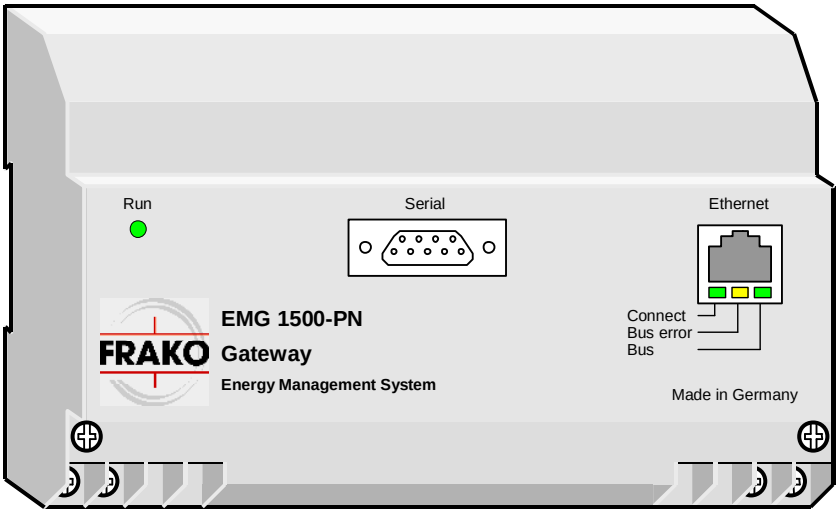
EMG 1500-PN

Operating manual

Gateway EMG 1500 - PN



Safety instructions

!!! Important, read before commissioning !!!

- The user must ensure that all operators are familiar with these operating instructions and follow them at all times.
- The operating instructions must be read carefully before the instrument is mounted, installed and commissioned.
- All actions taken must follow the operating manual.
- The installation and commissioning may only be carried out by appropriately qualified personnel with due regard for all rules and regulations that are in force.
- The instrument contains live components at the AC supply voltage and must therefore not be opened.
- If the instrument is visibly damaged, it must not be installed, wired up or commissioned.
- If the instrument does not work after commissioning, it must again be isolated from the mains.
- Any further laws, standards, guidelines, etc. relevant to this product must be complied with.

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1. Quick start

- **Before installation:**

  The EMG 1500-PN only requires the serial interface in order to assign the IP address. It can therefore make life easier to do this before the instrument is installed in the control cabinet.

  ⇒ The instrument is connected according to the wiring diagram Figure 1 on page 6. Only the connection to the power supply is needed.

  ⇒ The EMG 1500-PN is connected to the PC by a null-modem (crossover) cable (see Section 3.2.4, page 8).
  The software EMG-SW is used to carry out all network settings i.e. IP address, subnet mask and gateway.
  (see Section4.3, page 9)

  ⇒ The supply voltage must then be removed from the instrument.

- **Installation:**

  ⇒ The instrument is mounted by snapping it over a DIN rail.

  ⇒ The instrument is connected according to the wiring diagram Figure 1 on page 6.

  Important:
  The instrument must be disconnected from the power supply when being installed or serviced.

- **Commissioning:**

  If the instrument has not yet been assigned an IP address, this procedure must be carried out as described above under " **Before installation**".

  ⇒ If appropriate, the bus address must be adapted for the FRAKO Starkstrombus®. The factory default setting is Bus Address 1 (see Section 4.4, page 11).

2. Function

The EMG 1500–PN Gateway serves as interface between the Ethernet and the FRAKO Starkstrombus®.

2.1 Operating principle of the EMG 1500-PN

Polling signals are sent to the EMG 1500-PN via the Ethernet. These are converted into polling commands in the FRAKO Starkstrombus®. The response from the instrument addressed is then returned via the Ethernet. The EMG 1500-PN Gateway is capable of serving several Ethernet connections simultaneously.

2.2 Communication with the EMG 1500-PN

Various programs and devices can be linked to the EMG 1500-PN Gateway.

- The SYSTEM-SW is used to configure the EMG 1500-PN.
- The EMIS 1500 central unit uses the EMG 1500-PN to access the individual instruments in the Energy Management System and collect their data.
- The Setup programs for the individual EM (Energy Management) instruments such as EMA-SW, EMR-SW or OPT-SW, are also able to be connected to the appropriate instruments via the EMG 1500-PN.

