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ENOVATES

ENOVATES eDLB2.0 Active Load Balancing

Product Information

Technical Specifications

- **Measuring Instrument:** Phoenix Contact EEM-MA371
- **Display:** LCD with two-colour backlit
- **Supply Voltage Range:** 100-230V AC or 150-250V DC
- **Power Consumption:** 4W
- **Main Type:** 3-phase (3 or 4 conductor) and 1-phase
- **Operating Mode:** Indoor use
- **Conformance:** CE compliant
- **Dimensions:** 90 mm (Width) x 90 mm (Height) x 71.9 mm (Depth)
- **Ambient Conditions:**
  - **Maximum Altitude:** 2000 m
  - **Max. Permissible Relative Humidity (Operation):** 95% (non-condensing)

Product Usage Instructions

Introduction

This manual provides technical guidance for installing the eDLB 2.0, a device for active load balancing in a charging island configuration with eNovate’s charge points.

Product Overview

The product includes the Phoenix Contact EMpro EEM-MA371 measuring device and 3x Rogowski Coil PACT RCP-D95.

Standard Configuration of the EMpro EEM-MA371

- **Language:** English
- **PIN Code:** 0100
- **Mode IP Address:** Static IP 192.168.11.30
- **Grid Type:** 3PH-4W-3RC
- **Nominal Voltage:** 380V
- **Current Input:** 1000A

Charging Island Configuration Types

- The eDLB device can be connected in different charging island configurations, like Star, Daisy Chain, and Hybrid configurations.

Technical Specifications

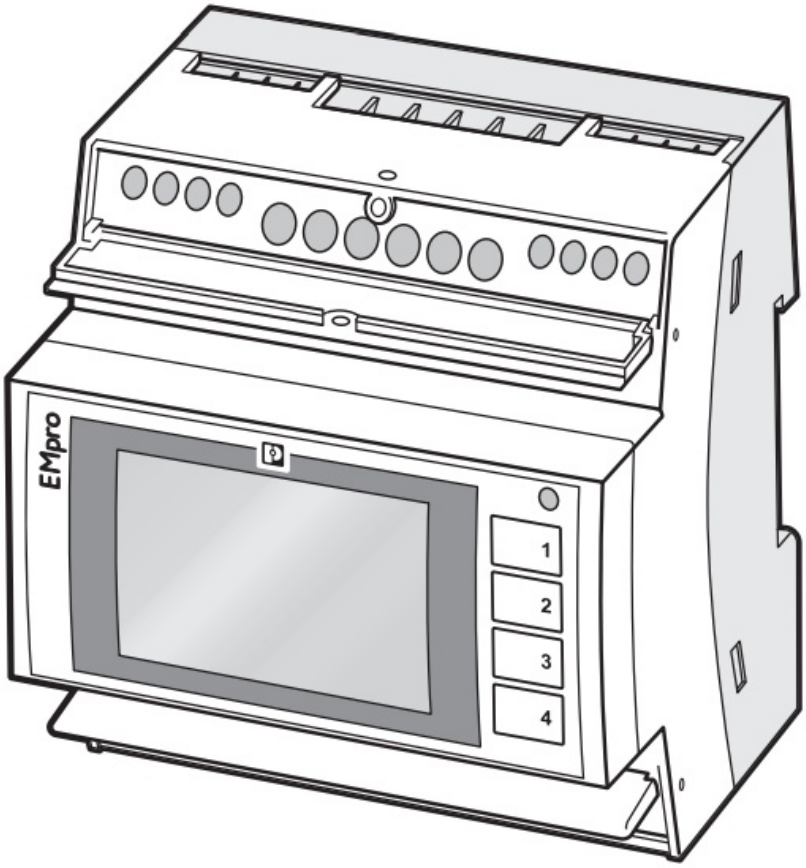
- For detailed technical specifications of the Phoenix Contact EEM-MA371, refer to the manual provided with the device.

