

# EEM-MA770-PN - Measuring device



2907946

<https://www.phoenixcontact.com/us/products/2907946>

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Multifunctional energy measuring device with integrated Modbus/TCP and PROFINET interface for measuring electrical parameters in low-voltage installations up to 690 V. (phoenixcontact.com/empro-help)

## Commercial data

|                                      |               |
|--------------------------------------|---------------|
| Item number                          | 2907946       |
| Packing unit                         | 1 pc          |
| Minimum order quantity               | 1 pc          |
| Sales key                            | C446          |
| Product key                          | CMMC21        |
| GTIN                                 | 4055626260372 |
| Weight per piece (including packing) | 515.8 g       |
| Weight per piece (excluding packing) | 560 g         |
| Customs tariff number                | 90303100      |
| Country of origin                    | DE            |

## Technical data

### Product properties

|                         |                         |
|-------------------------|-------------------------|
| Product type            | Energy measuring device |
| Product family          | EMpro                   |
| Number (Ethernet ports) | 3                       |

### Display

|              |   |
|--------------|---|
| Display type | LCD display, backlit, 2-color, multi-line |
|--------------|---|

### Electrical properties

|   |   |
|---|---|
| Maximum power dissipation for nominal condition | 10 VA   |
| Mains type                                      | 3-phase (3 or 4-conductor), 2-phase (2-conductor), and single-phase (1-conductor) |

### Electrical isolation

|                  |                       |
|------------------|-----------------------|
| Test voltage     | 4 kV AC (50 Hz, 60 s) |
| Pollution degree | 2                     |
| Insulation       | Reinforced insulation |

### Electrical isolation Housing against all potentials IEC 61010-1

|                       |                       |
|-----------------------|-----------------------|
| Standards/regulations | IEC 61010-1           |
| Overvoltage category  | III (300 V AC)        |
|                       | II (600 V AC)         |
| Insulation            | Reinforced insulation |

### Electrical isolation Supply against all other potentials IEC 61010-1

|                       |                       |
|-----------------------|-----------------------|
| Standards/regulations | IEC 61010-1           |
| Overvoltage category  | III (300 V AC)        |
|                       | II (600 V AC)         |
| Insulation            | Reinforced insulation |

### Electrical isolation Voltage measurement input against all other potentials IEC 61010-2-030

|                       |                       |
|-----------------------|-----------------------|
| Standards/regulations | IEC 61010-2-030       |
| Measuring category    | III (300 V AC)        |
|                       | II (600 V AC)         |
| Insulation            | Reinforced insulation |

### Electrical isolation Current measurement input against all other potentials

|            |                       |
|------------|-----------------------|
| Insulation | Functional insulation |
|------------|-----------------------|

### Electrical isolation Digital I/Os

|            |                       |
|------------|-----------------------|
| Insulation | Functional insulation |
|------------|-----------------------|

### Electrical isolation Communication interface

|            |                       |
|------------|-----------------------|
| Insulation | Functional insulation |
|------------|-----------------------|

### Supply

|                      |                                      |
|----------------------|--------------------------------------|
| Supply voltage range | 100 V AC ... 400 V AC ( $\pm 20\%$ ) |
|                      | 150 V DC ... 250 V DC ( $\pm 20\%$ ) |
| Power consumption    | $\leq 4$ W                           |
| Nominal frequency    | 50 Hz ... 60 Hz (AC sine)            |

## Input data

### General

|                          |  |
|--------------------------|--|
| Measuring principle      | True RMS value measurement (TRMS)                        |
| Measured value           | AC sine (50 Hz/60 Hz)                                    |
| Acquisition of harmonics | up to 63rd harmonic                                      |
| Description of the input | Digital input in accordance with IEC/EN 61131-2 (type 3) |
| Number                   | 1  |
| Voltage input signal     | 24 V DC  |
|                          | 0 V DC ... 30 V DC                                       |
| Current input signal     | 2 mA ... 15 mA   |
| Protection               | 250 mA (fast-blow)                                       |
| Protective circuit       | Protection against incorrect DC connection (max. 30 V)   |

### Measurement: Voltage

|   |  |
|---|--|
| Input name                                    | Voltage measuring input V1, V2, V3             |
| Input voltage range direct                    | 35 V AC ... 690 V AC (Phase/Phase)             |
|   | 20 V AC ... 400 V AC (Phase/neutral conductor) |
| Input voltage range via external transformers | 60 V AC ... 2000000 V AC (primary)             |
|   | 60 V AC ... 400 V AC (secondary)               |
| Surge voltage capacity                        | 760 V AC (Phase/Phase)                         |
| Precision                                     | 0.02 %   |
| Power consumption                             | < 0.5 VA                                       |

### Measurement: Current

|   |                                     |
|---|-------------------------------------|
| Input name  | Current measurement I1, I2, I3      |
| Input current   | 1 A (secondary)                     |
|   | 5 A (secondary)                     |
| Measuring range                                       | 1 A ... 20000 A (primary)           |
| Overload capacity                                     | 6 A ( $I_{max}$ )                   |
| Response threshold from measuring range nominal value | 10 mA (1 A)                         |
|   | 50 mA (5 A)                         |
| Precision   | 0.2 %                               |
| Current overload                                      | 50 A for 1 s                        |
|   | 20 A ( $4 \times I_N$ , continuous) |
| Power consumption                                     | < 0.5 VA                            |

