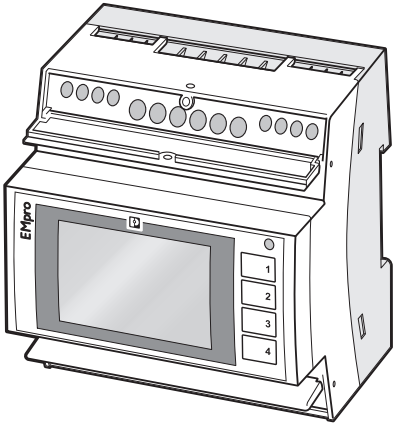
eDLB2.0



Installation manual

Technical guidance

ENOVATES

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to get the latest update of the manual
https://www.enovates.com/download/edlb-installation-manual/

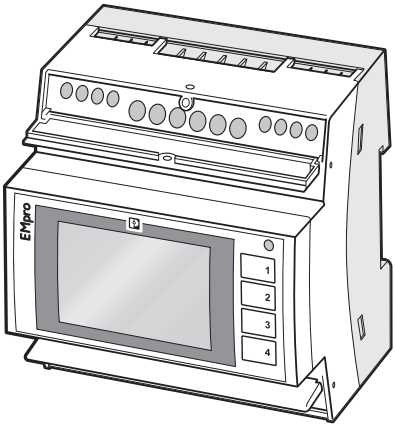
Contents

1. INTRODUCTION

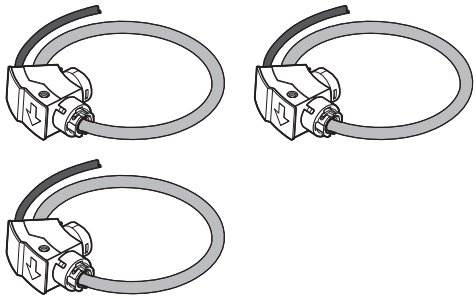
This manual is a technical guidance for installing an eDLB, a device for active load balancing in a charging island configuration with eNovates charge points. The type of charge points in the island can be single or double socket models. The measurement device is a Phoenix Contact EMpro EEM-MA371 in combination with Rogowski coils.

2. PRODUCT OVERVIEW

2.1 Overview



Phoenix Contact EMpro EEM-MA371



3x Rogowski Coil PACT RCP-D95

2.2 Standard configuration of the EMPRO EEM-MA371

The measuring device is delivered from the factory with the below configuration preset.

General	
Language	English
PIN code	0100

Network	
Mode	Static IP
IP address	192.168.11.30

Grid	
Grid type	3PH-4W-3RC
Nominal voltage	380 V
Current input	1000 A

If you have to adapt or customize this standard preset, please use the product manual of the EEM-MA371, delivered with the device. Make sure the IP address is in the correct range and the Current input setting is set to the maximal grid current.

WARNING: If the “current input” value is ≤ 400A, the maximal error on the measured current is < ±4A. If the “current input” value is > 400A, this maximal error is < ±40A. The accuracies are guaranteed with measurements up to 120% of the “current input” value.

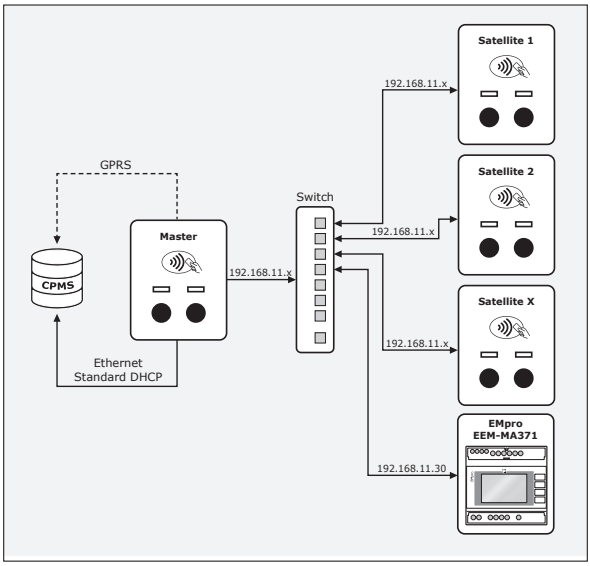
2.3 Charging island configuration type

The type of charging island configuration is illustrated below.

