

blue'Log X series

(X-1000 | X-3000 | X-6000)



Operating Manual

Version 20150922

Copyright

Copyright for this manual remains with the manufacturer. No part of this manual may be reproduced or edited, duplicated or distributed using electronic systems without written permission from meteocontrol GmbH.

Compensation shall be payable in the event of any copyright infringements.

All brand names mentioned in this manual are the property of their respective manufacturers and are hereby acknowledged.

Contact data

The manufacturer of the device described in this documentation is:

meteocontrol GmbH

Spicherer Str. 48

D-86157 Augsburg

Tel.: +49 (0) 821 / 3 46 66-0

Web: www.meteocontrol.com

Technical support:

Tel.: +49 (0) 821 / 3 46 66-88

Fax: +49 (0) 821 / 3 46 66-11

E-mail: technik@meteocontrol.de

Details regarding the manual

The original operating manual is written in German. All other language versions are translations of the original operating manual and are hereby identified as such.

© 2015 meteocontrol GmbH

All rights reserved.

All information in this operating manual has been compiled and checked with the greatest care and diligence. Nevertheless, the possibility of errors cannot be entirely excluded. meteocontrol GmbH therefore cannot accept any liability for errors or their consequences.

Subject to technical alterations.

Contents

1.	General notes	5
1.1	Safety instructions	5
1.2	Warning symbols	5
1.3	Additional information	6
1.4	Text display	6
2.	Notes on this operating manual	7
2.1	Warranty and liability	8
3.	Safety instructions for operation	9
3.1	Intended use	9
3.2	Personnel	9
3.3	Protection concepts	10
3.4	Transport and storage	10
3.5	Internal battery	11
3.6	Cleaning	11
4.	Device overview	12
4.1	Overview of product versions	12
4.2	blue'Log front panel	12
4.3	blue'Log rear panel	13
4.4	Status LEDs	13
5.	Installation	14
5.1	Safety instructions for installation	14
5.2	Cables and wiring	15
5.2.1	Permitted cable types for the blue'Log power supply	15
5.2.2	Cable types for device connections	15
5.2.3	Maximum recommended cable lengths	16
5.2.4	Shielding	16
5.3	Installation	17
5.3.1	Installing device on DIN rail	17
5.4	Expanding the blue'Log	18
5.4.1	Connecting expansion modules	19
6.	Interfaces	23
6.1	Power supply	23
6.2	Voltage output	24
6.3	Ethernet	24
6.4	Multi input	24
6.4.1	Analog input	24
6.4.2	Digital input	24
6.5	Digital input	24
6.6	Digital output	25

- 6.7 RS485/422 interface 25
- 6.8 CAN interface 25
- 6.9 USB interface..... 25
- 7. Commissioning, configuration..... 26**
 - 7.1 Requirements 26
 - 7.2 Commissioning 26
 - 7.3 Establishing / checking connections 26
 - 7.3.1 Ethernet connection 26
 - 7.3.2 Connecting bus devices 27
 - 7.3.3 Connections to analog and digital inputs 27
 - 7.4 Log-on via display 28
 - 7.4.1 Start menu 28
 - 7.4.2 Setting language via quick access 28
 - 7.4.3 User selection..... 29
 - 7.5 Network configuration on the display 30
 - 7.5.1 DHCP setting 30
 - 7.5.2 Setting the static network parameters 30
 - 7.6 Firmware update via USB 31
 - 7.7 Showing the licenses on the display..... 31
 - 7.8 Logging on to device websites 32
 - 7.9 Logger master data..... 35
 - 7.10 Ethernet 36
 - 7.11 MX modules 36
 - 7.12 User management 37
 - 7.13 Licenses 37
 - 7.14 Date / time 38
 - 7.14.1 Time synchronization with system settings..... 38
 - 7.14.2 User defined time synchronization 38
 - 7.14.3 Time synchronization disabled 38
 - 7.15 Registering on the safer'Sun Portal 39
 - 7.15.1 Assignment to an existing system..... 39
 - 7.15.2 Setting up a new system using master data 39
 - 7.16 Portal communication 40
 - 7.16.1 Reporting at regular intervals 40
 - 7.16.2 Reporting at set times 40
 - 7.17 FTP push..... 41
- 8. Firmware update 42**
- 9. Licenses 43**
 - 9.1 FTP PUSH INTRADAY 43
- 10. Recording devices 43**
 - 10.1 Adding sensors 43
 - 10.1.1 Analog sensors 43

10.1.2	Modbus sensors	45
10.2	Adding meters	47
10.2.1	S0 meter	47
10.2.2	Modbus meter	49
10.3	Adding inverters	51
10.4	Adding string measuring systems	52
10.5	Adding battery system	53
11.	Alarms	54
11.1	Latest alarms	54
11.2	Contact addresses	55
11.3	Alarm configuration	56
12.	Visualization	57
12.1	Showing sensor values	57
12.1.1	Diagrams	57
12.1.2	Real-time values	57
12.2	Showing meter values	58
12.2.1	Diagrams	58
12.2.2	Real-time values	58
12.3	Showing inverter values	59
12.3.1	Diagrams	59
12.3.2	Real-time values	60
12.4	Showing string measuring system measured values	61
12.4.1	Diagrams	61
12.4.2	Real-time values	61
12.5	Showing battery system values	62
12.5.1	Diagrams	62
12.5.2	Real-time values	62
12.6	Showing Power Control values	63
12.6.1	Diagrams	63
12.6.2	Real-time values	63
13.	Messages	64
13.1	Logbook	64
14.	meteocontrol Power Control	65
14.1	General notes	65
14.1.1	Functions	65
14.1.2	Receiving specifications from the grid operator	66
14.1.3	Processing the data	67
14.1.4	Navigating to the Power Control website	69
14.2	General settings	70
14.2.1	Selecting data logger mode	70
14.2.2	Entering system data	73
14.3	Active power procedure	74

14.3.1	P(DI) procedure.....	76
14.3.2	P(AI) procedure.....	78
14.3.3	P(fix) procedure.....	79
14.3.4	Intelligent Power Limit (IPL)	80
14.3.5	Gradient limitation active power (P) procedure.....	82
14.3.6	Limitation to agreed connection power P_{AV}	84
14.3.7	Preset for fallback value.....	84
14.4	Reactive power procedure.....	85
14.4.1	$\cos\phi$ (DI) procedure	87
14.4.2	$\cos\phi$ (AI) procedure	89
14.4.3	$\cos\phi$ (fix) procedure	90
14.4.4	$\cos\phi$ (P) procedure.....	91
14.4.5	$\cos\phi$ (U) procedure	93
14.4.6	Q(DI) procedure	95
14.4.7	Q(AI) procedure	97
14.4.8	Q(fix) procedure.....	98
14.4.9	Q(U) procedure	99
14.4.10	$Q(P \times \tan\phi(\text{fix}))$ procedure	101
14.4.11	$Q(\cos\phi(\text{DI}))$ procedure	102
14.4.12	$Q(\cos\phi(\text{AI}))$ procedure	102
14.4.13	$Q(\cos\phi(\text{fix}))$ procedure.....	103
14.4.14	$Q(\cos\phi(\text{P}))$ procedure.....	103
14.4.15	$Q(\cos\phi(\text{U}))$ procedure	104
14.4.16	Procedure in the event of an error.....	105
14.4.17	Gradient limitation reactive power(Q) procedure	107
14.4.18	System control loop.....	109
14.5	Power Control checklist.....	111
15.	Technical data	112
16.	Environmental protection and disposal.....	115
17.	CE certificate	116
18.	RoHS Statement	117
19.	List of figures.....	118

1. General notes

1.1 Safety instructions

Safety instructions warn of dangers when using the devices and explain how they can be avoided.

The safety instructions are classified according to the severity of the risk and are subdivided into four groups:

DANGER



Imminent danger

Failure to comply with the warning notice will lead to an imminent risk of death or serious physical injury!

WARNING



Possible danger

Failure to comply with the warning notice may lead to death or serious physical injury!

CAUTION



Hazard with a risk of material damage

Failure to comply with the warning notice may lead to minor injuries!

ATTENTION

Risk of material damage

Failure to comply with the warning notice will lead to material damage!

1.2 Warning symbols

Particular dangers are highlighted using warning symbols.

ELECTRICAL HAZARD



Risk of electrocution!

Failure to comply with the warning notice will lead to an imminent risk of serious injury or death.

1.3 Additional information



This symbol can be found next to notes, additional information and tips.

1.4 Text display

Emphasized points are shown in bold and indicate important information.

Lists are shown with bullet points (level 1) and dashes (level 2):

- List 1
 - Point A
 - Point B
- List 2

Instructions describe steps which are to be carried out in the given order.

1. Instruction 1
 2. Instruction 2
- ↳ Result of the operation

Button names are shown in capitals and in "QUOTATION MARKS".

In **illustrations**, **item numbers** are used to indicate components.

The legend including item numbers and descriptions of the components is shown below the figure. Alternatively, direct references to components are made in the text.

2. Notes on this operating manual

This manual is a key aid when it comes to ensuring proper operation of the device. It contains important information and safety notes to help you use the devices correctly, economically and in the intended manner.

The manual helps to avoid dangers, to reduce repair costs and downtimes, and to increase the reliability and operating life of the devices.

During installation, all the manuals for system modules and components must be taken into account.

DANGER



Danger from improper handling of the device

The personnel responsible for installation, operation and maintenance of the system must have read and understood the operating manual before the devices can be installed and used safely!

The manual and documentation must be kept by the system and be available at all times as required.

meteocontrol GmbH accepts no liability for personal injury, damage to property, or system malfunctions and their consequences, insofar as these result from non-observance of this operating manual.

2.1 Warranty and liability

Details of the scope and form of the warranty as well as the warranty period are given in the meteocontrol GmbH General Terms and Conditions.

meteocontrol GmbH rejects any liability for damage arising from the non-observance of the operating manual.

This applies, in particular, to damage resulting from:

- Unintended use
- Incorrect operation
- Wrongly chosen materials and tools
- Faulty or non-executed maintenance and repairs

With Power Control, meteocontrol GmbH accepts no liability for events and occurrences outside of its control, such as:

- the correctness of control commands given by an energy supply company or failure to implement control commands that have been passed on
- hardware and/or software faults on the part of the system operator
- end-user switching processes
- Any liability for damage caused by such events and occurrences, such as lost profits, grid instability, damage to parts of the customer's system, for instance of an inverter, shall remain expressly excluded.

3. Safety instructions for operation

3.1 Intended use

Only the permitted signals and signal strengths may be applied to the connections of the data logger (blue'Log) and the expansion modules (MX modules) used here.

Installation is only permitted indoors. For installation outdoors or in a dusty environment, the device must be installed in a standardized protective enclosure.

3.2 Personnel

Installation, commissioning and maintenance of the device may only be performed by a qualified electrician.

Given their specialist training, knowledge, experience and familiarity with the relevant standards and regulations, a qualified electrician is in a position not only to carry out work on electrical systems but also to recognize and avoid possible dangers unaided.

The qualified electrician must comply with the occupational health and safety laws in force.

Please note in particular:

- all national installation and set-up regulations (e.g. VDE in Germany),
- all generally accepted codes of practice,
- information on transport, installation, operation, service, maintenance and disposal given in this installation manual,
- specific values, limits, and information relating to operating and ambient conditions on type plates and in data sheets.

3.3 Protection concepts

- The memory card (SD memory) must not be removed while the blue'Log is in operation
- The blue'Log may not be opened
- The blue'Log may not be modified
- Damaged devices must be taken out of operation immediately and checked by a qualified electrician
- Local regulations must be observed when using the devices
- The safety of the blue'Log and the user cannot be guaranteed if the safety precautions described are violated

3.4 Transport and storage

Every product leaves our factory in perfect electrical and mechanical condition.

Special packaging ensures safe transport.

On delivery, unpack the device and all accessories and check them for any damage.

WARNING



A damaged device must not be put into operation!

ATTENTION

To avoid possible damage, always use the original packaging when transporting or shipping the device.

Protect the device against dust and moisture.

3.5 Internal battery

The blue'Log data logger contains an internal lithium battery (button cell) which ensures that the time and date remain stored in the device in the event of a power cut.

ATTENTION

Lithium battery

The battery may only be replaced by the meteocontrol repair service, since the blue'Log housing needs to be opened.

meteocontrol GmbH accepts no liability for material damage owing to non-compliance with this warning notice!

3.6 Cleaning

Clean the outside of the device only using a dry, lint-free cloth.

If the device is very dirty, you can clean it using a slightly damp cloth and a commercially available household cleaner.

ATTENTION

Unplug the device from the mains before cleaning it!

ATTENTION

When cleaning the device, ensure that no moisture penetrates the housing!

4. Device overview

4.1 Overview of product versions

	blue'Log X-1000	blue'Log X-3000	blue'Log X-6000
Max. feed-in power in kWp	100	1000	unlimited
Storage capacity	16 GB	16 GB	32 GB

4.2 blue'Log front panel

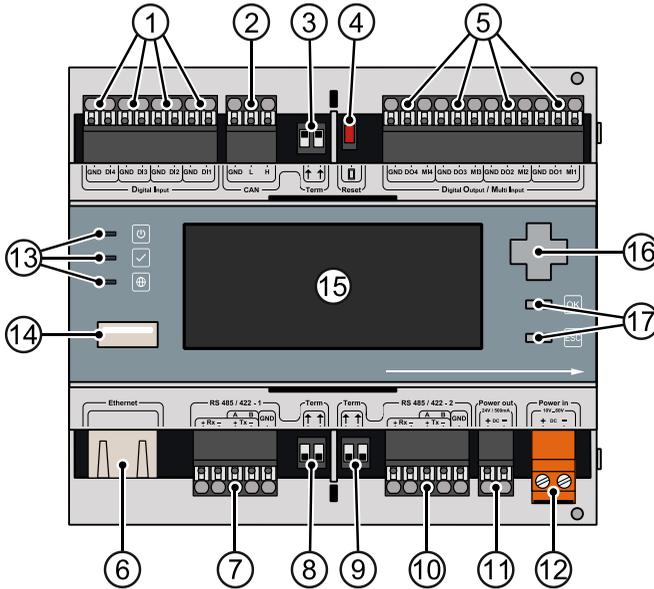


Fig. 1: Overview of the blue'Log front panel

- | | |
|---|-----------------------------------|
| (1) Digital input (DI1-DI4) | (9) RS485/422 termination – 2 |
| (2) CAN | (10) RS485/422 - 2 |
| (3) CAN termination | (11) Power out (24V / 500mA – DC) |
| (4) Reset | (12) Power in (20V...60V – DC) |
| (5) Digital output / multi input (DO1 – DO4, MI1 – MI4) | (13) LEDs: Power, status, online |
| (6) Ethernet | (14) USB interface |
| (7) RS485/422 - 1 | (15) Display |
| (8) RS485/422 termination – 1 | (16) Directional pad |
| | (17) Buttons: OK, ESC |

4.3 blue'Log rear panel

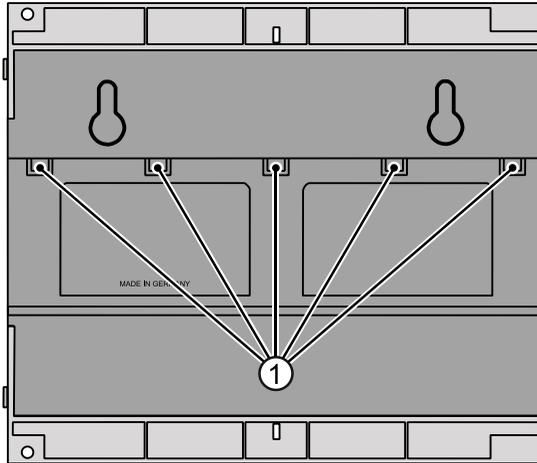


Fig. 2: Overview of the blue'Log rear panel

- (1) Clamp for DIN rail

4.4 Status LEDs

The front panel features three LED displays with the following meanings.

Symbol	LED	Meaning
		Green: blue'Log is supplied with power
		Off: No power supply
		Green: System loaded successfully, normal operation
		Orange: System booting, boot phase
		Red: System error
		Green: Connected to portal
		Off: No connection to portal

5. Installation

5.1 Safety instructions for installation

DANGER



Risk of electrocution!

Fatal injuries or death from contact with cables and terminals.

- Only connect or disconnect cables while the power supply is switched off.
- Provide a safeguard to prevent unintentional restart.

ATTENTION

Damage due to incorrect cabling!

Incorrectly connected cables can lead to damage or destruction of the measuring inputs and the device.

- Connect cables only to the sockets provided for this purpose.
- Observe the polarity during connection.

ATTENTION

Damage due to overvoltage!

Overvoltages or surge voltages may damage or destroy the device.

- Protect the power supply against overvoltages.

ATTENTION

Damage due to overvoltage!

Voltages of more than 24 V DC and currents of more than 20 mA on the analog inputs can destroy the relevant measuring inputs.

- Ensure that only voltages of up to 24 V DC are applied and only currents of up to 20 mA flow.
- Voltages of more than 24 V DC and currents of more than 20 mA on the digital inputs can destroy the relevant measuring inputs.

5.2 Cables and wiring

Recommended cable types for wiring the individual system components are given below. The restrictions resulting from the wiring are also listed.

5.2.1 Permitted cable types for the blue'Log power supply

Connecting cable	Voltage range	Cable cross section	Type
<ul style="list-style-type: none"> Finely stranded conductor 	U < 24 V DC	1 mm ²	H05V-K
<ul style="list-style-type: none"> Finely stranded conductor 	U >= 24 V DC	0.75 mm ²	H05V-K

5.2.2 Cable types for device connections

Bus cabling (inverters, current sensors)

- Recommended: Data cable (twisted and shielded) Li2YCYv (TP) 2×2×0.5mm² ¹⁾
- Alternatively: Network cable CAT 6-SFTP

Analog signals (irradiance sensor, temperature sensor)

- Sensor cable LiYCY 2×2×0.5mm²

Digital signals (energy meter, remote control system)

- Sensor cable LiYCY 2×2×0.5mm²

Ethernet network

- Network cable CAT 5 / CAT 6

5.2.3 Maximum recommended cable lengths

- Bus cabling (data cable RS485) 1200 m^{2) 3)}
- Sensors (voltage signal 0 V – 10 V) 100 m
- Sensors (current signal 4 mA – 20 mA) 600 m⁴⁾
- Meters 30 m
- Ethernet network 100 m³⁾

¹⁾ We recommend using the cable type UNITRONIC® Li2YCYv (TP) manufactured by Lapp Kabel, or an equivalent cable type. This cable is suitable for laying in soil.

