
# Condition monitoring system

## FAG OPTIME E-CM

User Manual

We pioneer motion

SCHAEFFLER

# Contents

# 1 About the manual

## 1.1 Information in this operating manual

This manual enables safe and efficient handling of the device.

Personnel must have carefully read and understood it before starting any work. A basic prerequisite for safe working is compliance with all the safety information and instructions in this manual.

In addition, the local accident prevention regulations and general safety regulations applicable to the device's area of use must be used.

## 1.2 Symbols

Safety information is marked by symbols in this manual. The safety information is introduced by signal words that indicate the severity of the hazard. To avoid accidents, personal injury and damage to property, always observe the safety information and act with caution.

The warning and hazard symbols are defined in accordance with ANSI Z535.6-2011.

1 Warning and hazard symbols

| Signs and descriptions | |
|---|---|
| ⚠ DANGER | In case of non-compliance, death or serious injury will occur. |
| ⚠ WARNING | In case of non-compliance, death or serious injury may occur. |
| ⚠ CAUTION | In case of non-compliance, minor or moderate injury may occur. |
| NOTICE | In case of non-compliance, damage or malfunctions in the product or the adjacent construction may occur. |

## 1.3 Signs

The warning, prohibition and mandatory signs are defined in accordance with DIN EN ISO 7010 or DIN 4844-2.

2 Warning, prohibition and mandatory signs

| Signs and descriptions | |
|---|---|
|  | General warning |
|  | Electrical voltage warning |
|  | Observe the manual |
|  | General mandatory sign |

## 1.4 Legal guidelines

The information in this manual reflects the status at the time of publication.

Unauthorised modifications to or improper use of the product are not permitted. Schaeffler accepts no liability in these cases.

Apps and functions may not be available in all countries and regions. The availability of apps and functions may change.

Further information, in particular on the OPTIME Mobile App and the OPTIME Dashboard, is available in the OPTIME Online Help in the OPTIME Dashboard. The Online Help is continuously updated.

Further information, particularly regarding the Power-Cloud, can be obtained from:
support@eco-adapt.com

### 1.4.1 Advice on third party products and services

All names of products and services cited in this manual are brand names of the respective companies. The details provided in the text are merely indicative and provided for information purposes only.

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- Modbus is a registered trademark of the Modbus Organization
- BACnet is a registered trademark of ASHRAE
- Wi-Fi is a registered trademark of the Wi-Fi Alliance

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Other product and manufacturer names cited in this publication may be the trademarks of their respective owners.

### 1.4.2 Other applicable documents, certificates and licences

**Licence information**

The firmware of the FAG OPTIME E-CM product uses open source libraries under the GNU General Public Licence (GPL) to provide certain functionalities of the product according to the requirements of GPL version 2 (section 3b) and version 3 (section 6b). For more information on the libraries used, including their respective license terms, see the FAGOPTIME E-CM web configurator menu under [Show open source licences].

**GPL written offer**

Eco-Adapt SAS provides the applicant, upon request, with machine-readable source code from the libraries used under the GPL for at least three years from the delivery date of the FAG OPTIME E-CM device.

## 1.5 Limitation of liability

All information and instructions in this manual have been compiled in accordance with the applicable standards and regulations, the current state of the art, and our many years of knowledge and experience.

The manufacturer shall not be liable for any damage resulting from:

- failure to observe this manual
- any use other than the intended purpose
- employment of untrained personnel
- unauthorised conversions
- technical modifications
- use of non-approved spare parts

In the event of customer-specific adjustments, the product that is actually delivered may differ from the description in this manual. In such cases, please contact Schaeffler to obtain further instructions or safety precautions for these devices.

We reserve the right to make technical modifications to the device to improve the user experience.

## 1.6 Availability

A current version of this manual is available at:
https://www.schaeffler.de/std/2235

Ensure that this manual is always complete and legible and is available to all persons engaged in transporting, fitting, dismantling, commissioning, operating or maintaining the product.

Keep the manual in a safe place for immediate reference.

## 1.7 Images

The images in this manual may be schematic representations and may differ from the delivered device.

# 2 General safety regulations



## 2.1 Usage for the intended purpose

The FAG OPTIME E-CM condition monitoring system is approved for use in indoor industrial environments. The FAG OPTIME E-CM condition monitoring system may only be used in accordance with the technical data. Unauthorised structural modifications to the system are not permitted. We assume no liability for any damage to machinery or injury to persons arising from such actions.

Intended use also includes the following:

- compliance with all instructions in the user manual
- compliance with all relevant specifications on occupational safety and accident prevention throughout the entire product life cycle of the system
- possession of the required specialist training and authorisation from your company to carry out the necessary work on the system

## 2.2 Usage not for the intended purpose

The OPTIME condition monitoring system does not provide machine protection and must not be used as a component of safety-related systems.

The OPTIME condition monitoring system is not classified as a safety component in accordance with Machinery Directive 2006/42/EG.

The same applies to the Power-Cloud system from Eco-Adapt SAS.

## 2.3 Warranty

The manufacturer provides warranty in relation to operational safety, reliability and performance only under the following conditions:

- The product may only be mounted and connected by authorized technical personnel.
- The system must be used in accordance with the information in the technical data sheets. The limit values indicated in the technical data must not be exceeded under any circumstances.
- Modifications and repairs to the system may only be performed by the manufacturer.

## 2.4 Qualified personnel

Obligations of the operator:

- Ensure that only qualified and authorised personnel perform the activities described in this manual.
- Ensure that personal protective equipment is used.

Qualified personnel must:

- Ensure adequate product knowledge, e.g. through training on proper handling and use of the product
- be fully familiar with the contents of this manual, particularly all safety instructions
- be aware of any relevant country-specific regulations

## 2.5 Safety regulations

This section summarises the most important safety regulations for working with the FAG OPTIME E-CM condition monitoring system.



### 2.5.1 Work on electrical devices

Work on the electrical assemblies may only be carried out by a qualified electrician.

Damaged components of the system must not be repaired. Any necessary repair work must be carried out by Schaeffler .

A defective connection cable must be replaced immediately by a qualified electrician.

Wiring, opening and closing of electrical connections may only be performed when the system is disconnected from the power supply and in a voltage-free state.

### 2.5.2 Safety during installation

Before installation, the components must be checked for external damage. If any damage or other defects are found, the system must not be commissioned.

Only qualified personnel may commission the system.

### 2.5.3 Safe handling of information interfaces

This product has the following information interfaces:

- 4G mobile network
  for full data transmission
- Ethernet (Modbus TCP or BACnet/IP)
  for partial data transmission
- RS 485
  for partial data transmission

This product has the following information interface for the electrical set-up:

- Wi-Fi
  for data transmission during electrical set-up

With the exception of the LTE interface, the product can be connected to other devices, components or to internal trusted networks via the aforementioned interfaces. Devices such as data carriers that are connected via information interfaces may contain malware or execute harmful functions undetected. The use of such information interfaces can damage this product or potentially the company infrastructure, e.g. IT infrastructure. In addition, the use of such interfaces may compromise your company's data security.

Before using our product and its information interfaces, please familiarise yourself with the following points:

- the safety precautions offered by the product and its information interfaces
- the security provisions of your company, e.g. in relation to IT security

Before commissioning, please clarify with your relevant points of contact whether, and which, security measures are to be taken when using the product and its associated information interfaces.

### 2.5.4 Protection against unauthorised use

The FAG OPTIME E-CM system provides security functions that meet the cybersecurity requirements in accordance with EN 18031 as part of the Radio Equipment Directive (RED).

