



MODERN ENERGY MONITORING

# EM-SC/FC Installation Manual

2020-09

## 1. Introduction



► This installation manual contains important information regarding the installation of the eTactica Power Meter (models EM-SC and EM-FC), which must be followed.

- Read the entire manual before beginning the installation in order to avoid making mistakes and to reduce the chances of any danger during the installation process.
- Pay attention to the installation instructions and be prepared to look them up during the installation process.

## 2. Safety Information

This manual contains information which you must observe for your own personal safety and the prevention of injury or damage. Such information is highlighted by the warning triangle shown below.

### Hazard classification

#### DANGER

This warning indicates danger with high risk, which if not avoided, can lead to death or serious injuries.

#### WARNING

This warning indicates danger with medium risk, which if not avoided, can lead to serious or major injuries.

#### CAREFUL

This warning indicates a lower risk, which if not avoided, can lead to minor or major injuries.

#### ATTENTION

This warning indicates that there is important information regarding the product or its parts requiring particular attention.

### Installation Information

#### WARNING

- Be sure to observe all hazard statements and warnings and cautions.
- Read the section entitled "Safety Information" very carefully.

### Safety Notes

#### DANGER

##### **Risk of lethal electric shock.**

- Risk of lethal electric shock: Lethal voltages are present in the live components.
- Install the Power Meter only in approved cabinets or housings so that the connectors between the current transformers (CTs) and Power Meter are appropriately covered and protected.
- To restrict access by unauthorized persons, the electrical cabinet shall be locked, with only authorized persons having access. Turn the power off before installation or maintenance, and provide protection against unintentional power-up during work.
- Install the Power Meter in a dry environment.

- Protect the Power Meter from humidity and moisture.
- Turn power off before commencing the installation or maintenance work and provide protection against unintentional power-up during work.
- Ensure that no voltage is being supplied to the conductors.

#### WARNING

- Always install data and power cables so that they are separated (Refer to DIN EN 50174-2).

#### ATTENTION

To prevent damage caused by a power surge, the Power Meter should be protected by a surge arrester (SPD Type 1) and surge protector (SPD Type 2).

- Make sure that the power source which supplies the Power Meter with voltage can be switched off easily, for example via a C2 or B6 miniature circuit breaker. This must be marked as the disconnecting device for the power source and be easily accessible.
- No maintenance on the Power Meter is required.

## 3. Target Group

The activities described in this document may only be carried out by a certified electrician with the following qualifications:

- Training in the installation and commissioning of electrical equipment.
- Safety regulations training in electrical hazards and safety.
- Knowledge of relevant standards and guidelines.

## 4. Description

The Power Meter with current transformers is intended for measuring mains connections in a cabinet or sub-cabinet, for either single or three-phase installations. The Power Meter continuously measures voltage, current, power factor, cumulative active and reactive energy, and line frequency. The measured data is available by a standard Modbus RTU interface. The Power Meter is offered in two versions: EM-SC for clamp-on CTs (0-80A, 0-200A, 0-500A, all 100mA secondary) and EM-FC using flexible coil CTs (0-1000A, 0-2000A, 0-3000A, all with an integrator with 333mV output). The CTs or flexible coils are placed on the mains conductors and register the current amperage.

## 5. Intended Use

The Power Meter must only be used when installed in an appropriately protected cabinet, in a dry indoor space. Install the Power Meter according to the instructions in this manual. Other uses or installation methods may lead to personal injury or damage to property. This includes any modifications to the Power Meter, unless specifically authorized by eTactica ehf. Any other use of the product aside from its intended use, as described in this manual, is deemed to be improper. Unauthorized alterations, modifications, repairs, or opening of the product casing will void the warranty and are prohibited. This manual is a part of the product and must be read, followed, and kept accessible at all times.

## 6. Disposal

The Power Meter and CTs must not be placed in regular waste disposal.



► Dispose of the Power Meter and CTs in accordance with your local regulations on electronic waste.

## 7. Contact Information

In case of any technical problems with this product, please contact

eTactica ehf  
 Borgartun 27  
 105 Reykjavik  
 Iceland

Tel: +354 535 3000  
 Internet: <http://www.etactica.com>  
 Email: [support@etactica.com](mailto:support@etactica.com)

## 8. What is in the box

Designation	Article no.	Quantity
Power Meter by type:		1
EM-SC	5060474160575	
EM-FC	5060474160483	
Current Transformer:		3
SC-80 (80A)	5060474160216	
SC-200 (200A)	5060474160223	
SC-500 (500A)	5060474160230	
FC-1000 (1000A)	5060474160247	
FC-2000 (2000A)	5060474160254	
FC-3000 (3000A)	5060474160261	
Device bus connector	822350424318	1
Voltage connector	GMSTB2,5/4-ST 7,62	1
Current transformer connector	BCP-500- 6 GN	1
Installation manual		1

