

**Scope**

This document applies to the B-control Energy Manager EM210 and EM300 with LAN, WiFi or RS485 communication interface, depending on the version.

**Connection and set-up**

**DANGER**



**Danger of death by electric shock.**

Live components carry potentially fatal voltages.

- Before starting any installation or maintenance work, switch off the power to the distribution board and secure to prevent it being switched on again accidentally.
- Make sure that the conductors to be connected to the meter are voltage-free.
- All installation and maintenance work on this unit must be carried out by a trained and authorised electrician.

The Energy Manager is supplied with power via outer conductor L1. At least the outer conductor L1 and neutral conductor N need to be connected for the unit to switch on.

**Intended use**

The Energy Manager is a measuring device that measures electrical values at the point of connection and makes them available via LAN, WiFi or RS485.

This product is NOT an active electrical energy meter as defined by EU Directive 2004/22/EC (MID); it must only be used for internal accounting purposes. The data that the Energy Manager collects about the energy generated by your system may differ from the data from the main energy meter.

As it is classified as overvoltage category III, the Energy Manager must only be connected in the sub-distribution board or consumer unit, downstream of the electricity supply company's energy meter.

The Energy Manager is suitable for indoor use only.

The Energy Manager is approved for use in the EU Member States and the USA. Do not use the Energy Manager if it is damaged and then use only as described in the documentation provided. Any other use or the use of damaged units may result in injury or damage to property.

For safety reasons, the product (including the software) must NOT be modified and components must NOT be installed that are not expressly recommended or sold by TQ-Systems GmbH for this product. Any use of the product other than as described in the Intended use section shall be regarded as contrary to the intended use. Unauthorised changes, conversions or repairs and opening of the product are prohibited.

The enclosed documentation is part of the product and must be read, followed and then retained in a place that is accessible at all times.

**Supported products and software versions**

For information on the supported products, the individual functions of your preinstalled software and firmware updates, go to the B-control Energy Manager product page at [www.b-control.com](http://www.b-control.com).

**Items supplied**

- 1 x B-control Energy Manager EM210 or EM300
- 1 x Installation instructions
- RS485 variant: connector for RS485 interface

Please contact your dealer if you identify any damage or if the delivery is incomplete.

**Additional materials required (not supplied):**

- For the LAN connection:  
1 x Network cable
- For operation with current transformers:  
3 x Current transformers and current transformer connecting cables

**Safety instructions**

**DANGER**



**Danger of death by electric shock.**

Live components carry potentially fatal voltages.

- Only use the Energy Manager in a dry environment and keep it away from liquids.
- Install the Energy Manager only in approved enclosures or distribution boards downstream of the electricity supply company's meter so that the connections for the outer and neutral conductors are located behind a cover or guard to prevent accidental contact.
- The enclosure or distribution board must be accessible only with a key or suitable tool in order to limit access to authorised personnel.
- Before starting any installation or maintenance work, switch off the power to the distribution board and secure to prevent it being switched on again accidentally.
- Before cleaning, switch off the power to the Energy Manager and only use a dry cloth to clean.

- Maintain the prescribed minimum distances between the network cable and mains voltage installation components or use suitable insulation.

**NOTICE**

**Avoid damage to or destruction of the Energy Manager**

- Do not connect an ISDN cable to the Energy Manager's network connection.

**Damage to or destruction of the Energy Manager by voltage surges on the network cable**

If network cables are installed outside the building, voltage surges can be caused by lightning strike, for example.

- If installed outside the building, the network cable must be protected with suitable overvoltage protection.
- Protect your solar installation with inverters using suitable overvoltage protection.

**Damage to or destruction of the Energy Manager by improper use**

- Do not operate the Energy Manager outside the specified technical tolerances.