²⁾ For cables exceeding the given length, the additional use of repeaters is necessary.

³⁾ Several separate cables of this length require a hub.

⁴⁾ 24 V DC power supply required.



Data cables must be isolated from power cables in accordance with EN 50174-2 using metal cable supports.

5.2.4 Shielding

The cable shielding may only be grounded at one end of the connection.

5.3 Installation

5.3.1 Installing device on DIN rail

1. Hang the blue'Log on the DIN rail using the provided clamp (rear panel).
2. Push the DIN rail latch ① on the front side of the device from bottom (latch open) to top (latch closed). This will fix the blue'Log to the DIN rail. The symbols (open/closed lock) above and below the DIN rail latch indicate whether or not the device is fixed.
3. Check the secure connection of the blue'Log to the DIN rail.



Fig. 3: Secure mounting on a DIN rail

To release the blue'Log from the DIN rail, push the DIN rail latch from top to bottom position. The device can now be removed from the DIN rail by lifting it off.

ATTENTION

Ventilation

For installation within a control cabinet, ensure at least 3 cm free space above and below the device for air circulation.

5.4 Expanding the blue'Log

The blue'Log can be expanded to provide additional interfaces using various expansion modules (MX modules).



Fig. 4: MX modules (example: RS485/422)

ATTENTION

Risk of damage when installing expansion modules

Installing MX modules during operation of the blue'Log can damage or destroy the blue'Log and the expansion modules.

- Disconnect the blue'Log from the power supply before installing MX modules for additional interfaces.

5.4.1 Connecting expansion modules

In order to expand the blue'Log by installing MX modules, remove the right-hand side-cover. To do this, unlock the four fasteners ① and pull off the right-hand side cap.

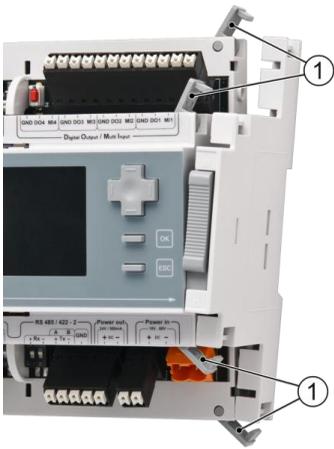


Fig. 5: Unlocking the fasteners



Fig. 6: Pulling off right-hand side cap



Keep the side cap at hand, as you will need to reattach it to the right-hand side of the expansion module later on to fasten the blue'Log and MX modules to the DIN rail again.

You can now see the blue'Log's expansion socket ① at the right-hand side of the housing.

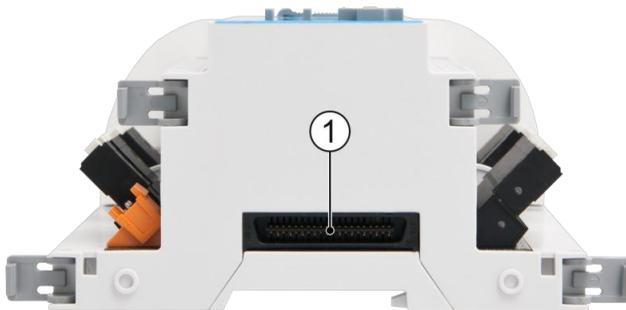


Fig. 7: Expansion socket

Plug the desired expansion module into the blue'Log's expansion socket.

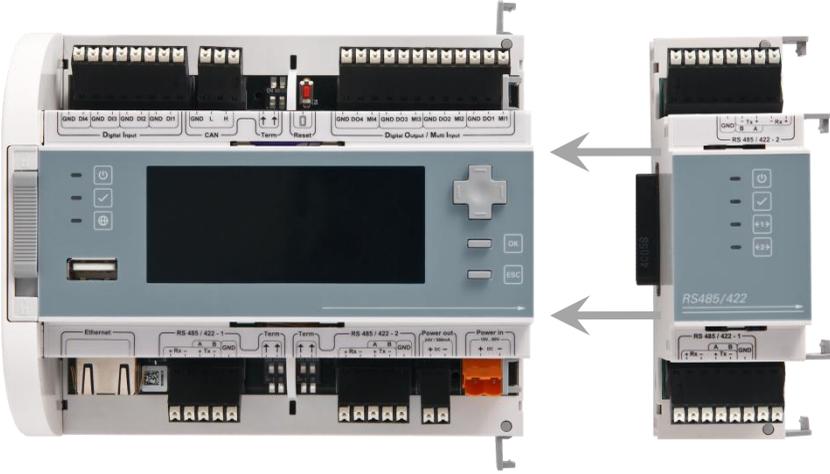


Fig. 8: Plugging expansion module into the blue'Log.

Now close the blue'Log's fasteners again in order to fix the expansion module to the preceding device.



Fig. 9: Attached expansion module

Reattach the side cap to the right-hand side of the expansion module and close the case locks.



Fig. 10: blue'Log and MX module connected and side cap attached

The blue'Log can be expanded with several MX modules of the same type or with different MX modules. Please see the data sheet for your basic device for details of the maximum number of expansion modules.



Fig. 11: blue'Log with various MX modules

ATTENTION

Order of installed MX modules

When connecting MX modules to the basic device, the prescribed order has to be observed in order to ensure correct functionality of the modules.

- The number of arrows and lines at the bottom of the front panels of blue'Log and MX modules indicates the order of connection. Higher rated modules must not be installed before a module with fewer lines (e.g. two arrows/lines). For example, a module with three arrows/lines must not be connected before a module with two arrows/lines.



Fig. 12: Order of installed MX modules

6. Interfaces

6.1 Power supply

The power supply of the data logger must comply with requirements below.

- Power supply: 20 V DC, 4.0 A ... 60 V DC, 1.3 A
max. 80 W

CAUTION



Complying with limit values

You should ensure that alternatively the following limit values are complied with.

- IEC 61010-1 (bzw. EN-/CSA-/UL- 61010-1)
Power supply of Limited-energy circuit with safety extra low voltage (SELV)
- EN 60950-1
Power supply with limited power sources

ATTENTION

Installing the power supply

The power supply including any protective devices may only be installed by a qualified electrician.

6.2 Voltage output

- Voltage: 24 V DC

The blue'Log can supply sensors (e.g. i'checker) with a maximum current consumption of 500 mA. For sensors with a current consumption totaling more than 500 mA, please use an external power supply.

6.3 Ethernet

- The blue'Log is directly connected to the PC / laptop or hub / switch using an Ethernet patch cable, which is included in delivery.

6.4 Multi input

The blue'Log has four multi inputs which can be used for either analog or digital signals. Each port is configured individually via software.

6.4.1 Analog input

The analog inputs are freely configurable as:

- Voltage input: 0-24 V DC
- Voltage input: 0-1 V DC
- Voltage input: 0-100 mV
- Current input: 0-20 mA
- Resistor (PT1000): 600-1800 Ω

6.4.2 Digital input

The digital inputs are freely configurable as:

- Pulse input in accordance with DIN 43864 (S0)
- Voltage level input: 0-24 V DC

6.5 Digital input

The digital inputs are freely configurable as:

- Pulse input in accordance with DIN 43864 (S0)
- Voltage level input: 0-24 V DC
- Potential-free contact: 24 V DC / 20 mA

6.6 Digital output

The digital outputs are freely configurable as:

- Open collector: max. 60 V DC / 200 mA
- Voltage output: 20...60 V DC (corresponding to supply voltage), max. 45 W, in total of all digital outputs (basic module and MX modules), max. 200 mA per output

6.7 RS485/422 interface

The RS485/422 interfaces are used to connect communication devices via the RS485 or RS422 bus.

- Each RS485/RS422 interface adapts automatically and can be terminated individually via switches.
- Please note the requirements for connecting bus devices in the enclosed "Device connection plans" document.

6.8 CAN interface

The CAN interface is used to connect communication devices via the CAN bus.

- The CAN interface can be terminated via a switch.

6.9 USB interface

The USB front socket (type A) is provided as a service interface. The interface can be used for:

- Restoring device software (firmware recovery)
- Updating the firmware

7. Commissioning, configuration

7.1 Requirements

In order to start up the blue'Log, the device must be securely mounted and all cables must be connected correctly.

7.2 Commissioning

- Switch on the power supply
- Wait until the blue'Log has finished booting.
 - ↳ The status LED on the device will light up.

ATTENTION

Power supply

During connection of the power supply it is imperative to ensure correct polarity (+ / -).

7.3 Establishing / checking connections

7.3.1 Ethernet connection

- The blue'Log can be integrated into a local network using a patch cable. Establishing the Ethernet connection allows direct access to the device and Internet access. A 1 m long Ethernet patch cable is included in delivery.

7.3.2 Connecting bus devices

The blue'Log is equipped with two RS485/422 interfaces to connect bus devices.

- Connect your bus devices to the data logger via the RS485/422 interfaces. Please note the respective requirements in the "Device connection plans" document.
- Typical bus devices include inverters, energy meters, string measuring systems and power quality analyzers.
- Only one device manufacturer can be queried per bus. Querying other sensors, meters or string measuring systems in parallel is not possible.
Sensors and meters can be queried together if they communicate via modbus.

7.3.3 Connections to analog and digital inputs

The blue'Log has several digital interfaces or analog/digital interfaces for recording and evaluating analog and digital signals.

- Devices with analog or digital outputs can be connected via the blue'Log's digital and analog inputs. Please note the respective requirements in the "Device connection plans" document.
- Typical devices for these interfaces are ripple-control receivers, remote control systems and sensors.

7.4 Log-on via display

7.4.1 Start menu

The device license is shown in the display start menu. The "OK" and "ESC" buttons take you to the blue'Log display menus.



Fig. 13: blue'Log display: Start menu

7.4.2 Setting language via quick access

1. To access the language settings, press the "ESC" button on the display start page.
2. Select the desired language.
 - ↳ The language will be changed immediately.



Fig. 14: blue'Log display: Setting languages, quick access

7.4.3 User selection

- To get to the user selection via the display, press the "OK" button.
- If no user is logged on, you will be taken to the user selection menu. Otherwise, you will access the main menu immediately.

The available users registered in the blue'Log are shown in the user selection menu. The individual users can be selected using the directional pad (up and down) and confirmed by pressing the "OK" button. Once a user has been selected, a PIN will be requested in order to log on.

By default, the users "service" and "user" are always available for selection.

- Service: PIN: 0010 → Full access for installers
- User: PIN: 0001 → Restricted rights for end users



Fig. 15: blue'Log display: User selection

7.5 Network configuration on the display

7.5.1 DHCP setting

If a DHCP server is connected to the blue'Log's network, the network parameters such as the IP address can be retrieved automatically. DHCP must be enabled on the data logger for this purpose.

1. Navigate to the network settings using the directional pad and the buttons:
Main menu → Telecommunication → Network

2. Enable the "DHCP" setting here.

↳ The IP address as well as the other parameters will now be retrieved automatically from the DHCP server



Fig. 16: blue'Log display: DHCP enabled

7.5.2 Setting the static network parameters

Follow the instructions below to set the static network parameters such as IP address, subnet mask, gateway and DNS server:

1. Navigate to the network settings using the directional pad and the buttons:
Main menu → Telecommunication → Network

2. Disable the "DHCP" setting

3. Enter the following network-specific parameters:

- IP address Obtain automatic DNS address (on / off)
- Subnet mask First DNS server
- Standard gateway Second DNS server



Fig. 17: blue'Log display: DHCP disabled

7.6 Firmware update via USB

1. Insert a USB stick containing the update file (file extension = img) into the USB socket. The file must be in the USB stick's root directory.
2. Navigate to the system settings using the directional pad and the buttons:
Main menu → System
3. Select Update via USB from the menu
Information as to whether a suitable update file was found on the stick will be shown beneath the menu item.
4. Select either to update your system or carry out a complete new installation (in this case, all data will be lost).
 - ↳ Once you confirm your action, the system will be updated.

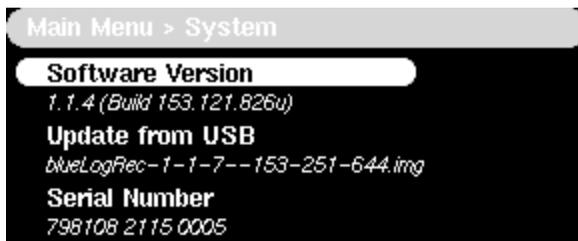


Fig. 18: blue'Log display: Updating via USB

7.7 Showing the licenses on the display

1. Navigate to the license display using the directional pad and the buttons:
Main menu → System → Licenses

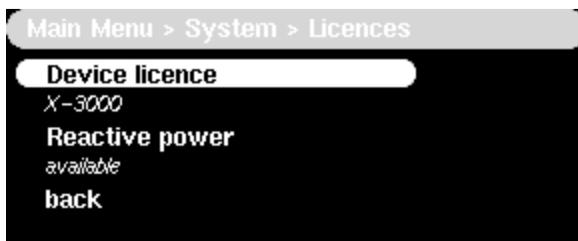


Fig. 19: blue'Log display: Licenses on the display

7.8 Logging on to device websites

Further configuration is possible via the device websites. Information regarding the operating status of the PV system can also be retrieved.

1. In order to address your blue'Log, enter the IP address in the address line of your web browser.

Alternatively, you can address your blue'Log with the following commands in the address line of your web browser:

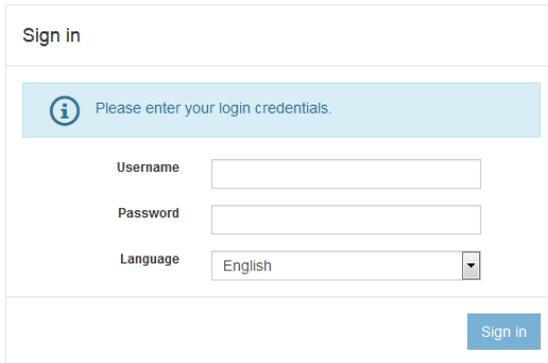
Only one blue'Log in the network *http://blue.x*

Several blue'Logs in the network *http://blue.x.nnnnnnnn*

n = last eight digits of the hardware number

2. Log on to the device websites using the following access data:

- User name: "service"
- Password "service"



Sign in

Please enter your login credentials.

Username

Password

Language

Sign in

Fig. 20: Logging on to device websites

- After the first successful log in on the device websites, the set-up wizard pop-up window will appear.

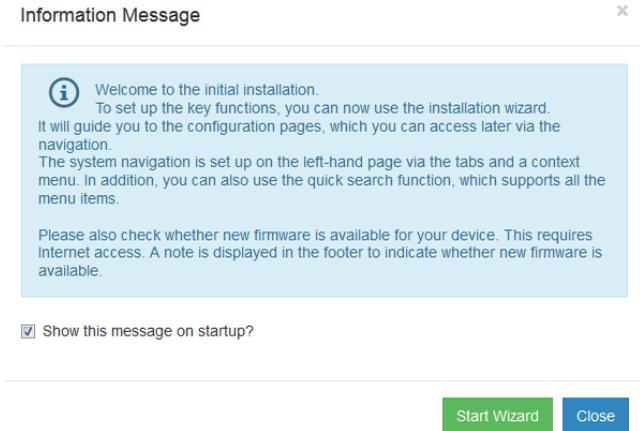


Fig. 21: blue'Log wizard information window

- The wizard guides you step by step through the main set-up points necessary for proper device operation. The relevant set-up step is shown in the navigation bar. You can switch between the individual menu items using the arrows (left and right) or the numbered points in the navigation bar.



Fig. 22: blue'Log wizard navigation bar

➤ After you close the wizard, you will be taken to the blue'Log's start page, the so-called "Dashboard", in the "Cockpit" menu.

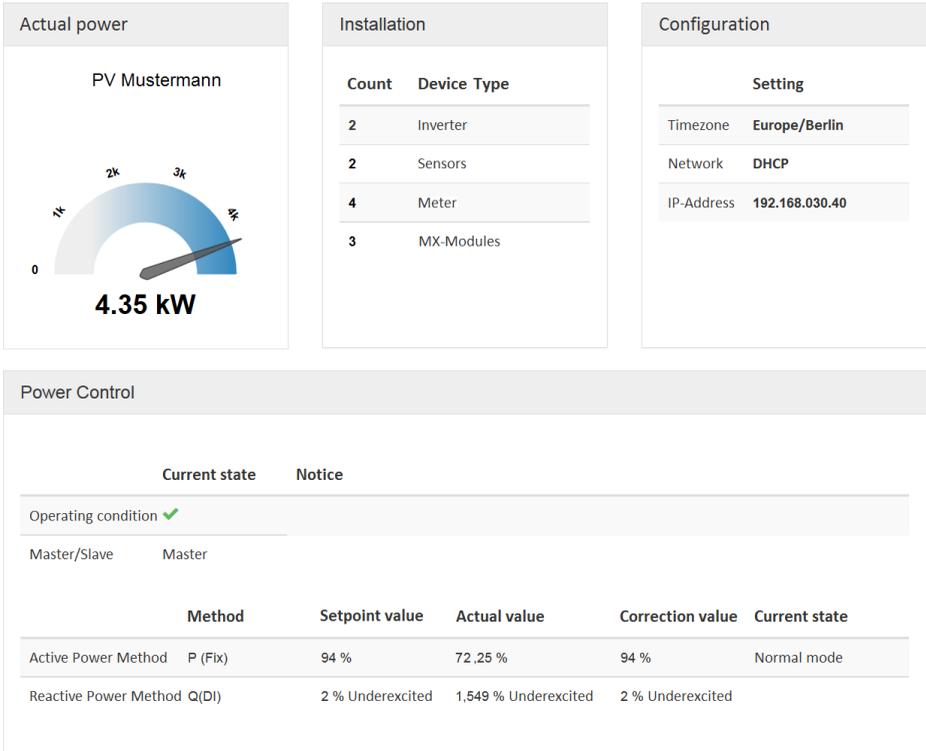


Fig. 23: Device websites: Dashboard

7.9 Logger master data

The data logger basic or master data are shown in the "Master data" menu or can be changed here. To get to the "Master data" menu, perform the following steps:

1. Navigate to the "PV system" area via the top navigation bar and then click on "Master data".
- The following information can be configured:
 - Photovoltaic system
 - **System / project name**
(Name describing your system)
 - **Total installed power**
(Total installed power P of your system)
 - **Agreed connection power P_{AV}**
(The connection power of your system agreed with the grid operator)
 - **AC nominal voltage U_{Nom}**
(Nominal voltage of your system)
 - **Maximum apparent power S_{AV}**
(Maximum possible apparent power S_{AV} of your system)

Data loggers

- **Model** (display only)
(of the blue'Log, e.g. X-1000)
- **Serial number** (display only)
(of the blue'Log, 79810X XXXX XXXX)
- **System ID** (display only)
(allocated by the portal, five digits)
- **Data logger name**
(Name describing your blue'Log in order to be able to identify the data logger clearly)
- **Data recording interval**
(interval at which the measurement data are recorded in the database. Five-minute and 15-minute values can be saved. 15-minute values are recommended for the longest possible archiving period.)

