

OPTIME E-CM

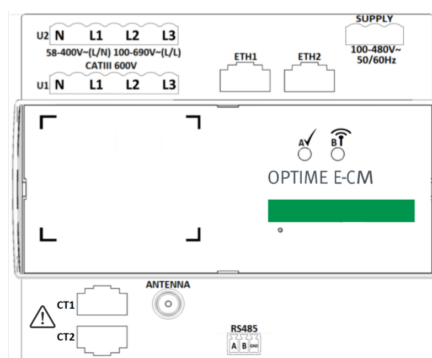
by  **ECO-ADAPT**

*Predictive maintenance solution for
electric rotating machines*

Solution de maintenance prédictive pour machines tournantes
électriques

Installation Manual *Manuel d'installation*

V1.0 Jan 2025



*Acquisition and signal processing unit providing
machine health indicators*

Boîtier d'acquisition et de traitement du signal pour le calcul d'indicateurs

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1. Warning & safety instructions

Safety during installation

- You must read this manual completely before the beginning of the installation in order to ensure user and equipment safety.
- The installation must be done by a certified professional. This manual does not aim at guiding someone without prior proper training for electrical devices manipulation.
- OPTIME E-CM must be installed in a fire-protected enclosure.
- To prevent material destruction and corporal lesion, you must respect the running ranges indicated in the “technical features” chapter.
- To prevent material damage, you must respect the admissible range of the current transformers and rogowski coils.
- In case of misuse of this operating manual, the protection provided by the product may be compromised.
- You must respect local standards, directives, rules and regulations. Constructor’s responsibility can’t be engaged if you do not respect this manual.

Protection against unauthorized use

- Data encryption and secure login with individual login data are the tools used to protect against unauthorized use of the OPTIME E-CM configuration Web Interface and OPTIME Cloud.
- Local configuration of the OPTIME E-CM module is password-protected. The default password should be modified during the installation process.
- A secure password should be used. The user is responsible for the security of his or her login data.
- Any detected security vulnerability or cyber-threat must be immediately reported to Eco-Adapt via security@eco-adapt.com. All reports contribute to the continuous improvement of our products' security

Disposal

- After use, dispose of the device and current sensors in an environmentally compatible manner in accordance with the respective national regulations at your location.
- If possible, dispose of the packaging material in the appropriate recycling waste.
- When you finally decommission the product, find out more about the applicable disposal regulations from the recycling center or from your specialist supplier.



This product shall not be treated as household waste. Instead, it shall be handed over to the applicable collection point for the recycling of electrical and electronic equipment. By ensuring this product is disposed of correctly, you will help prevent potential negative consequences for the environment and human health. For more detailed information about recycling of this product, please contact your local Civic Office, your household waste disposal service or Eco-Adapt.

Safety symbols

The following symbols aim to attract your attention on potential dangers, they appear in the documentation and on the product.



Security warning – this symbol warns the user of potential risks during the manipulation and invites them to read the documentation.



Risk of electric shock – this symbol indicates that there is a risk of electric shock that may cause equipment destruction, lesions or death if the instructions aren't respected.

2. FCC & IC STATEMENT

FCC 15.21

The Company “ECO-ADAPT” is not responsible for any changes or modifications not expressly approved by the party responsible for compliance. Such modifications could void the user’s authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

FCC 15.105

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

This device must be professionally installed.

2. FCC & IC STATEMENT

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

- (1) This device may not cause interference.
- (2) This device must accept any interference, including interference that may cause undesired operation of the device.

This equipment complies with RSS102's radiation exposure limits set forth for an uncontrolled environment under the following conditions:

1. This equipment should be installed and operated such that a minimum separation distance of 20cm is maintained between the radiator (antenna) and user's/nearby person's body at all times.
2. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

- 1) L'appareil ne doit pas produire de brouillage;
- 2) L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

