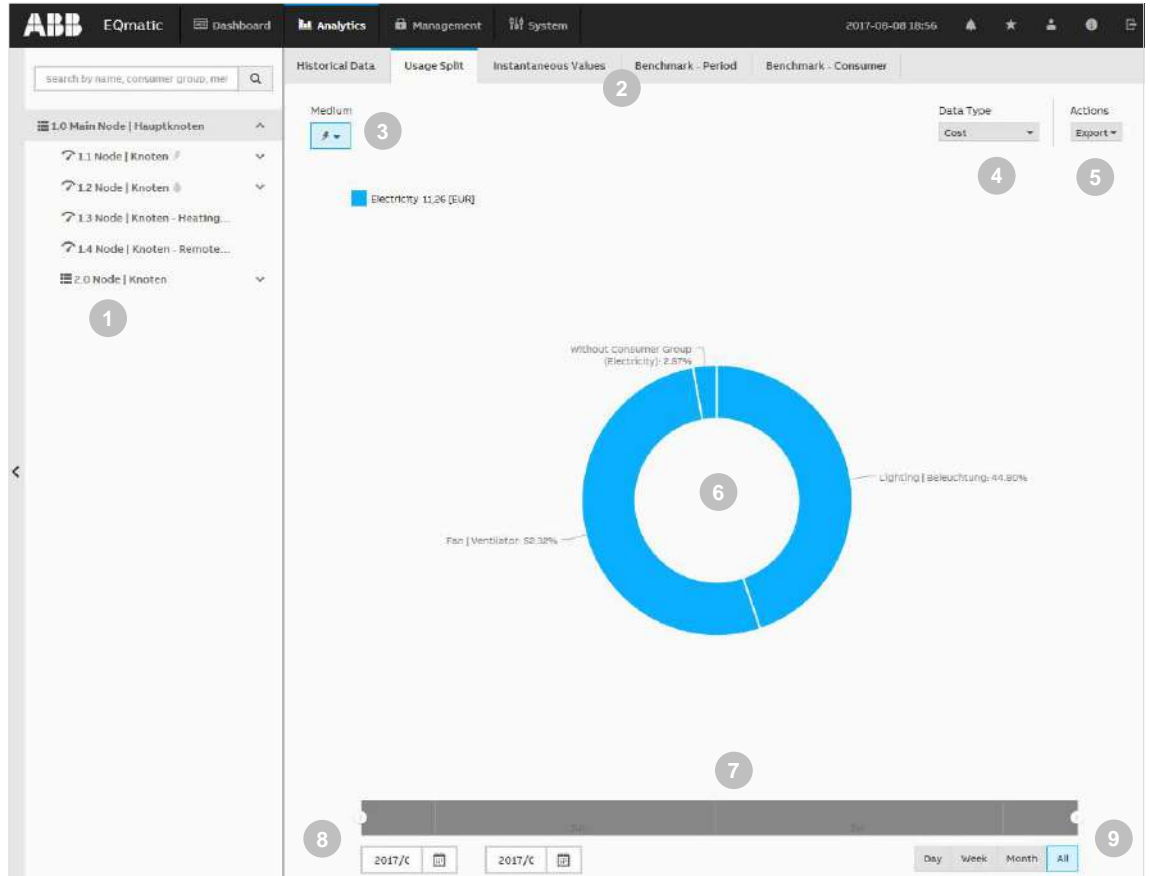
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Note
The values (e.g. costs, consumption) for the first and second axes are displayed based on the period set (using slider, calendar function or presets). The y-axis is scaled automatically according to the measured value or the unit (Wh, kWh, MWh, etc.).

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3.5.2 Usage split

Used to analyze and display costs and consumption, etc., per medium or consumer group.



No.	Column header	Description
1	Metering structure	Used to navigate and select a consumer or node. Click the icon to show or hide the metering structure.
2	Analysis functions	Menu for selecting the required analysis function
3	Media	Displays the media available in the system. Depending on the M-Bus/Modbus devices connected, the media electricity, water, gas and heat are displayed here. If M-Bus/Modbus devices have been assigned to consumer groups (e.g. lighting, electrical sockets, air conditioning, etc.), they can be opened using the sub-menu.
4	Data type	Used to select the required data type (e.g. Costs, Consumption, etc.)
5	Actions	Used to select further data processing options (e.g. Save as image, Export to .xlsx, csv, Save as favorite, Print chart)
6	Chart area	Used to display the data graphically. Click the related consumer group to highlight it.
7	Slider	Used to limit and move the required period.
8	Calendar function	Used to enter the required period (from/to)
9	Presets	Used to select and display current day, week, month, year, all. Presets are shown dynamically, depending on the measuring period.