7.10 Ethernet

In the "Ethernet" menu, all network settings described in Section 7.5 can be configured.

1. Navigate to the "System" area via the top navigation bar and then click on "Ethernet".

The following network settings can be configured:

- Enable DHCP
- IP address
- Subnet mask
- Standard gateway
- Obtain automatic DNS address (on / off)
- Primary DNS server
- Secondary DNS server

7.11 MX modules

If you have expanded the blue'Log data logger with one or more MX modules, the MX modules connected will be displayed on the "MX modules" page.

1. Navigate to the "System" area via the top navigation bar.
2. Navigate to the "MX modules" area via the left-hand navigation menu.

- ↳ If MX modules were connected to the blue'Log, these MX modules will be listed here.



Please note the information regarding the installation order for MX modules in Section 5.4!

7.12 User management

In the user management, access data for various users with various rights can be set up and managed.

1. Navigate to the "System" area via the top navigation bar.
2. Navigate to the "Users" area via the left-hand navigation menu.
3. By default, two users are preset. These cannot be removed from the system.
 - **Service**
User name: service, password: service
User group service: Full access for installers
 - **User**
User name: user, password: user
User group user: Restricted rights for end users (read only)
4. Further personalized users can be set up in addition to the existing ones. Users can be assigned to one of the aforementioned user groups (service or user) in order to specify authorizations for the persons.

7.13 Licenses

In the "Licenses" menu, you can view all licenses available to the data logger.

1. Navigate to the "System" area via the top navigation bar.
2. Navigate to the "Licenses" area via the left-hand navigation menu.
 - ↳ All installed licenses are shown here. Via the "Upload" button, other license files can be selected and uploaded to the device.



Each blue'Log has its individual license files – licenses cannot be transferred from one data logger to the next. License files from other blue'Logs are not accepted.

7.14 Date / time

To set the date and time, proceed as follows:

1. Navigate to the "System" area via the top navigation bar and then click on "Date / time".
- You can choose between three different settings for "time synchronization". Settings can be selected via the drop-down box. The selection options are described below.

7.14.1 Time synchronization with system settings

If "System settings" is set, the blue'Log will synchronize its system time with the meteocontrol safer'Sun Portal. Only the time zone needs to be given so the correct time can be assigned to the data logger.

- The following settings can be made:
 - **Time zone** (The time zone in which your system is located)
- The following information is displayed:
 - **Date** (Automatically retrieved date and time)

7.14.2 User defined time synchronization

With user-defined time synchronization, a time server for synchronizing with system time can be assigned to the blue'Log.

- The following settings can be made:
 - **Time server address** (Enter the address of an NTP time server, e.g.: *0.de.pool.ntp.org*)
 - **Time zone** (The time zone in which your system is located)
- The following information is displayed:
 - **Date** (Date and time automatically retrieved via the time server)

7.14.3 Time synchronization disabled

If time synchronization is disabled, the blue'Log will not query any time server. The time entered will be used as the system time. The time zone specified is used to define the switching points between summer and winter time.

- The following settings can be made:
 - **Time zone** (The time zone in which your system is located)
 - **Date** (Manually entered date and time)

7.15 Registering on the safer'Sun Portal

1. Navigate to the "PV system" area via the top navigation bar.
2. Navigate to the "Online portal" area via the left-hand navigation menu and click on "Registration".
 - ↳ You now have a choice (via a radio button) between adding your blue'Log data logger to an existing system or re-registering it by using master data.

7.15.1 Assignment to an existing system

- If the system is already set up on the portal, you can assign the data logger to the system here. In order to do this, you will need:
- the five-digit system ID for the PV system on the portal
- the portal user name
- the portal password
- Alternatively, the blue'Log can be added on the portal itself via the hardware serial number of the data logger.

7.15.2 Setting up a new system using master data

- You can set up a new system on the portal using the system master data and your portal access data. The system configuration can then be completed on the portal. To set up a new system, you will need the following portal access data:
- Portal user name
- Portal password
- If the new system was already set up on the portal, assignment of the data logger is possible on the portal at any subsequent point in time.

7.16 Portal communication

In the "Online portal" → "Communication" menu, the interval at which the data logger is to report to the portal can be set.

1. Navigate to the "PV system" area via the top navigation bar.
2. Navigate to the "Online portal" area via the left-hand navigation menu and then click on "Communication".
 - Via the corresponding radio button, you can specify whether your blue'Log should report to the online portal at regular intervals or at set times in order to transfer the measurement data collected.

7.16.1 Reporting at regular intervals

- Specify whether the blue'Log data logger should report to the portal every five, 15 or 60 minutes.
- If the data should only be transferred during a specific time window, enter a start and end time for data transfer. The selected interval (five, 15 or 60 minutes) will then apply within this time window.

7.16.2 Reporting at set times

- Specify specific times (full hours) during which the blue'Log data logger should report to the portal.
- A maximum of 24 full-hour times can be selected.

7.17 FTP push

With this function, measurement data can be sent not only to meteocontrol's safer'Sun Professional and VCOM portals but also to an independent FTP server.

1. Navigate to the "PV system" area via the top navigation bar.
2. Navigate to the "Online portal" area via the left-hand navigation menu and click on "Push service".
 - If you would like to send your measurement data to an independent FTP server in addition to the meteocontrol Internet portal, set the radio button on this page to "Active" and make the following server settings:
 - FTP server name (example: ftp.meteocontrol.de)
 - FTP port (default → 21)
 - Upload directory (The directory must exist on the server – it will not be created by the blue'Log data logger)
 - User name (User name for the FTP server)
 - Password (User password for the FTP server)

↪ The data will then be sent as a file in XML format to the FTP server set. The transmission interval is set to once per day at midnight local time.

Optionally it is possible of acquiring the license "FTP Push Intraday X series" to increase the frequency of data sending. With the license "FTP Push Intraday X series" the following interval settings are available:

↪ 60 minutes | 15 minutes | 5 minutes

Please also note chapter 9.1 FTP PUSH INTRADAY.

8. Firmware update

At first start-up you should check whether a new firmware update is available for your blue'Log.

1. Navigate to the "System" area via the top navigation bar.
2. Navigate to the "Firmware" area via the left-hand navigation menu.

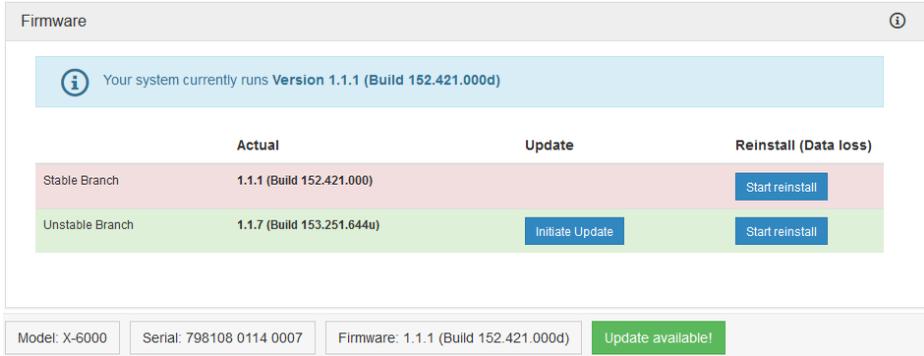


Fig. 24: Device websites: Firmware update

3. Select the latest update (highlighted in green) in order to ensure your blue'Log remaining up to date.
 - Clicking on the "Start update" button will update the system without deleting your data.
 - In the event of a new installation, the device will be reset to the factory settings with the selected firmware version. All locally saved data will be deleted.
- ↳ The system will now carry out the chosen update / new installation. Please do not switch off the blue'Log for the duration of the update / new installation.

9. Licenses

9.1 FTP PUSH INTRADAY

Even in their standard versions, the data loggers in the blue'Log X series offer the option to send measurement data to an external or independent FTP server on a daily basis. (See 7.17 for details of configuration).

By acquiring the "FTP Push Intraday X series" license, the frequency of data transmission can be increased. The following interval setting selections are available:

🔗 60 minutes | 15 minutes | 5 minutes

10. Recording devices

10.1 Adding sensors

10.1.1 Analog sensors

1. Navigate to the "Devices" area via the top navigation bar.
2. Navigate to the "Sensors" area via the left-hand navigation menu.

Sensor settings ⓘ

Please select a sensor from our database:

Model

Device configuration

Device name

Irradiation **Temperature**

Port

Unit

Gradient

Offset

Fig. 25: Device websites: Adding a new analog sensor

3. Via the drop-down menu, select a sensor model you connected to the input of the blue'Log data logger (e.g. Si-12TC-T). After selection the entry menu expands with further settings for this sensor.
4. If the sensor to be connected is not included in the list, you can select a generic template and configure the sensor manually. Please check in the data sheet whether the sensor is compatible.
5. Choose a "device name" which clearly identifies the sensor.
6. Via the drop-down menu, select one of the four ports (MI-1 to 4) to which the sensor is connected. If you have expanded your blue'Log basic device using a multi I/O MX module, further ports will be available.
7. The following suggested parameters can be carried over unchanged:
 - Unit
 - Gradient
 - Offset
8. Pay attention to the tabs under Device configuration. Each possible sensor measurement is configured in a separate tab (see Fig. 25: Irradiance tab and Temperature tab).
9. By selecting "Save", the sensor will be recorded and listed in the "Sensor overview".

Sensor overview i				
Device name	Port	Interface usage	Modbus address	Unit
— Irradiation sensor M&T / mc Si-12TC-T (0 - 10V)				
⊕ Irradiation	BM: MI-3	0-10 V		W/m²
⊕ Temperature	BM: MI-4	0-10 V		°C
⊕ Temperature sensor PT1000 sensor with integrated converter (0 - 10V)	BM: MI-2	0-10 V		°C

Fig. 26: Device websites: Sensor overview – analog sensors

10.1.2 Modbus sensors

1. Navigate to the "Devices" area via the top navigation bar.
2. Navigate to the "Sensors" area via the left-hand navigation menu.

Sensor settings ⓘ

Please select a sensor from our database:

Model Irradiation sensor M&T / mc SI-RS485-TC-T

Device configuration

Device name Irradiation sensor M&T / mc SI-RS485-TC-T

Irradiation

Port BM: RS485-2 ⚙️

Address 3

Save Cancel

Fig. 27: Device websites: Adding new modbus sensor

3. Via the drop-down menu, select a sensor model connected to the input of the blue'Log data logger (e.g. ST-RS485-TC-T). After selection the entry menu expands with further settings.
4. Choose a "device name" which clearly identifies the sensor.
5. Via the drop-down menu, select one of the two ports (RS485-1 or RS485-2) to which you have connected the sensor. If you have expanded your blue'Log basic device using an RS485/422 MX module, further ports will be available.

- Clicking on the gear button will take you to the configuration settings for the relevant RS485/422 interface. Configure the interface.

Interface Configuration: ✕

Baudrate

Data bits

Parity

Stop bit

Fig. 28: Device websites: RS485/422 sensor interface configuration

- Give the bus address of the sensor in the address box.
- By selecting "Save", the sensor will be recorded and listed in the "Sensor overview".

Sensor overview ⓘ				
Device name	Port	Interface usage	Modbus address	Unit
⊙ Irradiation sensor M&T / mc SI-RS485-TC-T (Modbus)	BM: RS485-2	Modbus RTU	3	
+ Irradiation sensor M&T / mc SI-12TC-T (0 - 10V)				

Fig. 29: Device websites: Sensor overview – modbus sensors

10.2 Adding meters

10.2.1 S0 meter

1. Navigate to the "Devices" area via the top navigation bar.
2. Navigate to the "Meters" area via the left-hand navigation menu.

The screenshot shows a web interface for adding a new meter. The title is "Add new Meter". Below the title, there is a section "Please select a meter" with a "Model" dropdown menu currently showing "S0 energy meter". Underneath is the "Device configuration" section, which includes a "Device name" text input field containing "S0 energy meter". A sub-section titled "Energy Counter" contains several fields: "Port" (dropdown menu showing "BM: MI-1"), "Unit" (dropdown menu showing "Wh"), "Pulse constant [Pulse/kWh]" (text input field showing "1000"), and "Device role" (dropdown menu showing "Consumption"). At the bottom left of the form are "Save" and "Cancel" buttons.

Fig. 30: Device websites: Adding a new S0 meter

3. Via the drop-down menu, select S0 energy meter. After selection the configuration menu expands with further settings.
4. If the meter to be connected is not included in the list, you can select a generic template and configure the meter manually. Please check in the data sheet whether the meter is compatible.
5. Choose a "device name" which clearly identifies the meter.
6. Via the drop-down menu, select one of the eight ports (MI-1 to 4, DI-1 to 4) to which you have connected the meter. If you have expanded your blue'Log basic device using a multi I/O MX module, further ports will be available.
7. The following suggested parameters can be carried over unchanged:
 - Unit
 - Pulse constant

8. Via the drop-down menu, select a role for the meter so the blue'Log can assign the meter values properly. The following roles are available for selection:
 - Sourcing Recording of energy sourced from the electricity network
 - Grid feed-in Recording of energy fed into the electricity grid
 - PV yield Recording of energy generated by the PV system
 - Consumption Recording of energy consumed by your appliances
9. By selecting "Save", the meter will be recorded and listed in the "Meter overview".

Meter Overview i				
Device name	Port	Interface usage	Modbus address	Unit
<input checked="" type="radio"/> S0 energy meter	BM: MI-1	2-15mA		Wh

Fig. 31: Device websites: Meter overview – S0 meter

10.2.2 Modbus meter

1. Navigate to the "Devices" area via the top navigation bar.
2. Navigate to the "Meters" area via the left-hand navigation menu.

Add new Meter

Please select a meter

Model Power quality analyzer Janitza UMG604 (Modt)

Device configuration

Device name Power quality analyzer Janitza UMG604 (Modt)

Multiple reading values

Operating Mode Modbus RTU

Port BM: RS485-2

Count arrow direction Generator reference arrow system

Address 66

Device role Source and feed in

Save Cancel

Fig. 32: Device websites: Adding new modbus meter

3. Via the drop-down menu, select a modbus energy meter. After selection the configuration menu expands with further settings.
4. Choose a "device name" which clearly identifies the meter.
5. Select the operating mode of the meter (modbus RTU or modbus TCP).
6. Via the drop-down menu, select one of the two ports (RS485-1 or RS485-2) to which the meter is connected. If you have expanded your blue'Log basic device using an RS485/422 MX module, further ports will be available.

- Clicking on the cog button will take you to the configuration settings for the relevant RS485/422 interface. Configure the interface.

Interface Configuration: ✕

Baudrate

Data bits

Parity

Stop bit

OK

Fig. 33: Device websites: RS485/422 meter interface configuration

- Via the drop-down menu, select the count arrow direction (generator count arrow system) in which the meter is connected.
- Via the drop-down menu, select a role for the meter for correct assignment of meter values by the blue'Log. The following roles are available to choose from:
 - Sourcing Recording of energy drawn from the grid
 - Grid feed-in Recording of energy fed in into the grid
 - PV yield Recording of energy generated by the PV system
 - Consumption Recording of energy consumed by your appliances
 - Consumption and grid feed-in
- By selecting "Save", the meter will be recorded and listed in the "Meter overview".

Meter Overview ⓘ				
Device name	Port	Interface usage	Modbus address	Unit
Janitza UMG604	BM: RS485-1	Modbus RTU	2	

Fig. 34: Device websites: Modbus meter overview

10.3 Adding inverters

1. Navigate to the "Devices" area via the top navigation bar.
2. Navigate to the "Inverters" area via the left-hand navigation menu.

Add New inverter

Please select a manufacturer (driver) first.

Vendor:

Interface:

Fig. 35: Device websites: Adding a new inverter

3. Select the manufacturer of your inverters (e.g. Kaco).
4. Select the interface of the blue'Log data logger to which the inverter is connected (e.g. RS485/422 – 1).
5. By selecting "Start scan", the previously selected bus interface will be scanned for connected inverters.

Inverter Overview

Edit

There are 2 inverters installed

Inverter	Address	Interface	Model	Serial	Firmware	Status
KACO-1-1	1	BM: RS485-1	Powador 3002			
KACO-1-2	2	BM: RS485-1	Powador 3002			

10 25 50 100

Fig. 36: Device websites: Inverter overview

6. Once the scan is complete, the inverters found will be listed in the "Inverter overview".
 - ↳ The inverters found are now known to the blue'Log data logger and will be continuously queried.



With RS485/422 communication, only devices from one manufacturer can be queried per connection / bus. Mixed operation is not possible.

10.4 Adding string measuring systems

1. Navigate to the "Devices" area via the top navigation bar.
2. Navigate to the "String measuring systems" area via the left-hand navigation menu.

Fig. 37: Device websites: String measuring system settings

3. Via the drop-down menu, select a model. After selection the configuration menu expands with further settings.
4. Choose a "device name" which clearly identifies the device.
5. Via the drop-down menu, select an RS485 port (1, 2 and/or possibly MX module) to which you have connected the device.
6. Clicking on the cog button will take you to the configuration settings for the relevant RS485/422 interface. Configure the interface (see also Fig. 33).
7. Give the bus address in the address box.
8. By selecting "Save", the device will be recorded and listed in the "String measurement system overview".

Device name	Port	Interface usage	Modbus address	Unit
KSTAR GSC Series	BM: RS485-2	Modbus RTU	2	
KSTAR GSC Series	BM: RS485-2	Modbus RTU	3	

Fig. 38: Device websites: String measuring system overview

10.5 Adding battery system

1. Navigate to the "Devices" area via the top navigation bar.
2. Navigate to the "Battery systems" area via the left-hand navigation menu.

Fig. 39: Device websites: Adding new battery system

3. Via the drop-down menu, select a model. After selection the configuration menu expands with further settings.
4. Choose a "device name" which clearly identifies the device.
5. Via the drop-down menu, select a port (Ethernet) to which you have connected the device.
6. Give the device address in the address box.
7. By selecting "Save", the device will be recorded and listed in the "Battery system overview".