2.3 Connections

The EMG 1500-PN is provided with connections for the power supply (230V AC) and three communications connections.

- an RJ-45 Ethernet jack
- a FRAKO Starkstrombus® connection (RS 485)
- an RS 232 connection (9-pin D Sub)

2.4 Display

The EMG 1500-PN has 4 LED annunciators. If the **Run** LED flashes, this indicates that the instrument is working correctly. The 3 other LEDs indicate the status of data transmission
(see Section 5.1, page 12)

3. Installation

3.1 Mounting

The EMG 1500-PN has a standardized enclosure for mounting on a 35mm DIN rail. It can be mounted in any orientation.

Important:

The instrument is only intended for installation in distribution boards or control cabinets. When the instrument is in operation, it must not be possible to touch the instrument terminals.

3.2 Electrical connections

The instrument is connected according to the wiring diagram on this page.

Important:

The instrument must be disconnected from the power supply when being installed or serviced.

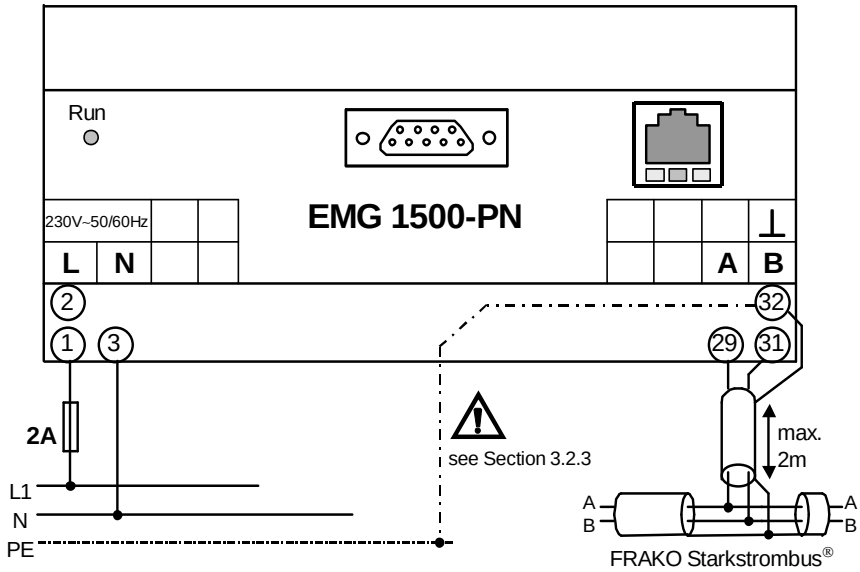


Figure 1: Wiring diagram

3.2.1 Power supply

The instrument requires a 230 V AC, 50/60 Hz power supply. Der This is connected at the "**230V~**" terminals as shown in the wiring diagram Figure 1, Seite 6.

Important:

The instrument power supply must be provided with 2 A external overcurrent protection.

3.2.2 Connection to the Ethernet

The EMG 1500-PN is connected to a hub or switch via the shielded RJ45 jack (10BaseT) at the front of the instrument. The pin assignment corresponds to that of an MDI port, so that a 1:1 cable must be used.

3.2.3 Connection to the FRAKO Starkstrombus®

The terminals "**Bus A**", "**Bus B**" and "**Bus ⊥**" are provided for connecting to the FRAKO Starkstrombus® as shown in Figure 1, on page 6.
The two poles of the two-wire bus are connected to terminals "A" and "B", attention being paid to the correct polarity, while the shielding is connected to the "⊥" terminal. The "A" terminal is thus connected with all the other A terminals of the bus, and the same applies to the B and "⊥" terminals. (No crossover in the cables!)

Important:

The bus shielding (⊥) must be earthed <u>only at one point</u> in the bus system. If this has not already been arranged at another point, it should be done at the EMG 1500-PN.

The bus must have a single-segment topology, all instruments being patched in to this segment or connected to it by a drop line up to 2 m in length. Star topologies can be constructed by using a repeater (component EMB 1101).

The total length of the bus should not exceed 1200 m. A repeater (component EMB 1101) must be installed in the line if greater distances are needed.

Terminator resistors must be connected at the beginning and at the end of a bus segment. A 120 ohm resistor is connected between terminals “A” and “B”. In bus systems with less than 4 devices connected a 1 kohm resistor must also be in place between the “A” and “⊥” terminals. The resistors must have a 250 mW power rating.