INTRODUCTION

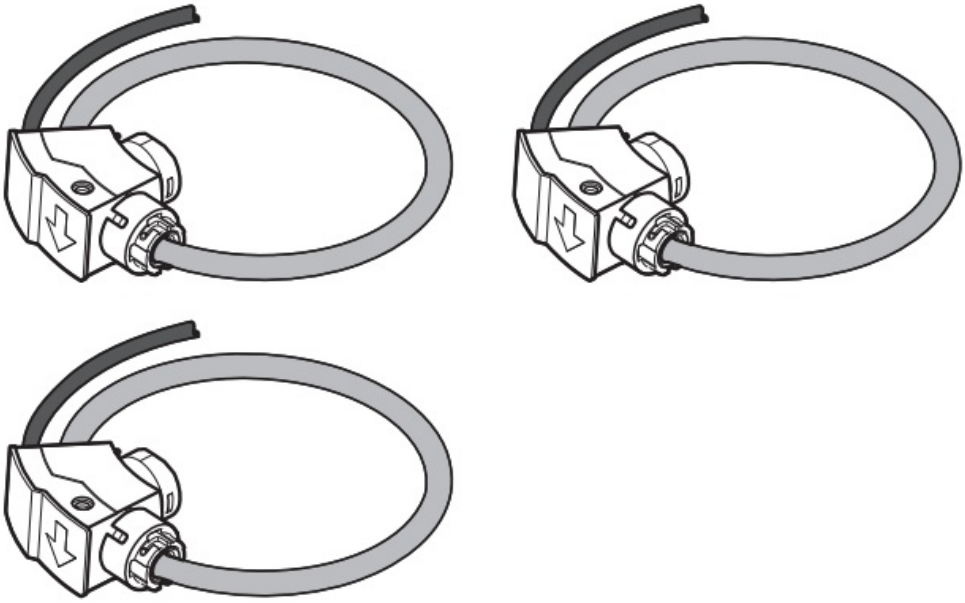
- This manual is a technical guide for installing an eDLB, a device for active load balancing in a charging island configuration with eNovate’s charge points.
- The type of charge points on the island can be single or double socket models. The measurement device is a Phoenix Contact EMpro EEM-MA371 in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

PRODUCT OVERVIEW

Overview



Phoenix Contact EMpro EEM-MA371



- 3x Rogowski Coil PACT RCP-D95

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

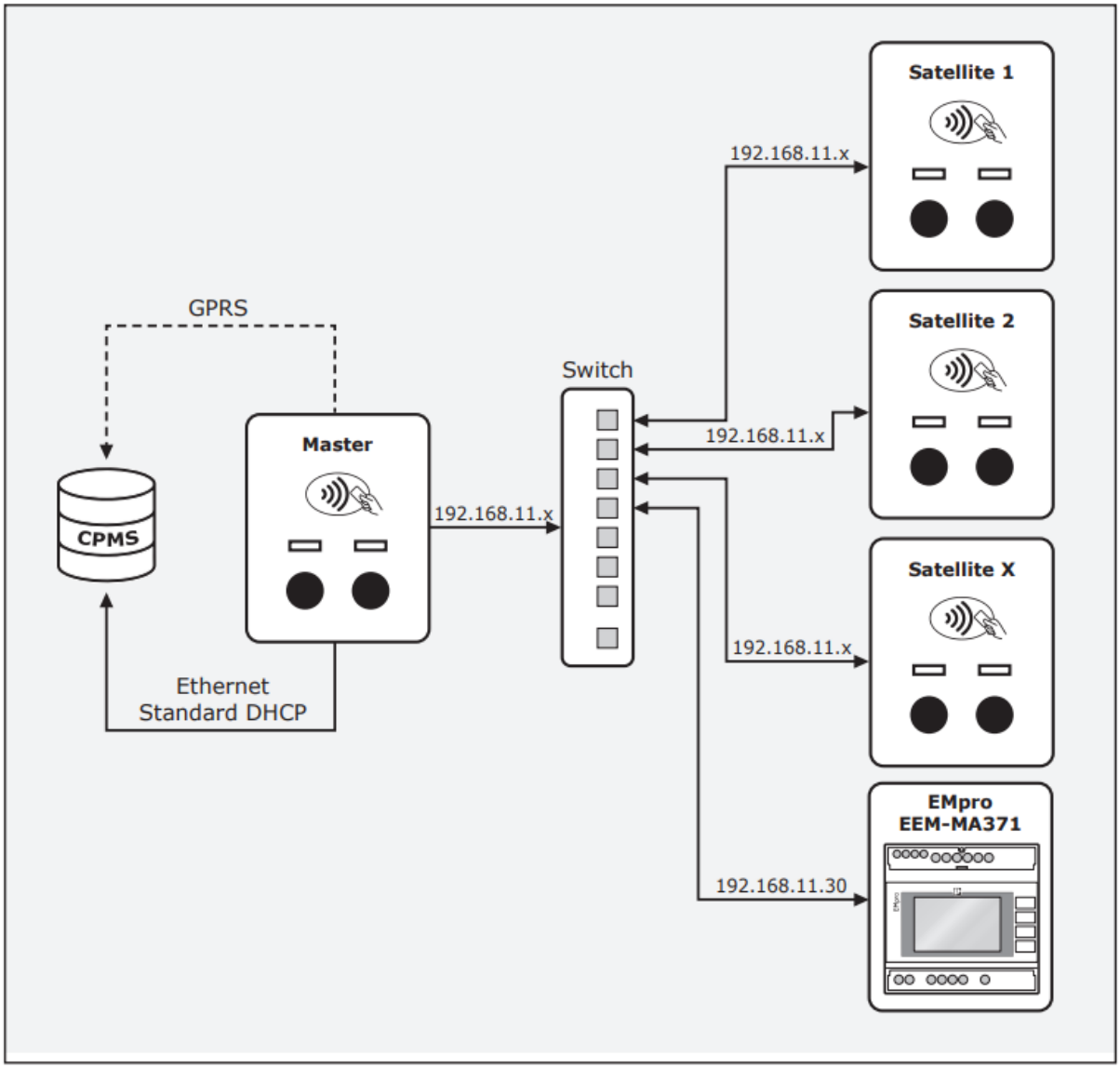
- If you have to adapt or customise this standard preset, please use the product manual of the EEM-MA371, delivered with the device.
- Make sure the IP address is in the correct range and the Current input setting is set to the maximum grid current.
- **WARNING:** If the “current input” value is ≤ 400A, 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.