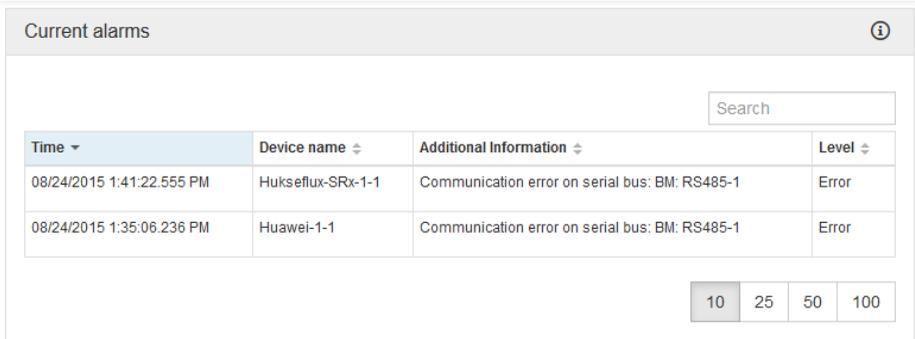
Device name	Port	Interface usage	Modbus address	Unit
Energy Storage System VARTA Engion	Ethernet	Modbus over TCP	192.168.30.50	

Fig. 40: Device websites: Battery system overview

11. Alarms

11.1 Latest alarms

1. Navigate to the "Cockpit" area via the top navigation bar.
2. Navigate to the "Alarms" area via the left-hand navigation menu.



Time ▾	Device name ▾	Additional Information ▾	Level ▾
08/24/2015 1:41:22.555 PM	Hukseflux-SRx-1-1	Communication error on serial bus: BM: RS485-1	Error
08/24/2015 1:35:06.236 PM	Huawei-1-1	Communication error on serial bus: BM: RS485-1	Error

Search

10 25 50 100

Fig. 41: Device websites: Latest alarms

- ↳ In this window, all alarms registered by the blue'Log are listed. Time, device name, type, error code, additional information and severity for each registered alarm are stated.

A distinction between the following alarm types is made:

Alarm types	Error code
System alarm	02xxx
Communication alarm	03xxx
Inverter alarm	05xxx
Alarm at input/output (I/O)	08xxx

11.2 Contact addresses

1. Navigate to the "Monitoring" area via the top navigation bar.
2. Navigate to the "Contact addresses" area via the left-hand navigation menu.

Edit Contact-Addresses
ⓘ

Contact ↕	E-Mail Addresses	Language ↕	
service		English	
user		English	
meteocontrol User	user@meteocontrol.de	Deutsch	

+

10
25
50
100

Fig. 42: Device websites: Updating contact addresses

3. By clicking on the "+" button, you can create a new contact address in the blue'Log.
4. Enter a contact (name) and an e-mail address and confirm the details by clicking on the disk symbol in the very top-right column.
5. The newly created contact address can be edited by clicking on the pen symbol or deleted by clicking on the dustbin symbol.
 - ↳ The blue'Log can send e-mail notifications to each recorded contact. This setting can be configured in the "Alarm configuration" menu.

11.3 Alarm configuration

1. Navigate to the "Monitoring" area via the top navigation bar.
2. Navigate to the "Contact addresses" area via the left-hand navigation menu.

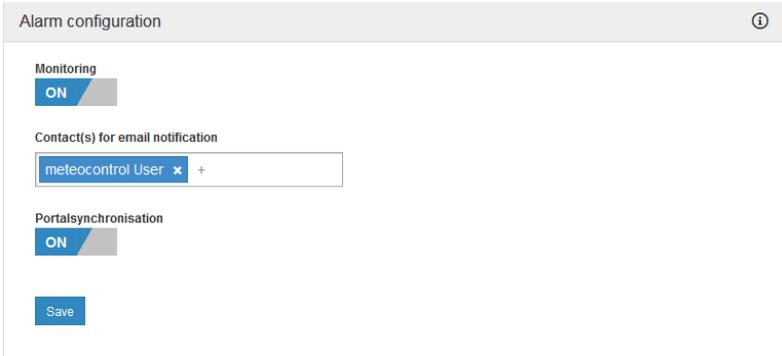


Fig. 43: Device websites: Alarm configuration

3. Enable monitoring.
4. By selecting "+" in the "Contact(s) for e-mail notification" field, a previously created contact (see Section 11.2 Contact addresses) can be selected. Alarm messages registered by the blue'Log are sent to this contact via e-mail.
5. If "Portal synchronization" is enabled, the alarms will also be sent to your registered portal account and therefore may be viewed online as well.

12. Visualization

12.1 Showing sensor values

12.1.1 Diagrams

1. Navigate to the "Cockpit" area via the top navigation bar.
2. Navigate to the "Charts" area via the left-hand navigation menu and select "Sensors".

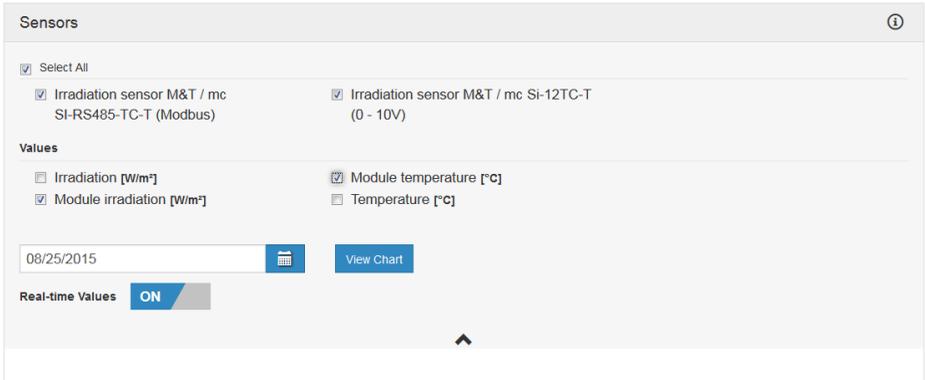


Fig. 44: Device websites: Selecting sensor diagram options

3. Select those sensor(s) of which the measured values should be included in the visualization.
4. Select the available measured values. All measured values available for the selected sensors will be open for selection. If an individual sensor is selected, a number of measured values can be shown in parallel. If several sensors are selected, only one measured value can be shown in each case.
5. As an option, the display of real-time values can be selected in addition to historical data in the diagram. The resolution of the real-time values is considerably higher than of the historical values.
6. Specify a period from which to visualize the measured values. No real-time measured values are available for days in the past.
7. By selecting "Show diagram", the configuration will close and the diagram view will appear.

12.1.2 Real-time values

1. Navigate to the "Cockpit" area via the top navigation bar.
2. Navigate to the "Real-time values" area via the left-hand navigation menu and select "Sensors".

12.2 Showing meter values

12.2.1 Diagrams

1. Navigate to the "Cockpit" area via the top navigation bar.
2. Navigate to the "Diagrams" area via the left-hand navigation menu and select "Meters".

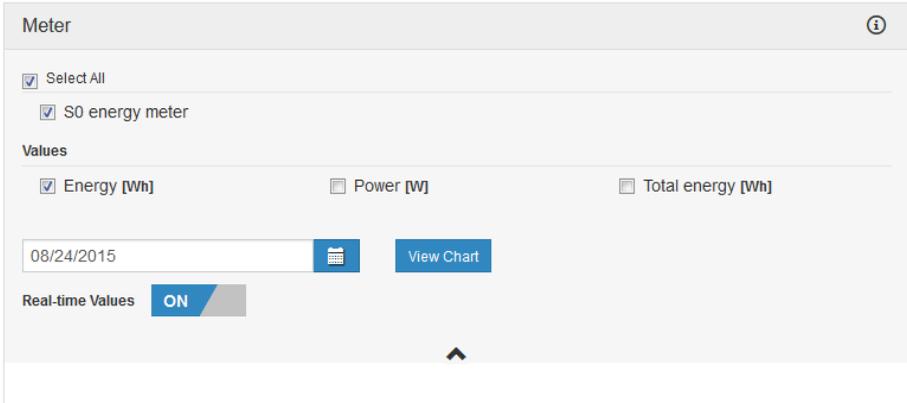


Fig. 45: Device websites: Selecting meter diagram options

3. Select the meter(s) from which to visualize the measured values.
4. Select the available measured values. All measured values available for the selected meters will be shown. If an individual meter is selected, a number of measured values can be shown in parallel. If several meters are selected, only one measured value can be shown in each case.
5. As an option, the display of real-time values can be selected in addition to historical data in the diagram. The resolution of the real-time values is considerably higher than of the historical values.
6. Specify a period from which to visualize the measured values. No real-time measured values are available for days in the past.
7. By selecting "Show diagram", the configuration will close and the diagram view will appear.

12.2.2 Real-time values

1. Navigate to the "Cockpit" area via the top navigation bar.
2. Navigate to the "Real-time values" area via the left-hand navigation menu and select on "Meters".

12.3 Showing inverter values

12.3.1 Diagrams

1. Navigate to the "Cockpit" area via the top navigation bar.
2. Navigate to the "Charts" area via the left-hand navigation menu and select "Inverters".

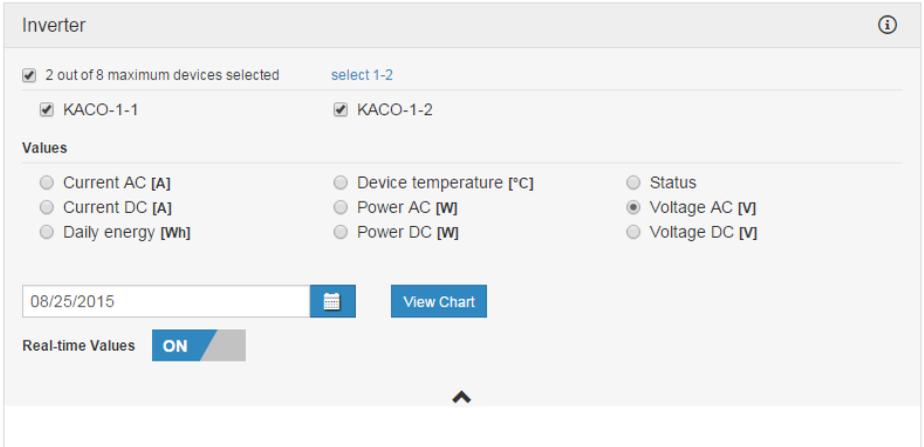


Fig. 46: Device websites: Selecting inverter diagram options

3. Select the inverter(s) from which to visualize the measured values.
4. Select the available measured values. All measured values available for the selected inverters will be shown. If an individual inverter is selected, a number of measured values can be shown in parallel. If several inverters are selected, only one measured value can be shown in each case.
5. As an option, the display of real-time values can be selected in addition to historical data in the diagram. The resolution of the real-time values is considerably higher than of the historical values.
6. Specify a period from which to visualize the measured values. No real-time measured values are available for days in the past.

- By selecting "Show diagram", the visualization configuration will close and the diagram view will appear in the same window.

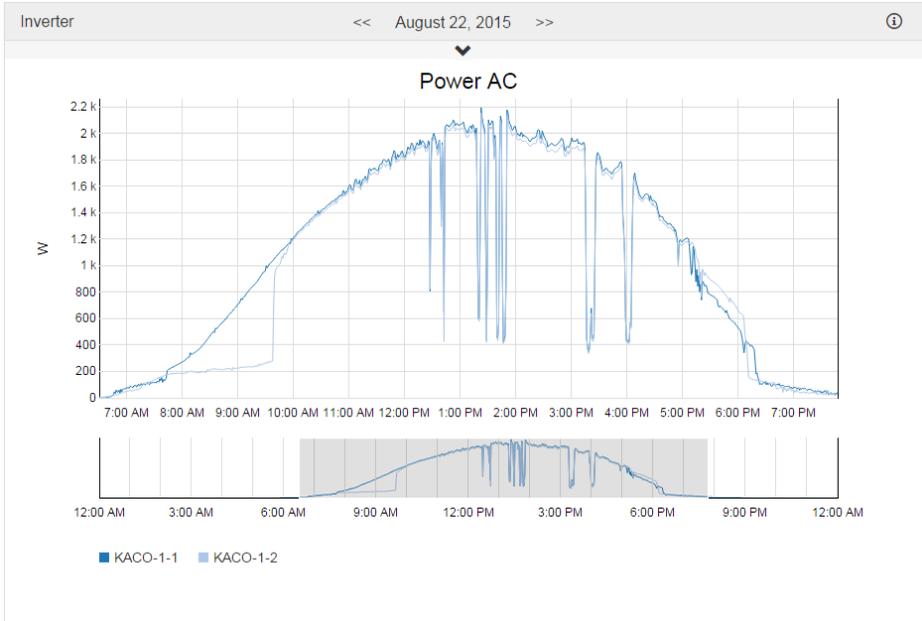


Fig. 47: Device websites: Visualizing the measured data

12.3.2 Real-time values

- Navigate to the "Cockpit" area via the top navigation bar.
- Navigate to the "Real-time values" area via the left-hand navigation menu and select "Inverters".

Inverter realtime values							
Description	Current DC	Daily energy	Power AC	Voltage DC	Address	Interface	Serial
KACO-1-1	1.35 A	733 Wh	375 W	290.3 V	1	BM: RS485-1	
KACO-1-2	1.26 A	592 Wh	329 W	270.8 V	2	BM: RS485-1	

Fig. 48: Device websites: Visualizing the real-time values

12.4 Showing string measuring system measured values

12.4.1 Diagrams

1. Navigate to the "Cockpit" area via the top navigation bar.
2. Navigate to the "Diagrams" area via the left-hand navigation menu and select "String measuring system".

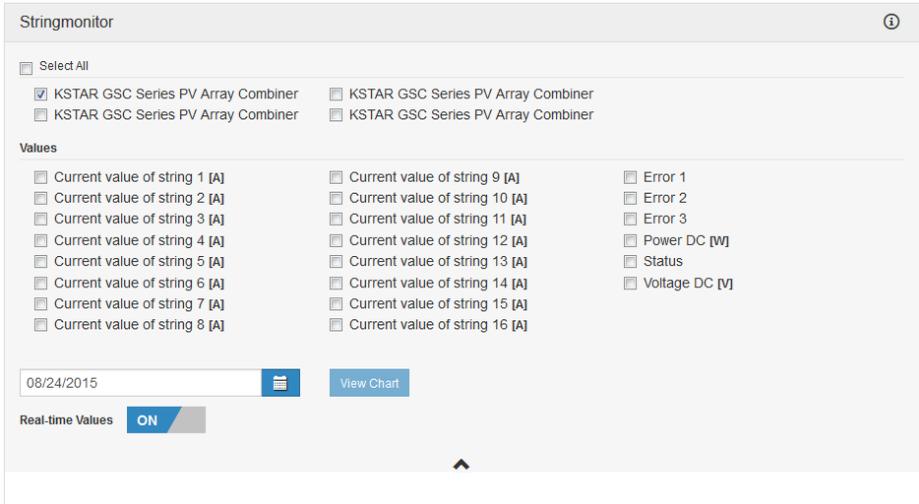


Fig. 49: Device websites: String measuring system

3. Select the string measuring system from which to visualize the measured values.
4. Select the available measured values. All measured values available for the selected devices will be shown. If an individual device is selected, a number of measured values can be shown in parallel. If several devices are selected, only one measured value can be shown in each case.
5. As an option, the display of real-time values can be selected in addition to historical data in the diagram. The resolution of the real-time values is considerably higher than that of the historical values.
6. Specify a period from which to visualize the measured values. No real-time measured values are available for days in the past.
7. By selecting "Show diagram", the configuration will close and the diagram view will appear.

12.4.2 Real-time values

1. Navigate to the "Cockpit" area via the top navigation bar.
2. Navigate to the "Real-time values" area via the left-hand navigation menu and select "String measuring system".

12.5 Showing battery system values

12.5.1 Diagrams

1. Navigate to the "Cockpit" area via the top navigation bar.
2. Navigate to the "Diagrams" area via the left-hand navigation menu and select "Battery systems".

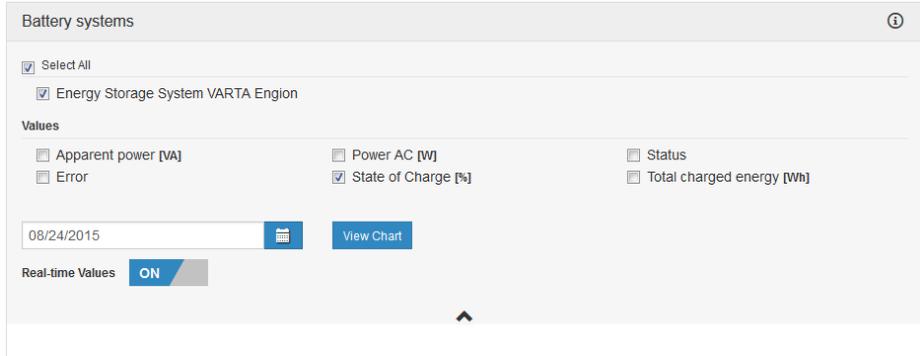


Fig. 50: Device websites: Selecting battery system diagram options

3. Select the battery systems from which to visualize the measured values.
4. Select the available measured values. All measured values available for the selected devices will be shown. If an individual device is selected, a number of measured values can be shown in parallel. If several devices are selected, only one measured value can be shown in each case.
5. As an option, the display of real-time values can be selected in addition to historical data in the diagram. The resolution of the real-time values is considerably higher than that of the historical values.
6. Specify a period from which to visualize the measured values. No real-time measured values are available for days in the past.
7. By selecting "Show diagram", the configuration will close and the diagram view will appear.

12.5.2 Real-time values

1. Navigate to the "Cockpit" area via the top navigation bar.
2. Navigate to the "Real-time values" area via the left-hand navigation menu and select "Battery systems".

12.6 Showing Power Control values

12.6.1 Diagrams

1. Navigate to the "Cockpit" area via the top navigation bar.
2. Navigate to the "Diagrams" area via the left-hand navigation menu and select "Power Control".

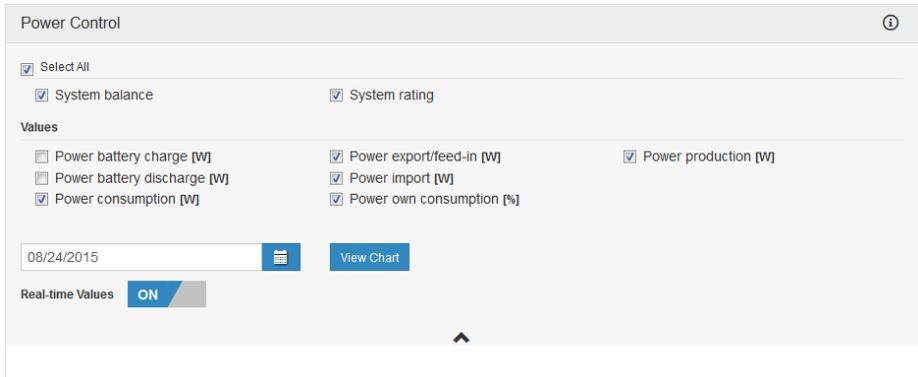


Fig. 51: Device websites: Selecting Power Control diagram options

3. Select the category from which to visualize the measured values.
4. Select the available measured values. All measured values available for the selected categories will be shown.
5. As an option, the display of real-time values can be selected in addition to historical data in the diagram. The resolution of the real-time values is considerably higher than that of the historical values.
6. Specify a period from which to visualize the measured values. No real-time measured values are available for days in the past.
7. By selecting "Show diagram", the configuration will close and the diagram view will appear.