**Technical data**

Interfaces	LAN (10/100 Mbit) WiFi (802.11b/g/n) RS485 (half-duplex, max. 115200 baud)
Protection class	II
IP code	IP2X
Connection cross section in line with EN 60204	10-25 mm <sup>2</sup> * *Mechanical: 1.5-25 mm (e.g. for connecting external current transformers)
Tightening torque for screw terminals	2.0 Nm
Weight	0.3 kg
Dimensions	88x70x65 mm
Ambient temperature in operation	-25 °C...+45 °C
with reduced measuring current I <sub>N</sub> at 32 A	-25 °C...+55 °C
Ambient temperature during transportation / storage	-25 °C...+70 °C
Relative humidity (non-condensing)	Up to 75 % as an annual average, Up to 95 % on up to 30 days/year
Max. altitude during operation	2000 m above sea level

Mains power supply	
Starting current	< 25 mA
For devices <b>without</b> WiFi:	
Operating voltage at L1	110/230 V AC ± 10 %
Frequency range	50/60 Hz ± 5 %
Internal consumption P <sub>max</sub> LAN/RS485	3.0 W int/ext 3.0/3.5 W
For devices <b>with</b> WiFi:	
Operating voltage at L1	230 V AC ± 10 %
Frequency range	50 Hz ± 5 %
Internal consumption P <sub>max</sub> LAN/WiFi/RS485	int/ext 5.0/3.5 W
Measuring current circuit for measurement category III	
Limit current I <sub>N</sub> / phase	63 A
For devices <b>without</b> WiFi:	
Rated voltage	max. 230/400 V AC
Frequency range	50/60 Hz ± 5 %
For devices <b>with</b> WiFi:	
Rated voltage	230/400 V AC
Frequency range	50 Hz ± 5 %

**Operation of the Energy Manager at ambient temperature of 55 °C**

The following conditions apply to operation of the Energy Manager at ambient temperatures up to 55 °C:

- The Energy Manager must not be run continuously at ambient temperatures of 55 °C

**DANGER**



**Danger of death by electric shock or fire**

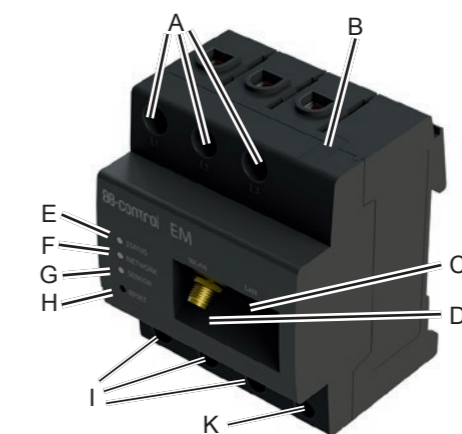
Live components carry potentially fatal voltages.

- Fuse protection must not exceed 32 A. External current transformers should be used for higher currents.
- The Energy Manager must be connected with cables that are at least 10 mm<sup>2</sup> in cross section and no less than 1 m long.

**Available versions**

- L: LAN interface
- LR: LAN and RS485 interface (only with suitable RS485 cable)
- LRW: LAN, WiFi and RS485 interface (only with suitable WiFi antenna, only with suitable RS485 cable)

**Product description**



A	Phase L1, L2, L3 outputs
B	RS485 interface
C	LAN interface
D	Connection for WiFi antenna
E	Status LED
F	Network LED
G	LED for RS485 bus / sensor LED
H	Reset button
I	Phase L1, L2, L3 inputs
K	Neutral conductor input

**RS485 interface**

Note the following points when connecting external devices to the RS485 interface of the B-control Energy Manager:

**Requirement for the cable:**

- Nominal voltage/wire insulation: 300 V RMS
- Cable cross section: 0.25 ... 1.5 mm<sup>2</sup>
- Cable type: Rigid or flexible
- Recommendation: Use AlphaWire standard cable, designation 2466C. Alternatively, a CAT5e cable can also be used.

**Requirement for cable installation:**

- In the area for connecting the RS485 interface on the Energy Manager, mechanical means must be provided to ensure that individual wires of the connecting cable are at least 10 mm away from live parts.
- The connecting cable must be run separately from the mains cables in the distribution board and on the permanent link.

**Requirements for the remote station:**

- The RS485 interface of the connected unit must meet the safety extra low voltage requirements.