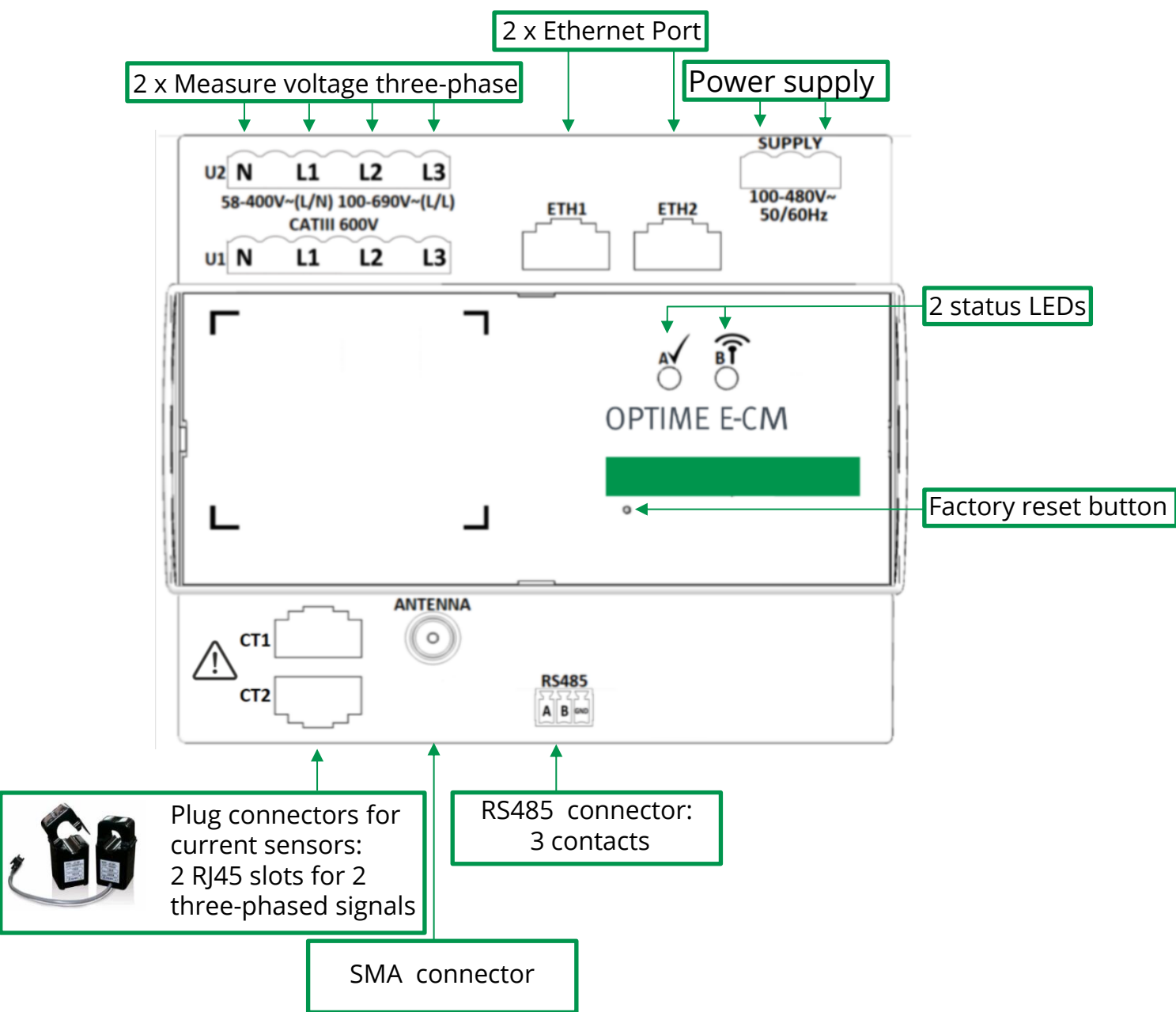
Cet équipement est conforme aux limites d'expositions de la CNR102 applicables pour un environnement non contrôlé aux conditions suivantes:

1. Cet équipement devra être installé et fonctionner de telle manière qu'une distance minimale de séparation de 20 cm soit maintenue entre la partie rayonnante (l'antenne) et l'utilisateur / les personnes à proximité à tout moment.
2. Cet émetteur ne doit pas être co-localisé ou opérer en conjonction avec toute autre antenne ou émetteur.

3. General description

OPTIME E-CM is an electrical and mechanical health monitoring solution for alternative current rotational machines.