### Measurement: Power

|                               |             |
|-------------------------------|-------------|
| Precision                     | 0.5 %       |
| Active energy (IEC 62053-22)  | Class 0.5 S |
| Reactive power (IEC 62053-23) | Class 2     |

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|             |             |
|-------------|-------------|
| ANSI C12.20 | Class 0.5 S |
|-------------|-------------|

## Output data

|                       |   |
|-----------------------|---|
| Output description    | Digital output in accordance with IEC/EN 61131-2 (type 3) |
| Number                | 1   |
| Current output signal | ≤ 100 mA  |
| Voltage output signal | 24 V DC   |
| Protection            | 250 mA (fast-blow)  |
| Protective circuit    | Protection against incorrect DC connection (max. 30 V)    |

## Connection data

### Current / voltage / supply

|                                  |   |
|----------------------------------|---|
| Connection method                | Screw connection                          |
| Stripping length                 | 8 mm                                      |
| Screw thread                     | M3  |
| Conductor cross-section rigid    | 0.2 mm <sup>2</sup> ... 6 mm <sup>2</sup> |
| Conductor cross-section flexible | 0.2 mm <sup>2</sup> ... 4 mm <sup>2</sup> |
| Conductor cross-section AWG      | 24 ... 10                                 |
| Tightening torque                | 0.5 Nm ... 0.6 Nm                         |

### Digital I/O / communication

|                                  |  |
|----------------------------------|--|
| Connection method                | Screw connection                             |
| Stripping length                 | 7 mm   |
| Screw thread                     | M3   |
| Conductor cross-section rigid    | 0.14 mm <sup>2</sup> ... 2.5 mm <sup>2</sup> |
| Conductor cross-section flexible | 0.14 mm <sup>2</sup> ... 1.5 mm <sup>2</sup> |
| Conductor cross-section AWG      | 26 ... 14                                    |
| Tightening torque                | 0.5 Nm ... 0.6 Nm                            |

## Interfaces

### Data: Network interface

|                        |            |
|------------------------|------------|
| Communication protocol | Modbus/TCP |
|                        | REST       |
| Connection method      | RJ45       |

### Data: Network interface

|                        |             |
|------------------------|-------------|
| Communication protocol | PROFINET RT |
| Connection method      | RJ45        |
| Number of connections  | 2           |
| Note                   | CC-B        |

## Dimensions

### Item dimensions

|       |       |
|-------|-------|
| Width | 96 mm |
|-------|-------|

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|        |                              |
|--------|------------------------------|
| Height | 96 mm                        |
| Depth  | 89.8 mm                      |
|        | 74.8 mm (Installation depth) |

## Material specifications

|       |                 |
|-------|-----------------|
| Color | gray (RAL 7042) |
|-------|-----------------|

## Environmental and real-life conditions

### Ambient conditions

|  |                                     |
|--|-------------------------------------|
| Degree of protection (Housing)                 | IP20 (Housing)                      |
| Degree of protection (Display)                 | IP54 (Display with seal (included)) |
| Ambient temperature (operation)                | -10 °C ... 55 °C                    |
| Ambient temperature (storage/transport)        | -40 °C ... 70 °C                    |
| Altitude                                       | ≤ 2000 m                            |
| Max. permissible relative humidity (operation) | ≤ 95 % (non-condensing)             |

## Approvals

### CE

|             |              |
|-------------|--------------|
| Certificate | CE-compliant |
|-------------|--------------|

### UKCA

|             |                |
|-------------|----------------|
| Certificate | UKCA-compliant |
|-------------|----------------|

### UL, USA/Canada

|                |                           |
|----------------|---------------------------|
| Identification | UL/C-UL Listed UL 61010-1 |
|----------------|---------------------------|

### UL data

|                |            |
|----------------|------------|
| Operating mode | Indoor use |
|----------------|------------|