**Connection diagram for RS485 connector:**

Pin	Identification	Description
1	VCC	Voltage output to supply external devices 9 V ± 10 % max. 280 mA
2	A	RS485 A
3	B	RS485 B
4	GND	Ground

Figure: The EM viewed from above WITHOUT connector

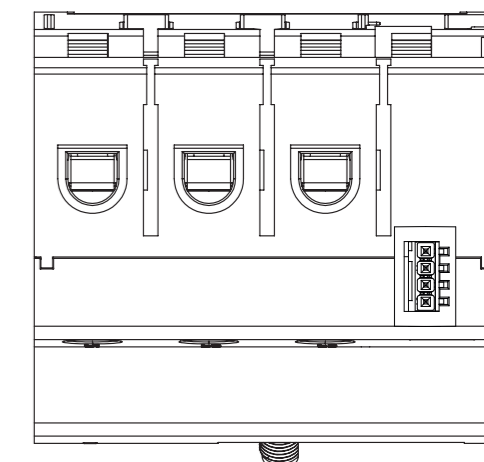


Figure: Enlarged detail of the figure from above WITH connector

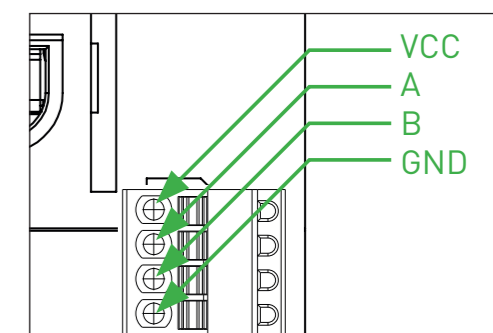
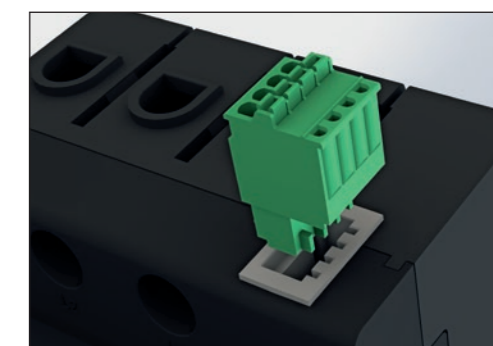


Figure: Energy Manager with connector at RS485 interface



**LED statuses**

**Status LED:**

- **Orange steady light:** Energy Manager restarting
- **Green steady light:** Energy Manager switched on
- **Green flashing slowly:** starting
- **Green flashing quickly:** firmware update in progress
- **Red steady light or flashing:** an error has occurred (see "Fault finding" section)

**Network LED:**

- **Off:** no connection
- **Green steady light:** connection active
- **Green flashing:** network activity

**Sensor LED:**

- **Green steady light:** sensors are ready-to-operate
- **Orange or red-green flashing:** At least one sensor / Smart Heater is not responding
- **Green flashing:** Communicating with the sensor / Smart Heater

### Electrical connection for direct measurement

It must be ensured that the maximum permitted current of 63 A per phase is not exceeded (by fitting a fuse, for example).

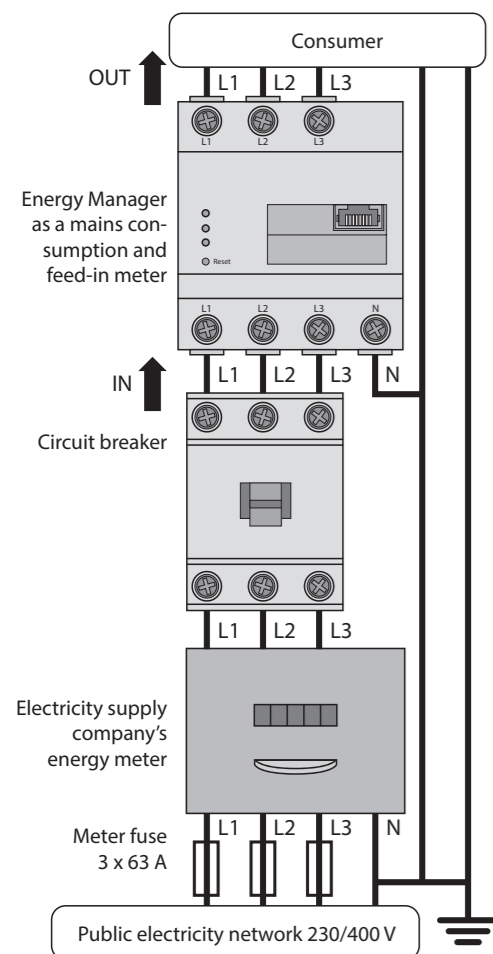
1. Install the Energy Manager on a DIN rail. To do this, hook the Energy Manager onto the top edge of the DIN rail and press down until it latches into place.
2. Connect the conductors to the Energy Manager. Do not exceed the permitted connection cross section and tightening torque for the screw terminals (see the "Technical data" section):
  - For a three phase power network, connect the outer conductors L1, L2 and L3 and the neutral conductor N to the Energy Manager as shown in the connection diagram.
  - For a single phase power network, connect the outer conductor L1 and neutral conductor N to the Energy Manager as shown in the connection diagram.