To protect against unauthorised use of the OPTIME cloud, the OPTIME mobile app and the OPTIME dashboard, data encryption and secure login using individual user credentials are implemented.

The Power-Cloud application is also protected by two-factor authentication.

The local configuration of the FAG OPTIME E-CM module is also password-protected.

The default password must be changed during initial installation. Users must log in with a user name and password, and use a secure password. The user is responsible for keeping their login data secure.

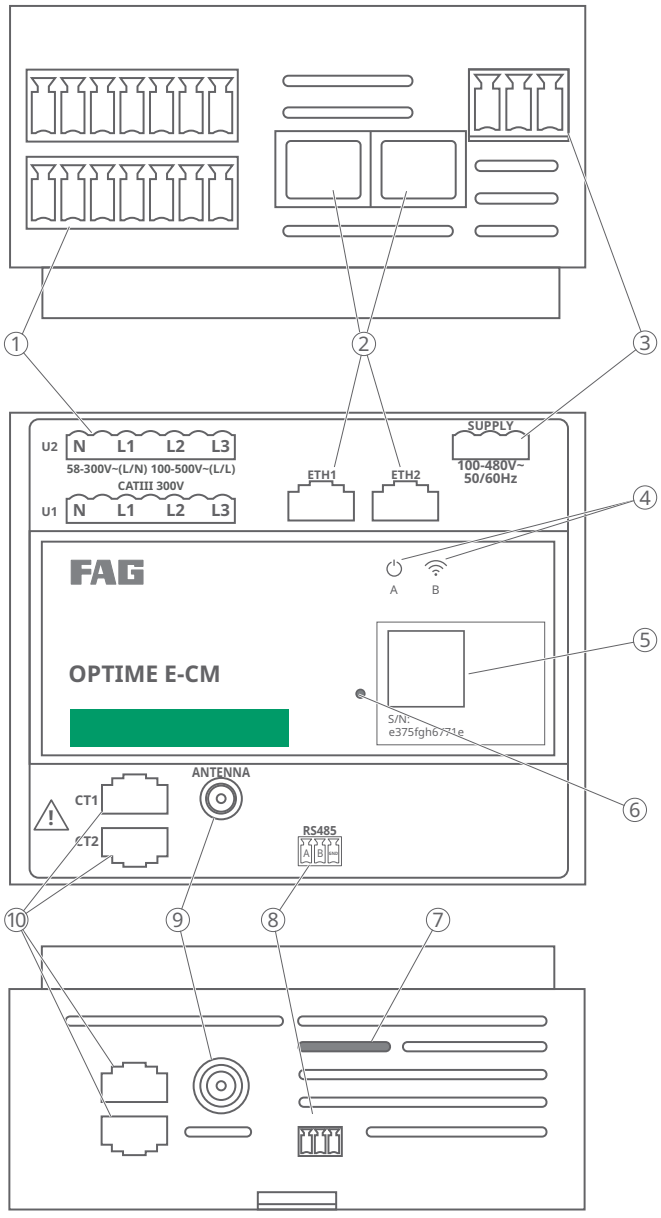
# 3 Product description

FAG OPTIME E-CM is an electrical and mechanical condition monitoring solution for AC-powered rotating machines. This solution enables the monitoring of two 3-phase rotating machines to be monitored.

Any attempt to equip a DC-powered or non-rotating electrical machine with this device is prohibited.



1 Connections on the device

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| | | | |
|---|---|---|---|
| 1 | 2x 3-phase voltage measurement | 2 | 2x Ethernet ports |
| 3 | Power supply | 4 | 2x status LEDs |
| 5 | Data Matrix code for device identification | 6 | Reset button |
| 7 | SIM card | 8 | RS485 port |
| 9 | Antenna connection | 10 | 2x connection for RJ45, each for one 3-phase current signal |

The FAG OPTIME E-CM generates its own Wi-Fi network to enable quick and easy set-up via a computer or smartphone. You can configure the electrical parameters via the web configurator. Provisioning is carried out using the OPTIME mobile app. During this process, the device type “Electric motor” is created automatically and the required motor parameters are requested. These parameters can also be defined in advance in the OPTIME dashboard’s hierarchy wizard to simplify provisioning.

The measurement data are transmitted to the OPTIME cloud via the 4G mobile network. There, the data are analysed and both the measurement data and analysis results are displayed in the OPTIME dashboard and the OPTIME mobile app.

Provisioning via the OPTIME mobile app and the OPTIME dashboard is not available to customers of Eco-Adapt SAS and the Power-Cloud.

## Further information

OPTIME:

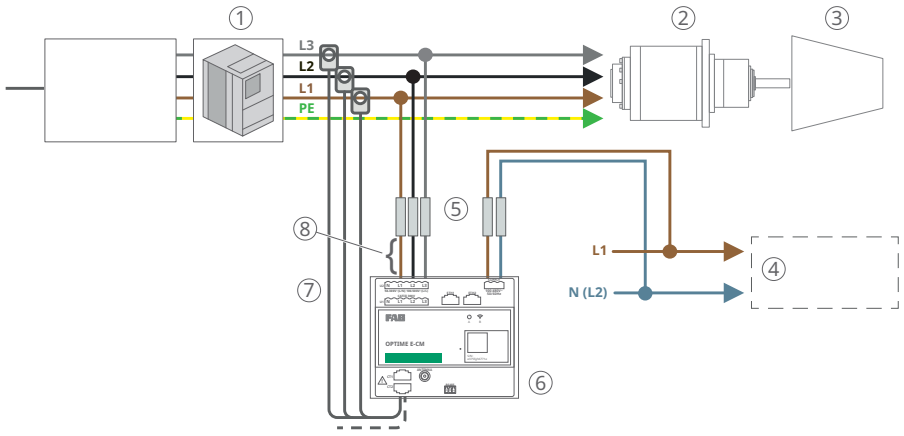
Online help ➤26|6.4
in the OPTIME dashboard

OPTIME | Ecosystem |
https://www.schaeffler.de/std/1FFF

Eco-Adapt SAS and Power-Cloud:

https://www.eco-adapt.com/download/

2 Wiring diagram




| | | | |
|---|---|---|---|
| 1 | Frequency converter (optional) | 2 | Electric motor |
| 3 | Machine | 4 | Device power supply AC 100 V to 480 V, 50 Hz to 60 Hz |
| 5 | Circuit breakers, fuse (2 A) | 6 | FAG OPTIME E-CM device |
| 7 | RJ45 cable (Lmax = 10 m) | 8 | Lmax = 1.5 m (max. distance between circuit breaker and device) |

## 3.1 Control elements and LED displays

The LED indicators of the FAG OPTIME E-CM device are located on the front of the device.

**LED activity during system start**

As soon as the FAG OPTIME E-CM device is supplied with power, the following LED activity occurs:

1. The SYSTEM LED flashes briefly.
2. Both LEDs light up once briefly.
3. The SYSTEM LED flashes continuously.
4. The SYSTEM LED lights up continuously in green.

3 Boot process

| LED | | Meaning |
|---|---|---|
| System A | Communication B | |
| **Boot process** | | |
| Flashes green | Flashes green | Boot process loading. |
| Flashes green | Off | System loading. |
| Lights up green | Off | System ready. |
| Flashes yellow | Off | Emergency mode loading. |
| Lights up yellow | Off | Emergency mode ready. |

4 Operation

| LED | | Meaning |
|---|---|---|
| System A | Communication B | |
| **Operation** | | |
| Lights up green | Flashes green | System ready.<br>LTE connection is being established. |
| Lights up green | Lights up red | System ready.<br>LTE connection could not be established. Retrying connection. |
| Lights up green | Lights up green | System ready.<br>LTE connection is established. |
| Lights up green | Off | System ready.<br>LTE connection not available. |

5 Firmware update

| LED | | Meaning |
|---|---|---|
| System A | Communication B | |
| **Firmware update** | | |
| Flashes green | Flashes yellow | Emergency mode update in progress. |
| Flashes yellow | Flashes yellow | System update in progress. |

If an update fails, e.g. in the event of a power failure, the device will start in emergency mode with limited functions. During an update, it must be ensured that the power supply is not interrupted.