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Note
<p>The data displayed and relative values refer to the selected period. If the data type <i>Costs</i> is selected, several media can be selected at the same time if they are available in the system.</p>

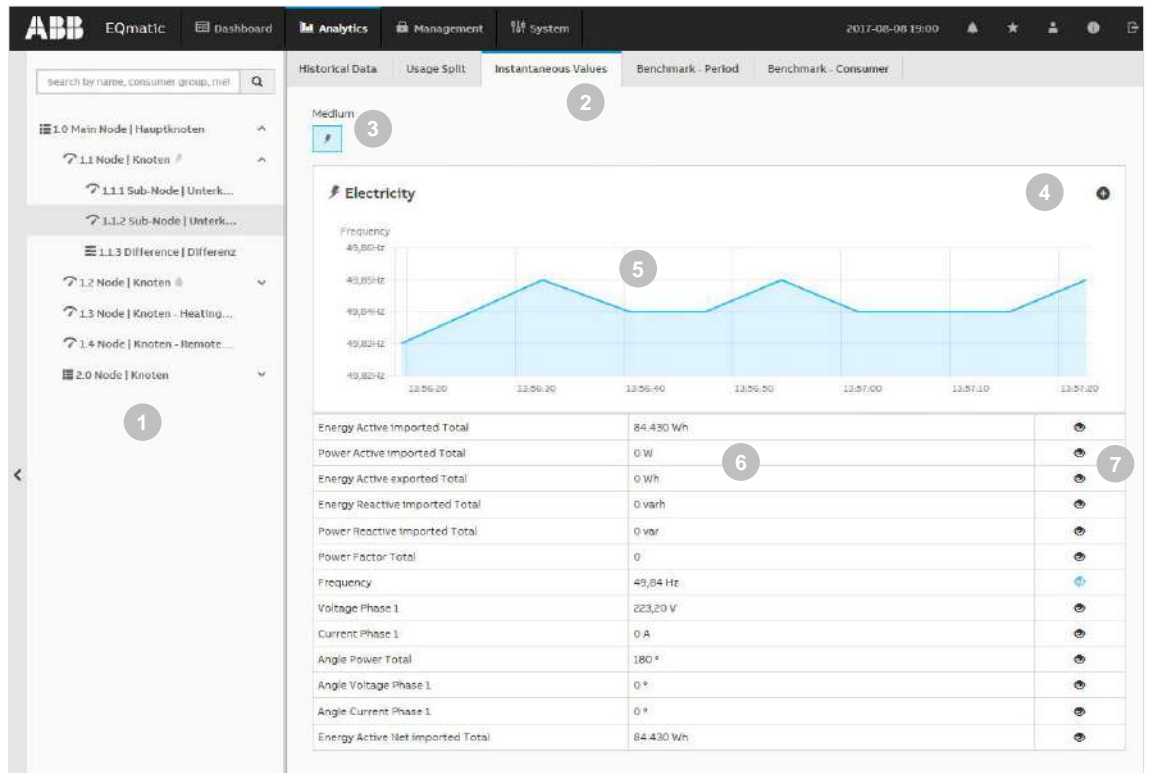
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3.5.3 Instantaneous values

This function displays the instantaneous value for a single data point in real time. The value is displayed on a serial chart.

You must first select the required metering point or meter in the metering structure.

Depending on the meter's functionality, various data points are available for display.



No.	Column header	Description
1	Metering structure	Used to navigate and select a consumer or node. Click the icon to show or hide the metering structure.
2	Analysis functions	Menu for selecting the required analysis function.
3	Media	Displays the media available in the system. Depending on the M-Bus/Modbus devices connected, the media electricity, water, gas and heat are displayed here.
4	Edit	Opens the window for selecting and adding data points to the table for subsequent observation.
5	Chart area	Used to display graphically the data point selected on a serial chart.
6	Table	The meter data points are listed in the table depending on the functionality and the available meter data points selected.
7	Display	Click the icon to display the data point on the real-time chart.