## 9. Product Diagram

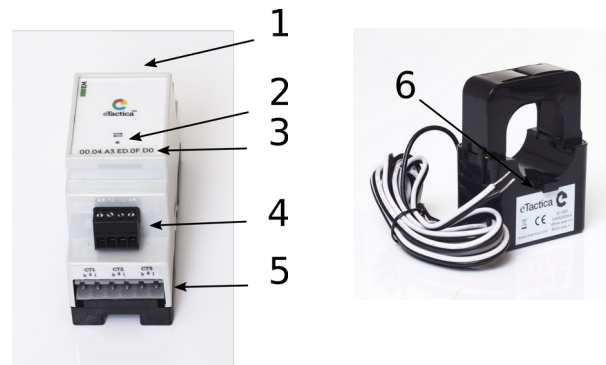


Figure 1: Power meter and current transformer

PART	DESCRIPTION
1	Voltage connector
2	Status LED
3	Serial Number
4	Device bus connector
5	Current Sensor connector (CT or coils)
6	Cable tie mounting tabs

## 10. Technical Data

	EM-SC	EM-FC
Voltage Measurement range	230 VAC ± 10% L1-N, L2-N, L3-N	
Operating frequency	50 and 60 Hz ± 2 %	
Current input range	0-100 mA AC RMS	0-333 mV AC RMS
Power supply (mains side)	230 VAC ± 10% L1..N	
Power supply (device bus)	5-24V DC at max 20 mA	
Measurement category	CAT III 300 V	
Pollution degree	2	
Housing protection	IP2X	
Temperature	Storage: -25°C to 70°C Operating: -5°C to 55°C CA	
Relative humidity	50 % to 90 %	
Altitude	< 2000m ASL	
Accuracy	Class 1 IEC-61557-12	
Safety	EN 61010-1:2010, EN 61010-2-30:2010	

Device Bus	
RS485 bus	2/3 wire Half duplex, 1 unit load
RS485 Isolation	From mains voltage: yes 5kVrms From DC supply: no
Interface protocol	Modbus/RTU - 19200@8E1 (default) (9600-115200 available)
Modbus address	Default last byte of serial number, <a href="#">see pos 3 in Figure 1</a> (Configurable)
Wire size – Device bus	0.25 mm <sup>2</sup> - 1.5 mm <sup>2</sup>
Wire size – Voltage measurement	0.2 mm <sup>2</sup> - 2.5 mm <sup>2</sup>
Wire size – Current sensors	0.2 mm <sup>2</sup> - 2.5 mm <sup>2</sup>

#### ATTENTION

- ▶ The current transformers may not be installed in equipment where they exceed 75 percent of the wiring space of any cross-sectional area within the equipment
- ▶ Restrict installation of current transformer in an area where it would block ventilation openings
- ▶ Restrict installation of current transformers in an area of breaker arc venting
- ▶ Secure current transformer and route conductors so that they do not directly contact live terminals or bus
- ▶ The CTs are not suitable for Class 2 wiring methods and not intended for connection to Class 2 equipment.
- ▶ For installation of flexible coils, see separate document.

#### Installing Voltage Connection

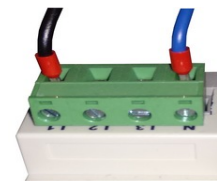


Figure 3: Wiring the voltage input connection to the power meter

- ▶ Connect a wire from L1 (phase 1) and N (Neutral) to the appropriate place on the screw terminal plug (see label on box).
- ▶ Repeat for L2 and L3 in three phase installations only.
- ▶ Plug the terminal plug into the Power Meter ([See position 2 in Figure 1](#)).

**ATTENTION** Make sure the phase connections are in the correct order

## 11. Installation Information

To install the Power Meter you will need the following:

- ▶ An insulated screwdriver.
- ▶ Device bus cabling, either premade cables from eTactica or custom made
- ▶ Cable ties.

### Installing Current Transformers

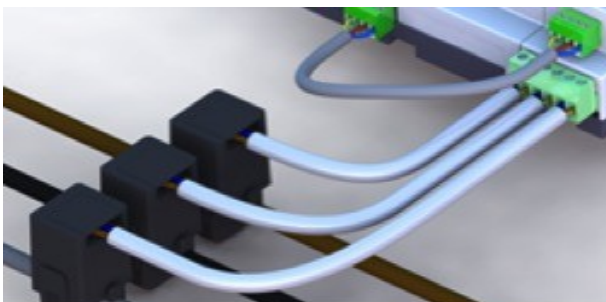


Figure 2: Installing current transformers

- ▶ Connect the wires from each CT to the Power Meter. Note the polarity, 'k' and 'l' markings on the CT should match the 'k' and 'l' markings on the EM-SC/FC
- ▶ Clamp the CT onto the conductor for L1 (phase 1). (Fig. 2). Note the polarity of the CT, the arrow on the CT should point towards the load.
- ▶ Repeat for L2 and L3 in three phase installations only.
- ▶ Fasten the CTs to the conductors with cable ties by using the tabs on the CT ([See position 6 in Figure 1](#)).
- ▶ The phases of the CTs should match the phases of the voltage inputs.