Charging island configuration type

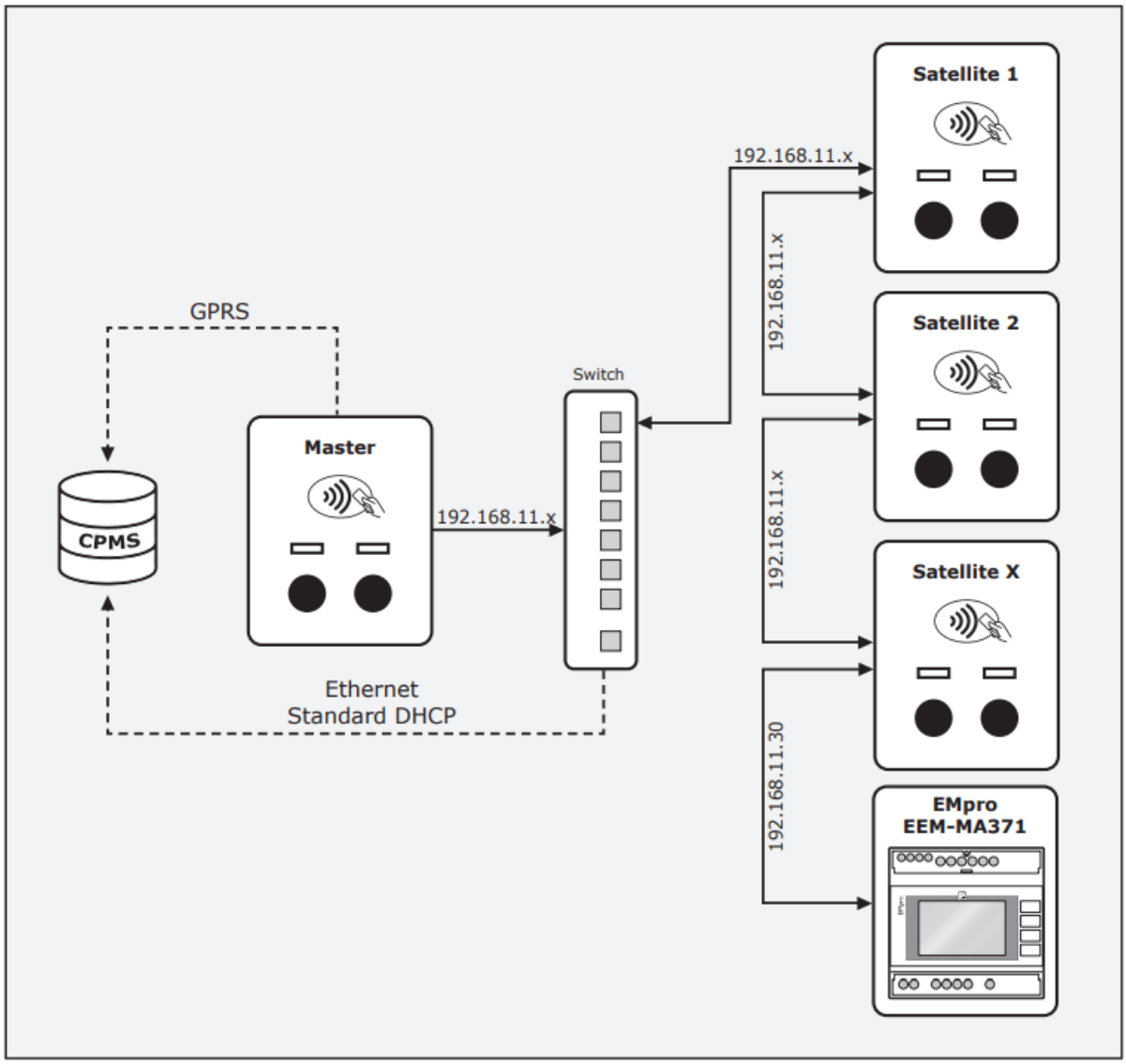
- The type of charging island configuration is illustrated below.
- This illustration indicates how the eDLB device should be connected in this specific island configuration.
- **NOTE:** The representation of master and satellite charge points is are illustration and may differ from reality.

