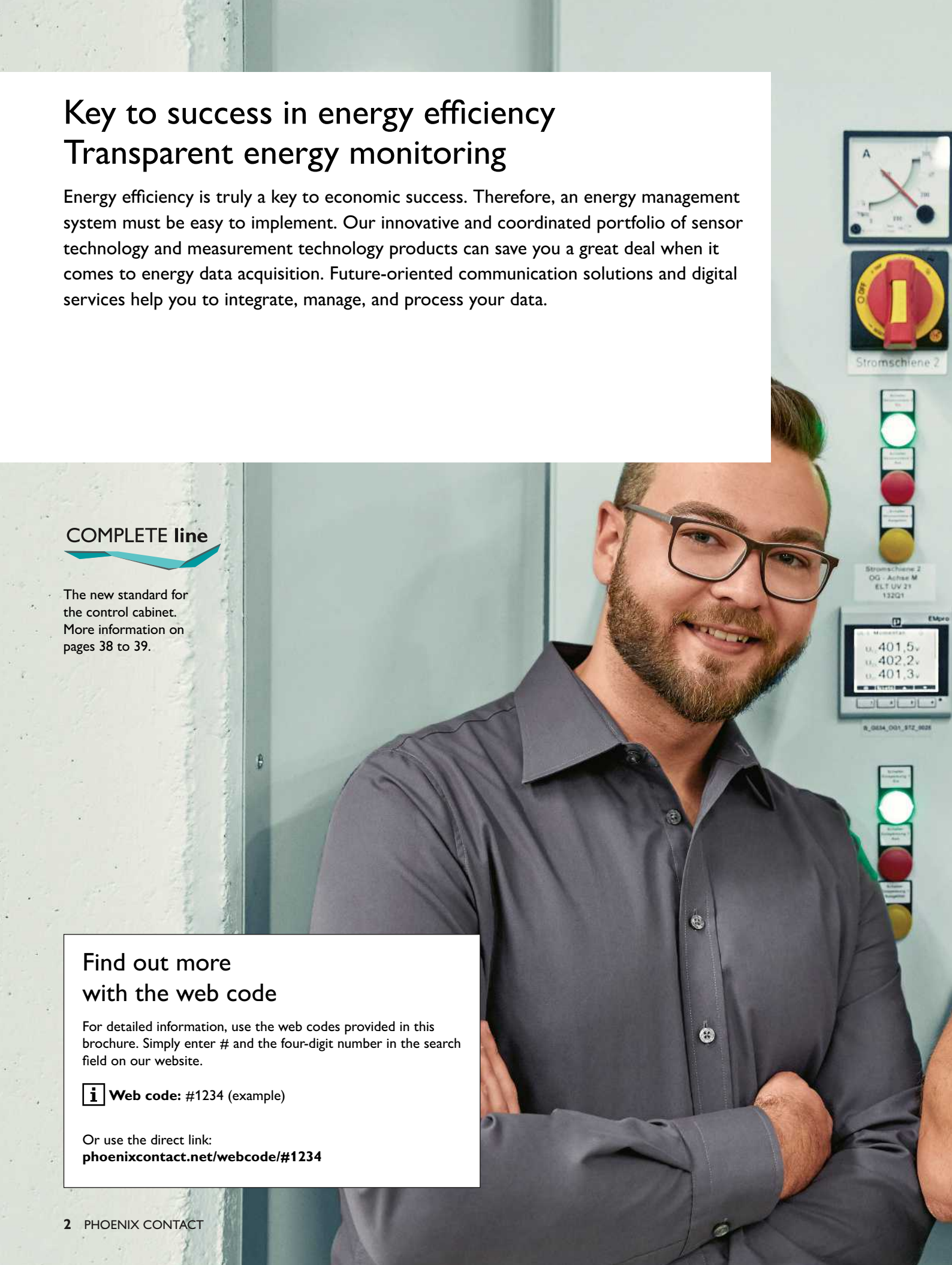

# Products and services for managing your energy

## Easy energy management

PHOENIX CONTACT
INSPIRING INNOVATIONS

# Key to success in energy efficiency
# Transparent energy monitoring

Energy efficiency is truly a key to economic success. Therefore, an energy management system must be easy to implement. Our innovative and coordinated portfolio of sensor technology and measurement technology products can save you a great deal when it comes to energy data acquisition. Future-oriented communication solutions and digital services help you to integrate, manage, and process your data.