The update can be carried out again via the web configurator. Please contact the relevant technical support.

**System reset**

Press the reset button for 3 s, if necessary using a straightened paper clip, to restart the device. This resets the password and connectivity information. Other device settings are retained.

**Resetting the device to factory settings**

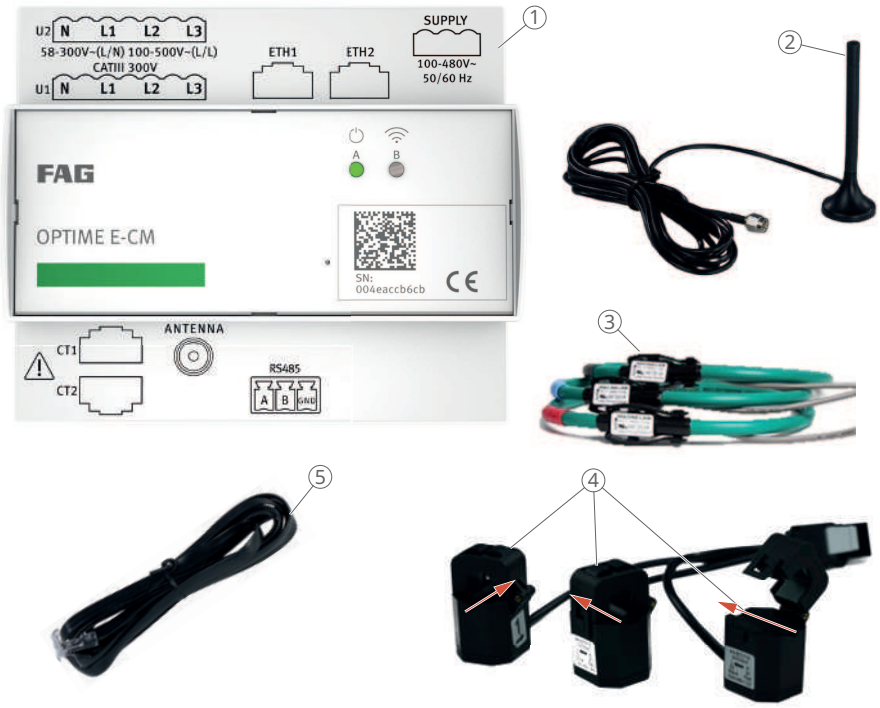
Press the reset button for 10 s, if necessary using a straightened paper clip, to reset the device to factory settings.

# 4 Scope of delivery

- FAG OPTIME E-CM.CPU-2CH:
  2-channel electrical and mechanical health monitoring solution for alternating current rotational machines
- Current transformers or Rogowski coils, incl. extension cables suitable for the currents to be measured
- Antenna (standard or high-sensitivity), depending on reception conditions



3 Scope of delivery

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| | | | |
|---|---|---|---|
| 1 | FAG OPTIME E-CM.CPU-2CH | 2 | Antenna (standard version or high-sensitivity, depending on reception conditions) |
| 3 | Rogowski coils | 4 | Current transformers |
| 5 | Extension cable | | |

## 4.1 Required accessories

To ensure the system is ready for use, the customer must provide the following devices and accessory parts in addition to the FAG OPTIME E-CM:

- 2-A fuse (circuit breaker) for input signals for voltage measurement and power supply (each input separately)
- Voltage measurement cable and power supply cable (in accordance with the requirements of the voltage range)

**⚠ WARNING**

**Safety risks due to non-approved components**

Only the accessory parts listed below are approved for use with this device. The manufacturer accepts no liability for damage to property, malfunctions or safety risks resulting from the use of non-approved components.

- ▸ Use only the accessories listed in the manual.

For customers of Eco-Adapt SAS who use the Power-Cloud, material numbers and designations are different.

6 Current transformers (CTs)

| Ordering number | Designation | Description | Rated current | Inside diameter |
|---|---|---|---|---|
| | | | A | mm |
| 301827972-0000-10 | OPTIME-E_CM.TRAFO-3CT-1A-10-2,5M | Set with 3 current transformers with split core | 1 | 10 |
| 301822131-0000-10 | OPTIME-E_CM.TRAFO-3CT_5A-10_2,5M | Set with 3 current transformers with split core | 5 | 10 |
| 301822123-0000-10 | OPTIME-E_CM.TRAFO-3CT_32A-10_2,5M | Set with 3 current transformers with split core | 32 | 10 |
| 301822140-0000-10 | OPTIME-E_CM.TRAFO-3CT_70A-10_2,5M | Set with 3 current transformers with split core | 70 | 10 |
| 301822158-0000-10 | OPTIME-E_CM.TRAFO-3CT_100A-16_2,5M | Set with 3 current transformers with split core | 100 | 16 |
| 301822166-0000-10 | OPTIME-E_CM.TRAFO-3CT_200A-24_2,5M | Set with 3 current transformers with split core | 200 | 24 |
| 301822182-0000-10 | OPTIME-E_CM.TRAFO-3CT_400A-36_2,5M | Set with 3 current transformers with split core | 400 | 36 |

7 Rogowski coils

| Ordering number | Designation | Description | Rated current | Inside diameter |
|---|---|---|---|---|
| | | | A | mm |
| 306244454-0000-10 | OPTIME-E_CM.TRAFO-3RC-3500A-105 | Set with 3 current transformers | 3500 | 105 |

### Current transformers (CTs) and Rogowski coils

Unless otherwise indicated, the following specifications apply to all current transformers (CTs) and Rogowski coils:

- maximum voltage (non-insulated conductor): 600 V
- maximum voltage (insulated conductor): depending on the conductor insulation

▦8 Extension cables for current transformers (CTs) and Rogowski coils as well as antenna accessories

| Ordering number | Designation | Description | Length |
|---|---|---|---|
| | | | m |
| 301822344-0000-10 | OPTIME-E_CM.CAB-EXT-5M | Extension cable for current measurement | 5 |
| 301822352-0000-10 | OPTIME-E_CM.CAB-EXT-10M | Extension cable for current measurement | 10 |
| 301819742-0000-10 | OPTIME-E.ANT-868MHZ-STD_MAG-2,5M | Standard mobile antenna with magnetic fixture, frequencies ➤30\|10 | 2,5 |
| 301819750-0000-10 | OPTIME-E.ANT-868MHZ-HS_FIX-2,5M | High sensitivity antenna with wall mounting set, frequencies ➤30\|10 | 2,5 |
| 301820767-0000-10 | OPTIME-E.ANT-868MHZ-HS_MAG-2,5M | High sensitivity antenna with magnetic fixture, frequencies ➤30\|10 | 2,5 |
| 301820775-0000-10 | OPTIME-E.CAB-EXT_ANT-5M | Antenna extension cable | 5 |
| 301820783-0000-10 | OPTIME-E.CAB-EXT_ANT-10M | Antenna extension cable | 10 |

# 5 Assembly

**⚠ WARNING**

**Severe or fatal injury due to live components**

Failure to observe the safety regulations and the information on assembly can result in a life-threatening electric shock.