The following figure contains a connection example.

The end user must be able to isolate the B-control Energy Manager from the power supply by means of a freely accessible meter fuse or an additional circuit-breaker.

Designation	Explanation
L1, L2, L3	Outer conductor
N	Neutral conductor
OUT	Meter output, consumer side
IN	Meter input, mains side

Figure: Connection for direct measurement



### Electrical connection for indirect measurement with current transformers

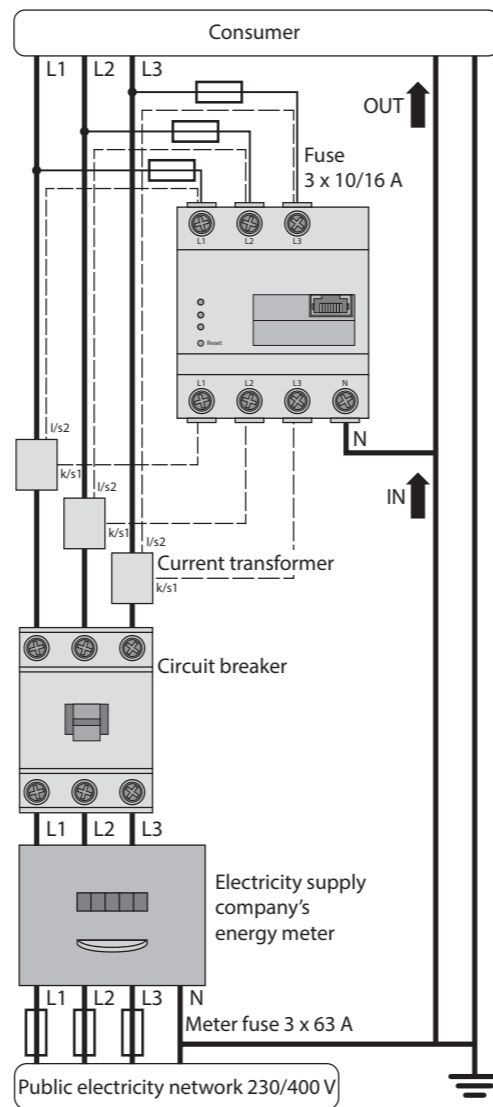
1. Install the Energy Manager on a DIN rail. To do this, hook the Energy Manager onto the top edge of the DIN rail and press down until it latches into place.
2. Connect a current transformer to each outer conductor L1, L2 and L3.
3. Connect a cable for the secondary current measurement to terminals k/S1 and I/S2 on each current transformer. Do not exceed the permitted connection cross section and tightening torque for the screw terminals (see the "Technical data" section).
4. Connect the connecting cable for the current measurement to the Energy Manager and do not exceed the permitted tightening torque for screw terminals (see the "Technical data" section).
5. Connect the connecting cable for the voltage measurement to the Energy Manager and do not exceed the permitted tightening torque for screw terminals (see the "Technical data" section).
6. Connect the connecting cables for the voltage measurement to the outer conductors L1, L2 and L3.

The following figure contains a connection example.

The end user must be able to isolate the B-control Energy Manager from the power supply by means of a freely accessible meter fuse or an additional circuit-breaker.

Designation	Explanation
L1, L2, L3	Outer conductor
N	Neutral conductor
OUT	Meter output, consumer side
IN	Meter input, mains side

Figure: Connection for indirect measurement with current transformers



### Set-up

Note: Only start up the Energy Manager with a PC / laptop.

1. Attach the cover or the contact guard of the sub-distribution board to the Energy Manager.

#### A) Connecting to the Energy Manager via LAN

- 2A. Connect the network cable to the network connection of the Energy Manager.
- 3A. Connect the other end of the network cable to a router/switch or directly to the PC/laptop.
- 4A. Restore the power to the sub-distribution board.
  - The LEDs on the Energy Manager light up during start-up.