12.6.2 Real-time values

1. Navigate to the "Cockpit" area via the top navigation bar.
2. Navigate to the "Real-time values" area via the left-hand navigation menu and select "Power Control".

13. Messages

13.1 Logbook

1. Navigate to the "Cockpit" area via the top navigation bar.
2. Navigate to the "Logbook" area via the left-hand navigation menu.

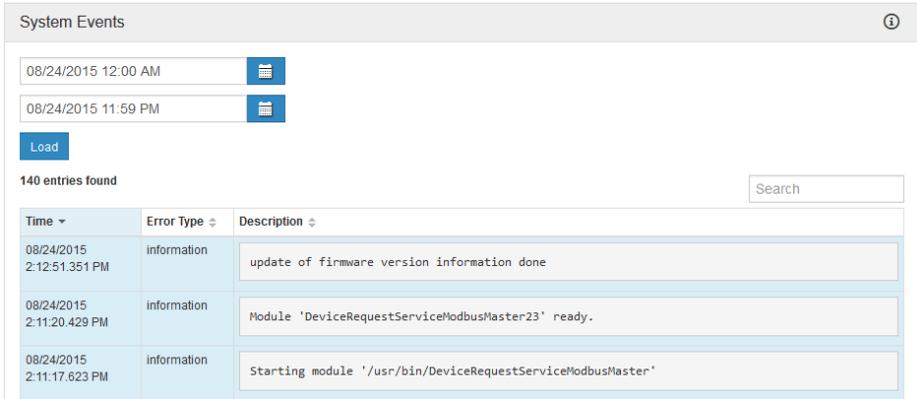


Fig. 52: Device websites: Logbook

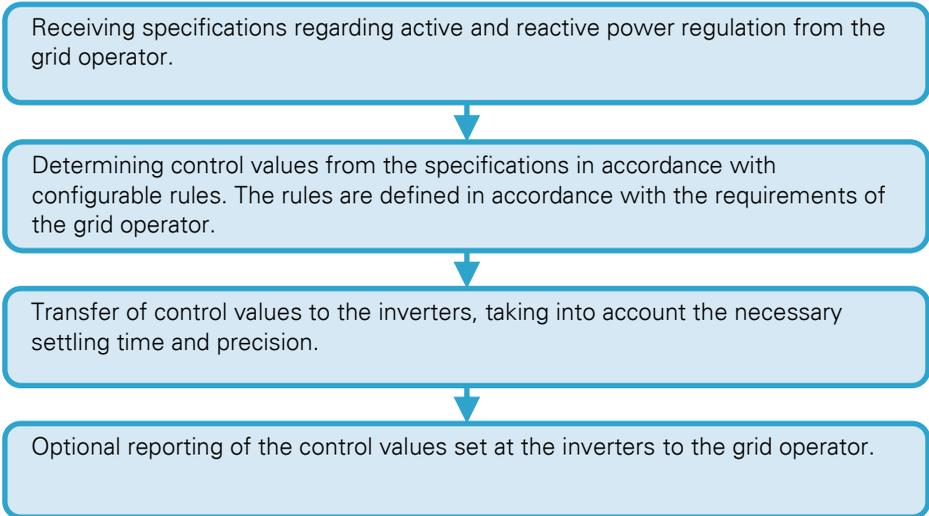
3. System events (max. 500 entries) are listed in the logbook.
4. Entries can be sorted according to "Time", "Error code", "Error type" and "Description" by clicking on the column headers.
5. The time can be narrowed down by specifying dates.
6. The entries can be searched and filtered via the search field. Several search terms may be entered.

14. meteocontrol Power Control

14.1 General notes

Power Control is a system allowing grid feed-in management for photovoltaic systems. meteocontrol Power Control enables meeting national and international requirements of grid operators as well as any country-specific feed-in regulations according to the system size.

14.1.1 Functions



14.1.2 Receiving specifications from the grid operator

The specifications for calculating target values for active power are transferred by the grid operator via the remote control system. Depending on the remote control system used, these are transferred to the blue'Log via digital or analog signals.

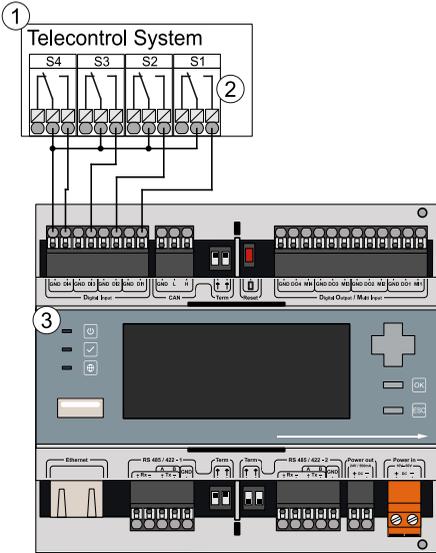


Fig. 53: Remote control system connection: Digital input (DI)

- (1) Remote control system
- (2) Signal outputs, potential-free
- (3) blue'Log

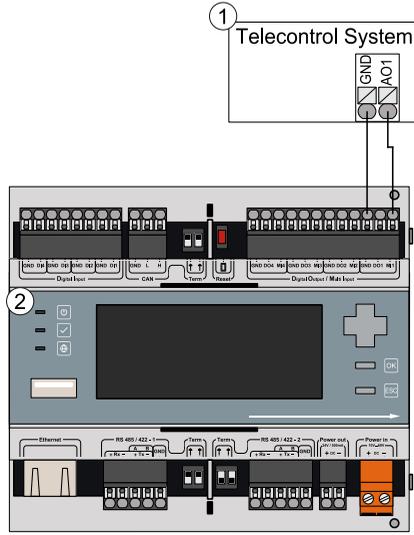


Fig. 54: Remote control system connection: Analog input (AI)

- (1) Remote control system
- (2) blue'Log

14.1.3 Processing the data

In order to satisfy the grid operator's specifications, the blue'Log has various procedures allowing grid feed-in management for your PV system. The respective method is determined by the procedure used in each case and has to be selected according to the specific requirements of the grid operator.

Active power procedure

- P(DI)
- P(AI)
- P(fix)

Please see Section 14.3 Active power procedure for a detailed description of the active power procedures.

In addition to the type of specified target value, the blue'Log also provides the option of specifying the rate at which the control values change (gradient limitation) according to the respective grid operator's requirements (see Section 14.3.5 Gradient limitation active power (P) procedure).

The Intelligent Power Limit (IPL) function also provides the option of enabling active power regulation (closed loop) (see Section 14.3.4 Intelligent Power Limit (IPL)).

Reactive power procedures

- | | | |
|--------------------------|--------------------------------------|-----------------------------|
| • $\cos\phi(DI)$ | • $Q(DI)$ | • $Q(\cos\phi(DI))$ |
| • $\cos\phi(AI)$ | • $Q(AI)$ | • $Q(\cos\phi(AI))$ |
| • $\cos\phi(\text{fix})$ | • $Q(\text{fix})$ | • $Q(\cos\phi(\text{fix}))$ |
| • $\cos\phi(P)$ | • $Q(U)$ | • $Q(\cos\phi(P))$ |
| • $\cos\phi(U)$ | • $Q(P \times \tan\phi(\text{fix}))$ | • $Q(\cos\phi(U))$ |

For a more detailed description of the reactive power procedure, see Section 14.4 Reactive power procedure.

In addition to the type of specified target value, the blue'Log also provides the option of specifying the rate at which the Q control values change (gradient limitation) in accordance with the grid operator's requirements (see Section 14.4.17 Gradient limitation reactive power(Q) procedure). This gradient limitation merely relates to the Q reactive power procedure – not to the $\cos\phi$ reactive power procedure.

The reactive power system control loop function also provides the option of enabling reactive power regulation (closed loop) (see Section 14.4.18 System control loop).

14.1.4 Navigating to the Power Control website

1. Navigate to the "PV system" area via the top navigation bar.
2. Navigate to the "Power Control" area via the left-hand navigation menu.

The screenshot displays the 'Power Control' interface. At the top, a navigation bar includes 'COCKPIT', 'MONITORING', 'PV-PLANT' (selected), 'DEVICES', 'SYSTEM', 'WIZARD', and 'LOG OUT'. A search bar on the left contains 'Power Control' and a status indicator shows 'active'. The left-hand navigation menu lists 'Basic-Data', 'Power Control' (selected), and 'Online-Portal'. The main content area is divided into four sections:

- Select datalogger mode:** Features radio buttons for 'Standalone' (selected), 'Master', and 'Slave'.
- Plant-Data:** Includes input fields for 'Agreed power rating P_M ' (1000 kW), 'AC nominal voltage $U_{nominal}$ ' (20 kV), and 'Max apparent power S_M ' (1100 kVA), with a 'Save' button.
- Active-Power configuration:** Shows 'Methods' set to 'P(DI)', 'Activate intelligent Power Limit (IPL)' set to 'ON', 'Options' with 'Gradientlimit P-Method' set to 'Fully on', 'Gradient' at 1.837 %/s, 'Limit to Agreed power rating P_M ' set to 'ON', and 'Fallback value' at 70 %.
- Reactive Power:** Shows 'Default method switch' set to 'OFF' and 'Default Method' set to 'Q(DI)'.

Fig. 55: Power Control: Overview

14.2 General settings

14.2.1 Selecting data logger mode

The data logger mode indicates the blue'Log's role at passing on specified control values.

Standalone

No specified control values are sent to other blue'Logs. This setting is recommended if the specified control values apply exclusively to the inverters operated on this data logger.

Master

The master blue'Log takes over calculation of the control values and sends the values to the slaves and its inverters. The remote control system is connected to this blue'Log.

Fig. 56: Power Control: Master data logger mode

Input box	Meaning
Transfers to all slaves	Specified control values are sent as general broadcast messages. All blue'Log slaves receive the data and control their inverters. This setting is recommended if the specified control values apply to all blue'Logs in the network.
Transfers to a slave group	Specified control values are sent as group broadcast messages. The blue'Log slaves that belong to the set group receive the data and control their inverters. This setting is recommended if there are several masters in the network.
Slave group	Number of the slave group to which specified control values are to be sent.

Slave

The data logger receives the specified control values from its master and transfers the data to the connected inverters. The remote control system is not connected to this blue'Log.

Select datalogger mode ?

Datalogger-mode

Standalone
 Master
 Slave

Please select an receive mode

Receive **common** broadcast notifications
 Receive **group** broadcast notifications

Slavegroup

Active-Power configuration ?

Fallback value

 %

Reactive Power ?

Failover methods

Primary error method

 ▼

cosφ(fix)

Fig. 57: Power Control: Slave data logger mode

Input box	Meaning
Receives general broadcast messages	Specified control values are received from the blue'Logs configured as masters.
Receives group broadcast messages	Specified control values are received for the configured broadcast group only.
Slave group	Number of the slave group

Input box	Meaning
Active power fallback value	In the event of an error in the transfer of the control values, a configurable, constant P fallback value is specified as the control value.
Procedure in the event of an error	In the event of an error in the transfer of the control values, a configurable, constant $\cos\phi$ or Q fallback value is specified as the control value.
Primary error procedure	Selects the reactive power error procedure which is used if communication fails.
$\cos\phi(\text{fix})$	Configurable, constant $\cos\phi$ value when $\cos\phi(\text{fix})$ is selected as error procedure
Q(fix)	Configurable, constant Q value in % S_{AV} when $\cos\phi(\text{fix})$ is selected as error procedure



A master data logger sends the specified control values to the slaves. The active and reactive power procedures can be set and configured for standalone and master blue'Logs only.

14.2.2 Entering system data

The system data are basic values which are essential in order to determine the inverter control values. Missing or incorrect details lead to incorrect control values.

Plant-Data
ⓘ

Agreed power rating P_{AV}

kW

AC nominal voltage $U_{nominal}$

kV

Max apparent power S_{AV}

kVA

Save

Fig. 58: Power Control: System data



It is imperative for the parameters in this section to be correct in order to ensure the Power Control procedures functioning properly.

Input box	Meaning
Agreed connection power P_{AV}	Maximum feed-in active power at the grid connection point as agreed with the grid operator
AC nominal voltage U_{Nom}	Nominal voltage at the high-voltage grid connection point
Maximum apparent power S_{AV}	Maximum apparent power at the grid connection point as agreed with the grid operator

14.3 Active power procedure

Control values for inverter active power control or active power regulation can be determined using various procedures. In addition to the procedures, options are made available which allow further settings to be specified (e.g. the Intelligent Power Limit function allows a closed control loop to be enabled).

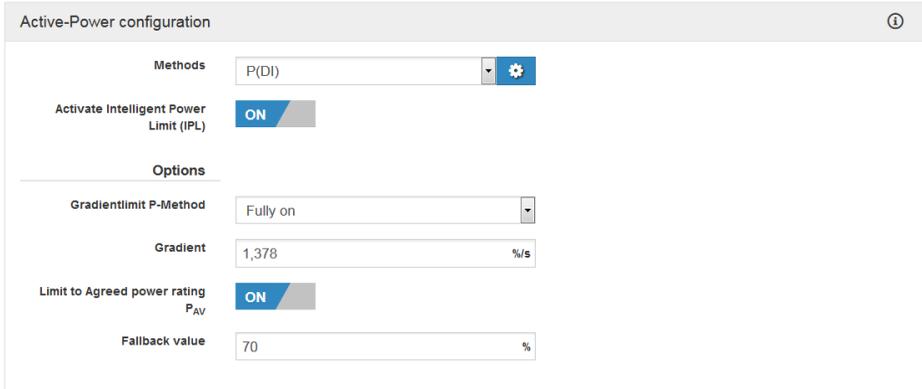


Fig. 59: Power Control: Active power regulation

Input box	Meaning
Procedure	Selects the active power procedure
Cog button	Brings up the configuration settings for the selected active power procedure
Enable Intelligent Power Limit (IPL)	Enables the IPL function (see Section 14.3.4 Intelligent Power Limit (IPL))
Gradient limitation P procedure	Enables adjusting the changing rate of the P control values
Zero up only	Gradient limitation is active only if the previous active power limitation was 0%
Up only	Gradient limitation is active only during increase of active power limitation
Fully on	Gradient limitation is always active during decrease or increase of the active power limitation
Gradient	Specifies how high the maximum rate of change in the active power can be per second

Input box	Meaning
Limitation to agreed connection power P_{AV}	If enabled, the active power is limited at the grid connection point to the agreed upon connection power P_{AV}
Fallback value	Set fallback value as target value in the event of an error

14.3.1 P(DI) procedure

With this procedure, the active power P is used as the control value.

The specified target value is provided by the grid operator as a digital input signal. This is possible for example via a remote control system connected to the digital inputs of the blue'Log. Via bitmask the digital signals are assigned to the percentage target control values.

Step 1

In Step 1, the digital inputs used are configured. Digital inputs of the blue'Log are assigned to the active power procedure in the process.

Active Power method with digital input x

Step 1
Step 2

No. Inputs

1	BM: DI-1	✖
2	BM: DI-2	✖
3	BM: DI-3	✖
4	BM: DI-4	✖

+

Hold last value OFF

OK
Cancel

Close

Fig. 60: P(DI) Power Control procedure: Selecting the digital inputs

Input box	Meaning
Inputs	Description of the digital input on the blue'Log
+	Adds digital blue'Log interfaces
Retain last value	If enabled, the last valid target value is retained in the event of an error. The configured fallback value (see Fig. 55: Power Control) loses its validity for this procedure

Step 2

In Step 2, bitmasks are assigned to percentage target control values. Boxes highlighted in blue represent a combination of active signals at the digital interfaces of the blue'Log. If a corresponding combination of active signals is enabled at the digital inputs, the percentage control value assigned in each case will come into force.

Active Power method with digital input x

Step 1 Step 2

Bitmask	BM: DI-1	BM: DI-2	BM: DI-3	BM: DI-4	P
0	☑	☐	☐	☐	100 %
1	☐	☑	☐	☐	60 %
2	☐	☐	☑	☐	30 %
3	☐	☐	☐	☑	0 %

+

Hold last value OFF

OK
Cancel

Close

Fig. 61: P(DI) Power Control procedure: Reduction levels bitmask

Input box	Meaning
Bitmask	Number of the bitmask / specified target value
P	The percentage control value for active power reduction / the target control value
+	Adds further target control values
Retain last value	If enabled, the last valid target value is retained in the event of an error. In this case the fallback value loses its validity for this procedure.

The percentage target values specified by the grid operator always relate to the agreed upon connection power P_{AV} .

14.3.2 P(AI) procedure

With this procedure, the active power P is used as the control value.

The specified target value is provided by the grid operator as an analog input signal. This is possible for example via a remote control system with an analog output connected to an analog input of the blue'Log. The target value is calculated from the analog value using a two-point linear equation. For configuration, the highest and lowest measurement values for the analog signal are required. These lie at the end and the start of the line.

Active Power method with analog input x

Settings

Analog input	BM: MI-4 ▼				
First measurement	4	mA	equals	0	%
Second measurement	20	mA	equals	100	%
Hold last value	OFF				

OK
Cancel

Close

Fig. 62: P(AI) Power Control procedure: Setting measured values

Input box	Meaning
Analog input	Description of the analog input on the blue'Log
Lowest measured value	Value pair for the lowest operating point (example: 4 mA corresponds to a specified control value of 0 % P _{AV})
Highest measured value	Value pair for the highest operating point (example: 20 mA corresponds to a specified control value of 100 % P _{AV})
Retain last value	If enabled, the last valid specified value is retained in the event of an error. The configured fallback value (see Fig. 55: Power Control) loses its validity for this procedure

14.3.3 P(fix) procedure

With this procedure, a fixed active power limit is used as the control value.

The specified target value (for example 60 or 70 percent) is set as the permanent active power limit. The PV yield active power can be limited with this procedure.