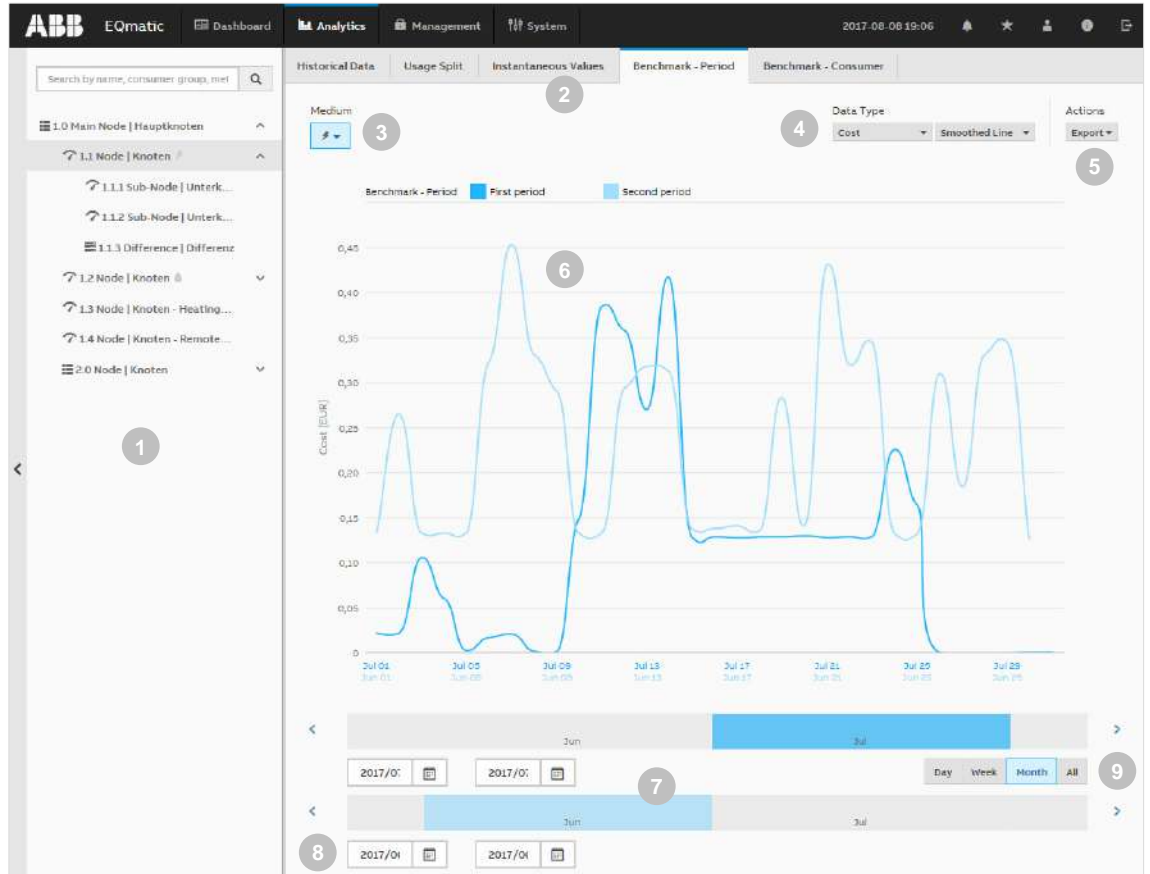
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Note
<p>The values in the diagram are updated depending on:</p> <ul style="list-style-type: none">• Speed of the devices• Number of devices in the system• Data resolution and transmission behavior of the M-Bus/Modbus device <p>The minimum update time is 5 seconds.</p>

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3.5.4 Benchmark - period

To compare a consumer or node over two intervals (e.g. current month, previous month).