- The device is approved for use indoors only.
- The device must be installed in a fire-resistant, mechanically and electrically stable housing, e.g. a certified control cabinet.
- Disconnect the system from the power supply before starting the installation.
- Use a certified voltage tester to ensure that the installation has been disconnected from the power supply and isolated.



## 5.1 Guidelines for assembly

Observe the following when planning the installation site:

- Reserve a section of at least 6 modules (108 mm) on a 35-mm DIN rail in the control cabinet.
- Ensure that the supplied current transformers (CTs) with 2,5 m cables can be connected to the device following installation.
- If longer distances are required, approved extension cables of up to 10 m must be planned. If no suitable space is available in an existing installation, an additional control cabinet that is equipped with a 35-mm DIN rail must be installed.
- The cables used between the circuit breaker and the voltage input terminals must be designed for 600 V or 1000 V, depending on the wiring type, and must be less than 1,5 m long.
- The screws of the input connections must be tightened to the specified torque ➤32|▦9.

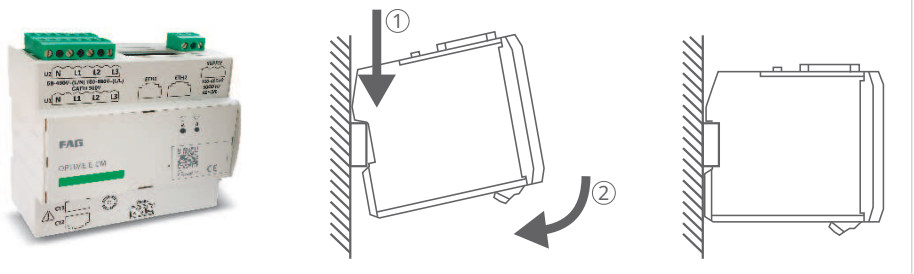
Make sure there is a sufficient supply of air to maintain the temperature specifications for the device ➤32|▦9.

## 5.2 Mechanical design

Device installation:

1. Position the device at a slight angle with the upper edge of the rear recess on the DIN rail.
2. Press the device onto the DIN rail until the device clicks into place.

4 Mounting the device




| | | | |
|---|---|---|---|
| 1 | Attach the device | 2 | Allow the device to engage |

## 5.3 Electrical connections

A sufficiently long connection cable with the corresponding specifications must be provided for the electrical connection.

### 5.3.1 Connecting to the power

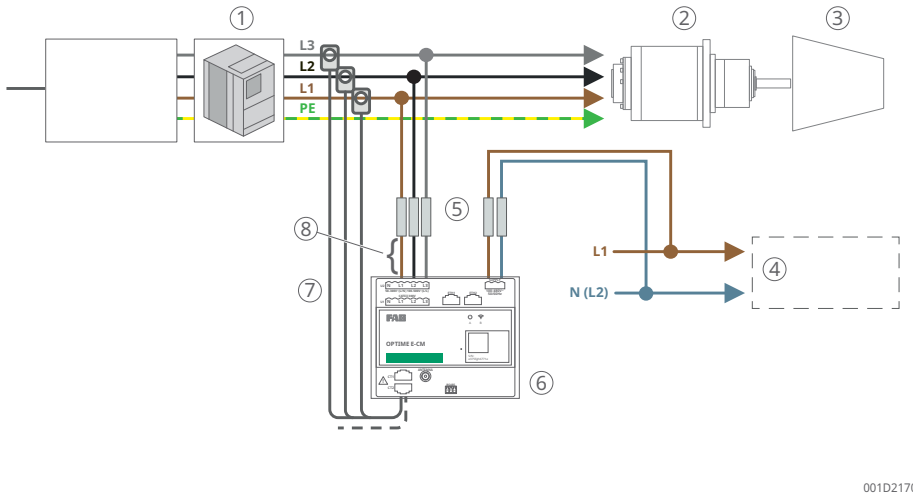
1. Install the circuit breakers (rated current 2 A) in such a way that the power supply can be safely and easily interrupted at any time.
2. Connect the cables to the 2-pole power supply terminals to supply power to the FAG OPTIME E-CM module ➤19|5 ➤20|6 ➤20|7.

### 5.3.2 Connecting the voltage inputs

1. Install a circuit breaker (rated current 2 A) in front of the meter for each voltage input used:
   – Position each circuit breaker so that the voltage signal can be safely and easily interrupted.
2. Connect wires L1, L2, L3 from the motor or the machine to the 4-pole voltage input connector. If a neutral conductor is connected to the machine, connect it to the N pin ➤32|10.2. Observe the connection diagrams ➤19|5 ➤20|6 ➤20|7.
3. If necessary, use the second voltage input connector and separate wiring with a separate circuit breaker if a second machine is to be monitored.

#### 5.3.2.1 3-phase installation

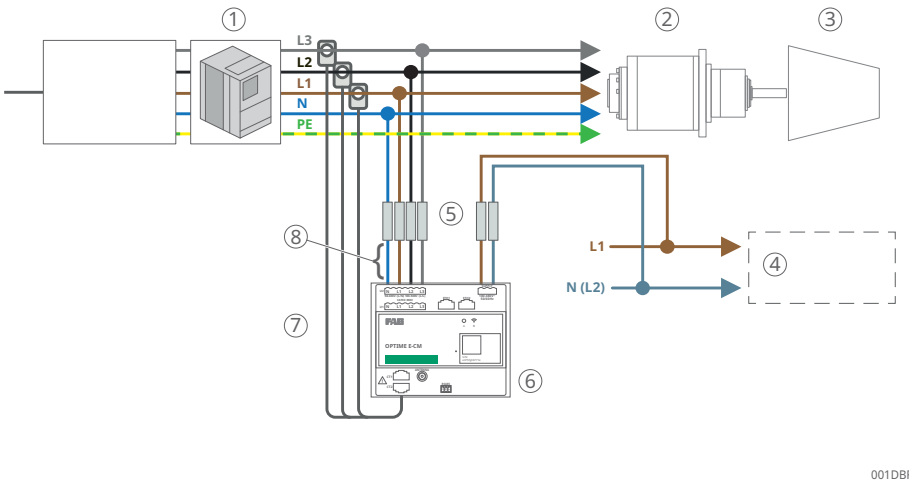
5 3-phase installation




| | | | |
|---|---|---|---|
| 1 | Frequency converter (optional) | 2 | Electric motor |
| 3 | Machine | 4 | Device power supply AC 100 V to 480 V, 50 Hz to 60 Hz |
| 5 | Circuit breakers, fuse (2 A) | 6 | FAG OPTIME E-CM device |
| 7 | RJ45 cable (Lmax = 10 m) | 8 | Lmax = 1.5 m (max. distance between circuit breaker and device) |