## Standards and regulations

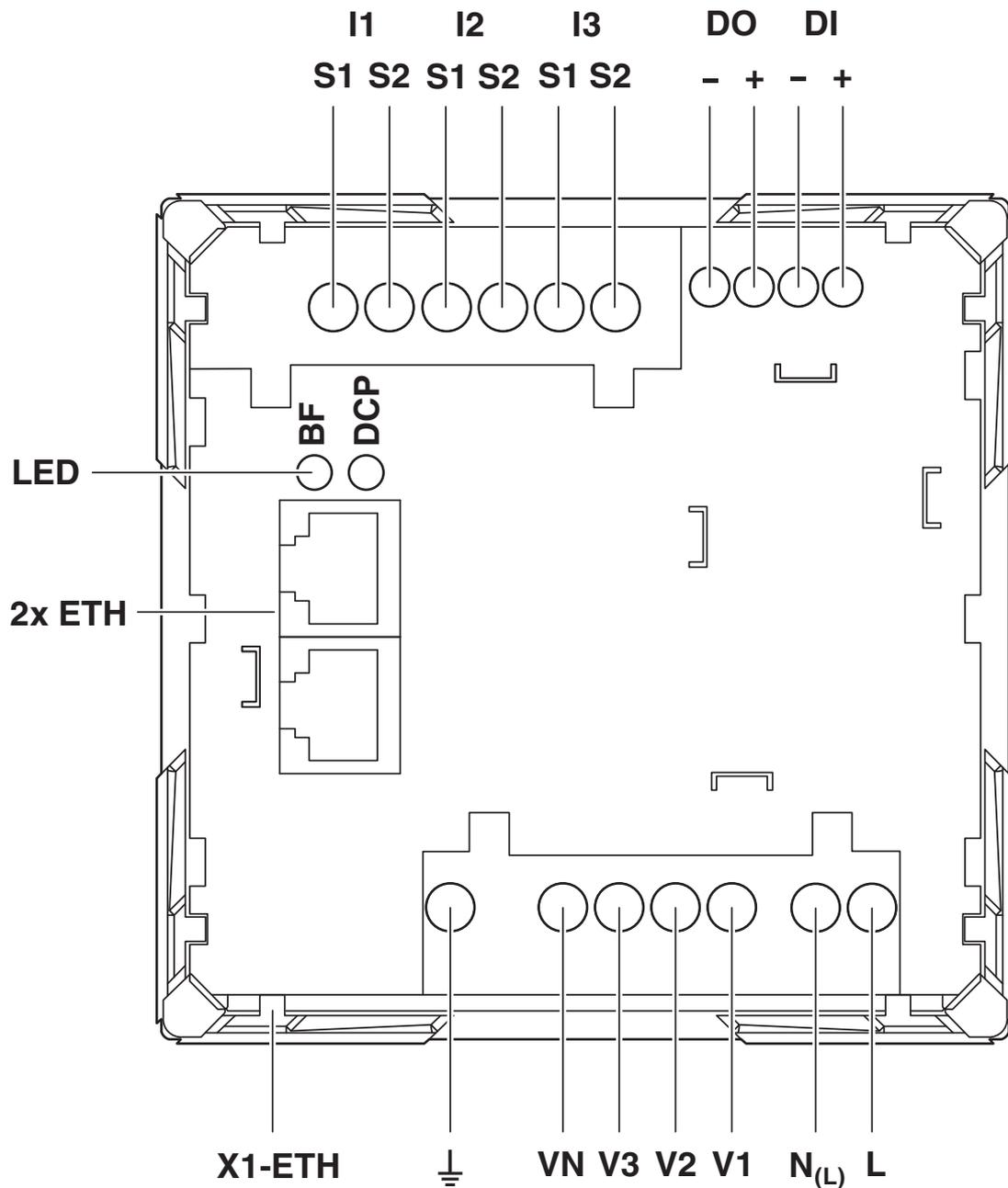
|                       |              |
|-----------------------|--------------|
| Standards/regulations | IEC 61010-1  |
|                       | IEC 61326-1  |
|                       | IEC 61557-12 |

## Mounting

|                   |                                      |
|-------------------|--------------------------------------|
| Mounting type     | Panel mount                          |
| Mounting position | Front panel installation, horizontal |