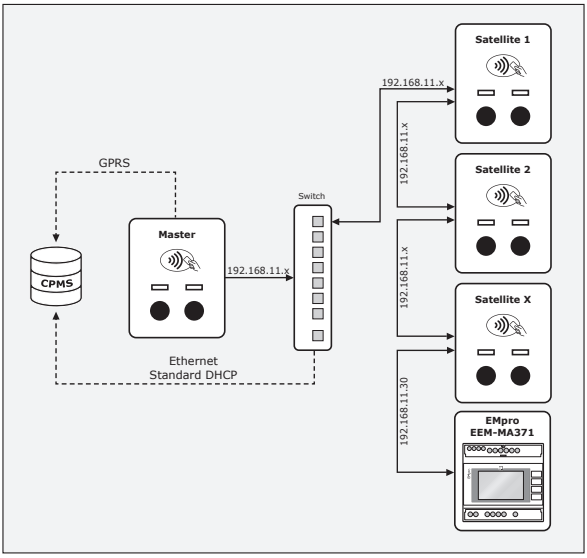
This illustration indicates how the eDLB device should be connected in this specific island configuration.

NOTE: The representation of master and satellite charge points are illustrations and may differ from reality. Charge points with a single socket, double socket or a combination of the two can be used in a charging island configuration.

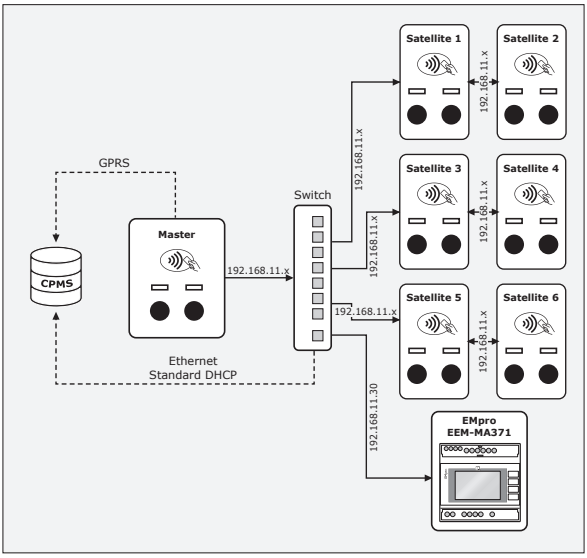
Star configuration



Daisy chain configuration



Hybrid configuration



3. TECHNICAL SPECIFICATIONS

3.1 Measuring instrument - Phoenix Contact EEM-MA371

General	
Display	LCD display with two-color backlit
Supply voltage range	100-230V AC or 150-250V DC
Power consumption	≤ 4W
Mains type	3-phase (3 or 4 conductor) and 1-phase
Operating mode	Indoor use
Conformance	CE compliant

Dimensions	
Width	90 mm
Height	90 mm
Depth	71,9 mm

Ambient conditions	
Ambient temperature (operation)	-10°C to 55°C
Ambient temperature (storage/transport)	-40°C to 70°C
Maximum altitude	≤ 2000 m
Max. permissible relative humidity (operation)	≤ 95 % (non-condensing)
Degree of protection	IP40 (Display) / IP20 (Housing)

Device	
Communication protocol	REST API over ethernet
Connection method	RJ45

Input data	
Measuring principle	True r.m.s. value measurement
Measured value	AC sine (50/60 Hz)
Input name	Voltage measuring input V1, V2, V3
Input voltage range	35 V AC ... 690 V AC (Phase/Phase) 20 V AC ... 400 V AC (Phase/neutral conductor)
Input name	Current measurement RC1, RC2, RC3
Input current	4000 A
Response threshold from measuring range nominal value	5 A

3.2 Rogowski Coil – PACT RCP-D95

General	
Insulation	Double insulation
Rated insulation voltage	1000 V AC (rms CAT III)
Maximal input current	600 V AC (rms CAT IV)
Conductor structure single line	2x 0.22 mm² (Signal) tinned 1x 0.22 mm² (Shielding) tinned

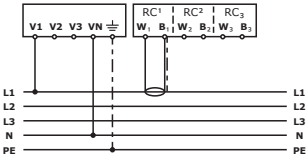
Dimensions	
Length of measuring coil	300 mm
Diameter of measuring coil	8.3 mm ±0.2 mm
Length of signal cable	3000 mm

4. COMMONLY USED GRID TYPES

The device is designed for connecting to various network types in two-, three- or four-conductor networks with symmetrical or asymmetrical load.