Recommended cable types:
Surge impedance 100 - 120Ω; Ø ≥ 0,3mm²; twisted together and shielded;

Types:

Manufacturer	cable-type	order number	cable Ø
	Twinax 105 Ω		
Lapp	Unitronic® Bus CAN 1x2x0,34	2170263	6,8 mm
Helukabel	CAN BUS 1x2x0,34	801572	6,5 mm
Leoni	L-02YSCY 1x2x0.34/2.0-120 VI	L45551-P21-C5	6,8 mm

Note:
Always avoid mixing various cable types.

3.2.4 RS-232 connection

The EMG 1500-PN must be configured using the “SYSTEM-SW” software. To do this the instrument is connected to a PC by a crossover RS-232 (null-modem) cable. This cable is not included in the scope of supply.

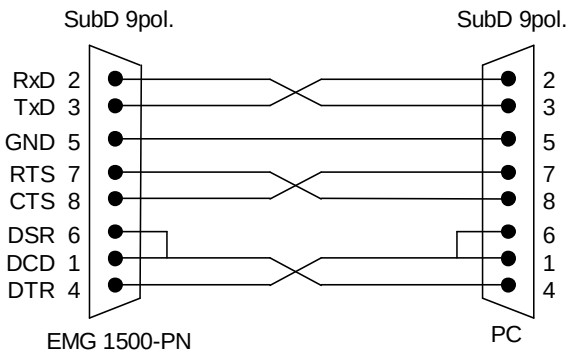


Figure 2: RS-232 cable

4. Commissioning

4.1 Preparations before commissioning

Caution:

It must be ensured that the instrument terminals can no longer be touched before the instrument is commissioned. This can be by means of a closed cabinet door, a protective hood or similar.

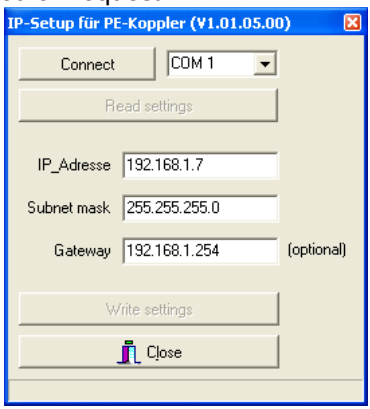
Once the installation has been completed as in Section 3 and the above safety notice has been complied with, the EMG 1500-PN can be powered up and commissioned.

4.2 Instrument self-test

The **Run** LED comes on when the power supply to the instrument has been switched on. After about 20 seconds the EMG 1500-PN is ready to operate and the **Run** LED begins to flash once per second.

4.3 Assigning an IP address

The EMG 1500-PN requires a unique IP address before it can be accessed via the Ethernet. The address is assigned using the software “EMG-SW” supplied as part of the package together with the “FRAKO-NET” software or supplied on request.



This software enables the user to assign the EMG 1500 an IP address, a subnet mask and a gateway address. To do this, however there must be a serial connection between the EMG 1500-PN and the PC (see also Section 3.2.4, page 8)

The assignment of a gateway address is optional. If this entry field is cleared, no gateway address is assigned to the EMG 1500-PN.

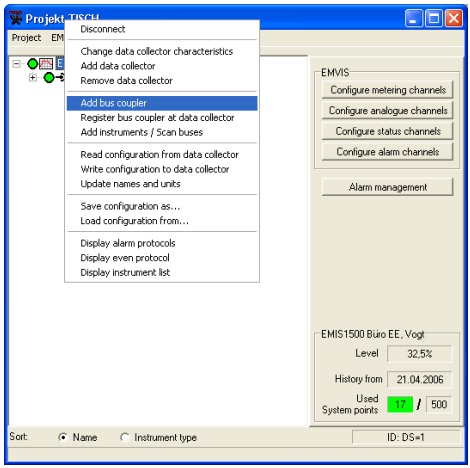
Clicking the **Write settings** transfers the data to the EMG 1500-PN where they are saved in non-volatile memory. The instrument must then be restarted for the new settings to become effective (switch AC power supply off and on again).

Important:

The specified gateway must be located within the subnetwork concerned. The specified subnet mask must comply with the IP rules.