2 three-phase AC machines can be monitored with the solution. Any attempt to equip a DC or not rotating electrical equipment, with such a device would be inappropriate.

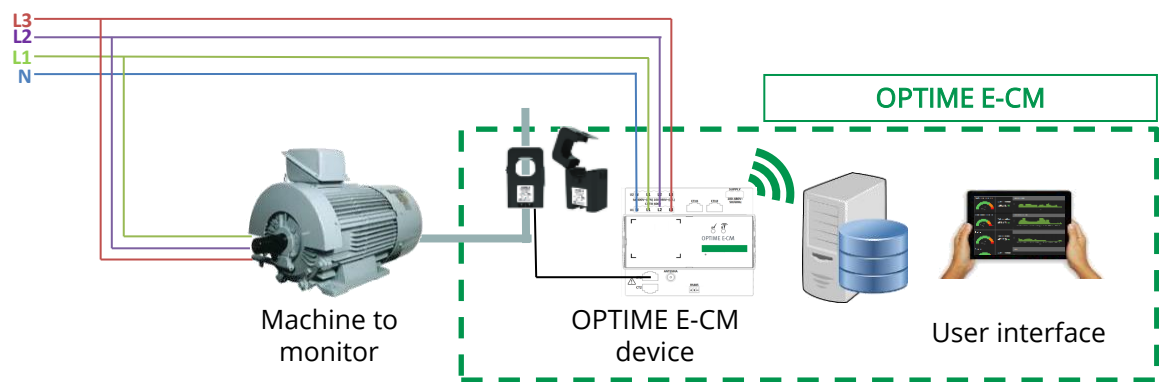


The OPTIME E-CM generates its own Wi-Fi network to allow quick and easy configuration from a computer or a smartphone.

Depending on the configuration, the metering data can be transmitted in Modbus TCP, BACnet/IP, via the Ethernet interface or via 4G cellular network.

Configuration steps related to the web platform can be performed remotely after the physical installation.

Link to the cloud platform : <http://www.poweradapt.com>



4. Installation

4.1 How to install the OPTIME E-CM product in the electrical cabinet

- The OPTIME E-CM must be installed in a mechanical and electrical, fire resistant, enclosure (electrical cabinet).
- In the cabinet, find a 6 DIN modules wide available space on DIN rail. If there is no remaining space, please install a separate cabinet with DIN rails.
- Current transformers are provided with 2.5m long cables, make sure they can be connected to the OPTIME E-CM once it is installed.

4.2 How to power supply

Install a dedicated circuit breaker (rated for 2A) to connect the power supply wires. Connect wires to the 2-pin power supply connector terminals to supply OPTIME E-CM

4.3 How to connect voltage inputs

- Install a circuit breaker (rated for 1A) upstream of the meter, for each the voltage inputs that will be used. It will allow you to cut the power. It must be placed so as to be easily reachable.
- Connect wires L1, L2, L3 of the motor or machine the 4x pin voltage connector. If the neutral wire is connected to the machine, connect it to the N pin.
- Use separate wiring to the second voltage input connector if you order to monitor a second machine.

- Before any operation on the voltage inputs or power supply connectors, please check that the circuit is isolated
- Cables used between the circuit breaker and the voltage input connectors must be rated for 600V and must be less than 1.50m long.



Once installation of voltage acquisition is done, please check that :

- Isolation between the different circuits is maintained.
- Cables with dangerous voltage cannot enter in contact with the ports Ethernet.
- L1, L2 and L3 terminals and external circuits connected to these terminals are not reachable neither linked to other reachable parts.

4.4 How to install current transformers

There are two options to measure the current (based on two criteria: the maximum measured current and the current conductors' section):

- A - Current transformers
- B - Rogowski coils

These devices are grouped by three and you can connect them to the OPTIME E-CM through a RJ45 connector. You can therefore measure one three phase signal with one RJ45 connector. The OTIME E-CM has 2 RJ45 inputs, it can measure 2 three phase signals, to monitor to distinct motors or machines.

The current measuring devices must be placed be placed around the current conductors as shown below.