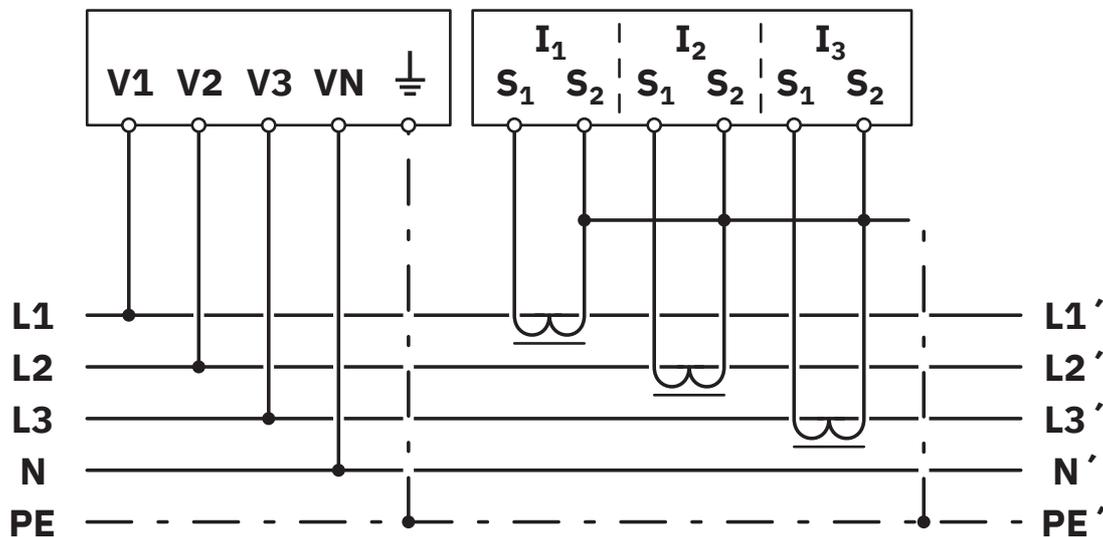
## Drawings

Connection diagram



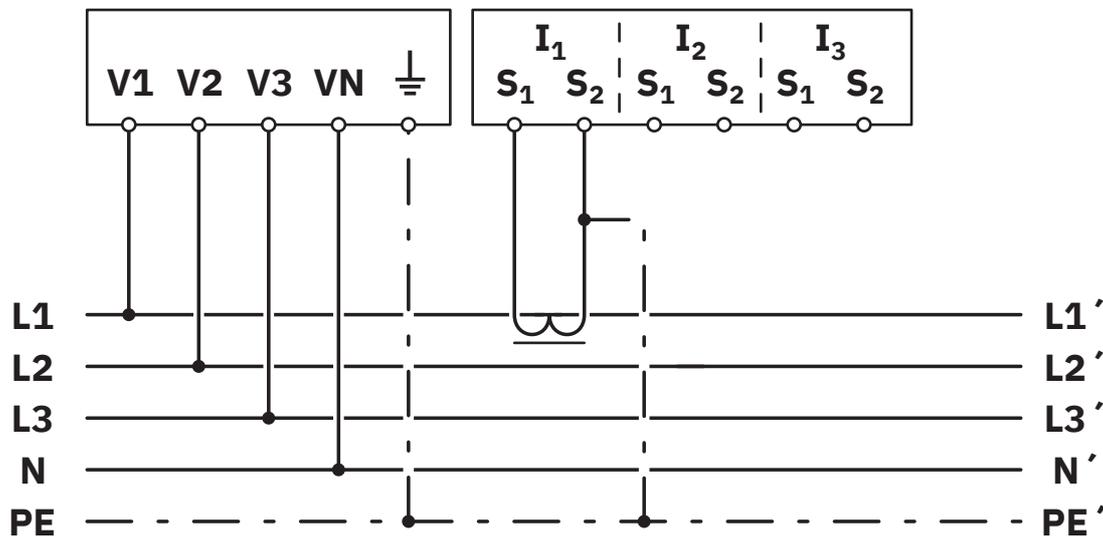
Connection assignment

Connection diagram



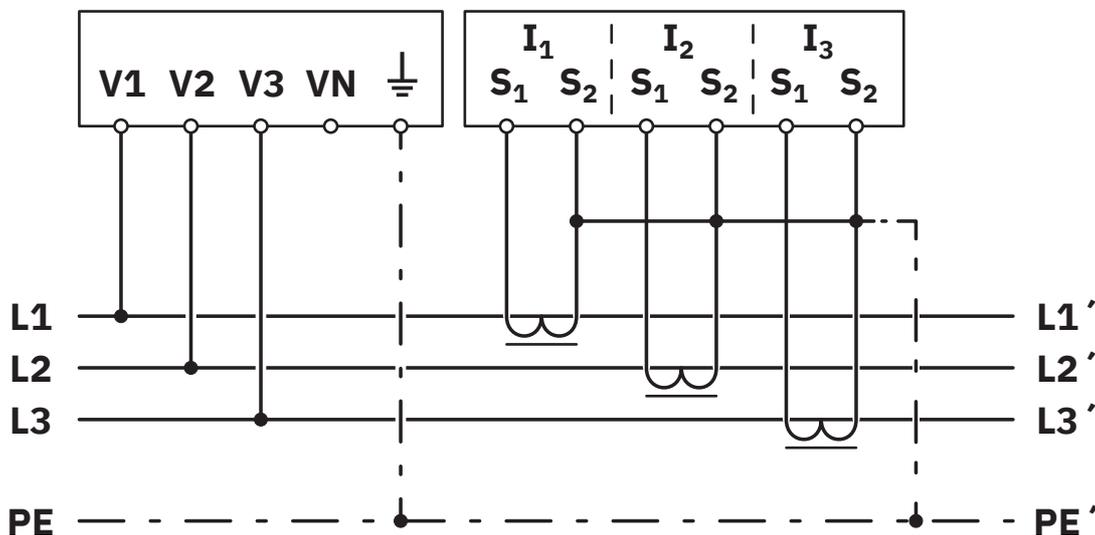
Network type: 3PH-4W-3CT

Connection diagram



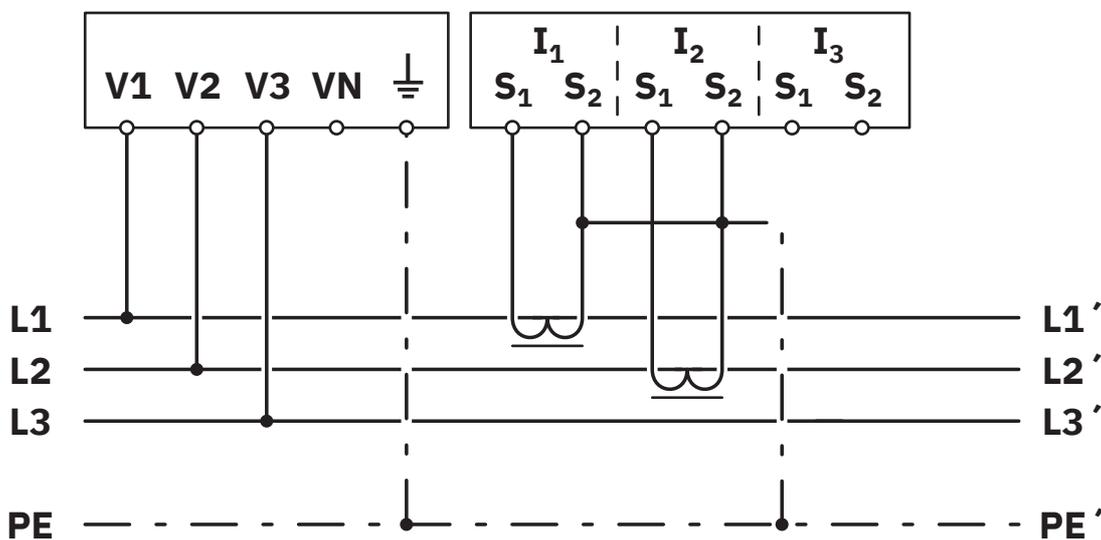