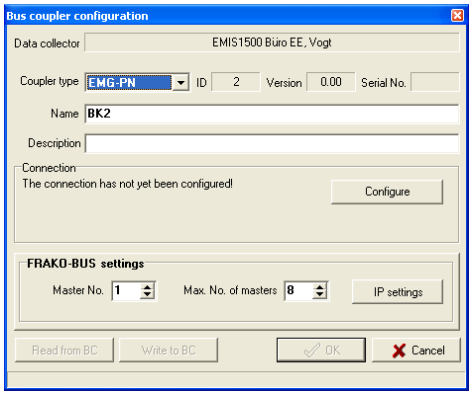
4.3.1 Assigning the IP address using „SYSTEM-SW“

It is only possible to assign this address if the program SYSTEM-SW is installed on the PC.



A further requirement is also that at least one project has already been created with this software. In this project there is at least one data collector of the type EMIS 1500. In addition, a connection with this data collector must be in existence.

An additional bus coupler can be added by clicking the right mouse button with the cursor on the data collector. A dialog box is displayed in which the coupler type “**EMG-PN”** must be selected. The device can then also be assigned a name and a descriptive text.



- Clicking the **Configure** button informs the EMIS 1500 how the EMG 1500-PN is to be addressed.
- Clicking the **IP Settings** button displays the EMG-SW configuration software, enabling the user to assign the EMG 1500-PN an IP address (see section 4.3, page 9).

4.4 Assigning a bus address

Every device connected to the FRAKO Starkstrombus® must have a unique bus address. As factory default setting the EMG 1500-PN has the bus address 1.

The software SYSTEM-SW can be used to assign the EMG 1500-PN another bus address in the "Bus coupler configuration" dialog box. The setting "Max. Number of masters" should not be changed and should remain set at 8.

Important:

Each bus address may only be assigned once within a bus system. For larger systems it is recommended to draw up a table of bus addresses.

4.5 The Ethernet connection

At the latest 10 to 15 seconds after switching on the instrument an Ethernet connection to the nearest hub or switch must have been established. There is otherwise a risk that the Ethernet driver will not be loaded in the EMG 1500-PN.

Unplugging or plugging in the Ethernet cable during operation has no effect.

5. Instrument operation

Once the instrument has been installed (see Section 3) and commissioned (see Section 4) no further adjustments are necessary.

5.1 Displays

When the **Run** LED flashes, this indicates that the EMG 1500-PN is in operation. This LED comes on continuously (i.e. without flashing) for the first 20 seconds after the instrument is switched on.

The **Connect** LED indicates that at least one Ethernet connection has been established with the EMG 1500-PN.

The **Bus error** LED indicates that there are bus-related problems in the FRAKO Starkstrombus®. Each time this LED comes on, it indicates that there has been an error in the data transfer.

The **Bus** LED indicates data transfer between the Ethernet and the FRAKO Starkstrombus®.

5.2 Multiple connections

The EMG 1500-PN is able to maintain several connections simultaneously. This offers a possibility of several EMIS 1500 and/or several programs (e.g. OPT-SW or EMA-SW) communicating at the same time via the same EMG 1500-PN.

Inevitably this means that the data transmission rates for the individual programs or the EMIS 1500 instruments are reduced.

6. Guide to commissioning and troubleshooting

Malfunction:	**Possible cause:**	**Remedy:**
On start-up the **Run** LED does not come on or flash.	No power supply or incorrect voltage.	Check power connections (see Figure 1 on page 6)
After the IP address has been configured, there is no signal from the device.	The new IP address has not been adopted.	Switch the device off and then on again.
After the Ethernet cable has been plugged in, the device cannot be accessed.	During device start-up no Ethernet connection could be detected.	Switch the device off and then on again.
The **Bus error** LED comes on.	One or more EM devices on the FRAKO-Starkstrombus cannot be accessed.	Check bus connections to the devices (see Section 3.2.3)
		Check whether the correct bus address has been set in the device.
The **Bus error** LED flashes occasionally.	Poor bus connection to the devices.	Check the device bus connections (see Section 3.2.3)

7. Technical data

Device power supply:

Voltage:	230V AC ± 10%
Frequency:	45Hz to 65 Hz
Power draw:	approx. 10 VA
Protective measures:	to VDE 0411 Protection Class II (also EN 61 010 - 1)