#### B) Connecting to the Energy Manager via WiFi

- Note: The integrated WiFi interface and the DHCP server function are enabled in the Energy Manager at the factory.
- 2B. Restore the power to the sub-distribution board.
    - The LEDs on the Energy Manager light up during start-up.
  - 3B. Select the Energy Manager's WiFi network ("B-control-EM") on the PC/laptop.
  - 4B. Enter the WiFi password (network key) for the Energy Manager ("bcon210pw" on the EM210, "bcon300pw" on the EM300) and connect to the Energy Manager WiFi.
  - 5B. To call up the Energy Manager's user interface, enter the Energy Manager's static IP address "http://192.168.1.1" in your browser's address line.

### Start the user interface

#### Find the Energy Manager on the network (using the UPnP function)

Note: The UPnP function is enabled in the Energy Manager at the factory.

1. Open File Explorer and select the "Network" option under the drives.
2. The Energy Manager appears with the other network devices such as printers.
3. Double-click the device icon with the B-control-EM label to open the browser with the Energy Manager user interface.

#### Call up the user interface by name resolution (convenient call when installing an individual unit)

1. Enter the URL "http://b-control-em" in your browser's address line.
2. Press Enter
  - The Energy Manager user interface opens.
  - Did the Energy Manager user interface not open? Eliminate the error (see the "Fault finding" section).

### Start the user interface using the B-control Finder

1. Download and start the "B-control Finder" on the product page at [www.b-control.com](http://www.b-control.com).

### Reset the Energy Manager's network and WiFi settings

- Use a pointed object to press the Reset button for between 2 and 6 seconds.

### Restart the Energy Manager

- Use a pointed object to press the Reset button for at least 6 seconds.

### Fault finding

#### The status LED does not light up.

The Energy Manager is not being supplied with power.

- Make sure that at least the outer conductor L1 and the neutral conductor N are connected to the Energy Manager.

#### The status LED lights up or flashes red.

An error has occurred.

- Restart the Energy Manager (see the "Restart the Energy Manager" section).
- Please contact your service engineer or installation engineer.

#### The network LED does not light up or the Energy Manager is not found on the network.

The network cable is not plugged into the network connection correctly.

- Make sure that the network cable is plugged into the network connection correctly.

The Energy Manager is not on the same local area network.

- Connect the Energy Manager to the same router/switch.

#### The sensor LED flashes orange or red-green.

- Check the message under Sensor Settings on the Web interface to identify which sensors / Smart Heaters are no longer responding. If necessary, test the wiring to the sensor / Smart Heater or replace the sensor / Smart Heater.

#### The Energy Manager returns unrealistic measured values.

The Energy Manager was installed upside down.

- Check connections L1 to L3 again.
- The current transformers are not configured. Under Device Settings > CT ratio, activate the current transformer and set the correct transformer ratio.

### The user interface cannot be started with the URL "http://b-control-em".

- Download and start the "B-control Finder" on the product page at [www.b-control.com](http://www.b-control.com).

The name resolution is not working.

- Start the user interface via the Energy Manager's current IP address. To do this, start the user interface for the router and look up the IP address of the Energy Manager (see the router instruction manual).
- For Windows XP/7/8: Install Apple Bonjour® (download links at [www.apple.com](http://www.apple.com)). Hint: Apple Bonjour® is also contained in Apple iTunes®).
- Contact the network administrator.
- Further notes can be found in the FAQs at [www.b-control.com](http://www.b-control.com).

### Environmentally-friendly disposal

Dispose of the Energy Manager in accordance with the electronic waste disposal regulations that apply on site.

### Open source licenses

This product also contains open source software that was developed by third parties. This relates, in particular, to the GPL and LGPL licenses.

You will find the license text and associated notes on the Energy Manager user interface.

### Contact

If you have technical problems, please contact your service engineer or installation engineer.

TQ-Systems GmbH  
B-control Alliance Partner  
Mühlstr. 2 | Gut Delling  
D-82229 Seefeld  
Germany  
Internet: [www.b-control.com](http://www.b-control.com)