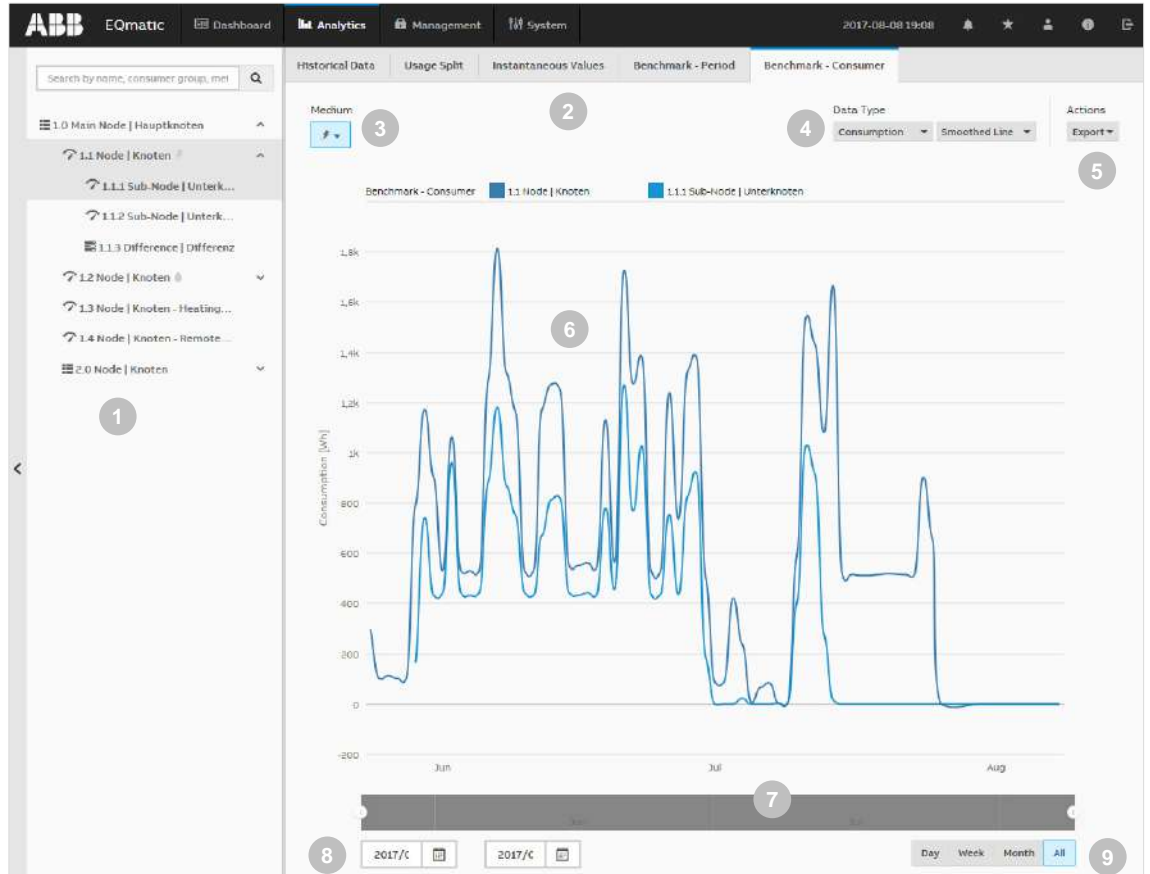
No.	Column header	Description
1	Metering structure	Used to navigate and select a consumer or node. Click the  icon to show or hide the metering structure.
2	Analysis functions	Menu for selecting the required analysis function
3	Media	Displays the media available in the system. Depending on the M-Bus/Modbus devices connected, the media electricity, water, gas and heat are displayed here. If M-Bus/Modbus devices have been assigned to consumer groups (e.g. lighting, electrical sockets, air conditioning, etc.), they can be opened using the  sub-menu.
4	Data type	Used to select the required data type (e.g. costs, consumption, etc.) and to display it on a chart (e.g. column chart, line chart, etc.)
5	Actions	Used to select further data processing options (e.g. Save as image, Export to .xlsx, csv, Save as favorite, Print chart)
6	Chart area	Used to display the data graphically. Click and drag or click a value on the chart to zoom
7	Slider	Used to limit and move the required periods
8	Calendar function	Used to enter the desired time intervals (from/to)
9	Presets	Used to select and display current day, week, month, year, all. Presets are shown dynamically, depending on the measuring period.

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3.5.5 Benchmark - consumer

Used to compare up to 5 consumers or nodes over an interval.





No.	Column header	Description
1	Metering structure	Used to navigate and select up to 5 consumers or nodes. Click the  icon to show or hide the metering structure.
2	Analysis functions	Menu for selecting the required analysis function
3	Media	Displays the media available in the system. Depending on the M-Bus/Modbus devices connected, the media electricity, water, gas and heat are displayed here. If M-Bus/Modbus devices have been assigned to consumer groups (e.g. lighting, electrical sockets, air conditioning, etc.), they can be opened using the  sub-menu.
4	Data type	Used to select the required data type (e.g. costs, consumption, etc.) and to display it on a chart (e.g. column chart, line chart, etc.)
5	Actions	Used to select further data processing options (e.g. Save as image, Export to .xlsx, csv, Save as favorite, Print chart)
6	Chart area	Used to display the data graphically. Click and drag or click a value on the chart to zoom
7	Slider	Used to limit and move the required periods
8	Calendar function	Used to enter the desired time intervals (from/to)
9	Presets	Used to select and display current day, week, month, year, all. Presets are shown dynamically, depending on the measuring period.