Serial interface:

Type	RS232 V.24
Protocol:	FRAKO internal protocol
Transmission:	115200 Baud, 8N1

Connection to FRAKO Starkstrombus®:

Electrical connection:	as per EIA RS 485
Transmission rate:	76,8 kbit/sec
Protocol:	FRAKO-Starkstrombus®

Ethernet interface:

Plug:	RJ45
Transmission:	10BaseT, half duplex

Mechanical design:

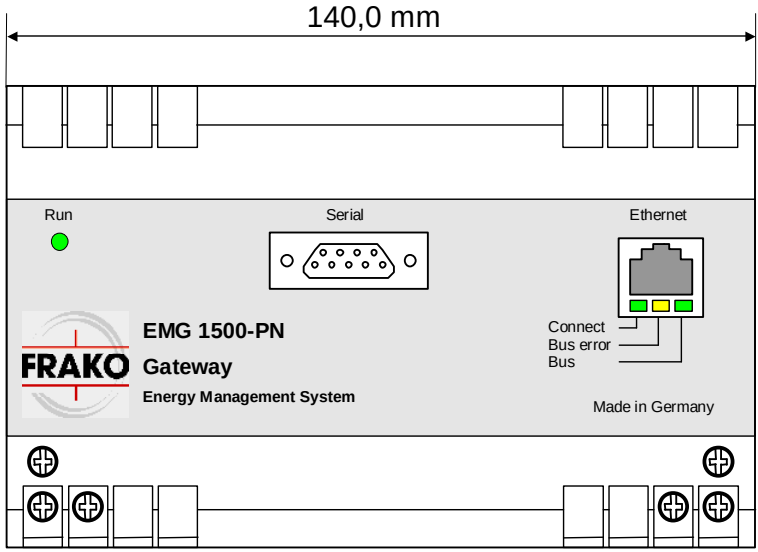
Enclosure material:	PC mit 10% GF, V-0 flame retardant to UL-94 V-0
Dimensions:	140 x 90 x 59 mm (W x H x D) see Figure 3
Weight:	0.50 kg
Mounting:	on DIN standard 35 mm rail
Orientation:	as desired
Electrical connections:	screw terminals
Max. conductor cross section:	2,5 mm²

Operating conditions:

Ambient temperature:	0℃ to 50C°

Ingress protection:

Enclosure / terminals:	IP 40 / IP 20



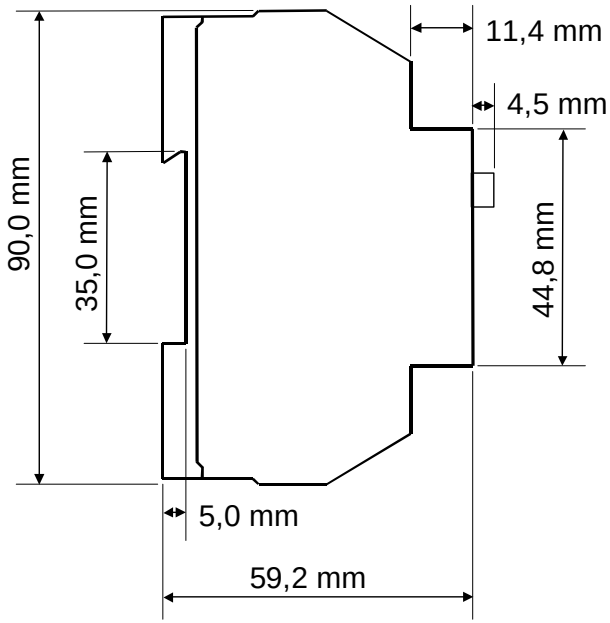


Figure 3: Enclosure dimensions

EMG 1500-PN

Sales programme

Power capacitors for low voltage
Power factor correction systems
Power factor correction systems with reactors
Modules for power factor correction systems
Active filters
Dynamic compensation of harmonics
Reactive power control relays
Maximum demand control systems
Mains monitoring instruments
Cost allocation
Energy management systems

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Subject to technical alteration

Reliable energy solutions.

FRAKO Kondensatoren- und Anlagenbau GmbH
Tscheulinstr. 21a · D-79331 Teningen · Germany
Phone +49 7641/453-0 · Fax +49 7641 / 453-545
http://www.frako.de · E-Mail: info@frako.de

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