- Only use current transformers and Rogowski coils that are listed in appendix. The RJ45 connectors are not designed to be connected to transformers that are not equipped with internal protection.



- You must not plug a telecommunication network into the RJ45 connectors. It could damage the product in case of surge on the network.

A. Use of clip-on current transformers

Transformers can be clipped around current conductors. You don't have to isolate the installation. Transformers close with a double clip (you must hear 2 clips to be sure it is correctly closed).

You must respect the phase order, transformers of one RJ45 group are numbered from 1 to 3

Transformers can then be blocked with clamping rings put on each side of the transformer like the adjacent picture.



Note: transformers assembly direction is indicated below of the transformers, the arrow's direction goes from the supply to the equipment. Please read the appendix for more details.

B. Use of Rogowski coil

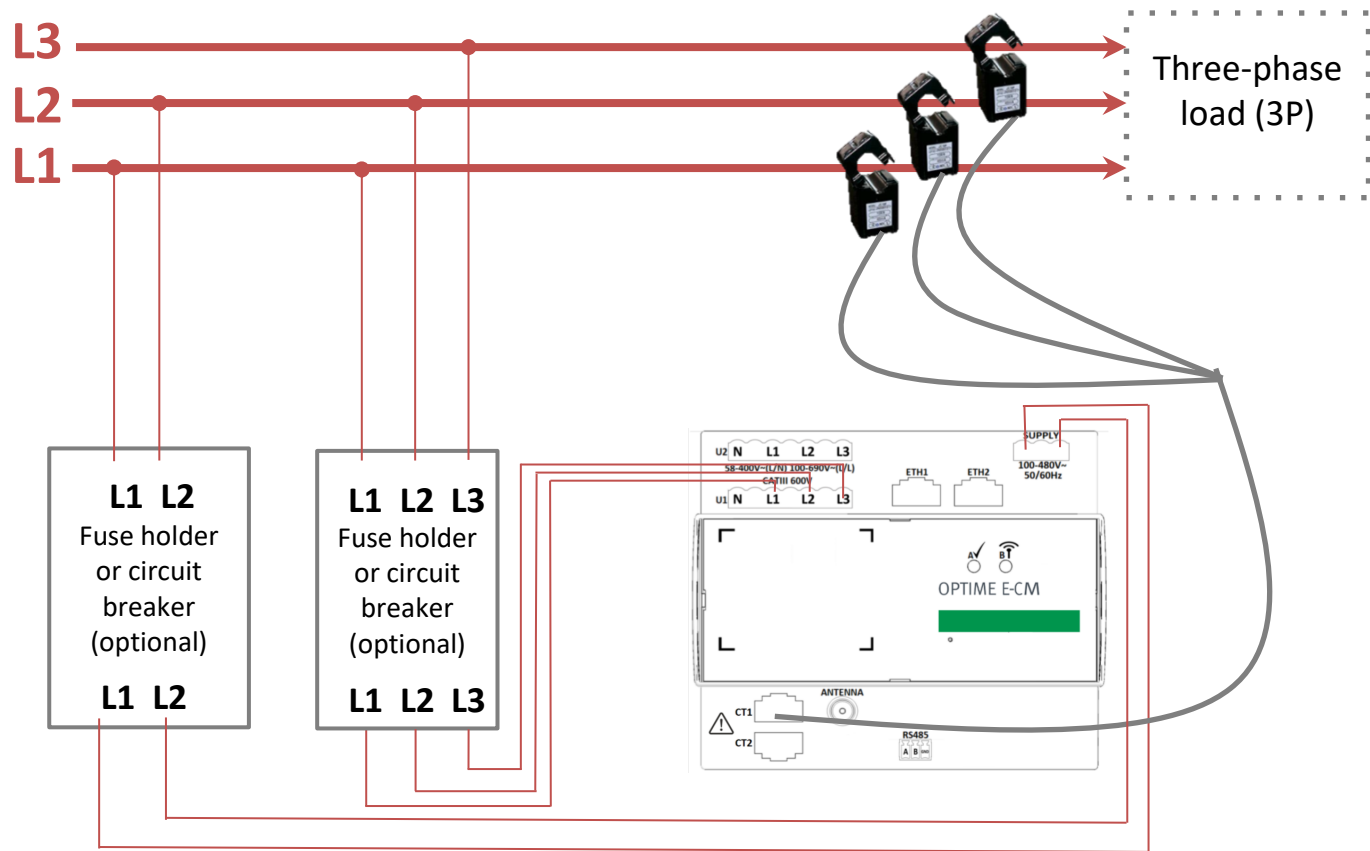


Rogowski coils must be wrapped around current conductors, screw it to close it.