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3.5.6 Reports

This function* allows you to send analyses and evaluations to various recipients automatically. You can send data either by e-mail or to an FTP server.

Example: send saved consumption figures or costs for a meter once a month to a recipient by e-mail in the file format .xlsx for further evaluation and archiving.

Reports configured are displayed and managed in an overview table.

Configuration of a report

There are various parameters available to help you configure reports. Enter the required values and parameters in the window and save the report.

* Available for QA/S 3.xx.1 Energy Analyzer, M-Bus from version 2.0.0

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Report
?

1 * Name

2 * Recipients

3 * Values

4 * Nodes

5 * Medium

6 * Resolution

7 * Format

8 * Filename

9 * Period
 type:

10 * Send on

11 End on

No.	Parameters	Description
1	Name	Name/description of the report
2	Recipients	Recipient of the report (e-mail or FTP)
3	Values	Used to select the values to be sent in the report (e.g. consumption, costs, etc.). Multiple selection possible.
4	Nodes	Used to select the required node or meter. Multiple selection possible.
5	Medium	Used to select the medium (e.g. electricity, gas, water, heat). Multiple selection possible.
6	Resolution	Used to select the data resolution for the report (e.g. hourly, daily etc.)
7	Format	Used to select the file format for the report (e.g. XLSX, CSV, etc.)
8	Filename	Used to enter the file name
9	Period	Used to select the interval for sending or period for the report (e.g. 1 x / week)
10	Send on	Used to set the time when the report is to be sent for the first time
11	End on	Used to set the time when the report is to be sent for the last time

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Planning and application

4 Planning and application

4.1 General M-Bus information

This chapter describes the basics of planning and installing M-Bus systems.

Further information

Standards:

- EN 13757-1 Communication systems for and remote reading of meters - Data exchange
- EN 13757-2 Communication systems for and remote reading of meters - Physical and link layer, twisted pair baseband (M-Bus)
- EN 13757-3 Communication Systems

M-Bus documentation:

- www.m-bus.com

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Planning and application

4.1.1 What is M-Bus?

M-Bus (Meter-Bus) is a European standard for remotely reading gas, water, heat or electricity meters. The M-Bus interface is designed for communication over two-wire lines. This bus satisfies the special requirements for remotely powered or battery-operated meters. The meters send the collected measured values and data to a common master for further processing on request.

Bus principle

The M-Bus is based on the master-slave principle.

Master = level converter (e.g. QA/S 3.xx.1 Energy Analyzer)

Slave = M-Bus device/meter (e.g. ABB electricity meter from the A and B series, water meter, heat meter, gas meter, etc., with M-Bus interface).

Up to 250 addresses (M-Bus devices) can be processed and polled in an M-Bus installation. The QA/S 3.xx.1 Energy Analyzer supports up to 16 or 64 meters, depending on the device type.

The M-Bus master polls the individual bus addresses. The bus address is either the primary address 1 – 250 or the 8-digit secondary address (generally the device's meter number or serial number). The corresponding slaves/meters respond with a data telegram. The data received from the slaves/meters are saved in the M-Bus master (e.g. QA/S 3.xx.1 Energy Analyzer) for further processing.

The primary address 0 is preset in the factory for M-Bus devices. The primary address must be assigned in the meter.

Transmission speed

The M-Bus is generally designed for speeds from 300 to 9600 baud. ABB meters from the A and B series can communicate at speeds of 2400 - 9600 baud. The speed must be set in the meter.

Polarity

The M-Bus interface is protected against polarity reversal, i.e. the wires of the cable used can be interchanged.

Topology

The M-Bus supports different bus topologies. The cables should be kept as short as possible. A combination of star, tree and linear structure is typically used to minimize the cable lengths.

However, a ring structure is not advisable because a single fault can cause the entire system to become faulty. Furthermore, a ring structure makes troubleshooting more difficult.