COMPLETE **line**

The new standard for the control cabinet. More information on pages 38 to 39.

## Find out more with the web code

For detailed information, use the web codes provided in this brochure. Simply enter # and the four-digit number in the search field on our website.

**Web code:** #1234 (example)

Or use the direct link:
**phoenixcontact.net/webcode/#1234**


# Contents

# Products and measuring devices for managing your energy

Whether for complex energy measurements or simple cost center billing, our multifunctional energy measuring devices and MID-certified energy meters record all electrical variables that are relevant to your energy management system. To ensure easy device installation and commissioning, we focused in particular on user-friendliness and optimum interaction with the current sensor technology.


## Multi-functional EMpro energy measuring devices

EMpro energy measuring devices acquire your energy data and communicate it to superordinate control and management systems. These products can be configured and integrated into your network in minutes.


## EMpro energy meters with MID certification

EMpro energy meters make it possible to calculate energy data for the exact cost center. Established communication interfaces enable easy integration into existing bus and network structures.

## Embedded tools and intelligent services

A wide range of practice-oriented web server and device functions simplifies installation, startup, monitoring, and servicing. Energy measuring devices with direct cloud connection enable you to utilize additional intelligent services, such as the visualization of energy data, device management, and monitoring the state of health of your energy measuring device.


## PACT RCP current transformers for retrofitting

PACT RCP current transformers are ideal for retrofitting, especially where space is too tight for a split core current transformer. Save on wiring work and connect the Rogowski coil directly to our EMpro energy measuring devices, without the measuring transducer that is usually required.

## PACT plug-in and winding current transformers

The PACT current transformer product family features a complete range for converting high alternating currents into 1 A and 5 A secondary currents. Versions with Push-in connection simplify your wiring.

# EMpro multi-functional energy measuring devices
# The fastest way to measure energy

EMpro energy measuring devices can be configured and integrated into your network in minutes. Benefit from the simple, direct connection of conventional Rogowski coils, and from the many practice-oriented web server and device functions.

Create your energy management system of the future with EMpro: the integrated REST (REpresentional State Transfer) interface and direct cloud connection pave the way to the digital world in the Internet of Things.

**Web code:** #1267



## Front panel device

Measuring devices for front panel installation provide you with a large matrix display and a rapid overview on site.

## DIN rail device with display

DIN rail devices with display provide you with a quick overview of your energy data in the control cabinet.

## Your advantages

- Energy measurement in just three steps with the intuitive installation wizard
- Reduced wiring and configuration work with the direct connection of conventional Rogowski coils
- Easy commissioning and service with intelligent web server and display functions
- Global data access and the utilization of intelligent services with direct cloud connection