- Charge points with a single socket, double socket, or a combination of the two can be used in a charging island configuration.

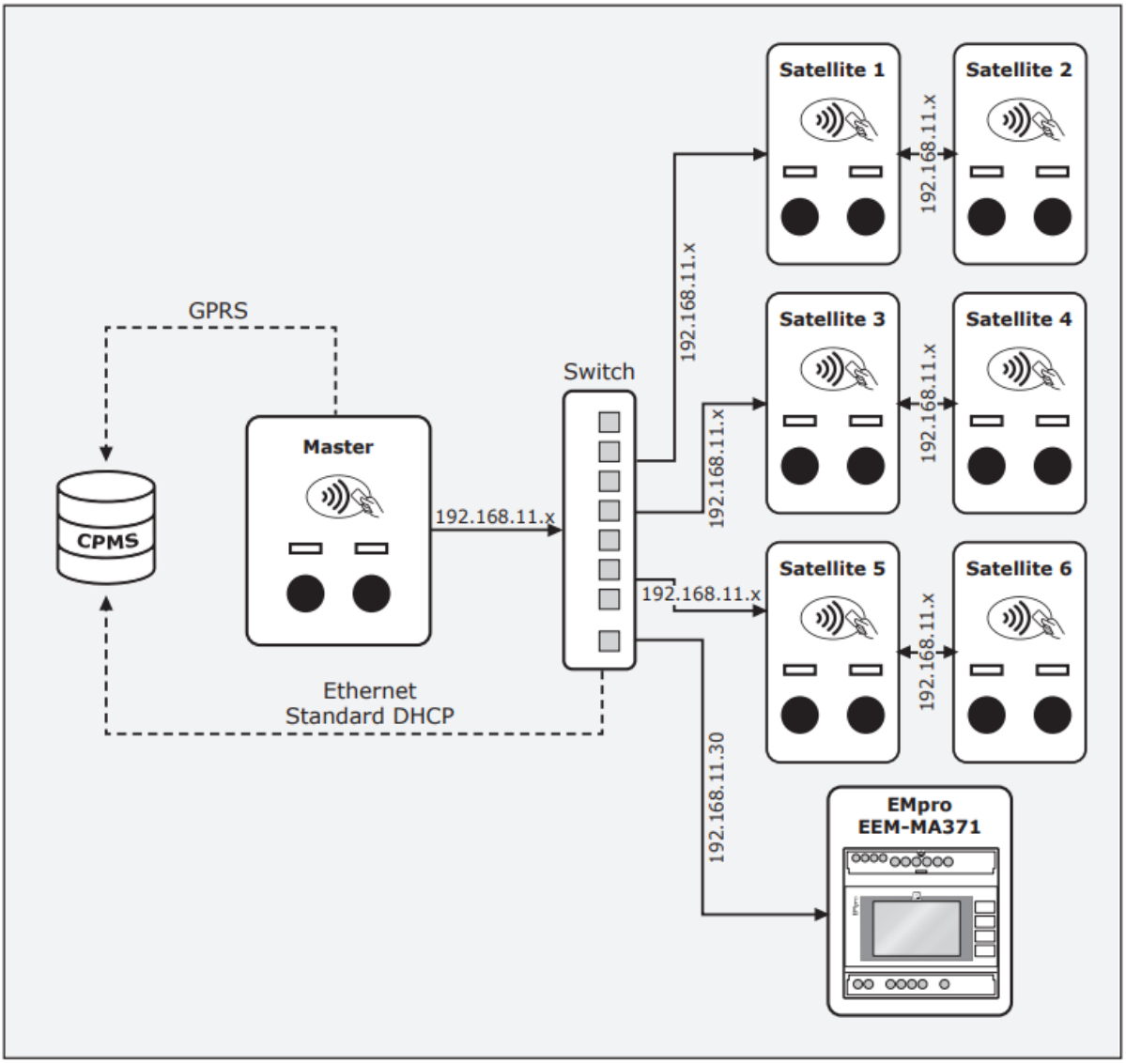
Star configuration



Daisy chain configuration



Hybrid configuration



TECHNICAL SPECIFICATIONS

Measuring instrument – Phoenix Contact EEM-MA371

General	
Display	LCD with two-colour 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 the measuring r ange nominal value	5 A