**⚠ WARNING**

- ▶ To reduce the risk of electric shock, always open or disconnect circuit from power distribution system (or service) or building before installing or servicing current transformers

## Connecting Device bus to Modbus Master

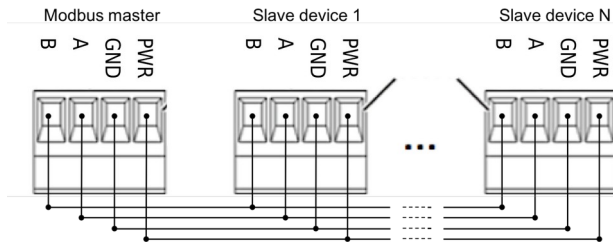


Figure 4: Wiring the Power Meter to the Modbus Master

As intended for a standard RS-485 network, all devices should be daisy chained (no branches, no loops) with the eTactica Gateway or suitable Modbus master at one end.

Modular premade cables comprising a "head" piece for the Gateway, multiple "Y" pieces for intermediate devices and a "tail" piece with built in 120 Ohm termination are available separately from eTactica to make installation plug and play

- ▶ Alternatively, refer to figure 4 for terminal assignments.
- ▶ While connecting devices, record the serial of each device, and the names/purpose of each measured channel. This will enable you to assign a useful cabinet model and share this information with your chosen software platforms.
- ▶ Connect the cable to the Power Meter ([See position 4 in Figure 1](#)).

## 12. LED Status indication

A LED light ([See position 2 in Figure 1](#)) indicates the status of the device.

LED PATTERN	DESCRIPTION
Fast blinking - 7 Hz	Bootloader running, will continue to normal operation after 5 seconds
Blinking - 1 Hz	The Power Meter is working as expected and is collecting and sending data
No blinking – always on	The Power Meter is powered, but is not receiving Modbus requests. Possible causes: ▶ RS485 is not wired correctly ▶ The Modbus master has not made a request in more than 30 seconds
No blinking – always off	The Power Meter is not powered. Check the wiring
Fast blinking – 2 Hz	Status error. Possible causes: Power factor is below 0.4. Please check the phases of the voltage match the phases of the Cts/Flexible Coils
Pattern fast blinking – 15 Hz	Device identification mode. Modbus masters can use this to help identify devices during configuration
Fast blinking – 15 Hz	Firmware update in progress

### 13. Appendix 1: Cabinet wiring diagrams

#### Single phase installation

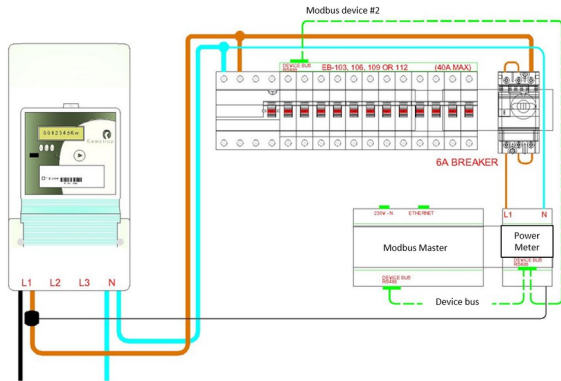


Figure 5: Single phase installation diagram

#### Three phase installation

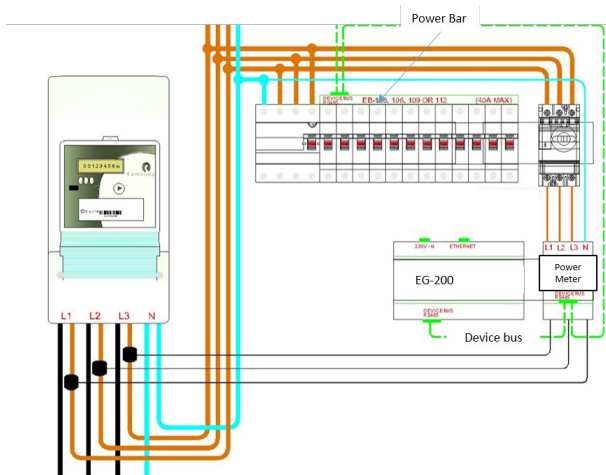


Figure 6: Three phase installation diagram

### 14. Revision History

REVISION	DESCRIPTION	AUTHOR
2020-09	Initial release	KJP