Fixed value ✕

Output limit (P/P_{AV}) %

OK
Cancel

Close

Fig. 63: P(fix) Power Control procedure: Setting the permanent reduction

Input box	Meaning
Power limit (P/P _{AV})	Permanent active power limitation in % (power threshold/agreed upon connection power)

14.3.4 Intelligent Power Limit (IPL)

With the help of the Intelligent Power Limit (IPL) function, active power regulation (closed control loop) can be enabled. As a result, cabling and transformer losses in PV power plants can be taken into account in order to provide the maximum permitted feed-in power at the grid connection point in accordance with the permitted stationary control deviation.

If, for example, a permanent limitation of feed-in power to 0 % or 70 % of nominal system power is specified, the IPL function can be used to increase the energy yield of your PV system. The power reduction is carried out while taking into account on-site energy consumption. If the feed-in power of your PV system is in the limitation range, the specified percentage active power will automatically be increased by the share of your on-site energy consumption.

The IPL function can only be guaranteed if the system's power flows are recorded. A variety of combinations of measurement components are available to ensure correct functionality of the IPL.

- Use of a power quality analyzer at the grid connection point
- Use of a feed-in and import meter at the grid connection point
- Use of a consumption meter ahead of the loads
- Use of a power quality analyzer / feed-in and import meter at the grid connection point as well as a consumption meter ahead of the consumers

-  • With help of a power quality analyzer, cabling and transformer losses in PV systems can be taken into account.

-  • When using S0 meters, meters with 1000 pulses/kWh or more are suggested in order to achieve an adequate level of accuracy.

-  • Optimum results with the IPL function can be achieved by recording grid feed-in and sourcing as well as consumption.

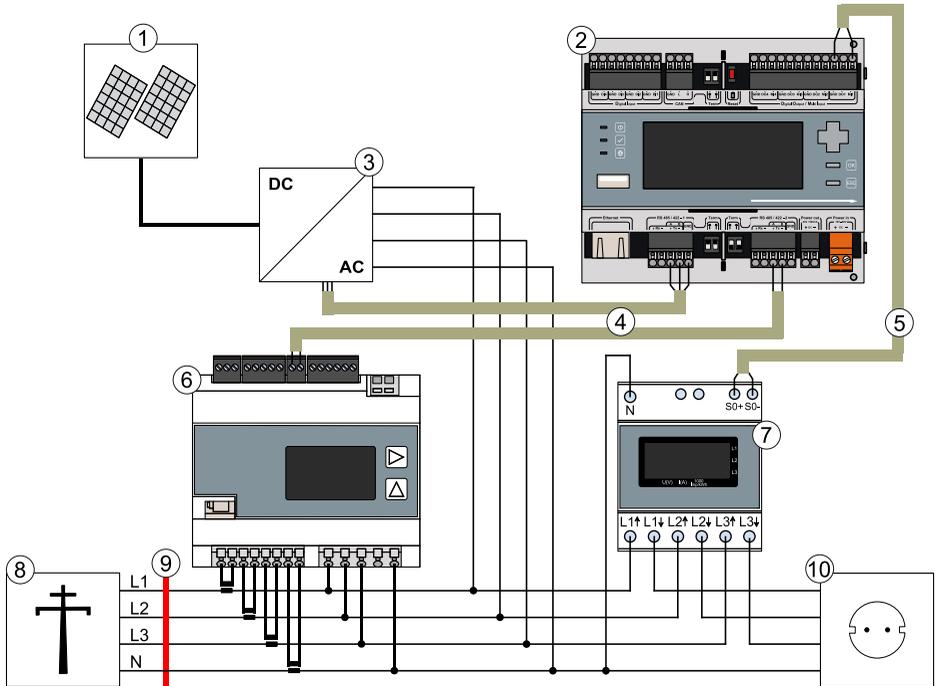


Fig. 64: Power Control: Example IPL set-up

- | | |
|------------------|--|
| (1) PV generator | (6) Power quality analyzer / feed-in meter |
| (2) blue'Log | (7) Consumption meter |
| (3) Inverter | (8) Public electricity grid |
| (4) RS485 bus | (9) Grid connection point |
| (5) S0 bus | (10) Consumer |

14.3.5 Gradient limitation active power (P) procedure

Gradient limitation for active power procedures is a function designed to limit the maximum change in active power within a specified period of time. The change in active power should follow a specific linear course (target trajectory). This linear course is defined via the gradient which is given as the maximum change in active power per second.

With gradient limitation, the control values are sent to the inverter in a time-discrete manner owing to the system's dead times. The following figure is an exemplary illustration of time-discrete control values.

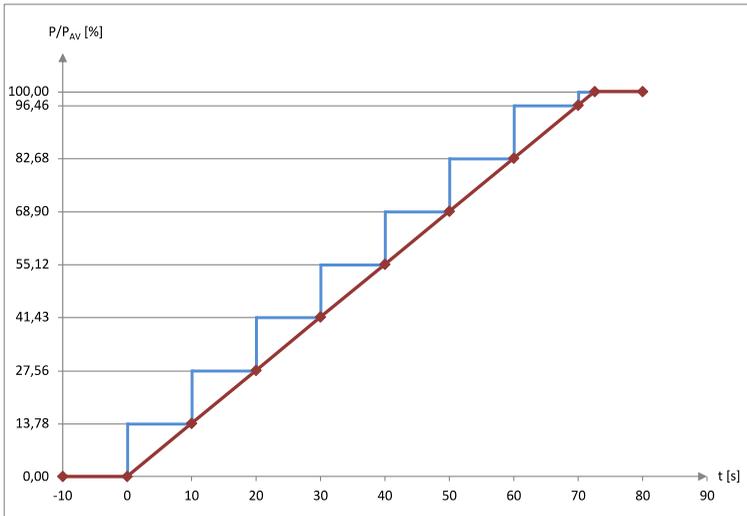


Fig. 65: Gradient limitation active power procedure: Time-discrete specification

- Red line: Target trajectory for specified active power
- Blue line: Time-discrete specified values sent to the inverters

Options for the gradient limitation P procedure

- Zero up only: Gradient limitation is active only if the previous active power limitation was 0%.
- Up only: Gradient limitation is active only if the specified active power is increased.
- Fully on: Gradient limitation is always active if the specified active power is decreased or increased.

The configurable gradient is determined using the following formula:

$$G = \frac{P}{t_G}$$

- P Active power share for determining the gradient in % P_{AV}
- t_G Time parameter for gradient limitation in s

14.3.6 Limitation to agreed connection power P_{AV}

If this function is enabled, the feed-in active power is limited to the agreed upon connection power P_{AV} . Taking readings from a power quality analyzer or a feed-in meter provides the blue'Log with measured values used as basis for calculating dynamic inverter activation.

Should the feed-in active power of your PV system exceed the agreed upon connection power, the inverters will be limited accordingly. This ensures feed-in active power as specified by the grid operator will not be exceeded at the grid connection point.

When using a feed-in meter we recommend the use of an accumulating meter. This takes into account the energy flow in all three phases and subtracts the consumption from the feed-in, while a non-accumulating meter only records the energy fed in without deducting consumption.

14.3.7 Preset for fallback value

The fallback value is used to enable sending a constant specified active power value to the inverters in the event of an error.



Fallback value

70 %

Fig. 66: P procedure fallback value

The fallback value is sent to the inverters in the event of the following errors:

- Error when receiving specified values (digital input or multi input).
- Error when configuring the selected active power procedure.
- Communication error between the master blue'Log and slave blue'Log (delay time before use of the fallback value is 10 minutes)

14.4 Reactive power procedure

Target values for inverter reactive power control or reactive power regulation can be determined using various procedures. In addition to the procedures, further options allow for more settings to be specified (e.g. the reactive power system control loop function allows a closed control loop to be enabled).

Reactive Power
?

Default method switch

Method switch
 ON

Default Method

No.	Input	Method
1	BM: MI-3	Q(DI)
2	BM: MI-4	Q(AI)

+

Failover methods

Failover method on invalid method switch

Default failover method

Default values on error in every method

Options

Gradientlimit Q-Method
 ON

Gradient
 %/s

Plant control circuit

control circuit
 ON

Transformer
 yes

Transformer rated power
 kVA

Plant control circuit limits

lower P_{limit}
 % of P_{Rv}

lower $\cos \varphi_{limit}$

upper Q_{limit}
 % of S_{imax}

Fig. 67: Power Control: Reactive power regulation

Input box	Meaning
Change of procedure	Enables setting options to switch the reactive power procedure during operation using digital signals
Standard procedure	
Input	Description of the digital input for switching procedure on the blue'Log
Procedure	Selects the reactive power procedures
Cog button	Brings up the configuration settings for the selected reactive power procedure
+	Adds further digital interfaces and selection boxes for reactive power procedures
Procedure in the event of invalid procedure switch	Set fallback reactive power procedure taking effect in the event of an error when switching procedures
General fallback procedure	Set fallback procedure as reactive power procedure in the event of an error during standard procedure
$\cos\phi$ (fix)	Set $\cos\phi$ fallback value as control value in the event of an error with the selected $\cos\phi$ procedure
Q(fix)	Set Q fallback value as control value in the event of an error with the selected Q procedure
Gradient limitation Q procedure	Enables the option of changing the rate at which the Q control values change
Gradient	Specifies how high the maximum rate of change in the reactive power can be per second
System control loop	Enables reactive power regulation
Transformer	If enabled, the reactive power requirement of the transformer is taken into account during regulation
Transformer nominal power	Details of transformer nominal power
Lower P_{Limit}	Active power threshold above which reactive power regulation is enabled
Lower $\cos\phi_{Limit}$	Operating limit of reactive power regulation for $\cos\phi$
Upper Q_{Limit}	Details of the operating limit for reactive power regulation for Q

14.4.1 $\cos\phi$ (DI) procedure

In this procedure the displacement factor $\cos \phi$ is used as control value.

The specified target value is provided by the grid operator as a digital input signal. This is possible for example via a remote control system connected to the digital inputs of the blue'Log. The digital signals are assigned to the specified control values via a bitmask.

Step 1

In Step 1, the digital inputs used are configured. Digital inputs of the blue'Log are assigned to the reactive power procedure in the process.

Reactive power method over digital inputs $\cos \phi$ (DI) x

The screenshot shows a configuration window titled "Reactive power method over digital inputs $\cos \phi$ (DI)". It has two tabs: "Step 1" (selected) and "Step 2". Below the tabs is a table with 5 rows, each representing a digital input. Each row has a number (1-5), a dropdown menu showing a label (e.g., "BM: DI-1"), and a trash icon. Below the table is a blue button with a white plus sign. At the bottom left, there is a "Hold last value" label and a grey button with "OFF" written on it. At the bottom right, there are three buttons: "OK" (green), "Cancel" (blue), and "Close" (green).

No.	Inputs	
1	BM: DI-1	
2	BM: DI-2	
3	BM: DI-3	
4	BM: DI-4	
5	BM: MI-1	

Hold last value OFF

OK Cancel

Close

Fig. 68: $\cos\phi$ (DI) Power Control procedure: Selecting the digital inputs

Input box	Meaning
Inputs	Description of the digital input on the blue'Log
+	Adds digital blue'Log interfaces
Retain last value	If enabled, the last valid specified value is retained in the event of an error. The fallback value loses its validity for this procedure.

Step 2

In Step 2, bitmasks are assigned to specified control values. Boxes highlighted in blue represent a combination of active signals at the digital interfaces of the blue'Log. If a corresponding combination of active signals is enabled at the digital inputs, the control value assigned in each case will take effect.

Reactive power method over digital inputs $\cos \varphi$ (DI) x

Step 1
Step 2

Bitmask	BM: DI-1	BM: DI-2	BM: DI-3	BM: DI-4	BM: MI-1	$\cos \varphi$	Excitement
0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0.95	Overexcited / Ind. fe ▼ 🗑
1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0.98	Overexcited / Ind. fe ▼ 🗑
2	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1	🗑
3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0.98	Underexcited / Cap. ▼ 🗑
4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	0.95	Underexcited / Cap. ▼ 🗑

+

Hold last value

OFF

OK

Cancel

Close

Fig. 69: $\cos \varphi$ (DI) Power Control procedure: Specifications bitmask

Input box	Meaning
$\cos \varphi$	Displacement factor control value
+	Adds further specified control values
Retain last value	If enabled, the last valid specified value is retained in the event of an error. The fallback value then loses its validity for this procedure.

14.4.2 $\cos\phi(AI)$ procedure

In this procedure, the displacement factor $\cos\phi$ is used as the control value.

The specified target value is provided by the grid operator as an analog input signal. This is possible for example via a remote control system with an analog output connected to an analog input of the blue'Log. The target value is calculated from the analog value using a two-point linear equation. For configuration, the highest and lowest measured values for the analog signal are required. These lie at the end and the start of the line. The excitation type for each point must also be given.

Reactive power method over analog input $\cos\phi$ (AI) x

Settings

Analaog input none ▼

First measurement 4 mA equals 0,95 Overexcited / Ind. feed in / Cap. sour ▼

Second measurement 20 mA equals 0,95 Underexcited / Cap. feed in / Ind. sou ▼

Hold last value OFF

OK
Cancel

Fig. 70: $\cos\phi(AI)$ Power Control procedure: Setting measured values

Input box	Meaning
Analog input	Description of the analog input on the blue'Log
Lowest measurement value	Value pair for the lowest operating point (example: 4 mA corresponds to a $\cos\phi$ of 0.95 overexcited)
Highest measurement value	Value pair for the highest operating point (example: 20 mA corresponds to a $\cos\phi$ of 0.95 under-excited)
Retain last value	If enabled, the last valid specified value is retained in the event of an error. The fallback value loses its validity for this procedure.

14.4.3 $\cos\phi(\text{fix})$ procedure

In this procedure a constant $\cos\phi$ displacement factor is used as control value.

The target value is specified as a constant displacement factor value. To this end, a configurable, constant value is saved.

Reactive power method with fixed $\cos\phi$ ✕

Offset factor $\cos\phi$

Underexcited / Cap. feed in / Ind. sourcing ▾

Fig. 71: $\cos\phi(\text{fix})$ Power Control procedure: Setting the constant specified value

Input box	Meaning
$\cos\phi$ displacement factor	Constant specified value for the $\cos\phi$ displacement factor

14.4.4 $\cos\phi(P)$ procedure

In this procedure the $\cos\phi$ displacement factor is used as control value.

Changing the displacement factor enables influencing the power fed in at the grid connection point. The selected measuring device records the power P fed in at the grid connection point and transfers the measurements to the data logger for this purpose. The logger then assigns the $\cos\phi$ control value to the relevant power, for example by using a two-point characteristic curve.

Depending on the selected characteristic curve type, value pairs (interpolation points) and the associated excitation types per interpolation point are needed in order to produce the characteristic curve (line) for this procedure.

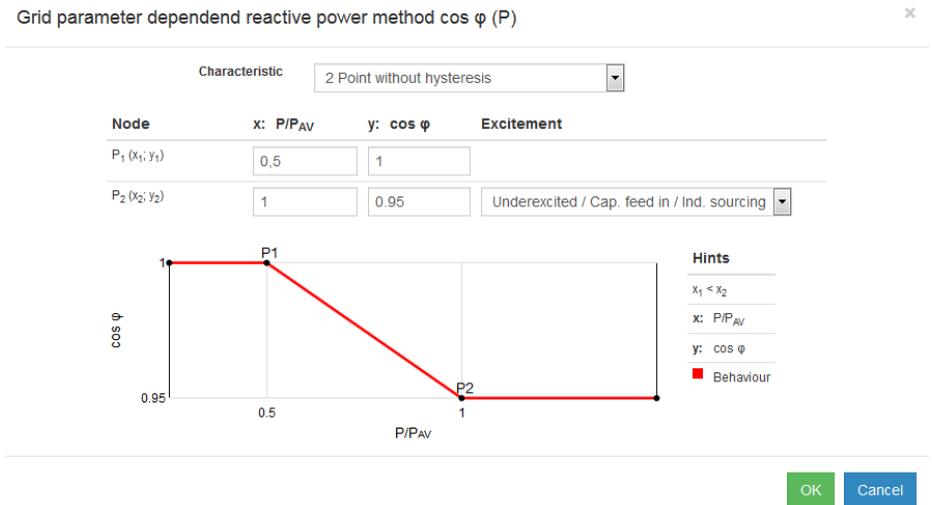


Fig. 72: $\cos\phi (P)$ Power Control procedure: 2 point without hysteresis

Grid parameter dependent reactive power method $\cos \varphi$ (P)



Characteristic: 4 Point with hysteresis

Node	x: P/P_{AV}	y: $\cos \varphi$	Excitement
$P_1 (x_1; y_1)$	0,917	0,93	Underexcited / Cap. feed in / Ind. sourcing
$P_2 (x_2; y_2)$	0,93	1	
$P_3 (x_3; y_3)$	1,07	1	
$P_4 (x_4; y_4)$	1,083	0,92	Overexcited / Ind. feed in / Cap. sourcing
Hysteresis P_{Hyst}	0,02	P/P_{AV}	

Hints

- $x_1 < x_2 < x_3 < x_4$
- x: P/P_{AV}
- y: $\cos \varphi$
- Behaviour
- Hysteresis P_{Hyst}

OK Cancel

Fig. 73: $\cos \varphi$ (P) Power Control procedure: 4 point with hysteresis

Input box	Meaning
Curve	Selects the type of curve
2 point without hysteresis	Curve with 2 interpolation points without hysteresis
2 point with hysteresis	Curve with 2 interpolation points with hysteresis
4 point without hysteresis	Curve with 4 interpolation points without hysteresis
4 point with hysteresis	Curve with 4 interpolation points with hysteresis
Interpolation point P1 to P4	Interpolation points 1 to 4 for the curve
x: P/P_{AV}	P/P_{AV} ratio of the individual interpolation points
y: $\cos \varphi$ excitement	Displacement factor control value for the individual interpolation points (incl. excitement type)
Hysteresis P_{Hyst}	Hysteresis of the curve as the P/P_{AV} ratio



This procedure requires a power quality analyzer that has been connected to the data logger and configured.

14.4.5 $\cos\phi(U)$ procedure

In this procedure the $\cos\phi$ displacement factor is used as control value.

By changing the displacement factor, it is possible to influence the voltage at the grid connection point by recording the voltage U at the grid connection point by the selected measuring device and transferring the results to the data logger. The logger then assigns the $\cos\phi$ control value to the relevant power using for example a two-point characteristic curve.