EtherNet/IP

PROFINET

Modbus

PROFICLOUD

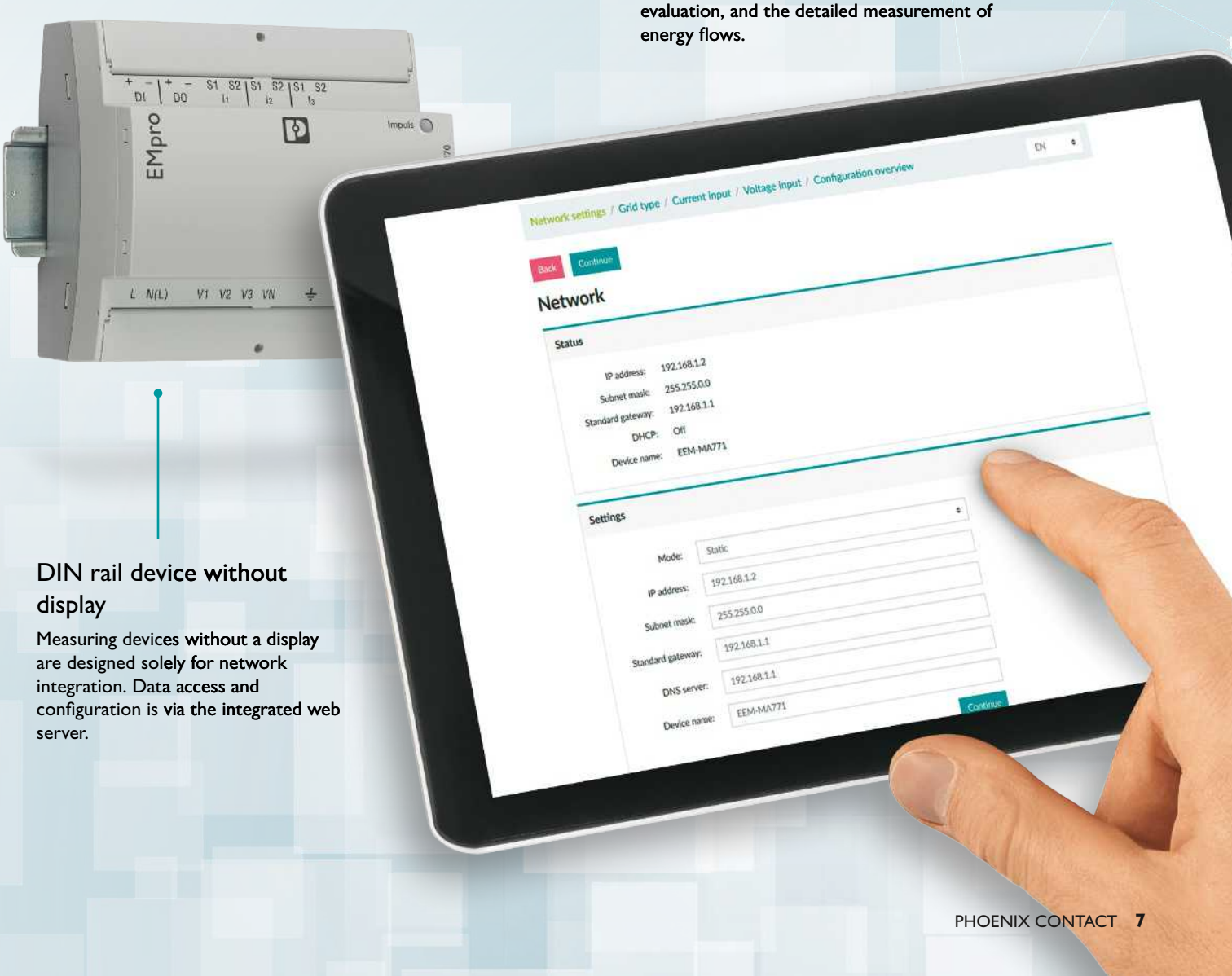
{ REST API }

### Flexible network connection

In addition to interfaces for classic industrial communication, the products also have an integrated REST API.
IoT-capable versions for direct cloud access enable global networking.

### Intuitive handling

**The web server enables intuitive configuration, data logging, network quality evaluation, and the detailed measurement of energy flows.**




### DIN rail device without display

Measuring devices **without a display** are designed solely for network integration. Data access and configuration is **via the integrated web server.**

# Intuitive installation wizard
# Just three steps to energy measurement

Set up the communication interface, select the grid type, and configure the measuring input. The EMpro energy measuring devices can be configured and integrated into the network in just three steps. The intuitive installation wizard starts up automatically when the device is switched on for the first time. Alternatively, you can also configure the basic settings directly on the device via the user-guided operating keys.


## Easy integration

All register tables necessary for setting up the communication interface can be conveniently viewed and called up via the web server. The integrated search function saves you time searching for the necessary register addresses.


## Complex made easy

The self-explanatory menu structure of the versatile web server and device functions guides you to your individual parameter settings quickly, even in complex applications.