Network type: 3PH-4W-1CT

Connection diagram



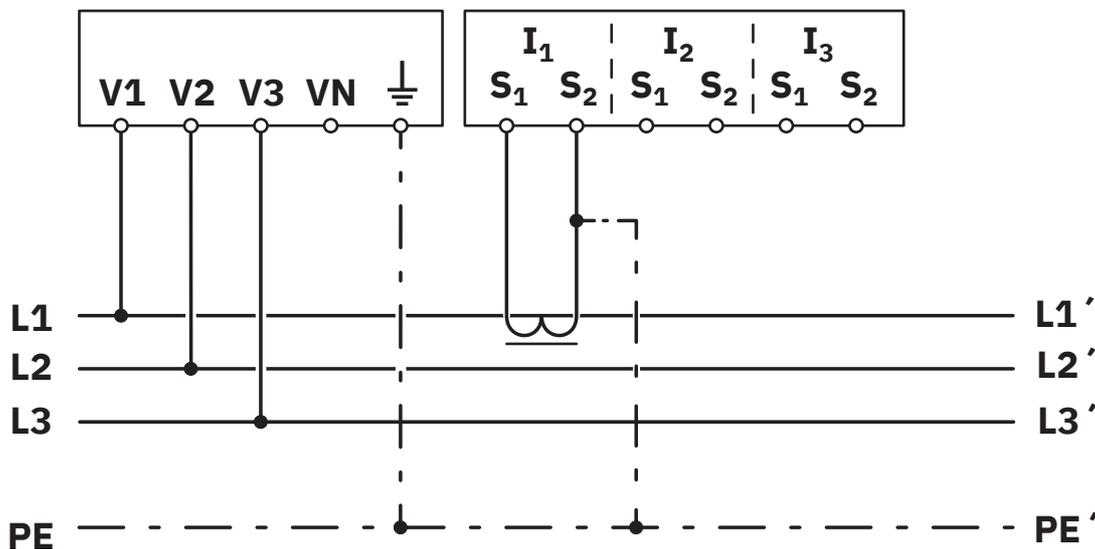
Network type: 3PH-3W-3CT

Connection diagram



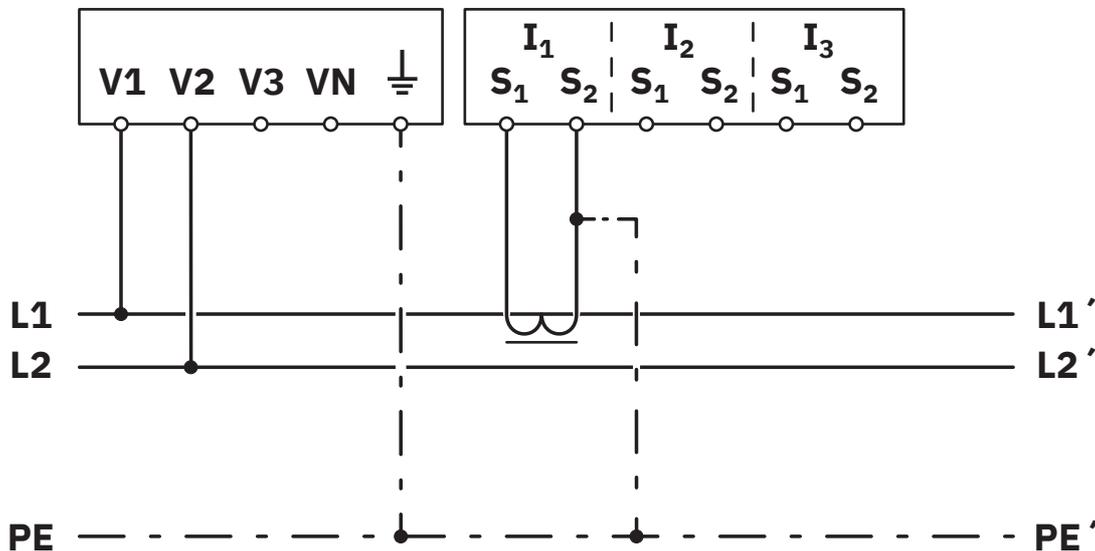
Network type: 3PH-3W-2CT

Connection diagram



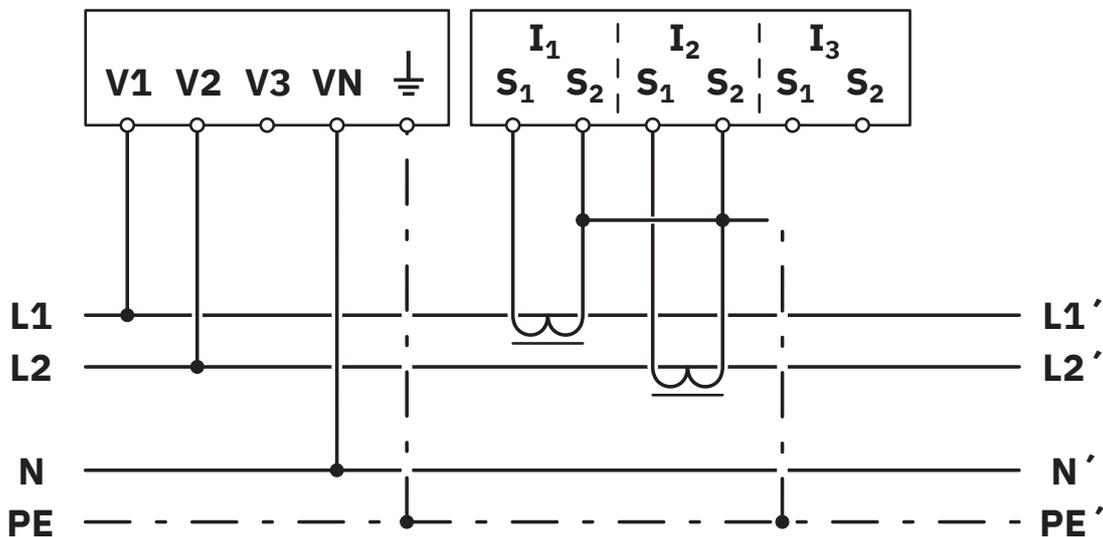