### 5.3.2.2 3-phase installation with neutral wire

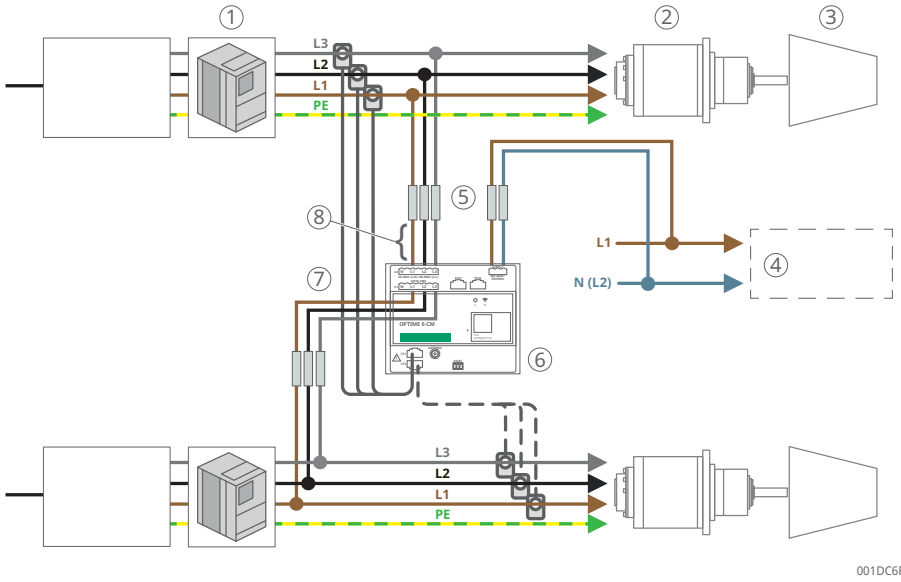
6 3-phase installation with neutral wire




| | | | |
|---|---|---|---|
| 1 | Frequency converter (optional) | 2 | Electric motor |
| 3 | Machine | 4 | Device power supply AC 100 V to 480 V, 50 to 60 Hz |
| 5 | Circuit breakers, fuse (2 A) | 6 | FAG OPTIME E-CM device |
| 7 | RJ45 cable (Lmax = 10 m) | 8 | Lmax = 1.5 m (max. distance between circuit breaker and device) |

### 5.3.2.3 Double 3-phase installation

7 Double 3-phase installation




| | | | |
|---|---|---|---|
| 1 | Frequency converter (optional) | 2 | Electric motor |
| 3 | Machine | 4 | Device power supply AC 100 V to 480 V, 50 to 60 Hz |
| 5 | Circuit breakers, fuse (2 A) | 6 | FAG OPTIME E-CM device |
| 7 | RJ45 cable (Lmax = 10 m) | 8 | Lmax = 1.5 m (max. distance between circuit breaker and device) |

### 5.3.3 Installation of current sensors

The current can be measured with 2 types of sensors, depending on the maximum current that is expected and the cross-section of the current conductors:

- Split-core current transformers (CTs)
- Rogowski coils

Each group of 3 sensors is connected to one RJ45 input of the FAG OPTIME E-CM device, so that a 3-phase signal can be measured with one RJ45 connection.

The FAG OPTIME E-CM device has 2 RJ45 inputs and can measure 2 3-phase signals in order to monitor 2 different motors or machines.



**⚠ WARNING**

**Risk of severe injury or death due to improper assembly**

Improper connection of the device may result in life-threatening electric shock and severe damage to the device, connected components and machines.

- ▸ Only use approved current transformers and Rogowski coils.
- ▸ The RJ45 connections are only intended for transformers that are equipped with internal protection.

**NOTICE**

**There is a risk of damage if the connection is incorrect**

Connection of a telecommunications network to an RJ45 connector can damage the device.

- ▸ Do not connect a telecommunications network to the RJ45 connectors.

**NOTICE**

**Malfunction due to incorrect connection**

The sequence and orientation of the current transformers, as well as their assignment to the voltage inputs, must be strictly observed. Failure to do so may impair functionality.

- ▸ Note the sequence and orientation (printed arrow) of the current transformers and their assignment to the voltage inputs.

#### 5.3.3.1 Use of split-core current transformers (CTs)

1. Attach one current transformer to each phase cable. Install the current transformer so that the arrow printed on it points from the power supply towards the motor.
2. Close the current transformer until 2 clicks are heard to ensure that it is properly closed.
3. Adhere to the correct phase sequence: the current transformers within one RJ45 connection group are numbered from 1 to 3.
4. Secure each current transformer on both sides using cable ties or clamping rings (not included in the scope of delivery).

8 Use of split-core current transformers


001D206F

#### 5.3.3.2 Use of Rogowski coils

1. Place each Rogowski coil around the power conductor and close it.
2. Position the conductor as close as possible to the centre of the coil to ensure an accurate measurement.

9 Rogowski coils

001D205F

### 5.3.4 Completing the installation

**⚠ WARNING**

**Danger to life from electric shock**

Improper installation may result in a life-threatening electric shock.

- Observe the installation instructions.
- Carefully check the installation after all work has been completed.

Once the installation is complete, check the following:

- Ensure there is insulation between the various circuits.
- Cables with potentially life-threatening voltages cannot come into contact with the Ethernet ports.
- Terminals L1, L2 and L3 and the external circuits connected to these terminals are neither accessible nor connected to other accessible parts.

# 6 Commissioning

## 6.1 Configuration

### 6.1.1 Communication interfaces

The FAG OPTIME E-CM device supports multiple communication interfaces for configuration, data transfer and system integration. The following options are available:



**Using Wi-Fi Direct for local configuration**

The device automatically activates its internal Wi-Fi hotspot within 1 min of being switched on:

- Establish a connection to the FAG OPTIME E-CM device using a laptop, tablet or smartphone.

**Using the 4G mobile connection**

Conditions for transmitting measurement data over the 4G mobile network without an additional configuration:

- Mount the antenna vertically on a horizontal metal surface outside the control cabinet to ensure sufficient signal strength.
- Connect the antenna to the antenna connection of the FAG OPTIME E-CM device.

**Using Modbus TCP via Ethernet (reserved for future use)**

Conditions for transmitting data via Ethernet using the Modbus TCP protocol:

- Connect the FAG OPTIME E-CM device to the Ethernet network using a standard Ethernet cable.
- Activate Ethernet communication in the configuration menu using the Wi-Fi interface.

**Using Modbus RTU via RS485 (reserved for future use)**

Conditions for transmitting data via the RS485 interface using the Modbus RTU protocol:

- Connect the communication cables to pins A, B and GND.

## 6.2 Set up the device via the web configurator

✓ The motor must be running under normal operating conditions.

1. Connect to the Wi-Fi network of the OPTIME E-CM device.

› Wi-Fi designation: OPTIME-E-CM-XXXXXX (last 6 digits of the device serial number (S/N)

› Password: optimewifi

2. Open the web browser. Enter the address of the web configurator:

› https://optime-e.net/

3. Enter user credentials.

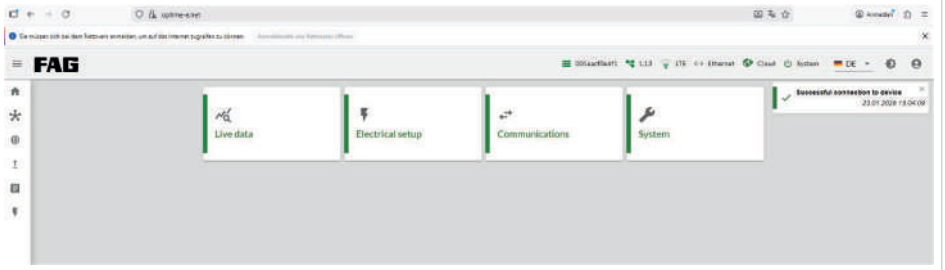
› User name: admin

› Password: admin

4. The application prompts you to change your password.
5. Open the [Electrical Setup] menu in the web configurator.

If the password is forgotten, press the reset button for 3 s to restore the device to the default password.