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Planning and application

4.1.2 Cables and lines

Cable types

A two-wire cable with a minimum cross section of 1.5 mm² is recommended for an M-Bus line.
Example: telecommunications cable

J-Y(ST) Y 2 x 2 x 0.8 mm

It is recommended to mark all M-Bus cables and the connection points. All M-Bus slaves must be connected directly whenever possible. Use only cables with twisted cores.

Cable length

The maximum length of the cables in a complete M-Bus system is 4000 m per channel. This aspect depends on the cable cross section and the technical characteristics of the cable (resistance, capacitance). Cables with a cross section of less than 0.5 mm² must not be used. The lower the cable's resistance, the longer the cable can be. The maximum permissible cable length must be observed, however. Otherwise, transmission errors may lead to malfunctions. The length also depends on the number of M-Bus devices connected in the network and on the speed set.

Number of M-Bus devices

Up to 250 M-Bus devices (slaves) can be connected in an M-Bus network. ABB Energy Analyzers support max. 16 or 64 M-Bus devices.

Each M-Bus device requires its own M-Bus address (1 - 250 for primary addresses) if the secondary address is not used. Since the maximum number of M-Bus devices in an M-Bus system is 250, the maximum cable length is 1000 m owing to the aforementioned dependencies. The cable length can be increased if the number of M-Bus devices is decreased.

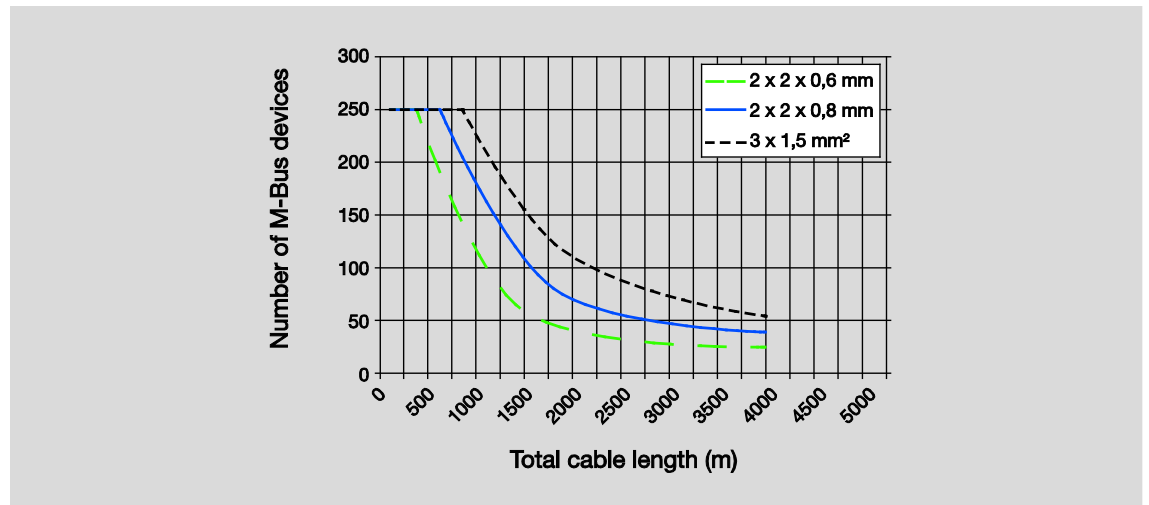


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Planning and application

4.1.3

Installation

Connection points

Commercially available connections and distribution boxes can be used at the connection points between the M-Bus cable and the M-Bus devices.

Labeling

Note

It is recommended to attach permanent labeling to the ends of the M-Bus cable to prevent confusion with the wiring for the electrical installation (230 V!).

Surge arrester / distances to sources of interference

The M-Bus devices (meters) are not protected against voltages higher than the maximum permissible bus voltage (± 50 V). M-Bus networks must be protected against impermissibly high overvoltage. Lightning protection equipment and surge arresters must be provided if necessary. Install M-Bus cables as far away as possible from the electrical power supply cables for other devices (not M-Bus devices).

Installation/commissioning of M-Bus devices

Caution

M-Bus devices must be installed and put into operation in accordance with the applicable standards and regulations, and this task is only allowed to be performed by trained specialists (e.g. electricians, gas fitters/plumbers).

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Planning and application

4.1.4 Troubleshooting

Update

If the device does not start properly and access to the user interface is not possible after a firmware update, the device will start with the previously installed firmware version. This process can take several minutes. The green LED flashes during this time. The device is ready for operation when the green LED is permanently ON.