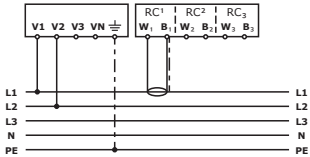
One-phase network, two conductors
One Rogowski coil

1PH-2W-1RC



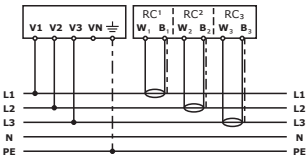
Two-phase network, two conductors
One Rogowski coil

2PH-2W-1RC



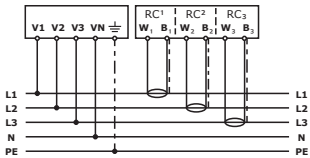
Three-phase network, three conductors
Three Rogowski coils

3PH-3W-3RC



Three-phase network, four conductors
Three Rogowski coils

3PH-4W-3RC



The grid type should be configured in the measuring device. The standard preset from the factory is 3PH-4W-3RC.

5. INSTALLATION PROCEDURE

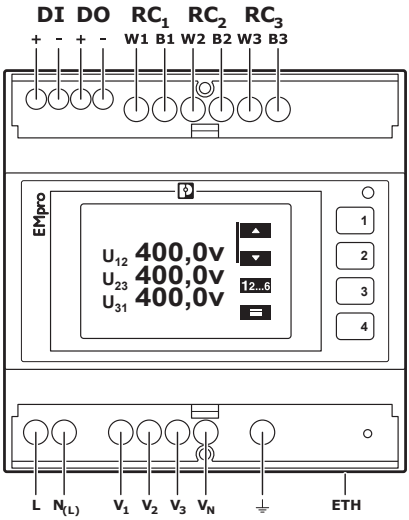
5.1 General safety information

	Install current transformers and corresponding measuring devices only when the power supply of the system is disconnected. Installation and service should be performed by a qualified licensed electrician. The installer is responsible for all (regional specific) electrical requirements.

	Do not use this device in installations where grid fallout can be life threatening. We do not guarantee that the system does not trigger an overcurrent leading to tripping overcurrent protections

5.2 Installation of the measuring device

Overview of connections on the measuring device



RC1, RC2, RC3	Current measuring input, Rogowski coil
W1, W2, W3	White signal cable of the Rogowski coils
B1, B2, B3	Blue signal cable of the Rogowski coils AND shielding of the signal cable
L, N(L)	Supply
V1, V2, V3, VN	Voltage measuring input
ETH	RJ45 ethernet connection
PE	Functional ground

IMPORTANT: The RJ45 ethernet connection should be connected to the charging island as shown in 2.3 Charging island configuration type.

Connection data

Current / Voltage / Supply	
Connection method	Screw connection
Stripping length	8mm
Conductor cross section	0.2 mm^2 - 6 mm^2 SOLID 0.2 mm^2 to 4 mm^2 FLEXIBLE 26 to 14 AWG
Torque	0.5 Nm to 0.6 Nm

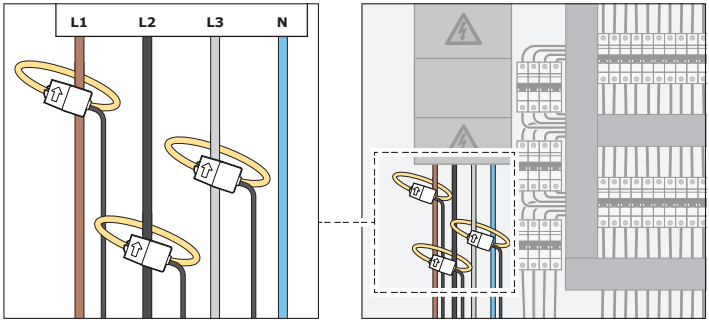
Communication	
Connection method	RJ45
Recommended cable	Cat5e or Cat6 Shielding is recommended for polluted environments

5.3 Installation of the coils

An indicator on the coil shows the direction of the current flow. It should thus point from the grid towards the building. Please make sure that the coil is mounted correctly around the conductor(s) in the installation cabin. The coils should be placed around the conductors bringing the grid into the electrical cabinet, before the current distribution to the building and charge islands.

The Rogowski coil is a split core coil, it can be unlocked and can be mounted around the conductor(s).