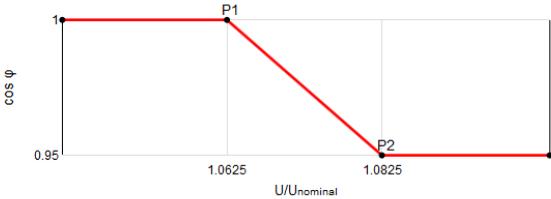
Depending on the selected characteristic curve type, value pairs (interpolation points) and the associated excitation types per interpolation point are needed in order to produce the characteristic curve (line) for this procedure.

Grid parameter dependent reactive power method $\cos\phi(U)$ ✕

Characteristic:

Voltage source:

Node	x: $U/U_{nominal}$	y: $\cos\phi$	Excitement
$P_1 (x_1; y_1)$	<input type="text" value="1,0625"/>	<input type="text" value="1"/>	
$P_2 (x_2; y_2)$	<input type="text" value="1,0825"/>	<input type="text" value="0.95"/>	<input type="text" value="Underexcited / Cap. feed in / Ind. sourcing"/>



Hints

$x_1 < x_2$

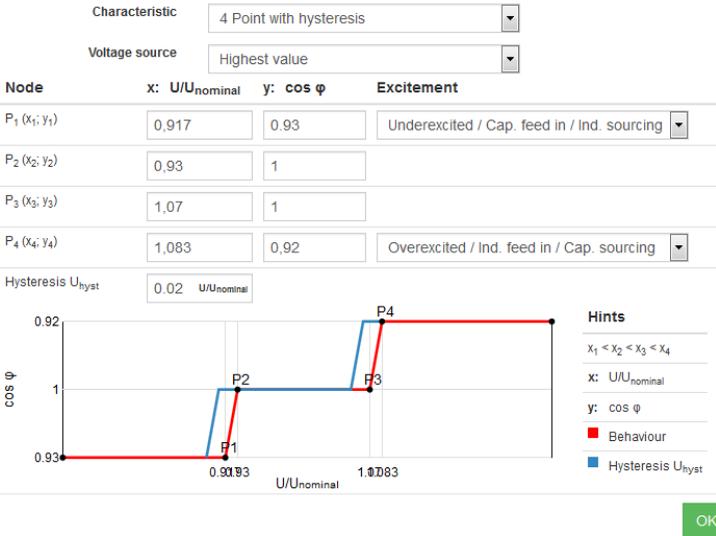
x: $U/U_{nominal}$

y: $\cos\phi$

■ Behaviour

Fig. 74: $\cos\phi(U)$ Power Control procedure: 2 point without hysteresis

Grid parameter dependent reactive power method $\cos \phi(U)$



OK Cancel

Fig. 75: $\cos \phi (U)$ Power Control procedure: 4 point with hysteresis

Input box	Meaning
Curve	Selects the type of curve
2 point without hysteresis	Curve with 2 interpolation points without hysteresis
2 point with hysteresis	Curve with 2 interpolation points with hysteresis
4 point without hysteresis	Curve with 4 interpolation points without hysteresis
4 point with hysteresis	Curve with 4 interpolation points with hysteresis
Voltage source	Selects the voltage source
L1 / L2	Outer conductor voltage phases L1-L2
L2 / L3	Outer conductor voltage phases L2-L3
L3 / L1	Outer conductor voltage phases L3-L1
Highest value	Automatically selects the highest value from the three phase voltages
Interpolation point P1 to P4	Interpolation points 1 to 4 for the curve
x: U/U_{Nom}	U/U_{Nom} ratio of the individual interpolation points
y: $\cos \phi$ excitation	Displacement factor control value for the individual interpolation points (incl. excitation type)
Hysteresis U_{Hvst}	Hysteresis of the curve as the U/U_{Nom} ratio



This procedure requires a power quality analyzer that has been connected to the data logger and configured.

14.4.6 Q(DI) procedure

In this procedure the reactive power Q is used as control value.

The specified target value is provided by the grid operator as a digital input signal, for example via a remote control system connected to the digital inputs of the blue'Log. The digital signals are assigned to the percentage specified control values via a bitmask.

Step 1

In Step 1, the digital inputs used are configured. Digital inputs of the blue'Log are assigned to the reactive power procedure in the process.

Reactive power method over digital input Q(DI) ×

Step 1
Step 2

No.	Inputs	
1	BM: DI-2 ▼	🗑️
2	BM: DI-3 ▼	🗑️
3	BM: DI-4 ▼	🗑️

+

Hold last value

ON

OK
Cancel

Fig. 76: Q(DI) Power Control procedure: Selecting the digital inputs

Input box	Meaning
Inputs	Description of the digital input on the blue'Log
+	Adds digital blue'Log interfaces
Retain last value	If enabled, the last valid specified value is retained in the event of an error. The fallback value loses its validity for this procedure.

Step 2

In Step 2, bitmasks are assigned to percentage specified control values. Boxes highlighted in blue represent a combination of active signals at the digital interfaces of the blue'Log. If a corresponding combination of active signals is enabled at the digital inputs, the percentage control value assigned in each case will take effect.

Reactive power method over digital input Q(DI) x

Step 1
Step 2

Bitmask	BM: DI-2	BM: DI-3	BM: DI-4	Q	Excitement	✕
0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	31,25 %	Overexcited / Ind. feed in / Cap. sourcing ▾	✕
1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0 %		✕
2	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	31,25 %	Underexcited / Cap. feed in / Ind. sourcing ▾	✕
+						

Hold last value

ON

OK
Cancel

Fig. 77: Q(DI) Power Control procedure: Specifications bitmask

Input box	Meaning
Q	Reactive power control value
+	Adds further specified control values
Retain last value	If enabled, the last valid specified value is retained in the event of an error. The fallback value then loses its validity for this procedure.

14.4.7 Q(AI) procedure

In this procedure the percentage reactive power Q is used as control value.

The specified target value is provided by the grid operator as an analog input signal, for example via a remote control system with an analog output connected to an analog input of the blue'Log. The target value is calculated from the analog value using a two-point linear equation. For configuration, the highest and lowest measured values for the analog signal are required. These lie at the end and the start of the line. The excitation type for each point must also be given.

Reactive power method over analog input Q(AI) ✕

Settings

Analog input	BM: MI-1					
First measurement	4	mA	equals	31,25	%	Overexcited / Ind. feed in / Cap. sour
Second measurement	20	mA	equals	31.25	%	Underexcited / Cap. feed in / Ind. sou
Hold last value	<input checked="" type="checkbox"/> ON					

Fig. 78: Q(AI) Power Control procedure: Setting measured values

Input box	Meaning
Analog input	Description of the analog input on the blue'Log
Lowest measurement value	Value pair for the lowest operating point (example: 4 mA corresponds to 31.25 % overexcited)
Highest measurement value	Value pair for the highest operating point (example: 20 mA corresponds to 31.25 % under-excited)
Retain last value	If enabled, the last valid specified value is retained in the event of an error. The fallback value loses its validity for this procedure.

14.4.8 Q(fix) procedure

In this procedure a constant percentage reactive power Q is used as control value.

The control value is specified as a constant percentage reactive power value. To this end, a configurable, constant value is saved.



Fig. 79: Q(fix) Power Control procedure: Setting the constant specified value

Input box	Meaning
Reactive power Q	Constant specified value for the percentage reactive power

14.4.9 Q(U) procedure

In this procedure the percentage reactive power Q is used as control value.

By changing the reactive power, it is possible to influence the voltage by recording the voltage U at the grid connection point by the selected measuring device and transferring the data to the data logger. The logger then assigns the Q control value to the relevant voltage, for example on basis of a two-point characteristic curve.

Depending on the selected characteristic curve type, value pairs (interpolation points) and the associated excitation types per interpolation point are needed in order to produce the characteristic curve for this procedure.

Grid parameter dependent reactive power method Q(U) ✕

Characteristic:

Voltage source:

Node	x: U/U _{nominal}	y: Q%	Excitement
P ₁ (x ₁ ; y ₁)	<input type="text" value="1,0625"/>	<input type="text" value="0"/>	
P ₂ (x ₂ ; y ₂)	<input type="text" value="1,0825"/>	<input type="text" value="31.225"/>	<input type="text" value="Underexcited / Cap. feed in / Ind. sourcing"/>

Hysteresis U_{hyst}:

Hints

x₁ < x₂

x: U/U_{nominal}

y: Q%

■ Behaviour

■ Hysteresis U_{hyst}

Fig. 80: Q(U) Power Control procedure: 2 point with hysteresis

Grid parameter dependent reactive power method Q(U)



Characteristic: 4 Point with hysteresis

Voltage source: Highest value

Node	x: $U/U_{Nominal}$	y: $Q_{\%}$	Excitement
P ₁ (x_1, y_1)	0,85	31	Underexcited / Cap. feed in / Ind. sourcing
P ₂ (x_2, y_2)	0,93	0	
P ₃ (x_3, y_3)	1,07	0	
P ₄ (x_4, y_4)	1,15	31	Overexcited / Ind. feed in / Cap. sourcing

Hysteresis U_{Hyst} : 0.02 $U/U_{Nominal}$

HINTS

- $x_1 < x_2 < x_3 < x_4$
- x: $U/U_{Nominal}$
- y: $Q_{\%}$
- Behaviour
- Hysteresis U_{Hyst}

OK Cancel

Fig. 81: Q(U) Power Control procedure: 2 point with hysteresis

Input box	Meaning
Curve	Selects the type of curve
2 point without hysteresis	Curve with 2 interpolation points without hysteresis
2 point with hysteresis	Curve with 2 interpolation points with hysteresis
4 point without hysteresis	Curve with 4 interpolation points without hysteresis
4 point with hysteresis	Curve with 4 interpolation points with hysteresis
Voltage source	Selects the voltage source
L1 / L2	Outer conductor voltage phases L1-L2
L2 / L3	Outer conductor voltage phases L2-L3
L3 / L1	Outer conductor voltage phases L3-L31
Highest value	Automatically selects the highest value from the three outer phase voltages
Interpolation point P1 to P4	Interpolation points 1 to 4 for the curve
x: U/U_{Nom}	U/U_{Nom} ratio of the individual interpolation points
y: $Q_{\%}$ excitement	Reactive power control value in % for the individual interpolation points (incl. excitement type)
Hysteresis U_{Hyst}	Hysteresis of the curve as the U/U_{Nom} ratio



This procedure requires a power quality analyzer that has been connected to the data logger and configured.

14.4.10 $Q(P \times \tan\phi(\text{fix}))$ procedure

In this procedure the reactive power Q is used as control value.

Here the reactive power is set according to the power fed in by recording the active power P at the grid connection point by the selected measuring device and transferring the measurements to the data logger. The logger assigns the control value Q to the relevant power via $\tan\phi$ – $\tan\phi$ is stipulated here.

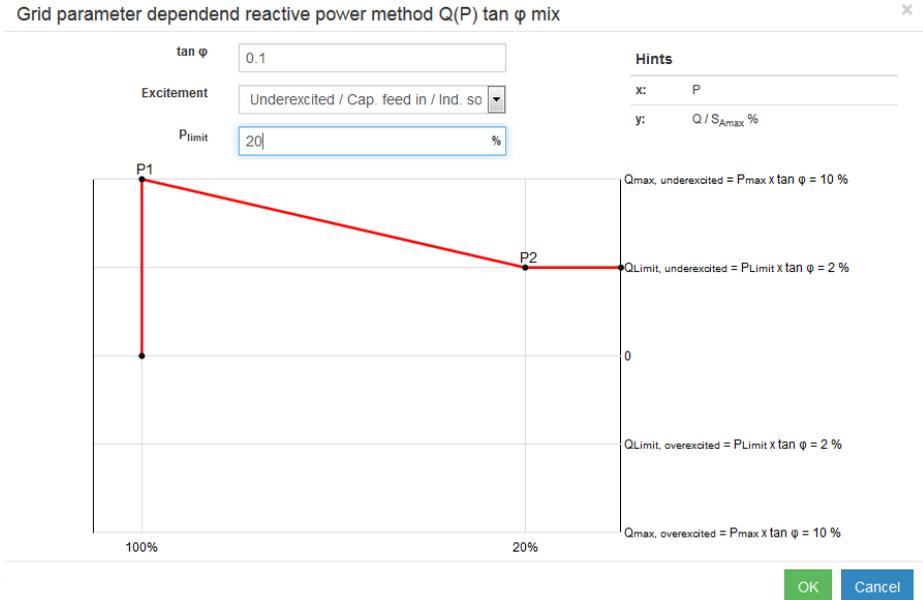


Fig. 82: $Q(P \times \tan\phi(\text{fix}))$ Power Control procedure: Specified reactive power curve

Input box	Meaning
$\tan\phi$	Constant value for $\tan\phi$
P_{Limit}	Lower active power(P) limit up to which the characteristic curve is traveled before the corresponding value Q is used as the fixed value. In $\%/P_{\text{AV}}$
Excitation	Excitation of the specified control value (overexcited / under-excited)

This procedure requires a power quality analyzer that has been connected to the data logger and configured.

14.4.11 Q(cosφ(DI)) procedure

In this procedure the reactive power Q is used as control value. The input signal of the grid operator here relates to the cosφ displacement factor to allow use of the generally greater inverter setting range with reactive power(Q) values. As a result, the inverters can be regulated within greater range.

The specified target value is provided by the grid operator as a digital input signal, for example via a remote control system connected to the digital inputs of the blue'Log. The digital signals are assigned to the specified displacement factor (cosφ) control values via a bitmask. Using the active power P recorded at the grid connection point by the selected measuring device, the specified displacement factor (cosφ) is converted into a reactive power(Q) control value by the data logger.

This procedure is configured in a similar manner to the cosφ(DI) procedure (cf. Section 14.4.1 cosφ(DI) procedure).



This procedure requires a power quality analyzer that has been connected to the data logger and configured.

14.4.12 Q(cosφ(AI)) procedure

In this procedure the reactive power Q is used as control value. The input signal of the grid operator here relates to the cosφ displacement factor to allow use of the generally greater inverter setting range with reactive power(Q) values. As a result, the inverters can be regulated within greater range.

The specified target value is provided by the grid operator as an analog input signal, for example via a remote control system with an analog output connected to an analog input of the blue'Log. The target value is calculated from the analog value using a two-point linear equation. Using the active power P recorded at the grid connection point by the selected measuring device, the specified displacement factor (cosφ) of the grid operator is converted into a reactive power(Q) control value by the data logger.

This procedure is configured in a similar manner to the cosφ(AI) procedure (cf. Section 14.4.2 cosφ(AI) procedure).



This procedure requires a power quality analyzer that has been connected to the data logger and configured.

14.4.13 $Q(\cos\phi(\text{fix}))$ procedure

In this procedure the reactive power Q is used as control value. A constant $\cos\phi$ displacement factor is used as the input value/target value. This input value is converted into a specified percentage reactive power(Q) control value to allow use of the generally greater inverter setting range with reactive power(Q) values. As a result, the inverters can be regulated within a greater range.

The target value is specified as a constant $\cos\phi$ displacement factor value. To this end, a configurable, constant value is saved. Using the active power P recorded at the grid connection point by the selected measuring device, the specified constant displacement factor ($\cos\phi$) is converted into a reactive power(Q) control value by the data logger.

This procedure is configured in a similar manner to the $\cos\phi(\text{fix})$ procedure (cf. Section 14.4.3 $\cos\phi(\text{fix})$ procedure).



This procedure requires a power quality analyzer that has been connected to the data logger and configured.

14.4.14 $Q(\cos\phi(P))$ procedure

In this procedure a $\cos\phi$ value is derived from the target value and is converted into the reactive power Q as a control value to allow use of the generally greater inverter setting range with reactive power(Q) values. As a result, the inverters can be regulated within a greater range.

By changing the reactive power, the active power fed in at the grid connection point can be influenced. To do this, the active power P fed in at the grid connection point is recorded by the selected measuring device and transferred to the data logger which assigns the displacement factor to the relevant power, for example on basis of a two-point characteristic curve, and converts it into a reactive power(Q) control value using the active power P recorded by the selected measuring device at the grid connection point.

This procedure is configured in a similar manner to the $\cos\phi(P)$ procedure (cf. Section 14.4.4 $\cos\phi(P)$ procedure).



This procedure requires a power quality analyzer that has been connected to the data logger and configured.

14.4.15 Q(cosφ(U)) procedure

In this procedure a cosφ value is derived from the target value and is converted into the reactive power Q as control value to allow use of the generally greater inverter setting range with reactive power(Q) values. As a result, the inverters can be regulated within a greater range.

By changing the reactive power, it is possible to influence the voltage at the grid connection point by recording the voltage U at the grid connection point by the selected measuring device and transferring the measurements to the data logger. This assigns the displacement factor to the relevant power, for example on the basis of a two-point characteristic curve, and converts it into a reactive power(Q) control value using the active power P additionally recorded by the selected measuring device at the grid connection point.

This procedure is configured in a similar manner to the cosφ(U) procedure (cf. Section 14.4.5 cosφ(U) procedure).



This procedure requires a power quality analyzer that has been connected to the data logger and configured.

14.4.16 Procedure in the event of an error

The procedure describes what happens in the event of an error. Different procedures can be configured for different errors.

Failover methods

Failover method on invalid method switch: [gear icon]

Default failover method: [gear icon]

Default values on error in every method

Q(fix): %

cosφ(fix):

Fig. 83: Power Control reactive power procedure: Failover methods

Procedure in the event of invalid procedure switch

The fallback procedure in the event of an invalid procedure switch takes effect if the specifications for switching the reactive power procedures are incorrect (e.g. no input is set or several inputs are set).

A fallback procedure can be selected and configured from all reactive power procedures (cf. Section 14.4 Reactive power procedure).

General fallback procedure

The general fallback procedure allows an alternative reactive power procedure to be used in the event of an error affecting the regular reactive power procedures.

A general fallback procedure can be selected and configured from all reactive power procedures (cf. Section 14.4 Reactive power procedure).

The following errors lead to the use of the general fallback procedure:

- Errors when receiving specified target values (digital input, multi input or communication with the power quality analyzer)
- Errors when configuring the selected reactive power procedure.

If no general fallback procedure was selected, the standard values will be used straight away in the event of an error.

Standard values in the event of errors in all procedures

In the event of an error in the reactive power procedure or in the configured fallback procedures, the configured $\cos\varphi$ or Q fallback value will be specified as the target value according to the reactive power procedure ($\cos\varphi$ or Q) selected.

If for instance no valid target value can be specified using the selected "Q(AI)" reactive power procedure with the help of an analog input signal (e.g. analog current signal outside the permitted 4 - 20 mA range), a target value will be specified via the selected general fallback procedure (e.g. "Q(U)"). If communication between the power quality analyzer (PQA) and the blue'Log fails, no valid target value can be defined. In this case, a set fallback value is specified as the target value.