Network type: 3PH-3W-1CT

Connection diagram



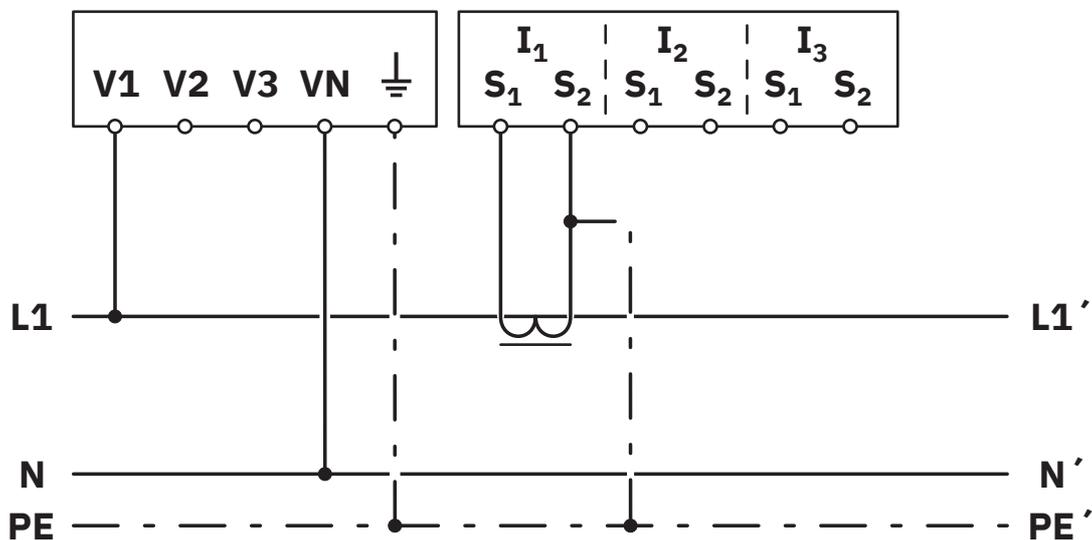
Network type: 2PH-2W-1CT

Connection diagram



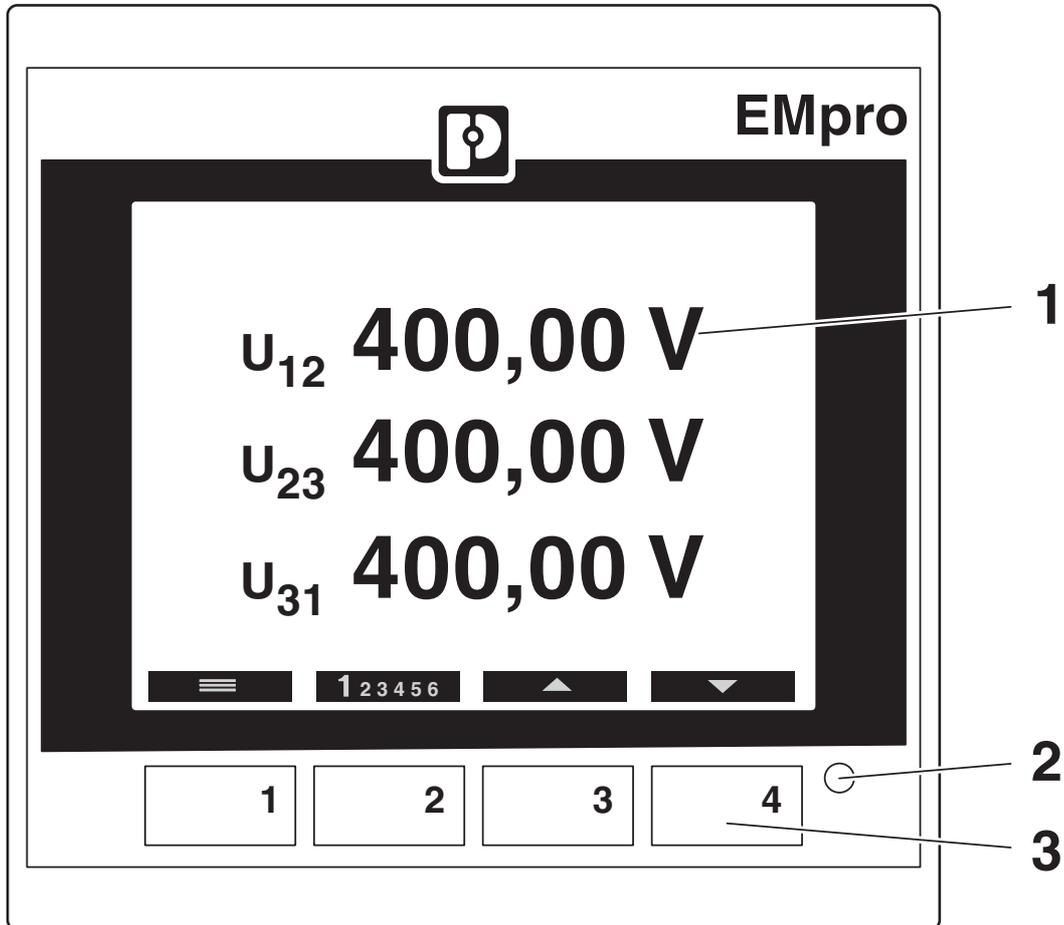
Network type: 2PH-3W-2CT

Connection diagram



Network type: 1PH-2W-1CT