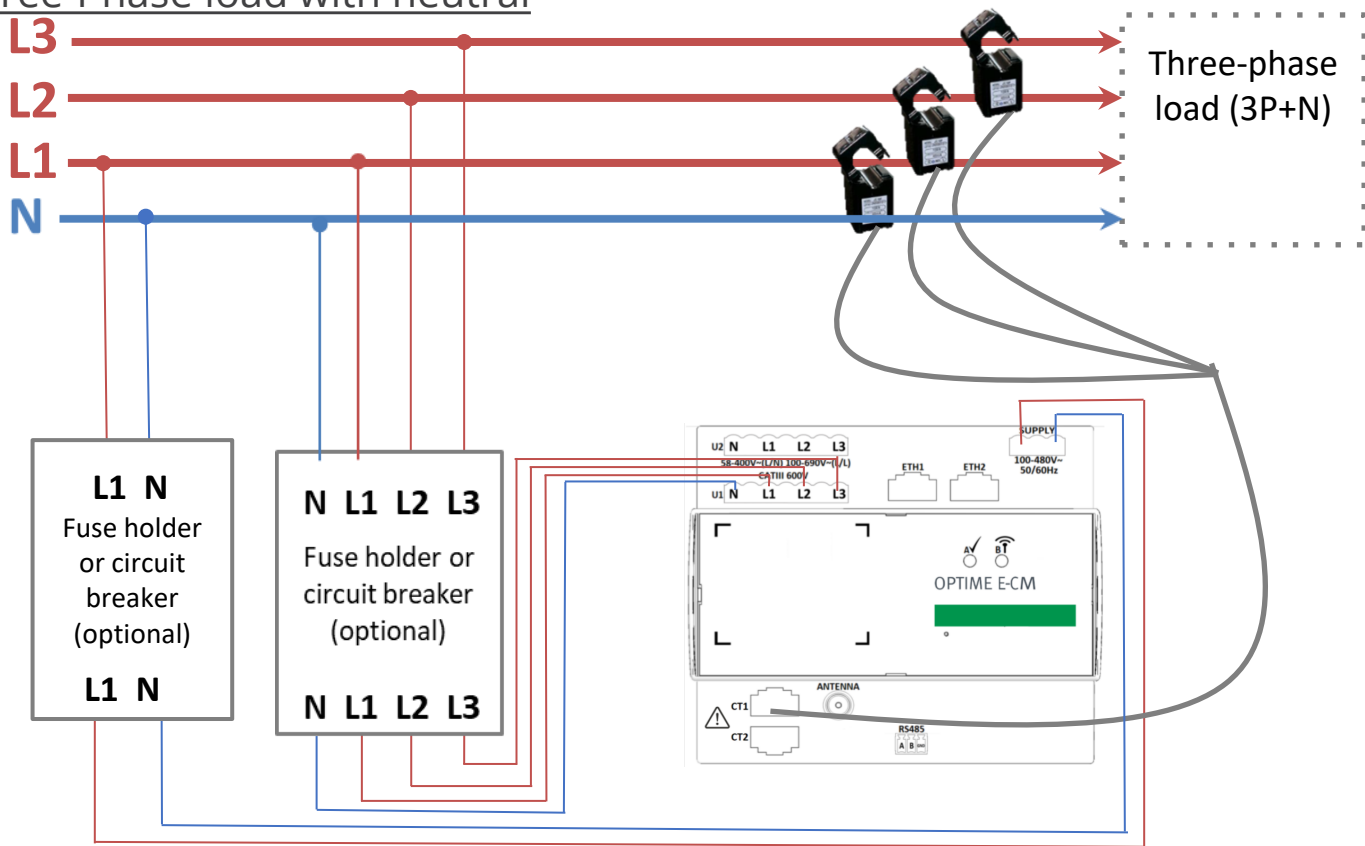
Please try to put the cable in the center of the coil.