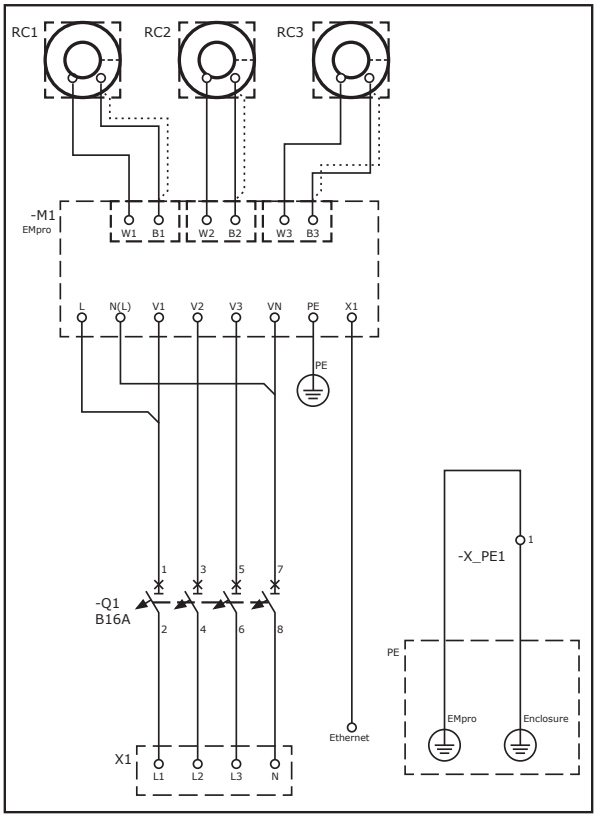
Example:

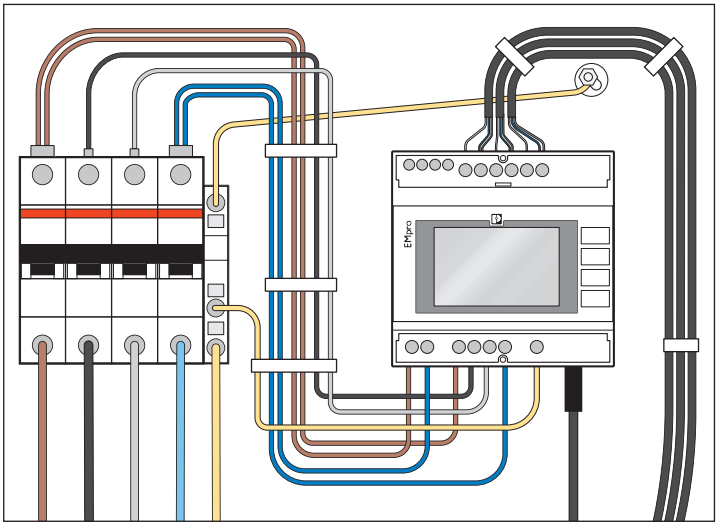


5.4 Example of a connection diagram

A type B circuit breaker, of 16A is recommended to install up front the EMpro measuring device.

After the circuit breaker, the connections can be wired with the following wires: voltage (rigid/flexible): 0.5 mm² ... 2.5 mm² / 0.5 mm² ... 4 mm² supply (rigid/flexible): 0.14 mm² ... 2.5 mm². L1 and N can be split to also provide power to the power supply for the measuring device.





6. CONFIGURATION KEYS

6.1 Related to the eDLB Device (not license related)

These config presets are important when installing an eDLB measurement device AND should be set on the master of the charging island.

When using EnoSAM, select eDLB from the ‘measurement device’ dropdown. You can also select the grid type (DELTA, PHASE1 or WYE) and set the Grid maximal current.
After you’ve set everything to your liking, click the APPLY button to implement these configurations.

Smart.external.limit.device (read/write)

This configuration should be set when a measuring device is connected. For the configuration of the Phoenix EEM-MA371, this value should be set on “eDLB”
(e.g. smart.external.limit.device = eDLB)

Installation.grid.max.current (read/write)

The value which is set in this configuration indicates the total maximum available current of the installation. This is the value of the main MCB of the building, which using an eDLB helps to prevent it from tripping. This is the same maximum current which will go through the Rogowski coils of the measuring device. The standard preset value of this configuration is 40A

(e.g. installation.grid.max.current = 40.0)

Smart.external.limit.limit.margin (read/write)

This is an extra safety offset margin on the installation.grid.max. current to limit the possibility of overcurrent of the grid. To limit possible fallout due to current peaks, set this parameter to 0.90.

(e.g. smart.external.limit.limit.margin = 0.95)

Smart.external.limit.fallback.limit.current (read/write)

This value replaces the “installation.grid.max.current” when an eDLB measuring device is disconnected from the master of the charging island. The standard preset value of this configuration is 8A

(e.g. smart.external.limit.fallback.limit.current = 8)

Smart.external.limit.edlb.endpoint (read/ write)

This config contains the static IP address set in the EEM- MA371. If this value does not match the IP address, no data can be read from the eDLB device.