Schematic diagram



Operating and indication elements

1 Backlit LCD

2 Pulse LED

3 Operating buttons for displaying measured values and for changing the configuration

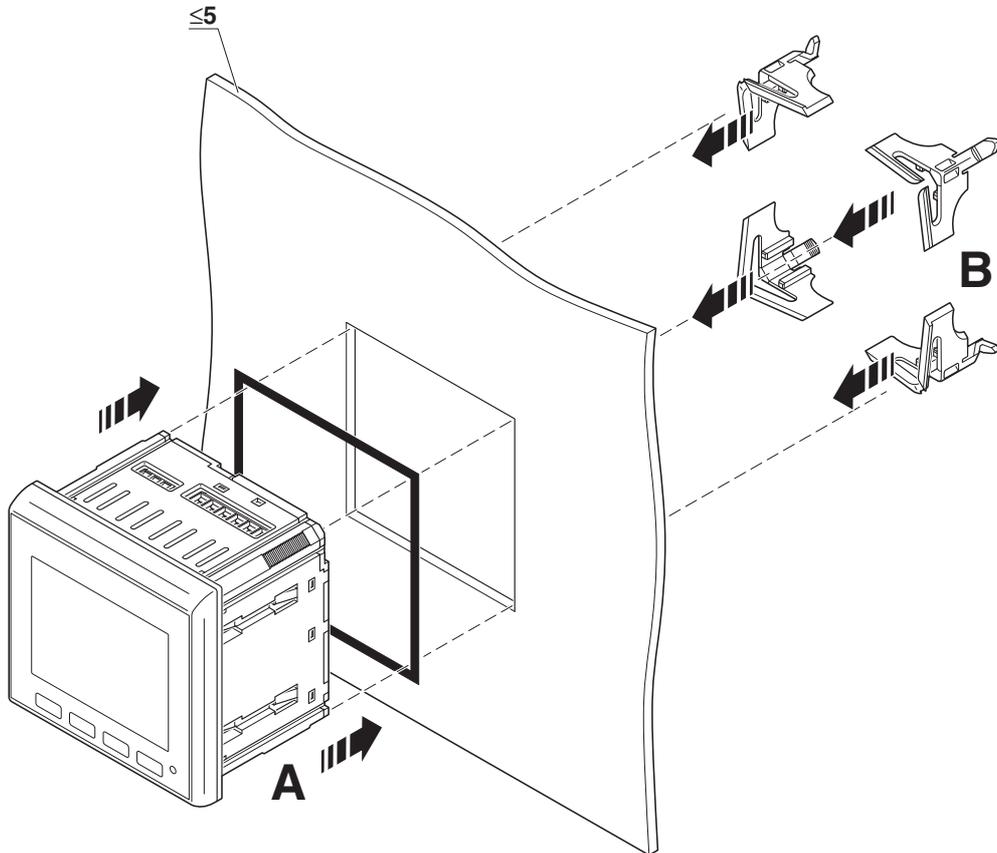
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Schematic diagram