Device access

Proceed as follows if the user interface is no longer accessible:

1. Check the connections, cables and network connection, etc.
2. Start the i-bus® Tool and scan the network for IP devices. Select the related device and click "Open website". The Login page opens. Enter your access data.
3. If the device is not listed in the i-bus® Tool after a network scan, undertake a restart including resetting the network settings (for further information see: [2.5.2 Resetting the device P. 20](#))
4. Repeat step (2.). A new IP address may be assigned via DHCP.

M-Bus

Problem	Possible means of rectification
No M-Bus devices or several M-Bus devices do not respond	<ul style="list-style-type: none"> • Short circuit on the M-Bus? • Cable not connected correctly or cable severed? • Energy Analyzer ready for operation, mains voltage (230 V) available? • The voltage at the M-Bus terminals is at least 24 V? • Identical speeds (300, 2400, 9600) on the Energy Analyzer and M-Bus devices?
One M-Bus device does not respond	<ul style="list-style-type: none"> • Bus address not assigned • Bus address incorrect • M-Bus device not connected • M-Bus cable severed • Check M-Bus address of the device • Measured voltage at the device is at least 24 V? • Identical speeds (300, 2400, 9600) on the Energy Analyzer and M-Bus devices?
Electrical ambient conditions	<ul style="list-style-type: none"> • The voltage measured at the most distant M-Bus device must be at least 24 V or more • If the voltage is less than 24 V, it might not be possible to read all M-Bus devices • The maximum output voltage of 42 V must not be exceeded

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Planning and application

4.2 **General Modbus RTU/RS-485 information**

This chapter describes the basics of planning and installing Modbus systems. You will find further information in the Modbus documentation/specification:

- www.modbus.org

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Planning and application

4.2.1 What is Modbus?

Modbus is a serial communication protocol that was developed and published for use with programmable logic controllers (PLC). It is a communication method for the transmission of information via serial cables between electronic devices. The device that requests the information is termed the Modbus master. The devices that send the information are Modbus slaves. In a standard Modbus network there is one master and up to 247 slaves each with a unique slave address from 1 to 247.

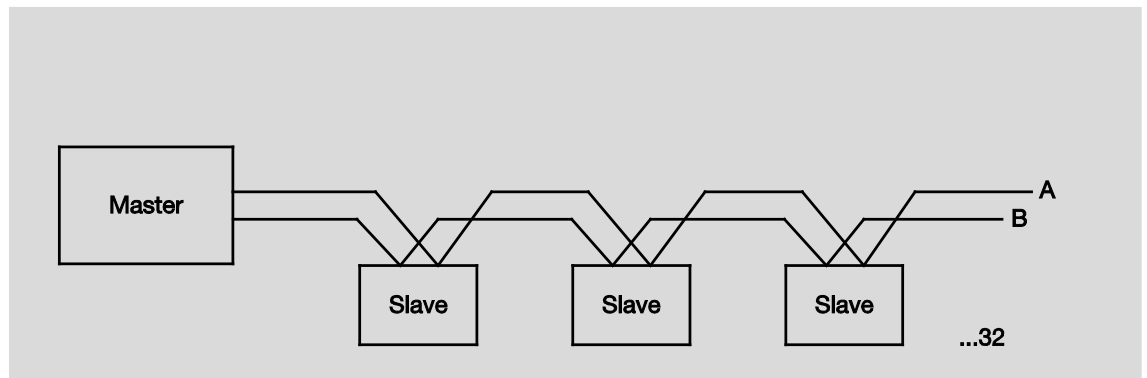
Bus principle RS-485

The Modbus standard uses the RS-485 standard. This standard defines the physical layer of the Modbus interface. The data are transmitted in serial form via a 2-wire bus (RS-485).

The RS-485 standard is based on the master – slave method and defines the bus cable as a cable with a start and an end that are each terminated using an EOL resistor RT (T=Termination).

Master = level converter (e.g. QA/S 4.xx.1 Energy Analyzer)

Slave = Modbus device/meter (e.g. ABB electricity meter from the A and B series, water meter, heat meter, gas meter, etc., with Modbus RTU interface).



Transmission speed

300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 baud

Polarity

Attention must be paid to the correct polarity of the core pairs during installation because incorrect poling will invert the data signals. Particularly if there are difficulties in relation to the installation of new devices, any troubleshooting should start with a check on the bus polarity.