(e.g. smart.external.limit.edlb.endpoint = http://192.168.11.30:80/)

HouseUsedCurrents (read only)

These values show the measured current from the measuring device on L1, L2, L3 in amperes

(e.g. HouseUsedCurrents = 1.469,2.866,4.896)

HouseVoltages (read only)

These values show the measured voltages from the measuring device between L1-N, L2-N, L3-N in volt
(e.g. HouseVoltages = 215.786,213.228,212.67)

HouseUsedPowers (read only)

These values show the measured power from the measuring device on L1, L2, L3 in watts
(e.g. HouseUsedPowers = 233.793,128.112,11.465)

6.2 Related to the charge point

These configuration keys are unique for each charge point AND should be configured on each charge point in the island.

Chargepoint.custom.max.current (read/write)

This configuration sets the maximum current for the charge point. Important: this value should never exceed the maximum permissible current of the power supply cable of the charge point
(e.g. chargepoint.custom.max.current = 32.0)

6.3 Related to the charge island - set on master

These configuration keys are important when configuring a charging island AND should be set on the master of the charging island.

Smart.local.cable.limit.current (read/write)

The value which is set in this configuration indicates the maximum permissible current of the charging island group. Important: this value should never exceed the maximum permissible current of the supply cable towards the charging island. The standard preset value of this configuration is 1000A.

NOTE: In case of an eDLB device configuration, this value is always less than or equal to the “installation.grid.max.current” *(e.g. smart.local.cable.limit.current = 1000)*

7. FALLBACK SCENARIOS

NOTE: The behavior of these scenarios may have changed due to software updates of the charging islands, always check for the latest manual of your chargers and the eDLB.

7.1 Disconnected measuring device

This scenario can occur with a star, a daisy or a hybrid configuration.

Situation

The ethernet connection of the measuring device is disconnected.

Behavior

The master will fall back to the current which is set in the following configuration: *smart.external.limit.fallback.limit.current*
This current will be distributed over all charge points in the charging island. The backend is informed about the disconnection.

Backend message: {“connectorId”:0,”status”:”Available”, errorCode”:”PowerMeterFailure”, ”info”:”unable to retrieve currents from eDLB”, “timestamp”:”<datetime>”}

7.2 Disconnected master from backend

This scenario can occur with a star, a daisy or a hybrid configuration.

Situation

The master of the charging island is disconnected from the backend.

Behavior

This situation does not impact the loadbalancing algorithm of the charging island.

NOTE: Only when connector.limit.current.offline = true, the connector of the master will fall back to the current which is set in connector.limit.current.offline.max. This configuration is unique per connector per charge point. This means it can be configured differently on each charge point in the charging island

7.3 Disconnected master from charging island

This scenario can occur with a star, a daisy or a hybrid configuration.

Situation

The master of the charging island is disconnected from the charging island.

Behavior

Island:

The island will fall back to the current set in config “smart.external.limit.fallback.limit.current“ because the DPM device is disconnected.

Master:
The master reserves the current set in config connector. limit. current.offline.max on the master, per disconnected satellite, from the available fallback current in the charging island.

Satellite:
If connector.limit.current.offline = false, the current limit of the satellite will not change. If it is equal to true, however, the current limit of the satellite will fall back to the current which is set in connector.limit.current.offline.max.

7.4 Disconnected satellite

This scenario can occur with a star, a daisy or a hybrid configuration. If this scenario occurs in a daisy setup, the result will be a Disconnect measuring device as mentioned in chapter 7.1.

Situation

Somewhere in the island a satellite is disconnected from the charging island.

Behavior

Island:
No change when the DPM device is still connected to the master.

Master:
The master reserves “x” amperes, per disconnected satellite, from the available current in the charging island. The amount of amperes is set in parameter connector. limit.current.offline.max on the master.

Disconnected satellite:

connector.limit.current.offline = false

The current limit of the satellite will not change.

connector.limit.current.offline = true

The current limit of the satellite will fall back to the current which is set in connector.limit.current.offline.max.

WARNING: This behavior is guaranteed only as long as the master is not rebooted, After reboot, the amount of satellites detected by the charging island might be changed.

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Brandstraat 13
9160 Lokeren
Belgium
+32 (0) 9 430 77 20
info@enovates.com

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