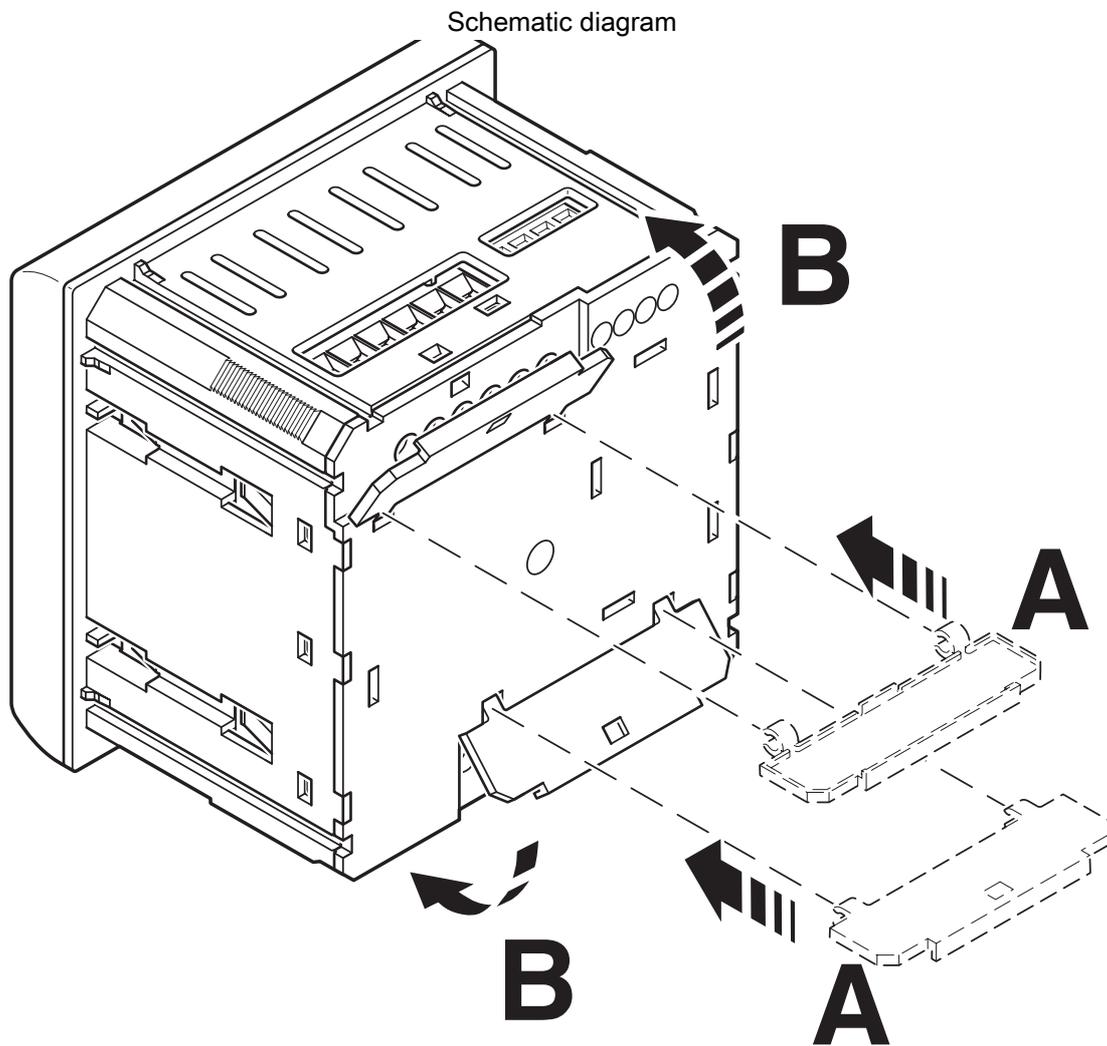


Mounting

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Mounting

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## Approvals

To download certificates, visit the product detail page: <https://www.phoenixcontact.com/us/products/2907946>



**EAC**

Approval ID: RU\*DE\*08.B.00734/19



**UL Listed**

Approval ID: E357804



**cUL Listed**

Approval ID: FILE E 357804

**PROFINET**

Approval ID: Z12426



**cULus Listed**

Approval ID: E357804

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## Classifications

### ECLASS

|             |          |
|-------------|----------|
| ECLASS-13.0 | 27142330 |
| ECLASS-15.0 | 27142330 |

### ETIM

|          |          |
|----------|----------|
| ETIM 9.0 | EC002301 |
|----------|----------|

### UNSPSC

|             |          |
|-------------|----------|
| UNSPSC 21.0 | 41113600 |
|-------------|----------|

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## Environmental product compliance

### EU RoHS

|   |              |
|---|--------------|
| Fulfills EU RoHS substance requirements | Yes          |
| Exemption                               | 7(a), 7(c)-I |

### China RoHS

|  |   |
|--|---|
| Environment friendly use period (EFUP) | EFUP-50   |
|  | An article-related China RoHS declaration table can be found in the download area for the respective article under "Manufacturer declaration". For all articles with EFUP-E, no China RoHS declaration table issued and required. |

### EU REACH SVHC

|                                     |  |
|-------------------------------------|--|
| REACH candidate substance (CAS No.) | Lead(CAS: 7439-92-1)   |
|                                     | Perfluorobutane sulfonic acid (PFBS) and its salts(CAS: n/a) |
| SCIP                                | 07dea559-2a6a-4abc-af12-198d5da0423c                         |

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