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

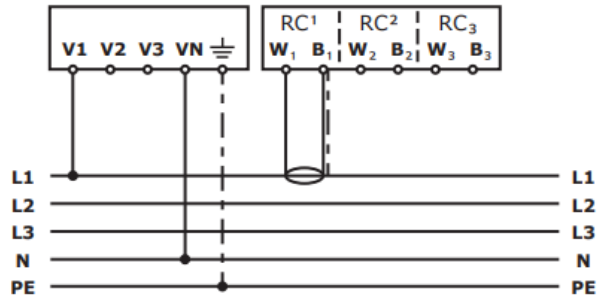
Diameter of measuring coil	8.3 mm ±0.2 mm
Length of signal cable	3000 mm

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.

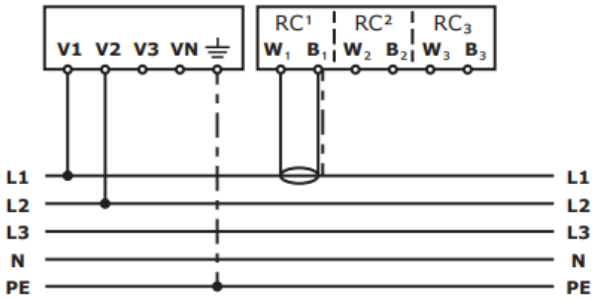
One-phase network, two conductors
One Rogowski coil

1PH-2W-1RC



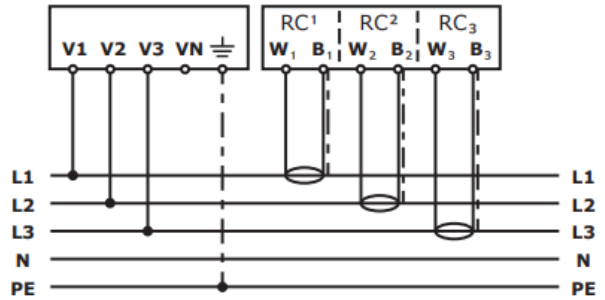
Two-phase network, two conductors
One Rogowski coil

2PH-2W-1RC



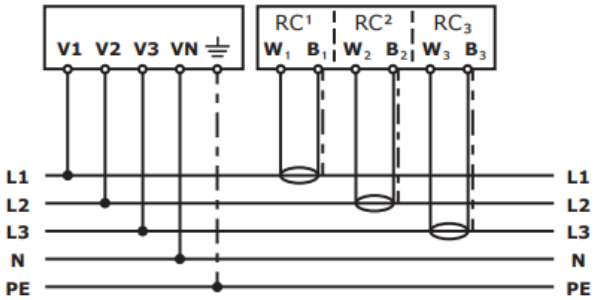
Three-phase network, three conductors
Three Rogowski coils

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.