Topology

The optimal cable topology for the Modbus RTU is a purely linear structure. Droplines to individual devices with a maximum length of 1 m are allowed. These droplines are not terminated.

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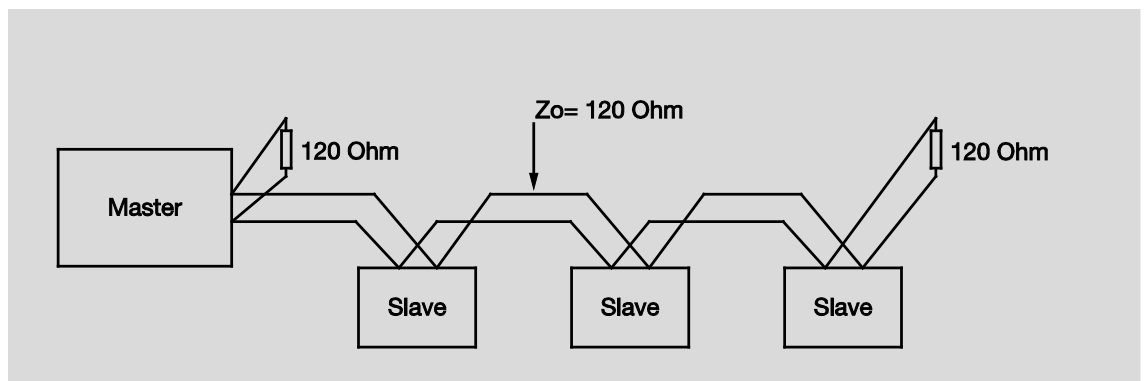
Planning and application

4.2.2 Cables and lines

Cable types

A twisted pair, screened cable is recommended as the bus cable. The cable type J-Y(St)Y n x 2 x 0.8 is suitable, for instance. The screen is to be connected to PE at one end.

The bus cable must be terminated with resistors (120 Ω , 0.25 W) at both ends so that only minimal reflections are produced. The serial communication on the RS485 interface operates most efficiently if the source and load impedance are matched at 120 Ohm. The EOL resistors are connected in parallel with terminals A and B and are included in the scope of delivery.



Cable length

The RS-485 specification limits the cable length to 1200 m, the number of devices in the bus to 32 and stipulates a linear topology (daisy chain).

Number of devices

The number of Modbus devices depends on the unit load (UL) of the RS-485 transceivers.

In the worst case a transceiver has 1 UL. An RS485 segment is specified for 32 UL. If more devices are to be connected, a repeater must be used.

Modern RS485 transceivers have 1/4 or 1/8 UL. If only such devices are used, 128 or 256 users are possible without repeaters.

Note

The ABB A and B series energy meters have a unit load of 1/8 UL. Therefore 64 ABB meters can be connected to the QA/S 4.64.1 Energy Analyzer without repeaters.

Caution

Modbus RTU devices must be installed and put into operation in accordance with the applicable standards and regulations, and this task is only allowed to be performed by trained specialists (e.g. electricians).

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Planning and application

4.2.3 Troubleshooting RS-485

To minimize potential sources of faults, a few basic aspects should be taken into account on the usage of RS-485.

Determine the communication characteristics of a device before the system design is completed. Pay attention to the following points here:

- Two-wire or four-wire system

RS-485 systems can be either two-wire or four-wire systems. The two-wire configuration - with the additional earth wire - reduces the wiring costs, however it is limited to half duplex communication (cannot receive and transmit at the same time). The majority of RS-485 devices have two-wire configurations.

- How high is the response time of the device (processing time)?
- What is the address range of the device that can be programmed?
- Which speed is supported?

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Appendix

A Appendix

A.1 Ordering details

Device type	Product name	Order No.	bbn 40 16779 EAN	Weight 1 pc. [kg]	Packaging [pcs.]
QA/S 3.16.1	Energy Analyzer, 16-fold, M-Bus, MDRC	2CDG110226R0011	997751	0.15	1
QA/S 3.64.1	Energy Analyzer, 64-fold, M-Bus, MDRC	2CDG110227R0011	997768	0.15	1
QA/S 4.16.1	Energy Analyzer, 16-fold, Modbus, MDRC	2CDG110228R0011	997775	0.15	1
QA/S 4.64.1	Energy Analyzer, 64-fold, Modbus, MDRC	2CDG110229R0011	997782	0.15	1



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