4.5 Three-phase installation

Three-Phase load

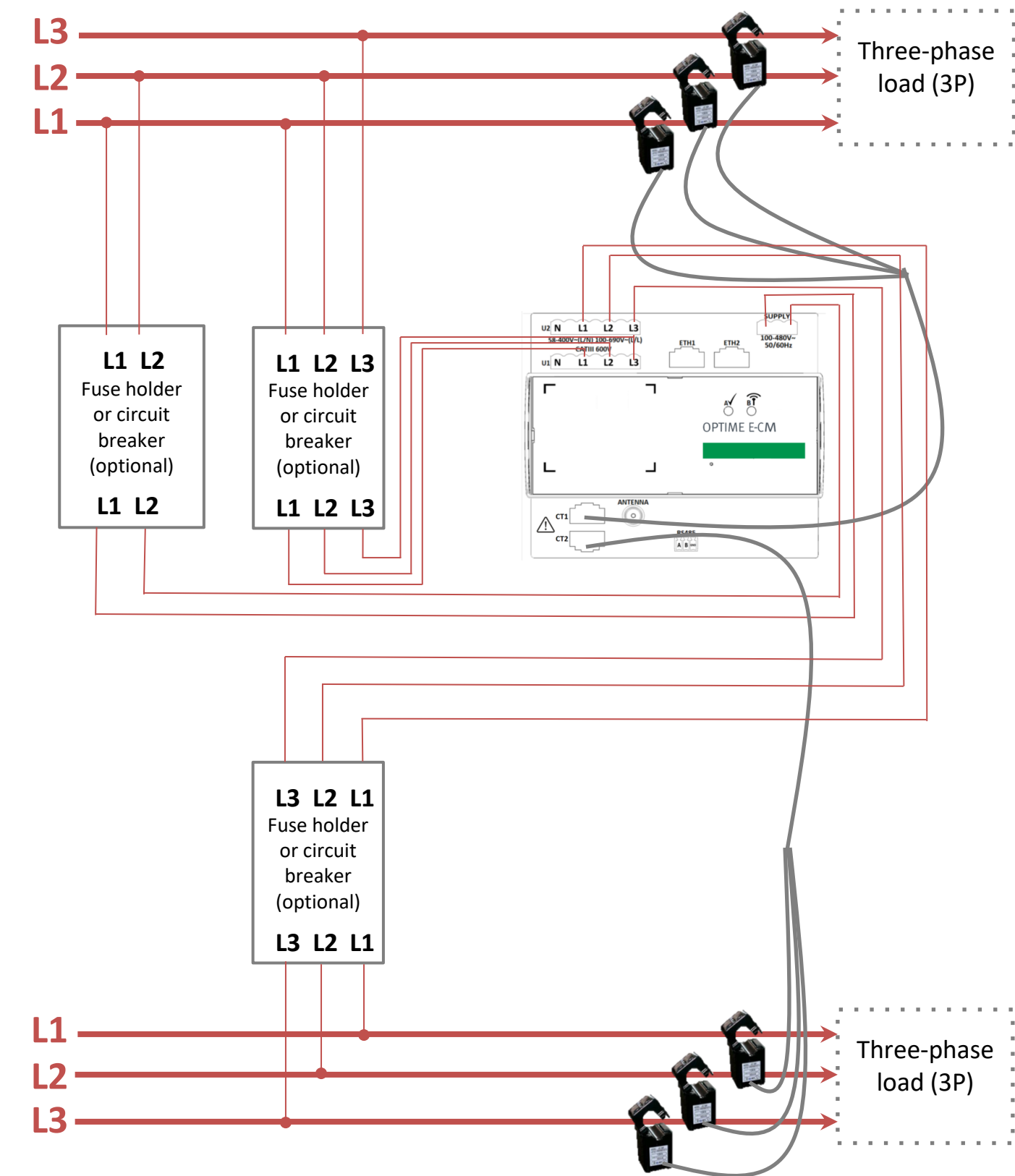


Three-Phase load with neutral



4.5 Three-phase installation

2 x Three-Phase load



4.6 Communication interfaces

A. Wi-Fi direct

OPTIME E-CM has its own Wi-Fi hotspot. It allows you to configure it with a laptop, a tablet or a smartphone.