## Transfer parameters with ease

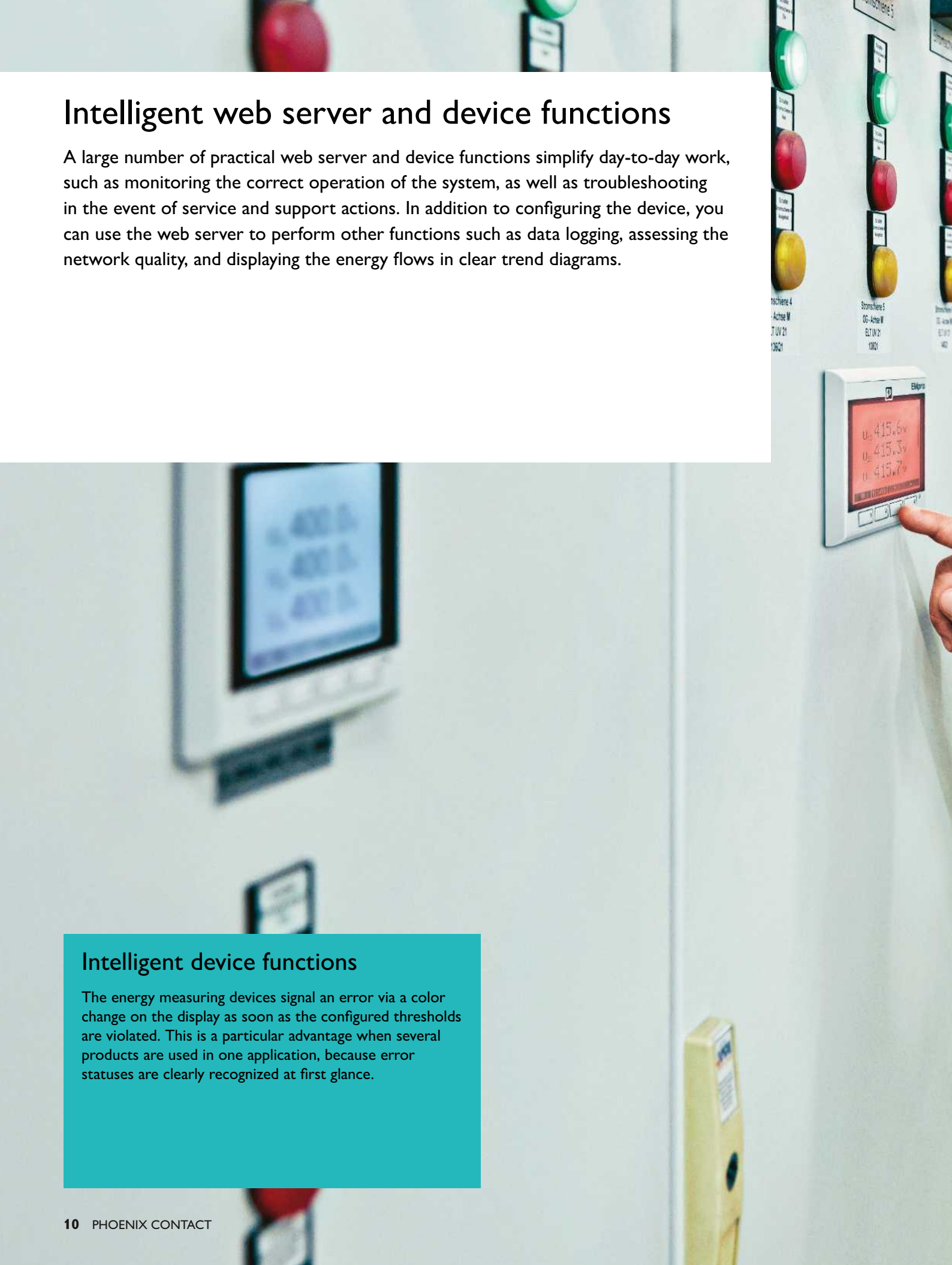
Easily transfer all settings or selected parameters to other energy measuring devices in the same network via the the web server. Direct transfer between devices is also possible.

## User-guided, also on site

You can use the user-guided operating keys and display for configuring the devices on site. Furthermore, you can read off the locally recorded measurement values on the LC display.

# Intelligent web server and device functions

A large number of practical web server and device functions simplify day-to-day work, such as monitoring the correct operation of the system, as well as troubleshooting in the event of service and support actions. In addition to configuring the device, you can use the web server to perform other functions such as data logging, assessing the network quality, and displaying the energy flows in clear trend diagrams.



## Intelligent device functions

The energy measuring devices signal an error via a color change on the display as soon as the configured thresholds are violated. This is a particular advantage when several products are used in one application, because error statuses are clearly recognized at first glance.


## Rapid troubleshooting

Export the current configuration data along with historical signal and error lists. This enables you to quickly gain initial insights for troubleshooting.