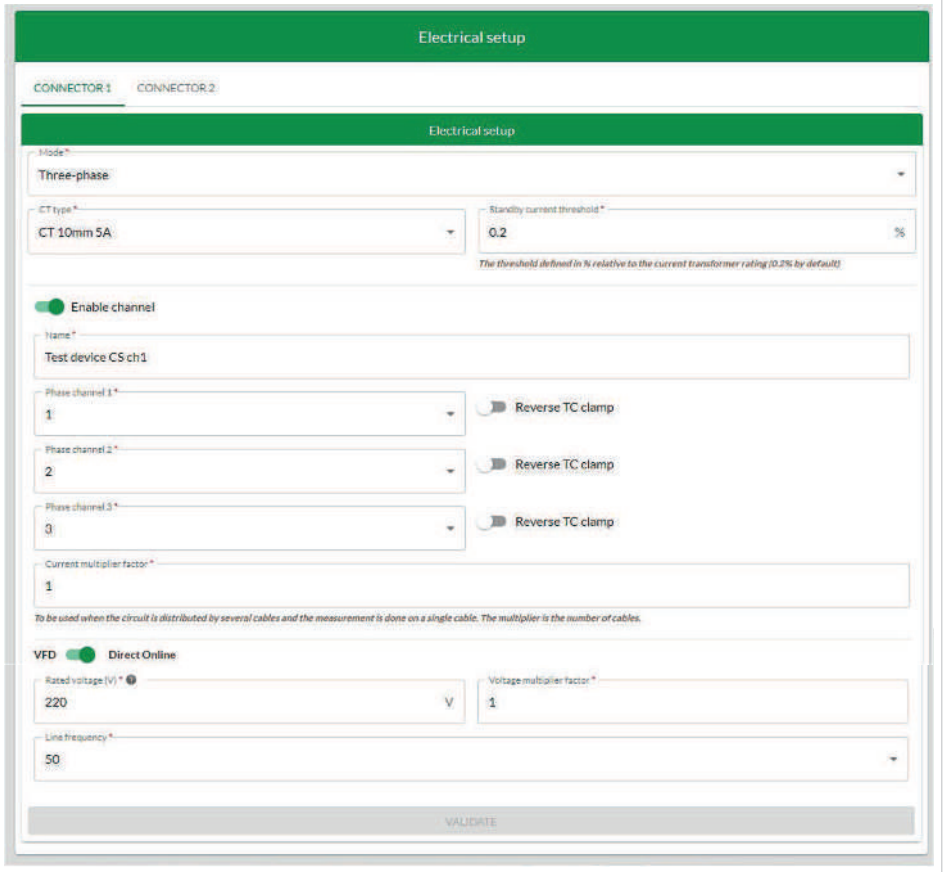
10 Electrical configuration menu




001D8D7D

6. Enter the electrical parameters to complete the configuration.

11 Electrical configuration input mask

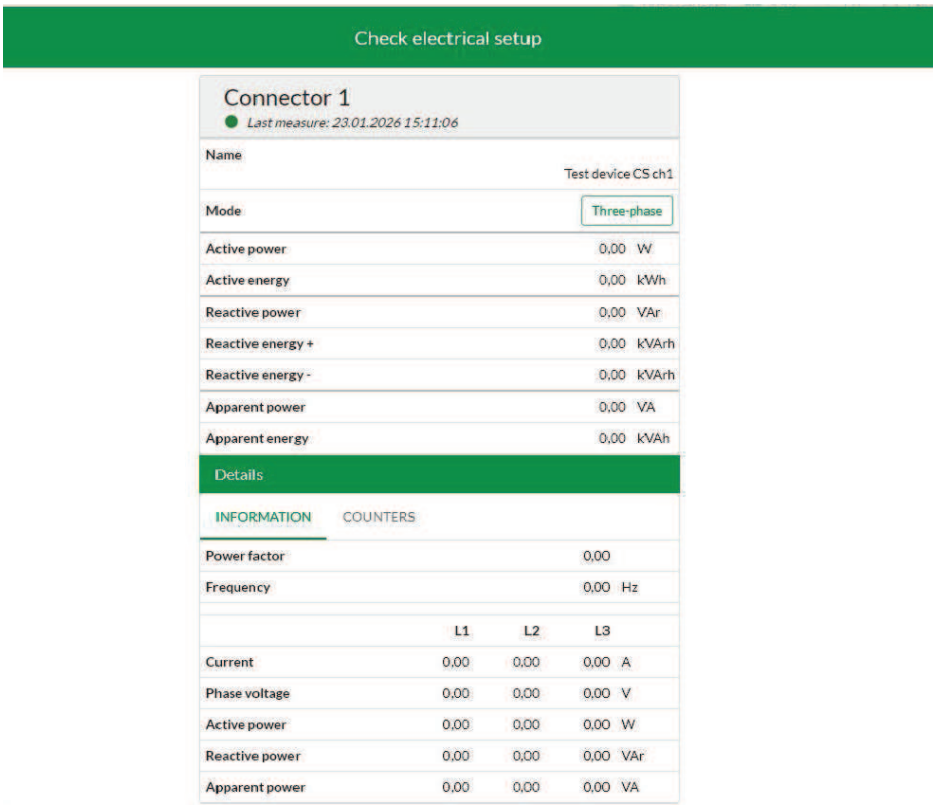



001D8D78

7. Enter the required information for the current measurement sensors.
8. After entering all parameters, select [Validate].

› The device checks the phase sequence and the polarity of the current measurement sensors.

12 Diagnostics




001D8D7B

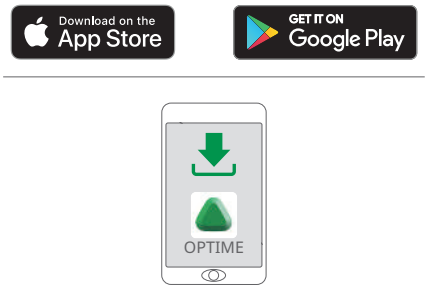
9. In the event of errors, follow the instructions in the web configurator.
10. Open the [Live data] menu in the web configurator.
11. Check the real-time measured values (current, voltage, frequency, etc.) for each phase. Check the plausibility of the measured values and compare them with the motor control system values to ensure correct configuration.
12. For standard provisioning, leave the settings under [Communication] and unchanged. Only make adjustments if required for an advanced configuration.

## 6.3 Provisioning the device in the OPTIME mobile app

Provisioning via the OPTIME mobile app and the OPTIME dashboard is not available to customers of Eco-Adapt SAS and the Power-Cloud.

1. Download the OPTIME mobile app.

13 Download the OPTIME mobile app




001B5450

2. Log in to the OPTIME mobile app using the OPTIME user credentials.
3. In the [Provision sensors] menu, select FAG OPTIME E-CM.
4. Follow the instructions in the OPTIME mobile app.
5. Scan the Data Matrix code on the front of the device.

14 Add the device to the OPTIME mobile app


Create the measurement point for electric motors in advance using the hierarchy assistant in the OPTIME dashboard. All data will then already be available and provisioning in the OPTIME mobile app will be significantly faster. Further information can be found in the OPTIME online help ➤26|6.4.

## 6.4 OPTIME Online Help

Comprehensive explanations on the content and operation of the OPTIME Dashboard are available in the Online Help. The Online Help includes detailed descriptions of the dashboard functions as well as information about the OPTIME Mobile App, the API, training opportunities and support topics. We also keep you informed about our current releases and updates. The Online Help is available in English only.

Accessing the Online Help:

- ▸ Log in to the OPTIME Dashboard.
- » The Online Help can be accessed from the menu at the top left of the OPTIME Dashboard start page.

# 7 Maintenance

The online help in the OPTIME dashboard also contains a list of frequently asked questions (FAQ) that can assist with troubleshooting.

If the problem persists or is not addressed in the FAQ, please contact the relevant technical support.