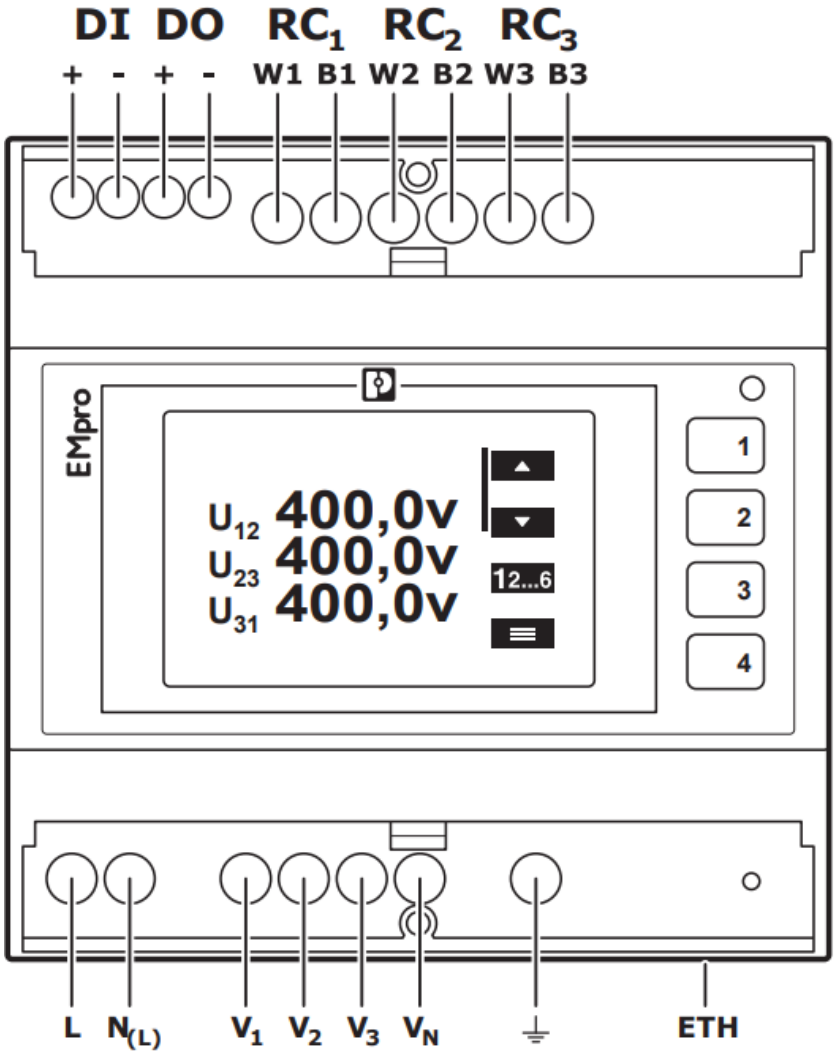
INSTALLATION PROCEDURE

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 will not trigger an overcurrent, leading to tripping of overcurrent protections

Installation of the measuring device

- Overview of connections on the measuring device



RC1, RC2, RC3	Current measuring input, Rogowski coil
W1, W2, W3	The 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

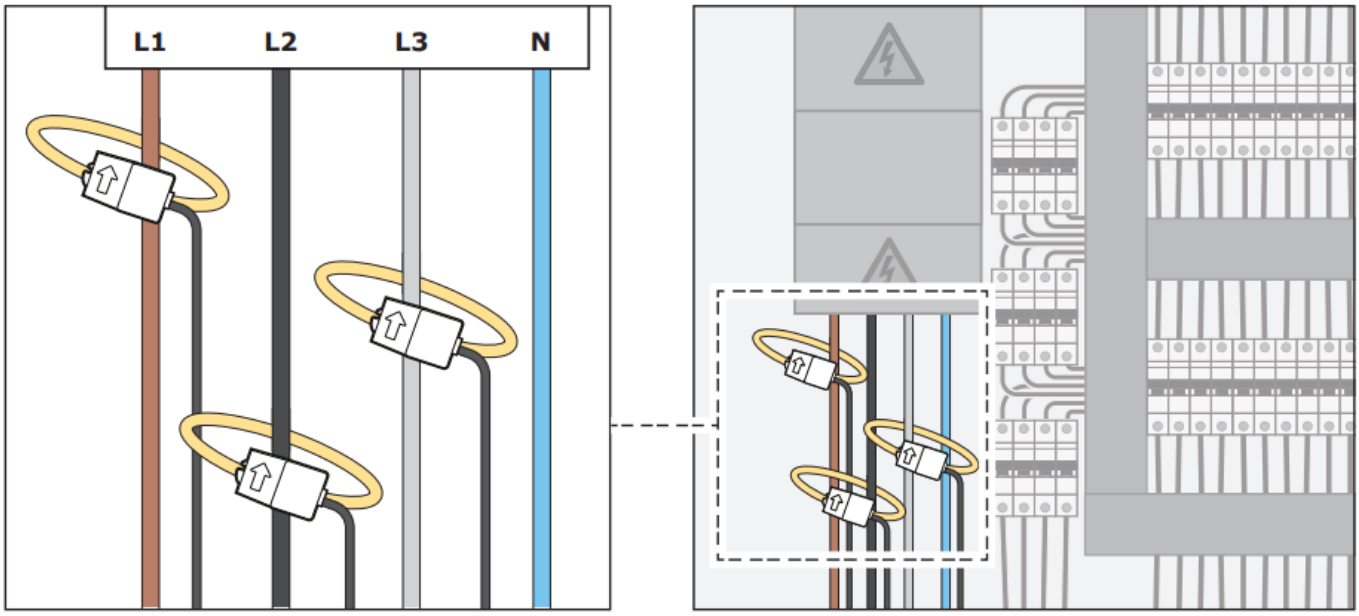
Current / Voltage / Supply	
Connection method	Screw connection
Stripping length	8mm
Conductor cross-section	0.2 mm² – 6 mm² SOLID 0.2 mm² to 4 mm² FLEXIBLE 26 to 14 A WG
Torque	0.5 Nm to 0.6 Nm