## Always up to date

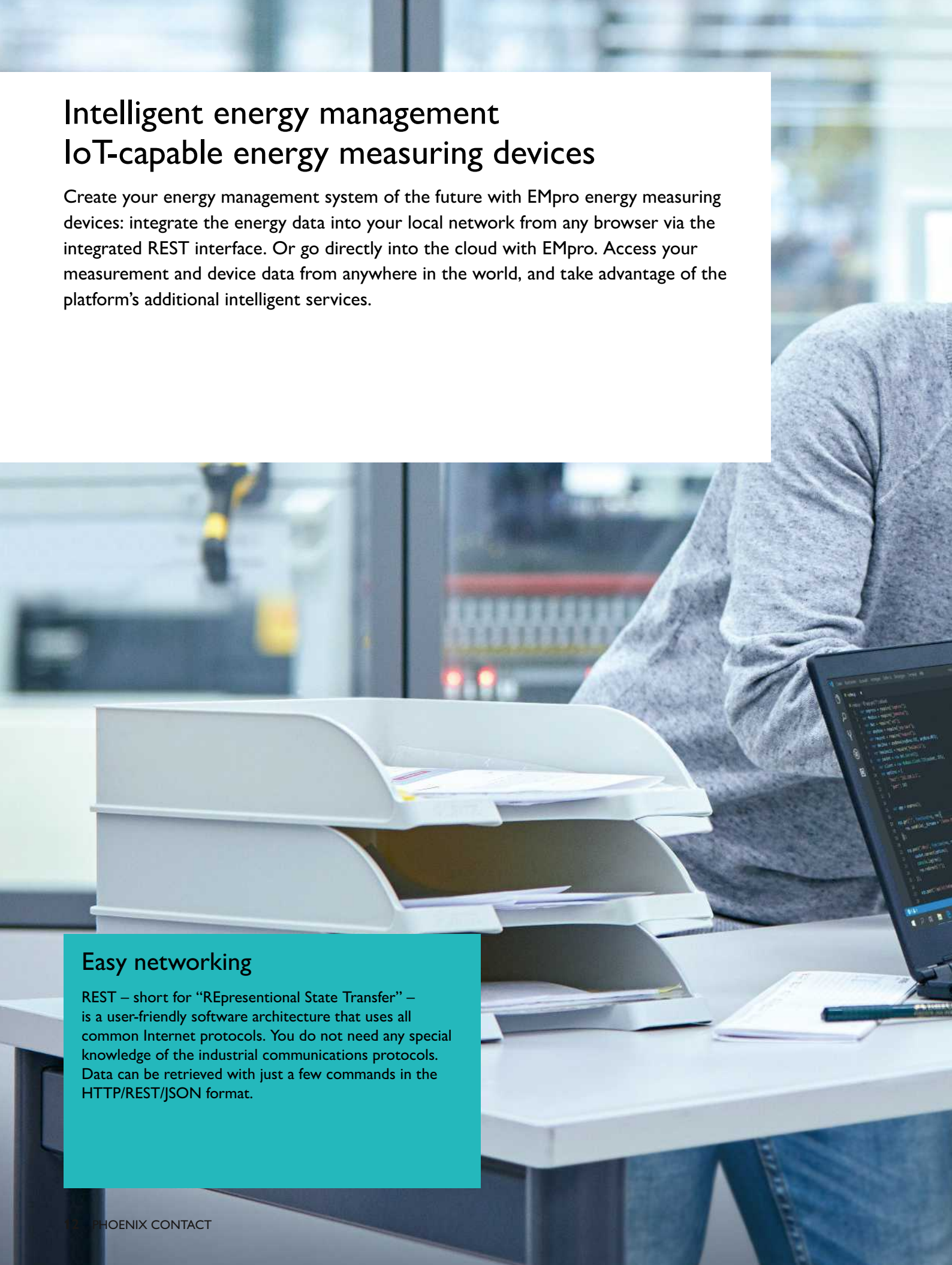
With firmware updates, you benefit from continuous development – for example with function extensions and performance optimizations.


## Superior data protection

Disabling the configuration function of the operating keys prevents manipulative interventions on site. Furthermore, disabling the Ethernet interface prevents unauthorized network access.