OPTIME

- EN: www.schaeffler.de/en/technical-support
- DE: www.schaeffler.de/technischer-support

Eco-Adapt SAS and Power-Cloud:

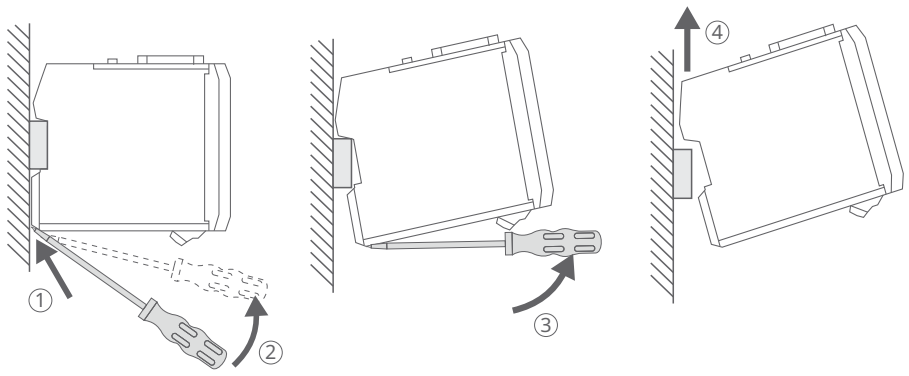
- support@eco-adapt.com

# 8 Disassembly

To remove the FAG OPTIME E-CM device from the DIN rail, proceed as follows:

1. Ensure that the device is de-energised and that all connections have been decoupled from the device.
2. Place a flat-blade screwdriver at the bottom edge of the module and lever the module upwards (1 and 2).
3. A further lever motion (3) releases the module from the DIN rail.
4. Lift the module upwards and out of the DIN rail (4).

15 Removing the device




| | | | |
|---|---|---|---|
| 1 | Position the slotted screwdriver | 2 | Lever the slotted screwdriver upwards until the device releases from the DIN rail |
| 3 | Lever the slotted screwdriver further upwards | 4 | Lift off the device |

# 9 Disposal

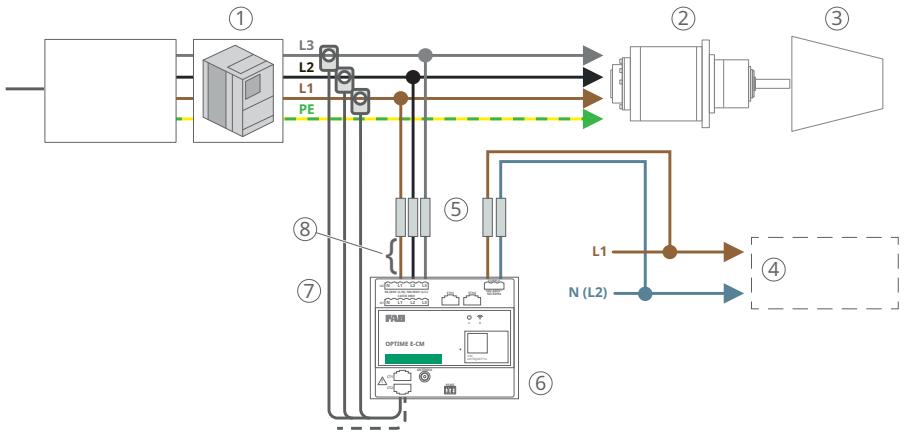
Observe the locally applicable regulations for disposal.

# 10 Technical information

## 10.1 Connection diagrams

### 10.1.1 3-phase installation

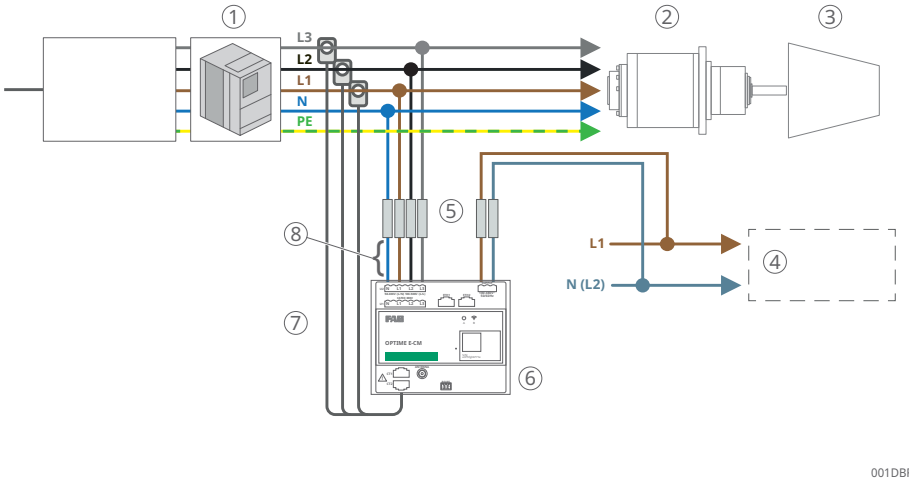
16 3-phase installation




| | | | |
|---|---|---|---|
| 1 | Frequency converter (optional) | 2 | Electric motor |
| 3 | Machine | 4 | Device power supply AC 100 V to 480 V, 50 Hz to 60 Hz |
| 5 | Circuit breakers, fuse (2 A) | 6 | FAG OPTIME E-CM device |
| 7 | RJ45 cable (Lmax = 10 m) | 8 | Lmax = 1.5 m (max. distance between circuit breaker and device) |

### 10.1.2 3-phase installation with neutral wire

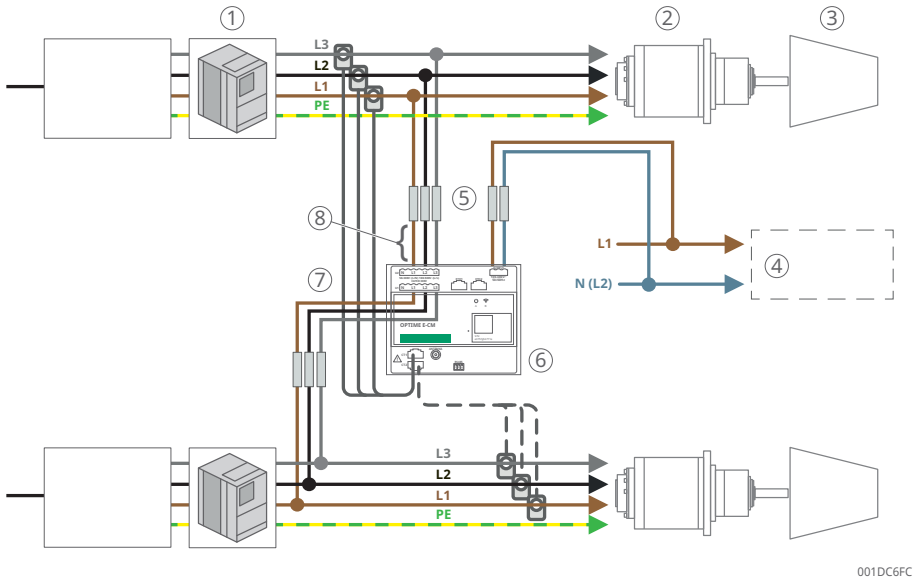
17 3-phase installation with neutral wire




| | | | |
|---|---|---|---|
| 1 | Frequency converter (optional) | 2 | Electric motor |
| 3 | Machine | 4 | Device power supply AC 100 V to 480 V, 50 to 60 Hz |
| 5 | Circuit breakers, fuse (2 A) | 6 | FAG OPTIME E-CM device |
| 7 | RJ45 cable (Lmax = 10 m) | 8 | Lmax = 1.5 m (max. distance between circuit breaker and device) |