The following errors lead to the use of the fallback values:

- Errors when receiving specified target values (digital input, multi input or communication with the power quality analyzer) for the general fallback procedure
- Errors when configuring the selected fallback procedure.
- Communication errors between the master blue'Log and slave blue'Log (the delay time before use of the fallback value is 10 minutes)

14.4.17 Gradient limitation reactive power(Q) procedure

Gradient limitation for reactive power procedures is a function designed to limit the maximum change in reactive power within a specified period. The change in reactive power should follow a specific linear course (target trajectory). This linear course is defined via the gradient which is given as maximum change in reactive power per second.

The gradient limitation relates exclusively to reactive power(Q) procedures (e.g. Q(DI)) and is always active when changing the specified reactive power.

With gradient limitation, the specified values are sent to the inverter in a time-discrete manner owing to the system's dead times. The following figure is an exemplary illustration of the time-discrete specified values.

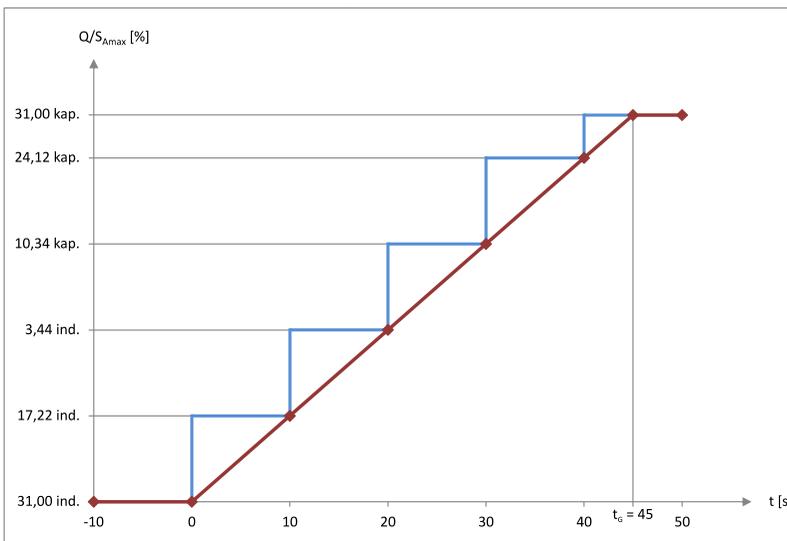


Fig. 84: Gradient limitation reactive power procedure: Time-discrete specification

- Red line: Target trajectory for specified reactive power
- Blue line: Time-discrete specified control values

The configurable gradient is determined using the following formula:

$$G = \frac{\Delta Q_{total}}{t_G} = \frac{Q_{max,ind} + Q_{max,cap}}{t_G}$$

- $\frac{\Delta Q_{total}}{S_{AV}}$ Target value specification range for reactive power regulation in %
- $Q_{max,ind}$ Max. inductive reactive power capacity of the inverters in % S_{AV}
- $Q_{max,cap}$ Max. capacitive reactive power capacity of the inverters in % S_{AV}
- t_G Time parameter for gradient limitation in s

14.4.18 System control loop

With the help of the "System control loop" setting option, the relevant reactive power procedure can be used for control purposes (open control loop; selection of control loop → "OFF") or regulation purposes (closed control loop; selection of system control loop → "ON"). Enabling a system control loop provides compensations for inconsistencies between production and the grid connection point (GCP), which occur due to the reactive power requirement of medium voltage cables and the transformer.

Plant control circuit

control circuit ON

Transformer yes

Transformer rated power kVA

Plant control circuit limits

lower P_{Limit} % of P_{AV}

lower $\cos\phi_{\text{Limit}}$

upper Q_{Limit} % of S_{Amax}

Fig. 85: Power Control reactive power procedure: Reactive power regulation

Input box	Meaning
System control loop	Enables reactive power regulation in a closed loop
Transformer	If enabled, the reactive power requirement of the transformer is taken into account during regulation
Transformer nominal power	Details of the transformer nominal power
Lower P_{Limit}	Active power threshold above which reactive power regulation is enabled
Lower $\cos\phi_{\text{Limit}}$	Operating limit for reactive power regulation for $\cos\phi$
Upper Q_{Limit}	Details of the operating limit for reactive power regulation for Q



The system control loop is only active if the reactive power procedure is selected.



For correct functionality of the system control loop, the following parameters have to be properly configured.

- Agreed upon connection power P_{AV} [kW]
- AC nominal voltage U_{Nom} [kV]
- Agreed upon maximum apparent power S_{AV} [kVA]
- Parameter model [transformer / no transformer]
- Transformer nominal power [kVA]
- Lower P_{Limit} [%]
- Lower $\cos\phi_{Limit}$
- Upper Q_{Limit} [%]



A power quality analyzer at the grid connection point is essential for the operation of the system control loop.

14.5 Power Control checklist

1. Is the chosen Power Control procedure suitable for the grid operator's specified target values?
2. Is the chosen Power Control procedure supported by the inverters?
3. Are the grid operator's remote control system interfaces compatible with the blue'Log interfaces?
4. Are there any specific features to be taken into account using the chosen active power procedure?
5. Are all necessary meters or a power quality analyzer installed in the PV system?
6. Are all necessary meters or a power quality analyzer configured in the blue'Log?
7. Is the correct data logger mode selected?
8. Are the PV system's technical data stored correctly?
9. Are the Power Control procedures and any advanced settings (e.g. gradient limitation) configured correctly?
10. Have the fallback procedures (in the case of reactive power procedures only) and the fallback values been set up?

15. Technical data

TECHNICAL DATA

Power supply	20-60 V DC
Power consumption	Typically 5 W max. 80 W, incl. MX module
ESD protection	Tested in accordance with DIN EN 61000-4-2 (4 kV contact discharge, 8 kV air discharge)
Operating temperature	-20°C to 70°C
Storage and transport temperature	-20°C to 85°C
Protection class	IP 20
Max. elevation	2000 m
Max. rel. air humidity.	80 %
Max. degree of soiling	2
Installation	Wall installation, electrical distribution board, control cabinet
Dimensions	147 mm x 110 mm x 63 mm (W x H x D), including side parts
Weight	385 g

DISPLAY / OPERATION

Display	1 (291 x 118 pixels)
LED display	3
Operating buttons / directional pad	2 / 1
Reset button	1
DIP switches (bus termination)	3 (2 x RS485/422 and 1 x CAN)

INTERFACES

Communication

- 2 x RS485/RS422 (interface is automatically switched and can be terminated individually)
- 1 x CAN (can be terminated)
- 1 x Ethernet (10/100 MBit)

Digital inputs

4 x digital inputs (mode configurable via software for each port)

The following options are available for each input:

Type	Usage	Range
Digital	Potential-free contact	24 V DC / 20 mA
Digital	S0	S0-compliant

Digital outputs/multi inputs

The four ports each have a pin for a digital output, a multi input and a ground:

4 x digital outputs (mode configurable via software for each port)

4 x multi inputs (mode configurable via software for each port)

The following options are available for each digital output:

Type	Usage	Range
Digital	Open collector	max. 60 V DC / 200 mA
Digital	Voltage output	20-60 V DC (corresponding to supply voltage), max. 45 W, in total of all digital outputs (basic module and MX modules) max. 200 mA per output

The following options are available for each multi input:

Type	Usage	Range	Precision	Resolution
Digital	Voltage level input	0-24 V DC		
Digital	Potential-free contact	24 V DC / 20 mA		
Digital	S0	S0-compliant		
Analog	Voltage input	0-10 V DC	2 mV DC	40 μ V DC
Analog	Voltage input	0-1 V DC	0.2 mV DC	4 μ V DC
Analog	Voltage input	0-100 mV DC	20 μ V DC	0.4 μ V DC
Analog	Current input	0-20 mA	4 μ A	100 nA
Analog	Resistor (PT1000)	600-1800 Ω	2 Ω	0.5 Ω

Memory

Service interface

Expandability

SD card slot

USB front socket (type A)

The system can be expanded with additional interfaces by connecting MX modules. Please note the limitations under "Software features".

DRIVERS

Supported inverters

The system is supplied with all inverter drivers available at the time of production. The number of supported inverter manufacturers is increasing all the time. For further information please visit the blue'Log driver data sheets at <http://www.meteocontrol.com/de/downloads/>.

SOFTWARE FEATURES

	X-1000	X-3000	X-6000
Maximum recordable power ¹⁾	≤ 100 kWp	≤ 1000 kWp	Unlimited
Number of bus devices monitored ^{1),2)}	Max. 50	Max. 100	Max. 100
Number of inputs (DI/AI) monitored Basic module only ³⁾	Max. 8	Max. 8	Max. 8
Number of inputs (DI/AI) monitored Basic module and expansion modules ³⁾	Max. 12	Max. 20	Max. 28
Web Portal compatibility			
safer'Sun: Professional	✓	✓	✓
VCOM virtual control room	✓	✓	✓
Remote access via portal ⁴⁾	✓	✓	✓
Visualization via websites	✓	✓	✓
Live values	✓	✓	✓
Websites for PC and tablet	✓	✓	✓
Online firmware update	✓	✓	✓
ftp push ⁵⁾	✓	✓	✓
Power Control active power	✓	✓	✓
Intelligent power limiting (IPL)	✓	✓	✓
Power Control reactive power	---	✓	✓

¹⁾ Limit applies to basic module and basic module with expansion modules

²⁾ E.g.: inverter, energy meter, power quality analyzer, string monitoring unit (see blue'Log driver data sheet for max. number)

³⁾ E.g.: sensors, ripple control receiver

⁴⁾ Function available in safer'Sun Professional and VCOM virtual control room

⁵⁾ Data transmission via ftp push 1 x daily, more frequent transmission is possible subject to payment of a license fee

MEMORY

Type: SD card
Size: X-1000: 16 GB | X-3000: 16 GB | X-6000: 32 GB

16. Environmental protection and disposal



Old and defective devices should be disposed of in accordance with national and local environmental and recycling regulations. Electronic components may not be disposed of along with household waste.

17. CE certificate



EG - KONFORMITÄTSERKLÄRUNG EC DECLARATION OF CONFORMITY



Konformitätserklärung gemäß dem Gesetz über Funkanlagen und Telekommunikationsend-einrichtungen (FTEG) und der Richtlinie 1999/5/EG (R&TTE)
Declaration of Conformity in accordance with the Radio and Telecommunications Terminal Equipment Act (FTEG) and Directive 1999/5/EC (R&TTE Directive)

Hersteller: <i>Manufacturer:</i>	meteocontrol GmbH
Anschrift: <i>Address:</i>	Spichererstrasse 48 D – 86157 Augsburg Germany
Produkt: <i>Product:</i>	blue' Log X series MX module RS485/422 MX module Multi I/O MX module GPRS

Wir erklären, dass die genannten Produkte folgenden Dokumenten und Normen entsprechen:
We declare that the products described above are in compliance with following documents and norms:

Measurement of electromagnetic field strength and SAR
 DIN EN 50383: (2011-06)

Global System for Mobile communications (GSM)
 ETSI EN 301 511: V9.0.2 (2003-03)

Electromagnetic compatibility
 ETSI EN 301 489-1: V1.9.2 (2011-09)
 ETSI EN 301 489-7: V1.3.1 (2005-11)
 DIN EN 61000-6-2 (2011-06)
 DIN EN 61000-6-3 (2011-09)
 DIN EN 61000-6-4 (2011-09)

Electrical Safety
 EN 61010-1: (2010)
 IEC 61010-1 (ed.3)
 UL 61010-1: (2012-05)
 CSA C22.2 No. 61010-1 (2012-05)

Augsburg, 13.07.2015
 Ort, Datum
Place, date


Jens Wening
 Technischer Direktor
Technical Director

18. RoHS Statement



DECLARATION OF CONFORMITY 2011/65/EU (ROHS)

meteocontrol GmbH declares that all manufactured products are RoHS compliant according to the Directive 2011/65/EU of the European Parliament and the Council from 8 June 2011 on restriction of the use of certain hazardous substances in electrical and electronic appliances. This concerns the following substances whose concentrations must not be exceeded:

Lead	0.1 %
Mercury	0.1 %
Cadmium	0.01 %
Hexavalent chromium	0.1 %
Polybrominated biphenyls (PBB)	0.1 %
Polybrominated diphenyl ethers (PBDE)	0.1 %

Since we are guaranteed RoHS compliance by our suppliers, we, **meteocontrol GmbH**, can confirm with a clear conscience that all our products comply with the abovementioned Directive.

Augsburg, 23.02.2015

Place and Date


Jens Wening
Technical Director

Energy&Weather^lServices

Niederlassung Moers

Carl-Zeiss-Straße 46 | 47445 Moers

meteocontrol GmbH | Spicherer Straße 48 | 86157 Augsburg

Geschäftsführung | Martin Schneider | Robert Pfatischer

Amtsgericht Augsburg | HRB 16 415 | DE 19 45 56 368

Hypovereinsbank Augsburg |

IBAN DE97 7202 0070 6770 1156 02 BIC HYVEDEMM408



19. List of figures

Fig. 1: Overview of the blue'Log front panel	12
Fig. 2: Overview of the blue'Log rear panel.....	13
Fig. 3: Secure mounting on a DIN rail	17
Fig. 4: MX modules (example: RS485/422)	18
Fig. 5: Unlocking the fasteners	19
Fig. 6: Pulling off right-hand side cap.....	19
Fig. 7: Expansion socket.....	19
Fig. 8: Plugging expansion module into the blue'Log.	20
Fig. 9: Attached expansion module	20
Fig. 10: blue'Log and MX module connected and side cap attached	21
Fig. 11: blue'Log with various MX modules	22
Fig. 12: Order of installed MX modules	22
Fig. 13: blue'Log display: Start menu	28
Fig. 14: blue'Log display: Setting languages, quick access	28
Fig. 15: blue'Log display: User selection	29
Fig. 16: blue'Log display: DHCP enabled.....	30
Fig. 17: blue'Log display: DHCP disabled	30
Fig. 18: blue'Log display: Updating via USB	31
Fig. 19: blue'Log display: Licenses on the display	31
Fig. 20: Logging on to device websites	32
Fig. 21: blue'Log wizard information window	33
Fig. 22: blue'Log wizard navigation bar.....	33
Fig. 23: Device websites: Dashboard	34
Fig. 24: Device websites: Firmware update	42
Fig. 25: Device websites: Adding a new analog sensor	43
Fig. 26: Device websites: Sensor overview – analog sensors	44
Fig. 27: Device websites: Adding new modbus sensor.....	45
Fig. 28: Device websites: RS485/422 sensor interface configuration.....	46
Fig. 29: Device websites: Sensor overview – modbus sensors	46
Fig. 30: Device websites: Adding a new S0 meter.....	47
Fig. 31: Device websites: Meter overview – S0 meter.....	48
Fig. 32: Device websites: Adding new modbus meter	49
Fig. 33: Device websites: RS485/422 meter interface configuration.....	50

Fig. 34: Device websites: Modbus meter overview	50
Fig. 35: Device websites: Adding a new inverter.....	51
Fig. 36: Device websites: Inverter overview.....	51
Fig. 37: Device websites: String measuring system settings	52
Fig. 38: Device websites: String measuring system overview	52
Fig. 39: Device websites: Adding new battery system.....	53
Fig. 40: Device websites: Battery system overview.....	53
Fig. 41: Device websites: Latest alarms.....	54
Fig. 42: Device websites: Updating contact addresses	55
Fig. 43: Device websites: Alarm configuration.....	56
Fig. 44: Device websites: Selecting sensor diagram options.....	57
Fig. 45: Device websites: Selecting meter diagram options.....	58
Fig. 46: Device websites: Selecting inverter diagram options	59
Fig. 47: Device websites: Visualizing the measured data	60
Fig. 48: Device websites: Visualizing the real-time values.....	60
Fig. 49: Device websites: String measuring system.....	61
Fig. 50: Device websites: Selecting battery system diagram options.....	62
Fig. 51: Device websites: Selecting Power Control diagram options.....	63
Fig. 52: Device websites: Logbook.....	64
Fig. 53: Remote control system connection: Digital input (DI).....	66
Fig. 54: Remote control system connection: Analog input (AI).....	66
Fig. 55: Power Control: Overview.....	69
Fig. 56: Power Control: Master data logger mode.....	70
Fig. 57: Power Control: Slave data logger mode.....	71
Fig. 58: Power Control: System data	73
Fig. 59: Power Control: Active power regulation	74
Fig. 60: P(DI) Power Control procedure: Selecting the digital inputs	76
Fig. 61: P(DI) Power Control procedure: Reduction levels bitmask.....	77
Fig. 62: P(AI) Power Control procedure: Setting measured values	78
Fig. 63: P(fix) Power Control procedure: Setting the permanent reduction.....	79
Fig. 64: Power Control: Example IPL set-up	81
Fig. 65: Gradient limitation active power procedure: Time-discrete specification.....	82
Fig. 66: P procedure fallback value	84
Fig. 67: Power Control: Reactive power regulation.....	85
Fig. 68: cosφ(DI) Power Control procedure: Selecting the digital inputs.....	87

Fig. 69: $\cos\phi$ (DI) Power Control procedure: Specifications bitmask..... 88

Fig. 70: $\cos\phi$ (AI) Power Control procedure: Setting measured values 89

Fig. 71: $\cos\phi$ (fix) Power Control procedure: Setting the constant specified value 90

Fig. 72: $\cos\phi$ (P) Power Control procedure: 2 point without hysteresis 91

Fig. 73: $\cos\phi$ (P) Power Control procedure: 4 point with hysteresis..... 92

Fig. 74: $\cos\phi$ (U) Power Control procedure: 2 point without hysteresis 93

Fig. 75: $\cos\phi$ (U) Power Control procedure: 4 point with hysteresis 94

Fig. 76: Q(DI) Power Control procedure: Selecting the digital inputs 95

Fig. 77: Q(DI) Power Control procedure: Specifications bitmask..... 96

Fig. 78: Q(AI) Power Control procedure: Setting measured values 97

Fig. 79: Q(fix) Power Control procedure: Setting the constant specified value 98

Fig. 80: Q(U) Power Control procedure: 2 point with hysteresis 99

Fig. 81: Q(U) Power Control procedure: 2 point with hysteresis 100

Fig. 82: $Q(P \times \tan\phi$ (fix)) Power Control procedure: Specified reactive power curve .. 101

Fig. 83: Power Control reactive power procedure: Failover methods..... 105

Fig. 84: Gradient limitation reactive power procedure: Time-discrete specification ... 107

Fig. 85: Power Control reactive power procedure: Reactive power regulation..... 109