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

Installation of the coils

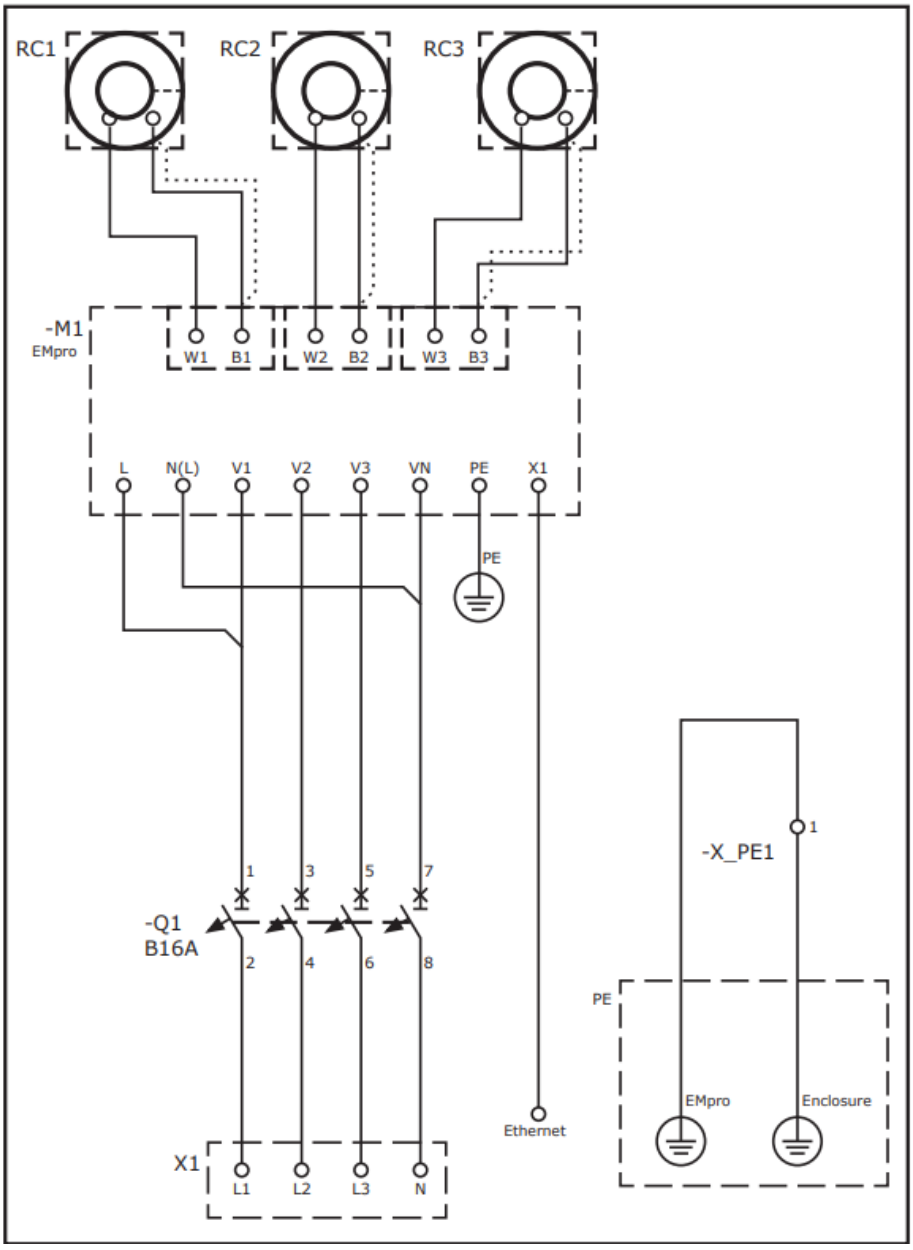
- An indicator on the coil shows the direction of the current flow. It should thus point from the grid towards the building. Please make sure that the coil is mounted correctly around the conductor(s) in the installation cabin.
- The coils should be placed around the conductors bringing the grid into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