### 10.1.3 Double 3-phase installation

18 Double 3-phase installation




| | | | |
|---|---|---|---|
| 1 | Frequency converter (optional) | 2 | Electric motor |
| 3 | Machine | 4 | Device power supply AC 100 V to 480 V, 50 to 60 Hz |
| 5 | Circuit breakers, fuse (2 A) | 6 | FAG OPTIME E-CM device |
| 7 | RJ45 cable (Lmax = 10 m) | 8 | Lmax = 1.5 m (max. distance between circuit breaker and device) |

## 10.2 Technical specifications

### 9 General

| Characteristic | Unit | Value |
|---|---|---|
| Dimensions (L × H × W), including connector plug | mm | 106,3×106,3×63 |
| **Operating conditions** | | |
| Ambient conditions | – | Indoors only |
| Operating temperature | °C | −5 ... +60 |
| Humidity | % | 5 ... 90, non-condensing |
| Degree of contamination | – | 2 |
| Maximum altitude | m | 2000 |

### 10 Power supply

| Characteristic | | Unit | Value |
|---|---|---|---|
| Power supply AC N-Ph or Ph-Ph | | V | 100 ... 480, RMS |
| Frequency | | Hz | 50 or 60 |
| Overvoltage category | | – | CAT III 600 V |
| Maximum voltage deviation from rated voltage | | % | ±10 |
| Terminal block with 2 connections | Quantity | Piece | 1 |
| | Stranded wires 16–12 AWG | $mm^2$ | 1,5 ... 2,5 |
| | Stripping length | mm | 7 |
| | Tightening torque | Nm | 0,5 |
| Maximum power consumption | | W | 10 |

### 11 Inputs and outputs

| Characteristic | | Unit | Value |
|---|---|---|---|
| **Voltage measurement inputs** | | | |
| Rated voltage N-Ph | | V | 58 ... 300, RMS |
| Rated voltage Ph-Ph | | V | 100 ... 500, RMS |
| Rated voltage max., with respect to earth | | V | 300 |
| Rated frequency | | Hz | 10 ... 200 |
| 4-pole terminal block | Quantity | Piece | 2 |
| | Stranded wires 16–12 AWG | $mm^2$ | 1,5 ... 2,5 |
| | Stripping length | mm | 7 |
| | Tightening torque | Nm | 0,5 |
| Measurement category | | – | CAT III |
| Overvoltage category | | – | CAT III 300 V |
| **Current measurement inputs** | | | |
| Only to be used with Schaeffler current transformers/Rogowski coils | | | |
| Number of connections | | – | 2× 3-phase |
| Connections | | – | RJ45 |
| Rated voltage, differential | | mV | 333 |
| Maximum voltage, differential | | mV | 426 |
| Sensors: Current transformers (CTs) or Rogowski coils | | – | Set with 3 sensors |

| Characteristic | Unit | Value |
|---|---|---|
| **Measurements** | | |
| – | – | In accordance with standard IEC 61557-12<br>Active energy index CEI 62053-21 Class 1 (1 %)<br>Reactive energy index CEI 62053-23 Class 2 (2 %)<br>Frequency |
| Measured variables | – | Ip, VpN, Up-p, Pp, Ptot, Sp, Stot Qp, Qtot, PF (vector)<br>Voltage unbalance, current unbalance<br>Voltage dips, voltage rises<br>THDu, THDi |

## 12 Interfaces

| Characteristic | | Unit | Value |
|---|---|---|---|
| **Ethernet connectivity (reserved for future use)** | | | |
| Number of connections | | – | 2 |
| Connection | | – | RJ45 |
| Overvoltage, max. | | kV | 1,5 |
| Standard in accordance with IEEE 802.3 | | – | 10/100 Base-T |
| Wiring | | – | Auto MDI/MDIX |
| **RS485 interface (reserved for future use)** | | | |
| 3-pole terminal block | Quantity | Piece | 1 |
| | Stranded wires 25–16 AWG | $mm^2$ | 0,14 ... 1,5 |
| | Stripping length | mm | 7 |
| | Tightening torque | Nm | 0,25 |
| Signal level | | V<br>V | 0 ... 5 (A-B)<br>–7 ... 12 (GND-A/B) |
| Common-mode voltage isolation, max. | | kV | 1,5 |
| Rate | | kbps | 9,6 ... 115,2 |
| Supported protocols | | – | Modbus RTU |
| **Wireless connection** | | | |
| Antenna | | Ω | External 50 |
| Connection | | – | SMA |
| Protocol | | – | LTE Category 1 |
| Frequency bands | LTE-FDD | – | B1/2/3/4/5/7/8/12/13/14/18/19/20/25/26/28 |
| **Wi-Fi connection** | | | |
| Antenna | | – | Internal |
| Protocol in accordance with IEEE 802.11 | | – | b/g/n |
| Frequency | | GHz | 2,4 |
| Mode | | – | Access point |
| Security | | – | WPA2 authentication<br>AES encryption |
| **LEDs** | | | |
| – | | – | Status |
| – | | – | Connection |

## 10.3 Type plate

The nameplate with the serial number (S/N) is located on the left-hand side of the housing.

The serial number is also encrypted in the applied Data Matrix code.

## 10.4 Abbreviations for measured values

13 Measured values

| Abbreviation | Description | Unit |
|---|---|---|
| Ip | Current per phase | A |
| VpN | Voltage phase to neutral conductor | V |
| Upp | Voltage between the phases | V |
| Pp | Active power per phase | W |
| Ptot | Total active power | W |
| Sp | Apparent power per phase | VA |
| Stot | Total apparent power | VA |
| Qp | Reactive power per phase | VAr |
| Qtot | Total reactive power | VAr |
| PF | Power factor (0...100) (Ptot/Stot) | % |

# 11 Declaration of Conformity

**Certificates**

The full text of the EU Declaration of Conformity and other certificates are available at the following Internet address:

EN: www.schaeffler.de/en/technical-support

DE: www.schaeffler.de/technischer-support

## 11.1 Declaration of Conformity

### 11.1.1 FCC Statement

**FCC 15.21**

The company "Eco-Adapt SAS" is not responsible for any changes or modifications that were not expressly approved by the regulatory authority responsible for compliance. Such modifications may invalidate the operating permit for the device.



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

- This device may not cause harmful interference and
- this device must accept any interference received, including interference that may cause unwanted operating states.

**FCC 15.105**

NOTE:

This device has been tested and found to comply with the limits for Class A digital devices, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the device is operated in a commercial environment. This device generates, uses and can emit high frequency energy. If it is not installed and used in accordance with the operating manual, interference may affect wireless communication. Operation of this device in a residential area may cause interference. In this case, users must rectify the interference at their own expense. This device must be installed by a specialist.

### 11.1.2 ISED Declaration of Conformity

This device contains one or more 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 all interference, including interference that may cause unwanted operation of the device.

This device complies with ISED RSS-102 radio frequency exposure limits that were defined for an uncontrolled environment under the following conditions:

- This device should be installed and operated in such a way that a minimum distance of 20 cm is maintained between the emitter (aerial) and the body of the user/persons nearby at all times.
- This transmitter must not be installed or operated in combination with any other aerial or transmitter.

# 12 Manufacturer details

Eco-Adapt SAS
28 Rue de Châteaudun
75009 Paris
France
www.eco-adapt.com

**Schaeffler Technologies AG & Co. KG**
Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
www.schaeffler.de/en/services

Technical support:
www.schaeffler.de/en/technical-support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