Wi-Fi is automatically activated. It is working less than one minute after plugging the power supply.

B. Connection via 4G

Radio data is transmitted via its 4G cellular network. There is no configuration required, just install the antenna properly:

- Install the antenna outside the electrical cabinet.
- Connect the antenna to the SMA interface

C. Ethernet Modbus TCP

If you want to use Modbus TCP to transmit data, you must connect OPTIME E-CM to Ethernet network with RJ45 cable. Software configuration is necessary to enable Ethernet communication. You can do this on the Wi-Fi interface.

D. Modbus RTU

Data can also be transmitted with Modbus RTU via RS485 interface (3 pins: A,B and GND).

E. BACnet/IP

Data can be transmitted using the BACnet/IP protocol. It is necessary to connect the OPTIME E-CM to the ethernet network with a RJ45 cable and the one of ethernet input.

5. Technical characteristics

Environmental conditions

- Indoor use
- Altitude: up to 2000m
- Operating temperature: -5 to 65°C
- Mains voltage fluctuation: $\pm 10\%$ of nominal voltage
- Overvoltage category: CATIII 600V
- Pollution degree: 2
- Relative humidity: 90 %

Power Supply:

- Supply voltage: 100-480V~
- Operating frequency: 50/60Hz
- Maximum power consumption: 10W

Connection:

- Tightening torque: 0.5Nm
- Length of cable to be stripped: 6-7.5mm
- Cable section: 1.5-2.5mm² (16-12AWG)

Assigned characteristics of the terminals :

2 x 4-point terminal block for voltage acquisition:

- Maximum voltage with respect to ground: 600V
- Rated voltage (N-L): 58 - 400V
- Rated voltage (L-L): 100 - 690V
- Frequency: 50/60Hz
- Measurement category: CAT III
- Connection:

- Tightening torque: 0.5Nm
- Length of cable to be stripped: 6-7.5mm
- Cable section: 1.5-2.5mm² (16-12AWG)

2 x CT connectors : current acquisition by external transformers or Rogowski cores:

RJ45

Nominal voltage: 333 mV (differential)

Maximum voltage : 426mV (differential)

2 x Ethernet connector: 10/100 Base-T (IEEE 802.3) interface

RJ45

Auto MDI/MDIX

5. Technical characteristics

3-point terminal block for Modbus RTU connection (via RS485)

- Signal level: 0 to 5V (A-B) and -7 to 12V (GND-A/B)
- Common mode voltage isolation: 1.5 kV
- Connection

Tightening torque: 0.25Nm

Length of cable to be stripped: 7mm

Cable section: 0.14-1.5mm² (25-16 AWG)

Antenna : for 4G connectivity (LTE category 1)

- SMA
- Impedance : 50 ohm

6. Appendix

Current transformers and Rogowski coil of the OPTIME E-CM range

The OPTIME E-CM must be used exclusively with the following measuring equipment:

- Current transformers :
 - 3TC-10-1A : kit of 3 split core CTs, diameter 10mm, rated current 1A
 - 3TC-10-5A : kit of 3 split core CTs, diameter 10mm, rated current 5A
 - 3TC-10-32A : kit of 3 split core CTs, diameter 10mm, rated current 32A
 - 3TC-10-70A : kit of 3 split core CTs, diameter 10mm, rated current 70A
 - 3TC-16-100A : kit of 3 split core CTs, diameter 16mm, rated current 100A
 - 3TC-24-200A : kit of 3 split core CTs, diameter 24mm, rated current 200A
 - 3TC-36-400A : kit of 3 split core CTs, diameter 36mm, rated current 400ANominal voltage 600V, Isolation 3 kV

- Rogowski coil :
 - 3TS-105 : Kit of 3 rogowski coils, diameter 105mm, rated current 3500A
 - 3TS-180 : Kit of 3 rogowski coils, diameter 180mm, rated current 3500ANominal voltage 600V, Isolation 3 kV