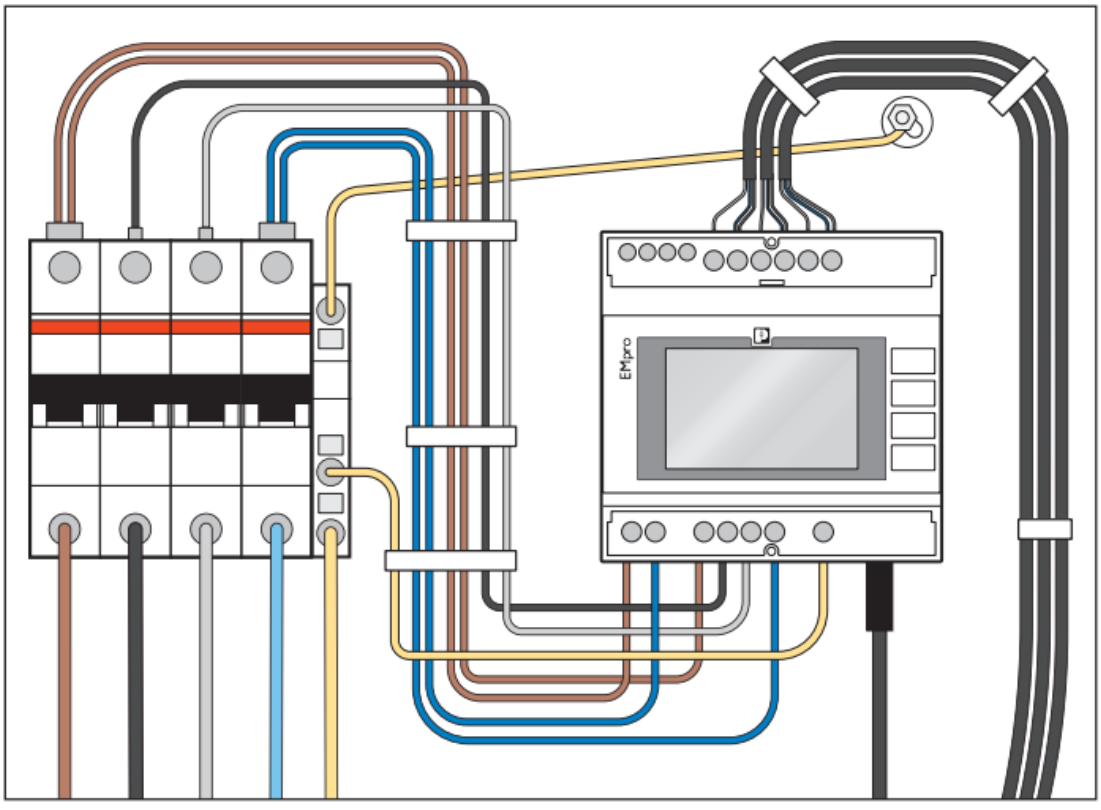
Example:



Example of a connection diagram

- A type B circuit breaker of 16A is recommended to be installed in front of 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.


RC1
RC2
RC3
-M1
EMpro
W1
B1
W2
B2
W3
B3
L
N(L)
V1
V2
V3
VN
PE
X1
PE
-Q1
B16A
1
3
5
7
2
4
6
8
X1
L1
L2
L3
N
Ethernet
-X_PE1
1
PE
EMpro
Enclosure


EMpro

CONFIGURATION KEYS

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’s maximum 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 uses an eDLB to help 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. limited 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, and 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 volts (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)

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)

Related to the charge island, set on the 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)

FALLBACK SCENARIOS

- **NOTE:** The behaviour 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.

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>”}

Disconnected the master from the 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 load balancing algorithm of the charging island.
- **NOTE:** Only when the connector.limit.current.offline = true, the connector of the master will fall back to the current, which is set in the 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

Disconnected the master from the 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 the 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.If 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.

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 on the island, a satellite is disconnected from the charging station.

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 pthe arameter 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 the connector.limit.current.offline.max.
- **WARNING:** This behaviour 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.

CUSTOMER SERVICE

- **Brandstraat 13**
- **9160 Lokeren**
- **Belgium**
- **+32094307720**
- **info@enovates.com**

- **Scan the QR code or go to the link to get the latest update of the manual**
  https://www.enovates.com/download/edlb-installation-manual/

FAQ

- **Q: Can different types of charge points be used in the charging island configuration?**
  - **A:** Yes, charge points with single sockets, double sockets, or a combination of both can be used in the charging island configuration.
- **Q: How can I customise the standard preset of the EMpro EEM-MA371?**

- **A:** To adapt or customise the standard preset, refer to the product manual of the EEM-MA371 delivered with the device. Ensure the IP address is in the correct range and the Current input setting is at the maximum grid current.

Documents / Resources

	ENOVATES eDLB2.0 Active Load Balancing [pdf] Instruction Manual PACT RCP-D95, eDLB2.0 Active Load Balancing, eDLB2.0, Active Load Balancing, Load Balancing, Balancing

References

- User Manual

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Active Load Balancing, Balancing, eDLB2.0, eDLB2.0 Active Load Balancing, ENOVATES, Load Balancing, PACT RCP-D95

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