# Intelligent energy management
# IoT-capable energy measuring devices

Create your energy management system of the future with EMpro energy measuring devices: integrate the energy data into your local network from any browser via the integrated REST interface. Or go directly into the cloud with EMpro. Access your measurement and device data from anywhere in the world, and take advantage of the platform's additional intelligent services.

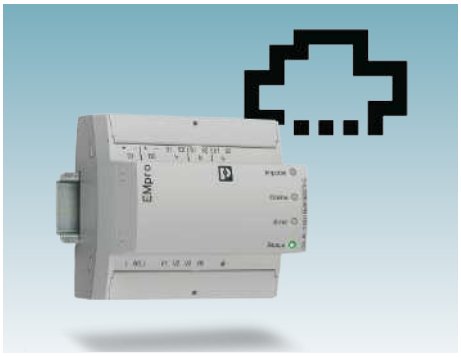


## Easy networking

REST – short for "REpresentional State Transfer" – is a user-friendly software architecture that uses all common Internet protocols. You do not need any special knowledge of the industrial communications protocols. Data can be retrieved with just a few commands in the HTTP/REST/JSON format.


## Fast system integration

The browser-based REST architecture enables the easy development of system integration and individual data access through configurable retrieval.




## Directly to the cloud

Versions with a direct connection to the cloud enable interaction with the devices from anywhere, and at any time. Access your measurement and component data anywhere in the world, without an additional gateway.

## Intelligent services

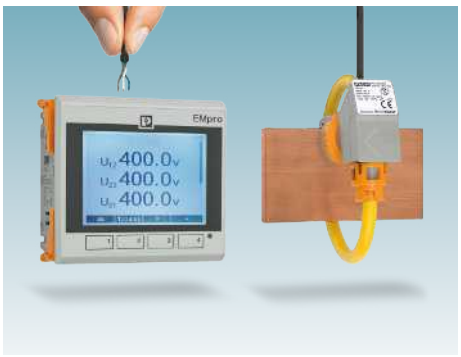
The measurement and device data is stored, processed, and visualized in the cloud. The platform features additional services, such as device management and monitoring the state of health of your energy measuring device.

# Flexible current measuring input
# Fast wiring and configuration

EMpro energy measuring devices measure the current either via external current transformers or Rogowski coils. A unique feature is, that in addition to our PACT RCP Rogowski coils, you can also directly connect any other conventional coil – regardless of the manufacturer. This gives you maximum flexibility and saves you a great deal of time during wiring.

## Flexible and time-saving

The Rogowski measuring input saves you a great deal of time during wiring and configuration. Directly connect any conventional Rogowski coil: the products process the mV signal directly. The measuring transducer that is normally used is no longer required.




## Just one click with PACT RCP

The PACT RCP Rogowski coil from Phoenix Contact makes things even easier. Configure the current input with just one click – the coil parameters are already saved in the web server.


## Flexible current transformer input

The current transformer input is rated for primary currents of up to 20,000 A. The secondary current can be set flexibly to either 1 A or 5 A.


## Intelligent polarity-reversal inversion

Did you accidentally reverse the current input polarity on a particularly hectic day? No problem: simply invert the input via the web server. No local rewiring required.

# Energy meters with EMpro MID approval
# Record, communicate, bill

EMpro energy meters with MID certification in accordance with EN 50470 enable cost-center-specific energy data billing. The measuring devices record key electrical parameters such as currents, voltages, power factors, powers, and energy values in all four quadrants. The data is forwarded to your higher-level control system via standard communication interfaces.

**Web code:** #1267


## Energy meters with M-Bus interface

Energy meters with M-Bus interface are suitable for use in building technology.


## Energy meters with Modbus/RTU interface

Energy meters with Modbus/RTU interface are particularly well-suited for billing-related electromobility energy data acquisition.

## Your advantages

- ☑ Simple bus and network connection via M-Bus, Modbus/RTU or Modbus/TCP interface
- ☑ Takes up little space on the DIN rail with an overall width of just 72 mm
- ☑ Save time and money: versions with direct current measurement up to 80 A
- ☑ Simple Modbus integration, thanks to uniform register tables with existing EMpro energy measuring devices
- ☑ Remote data access, storage, and export with Ethernet-based devices

### Flexible network connection

You can integrate the energy measuring devices into the most common industrial network structures and fieldbus systems.


### Energy meters with Modbus/TCP interface

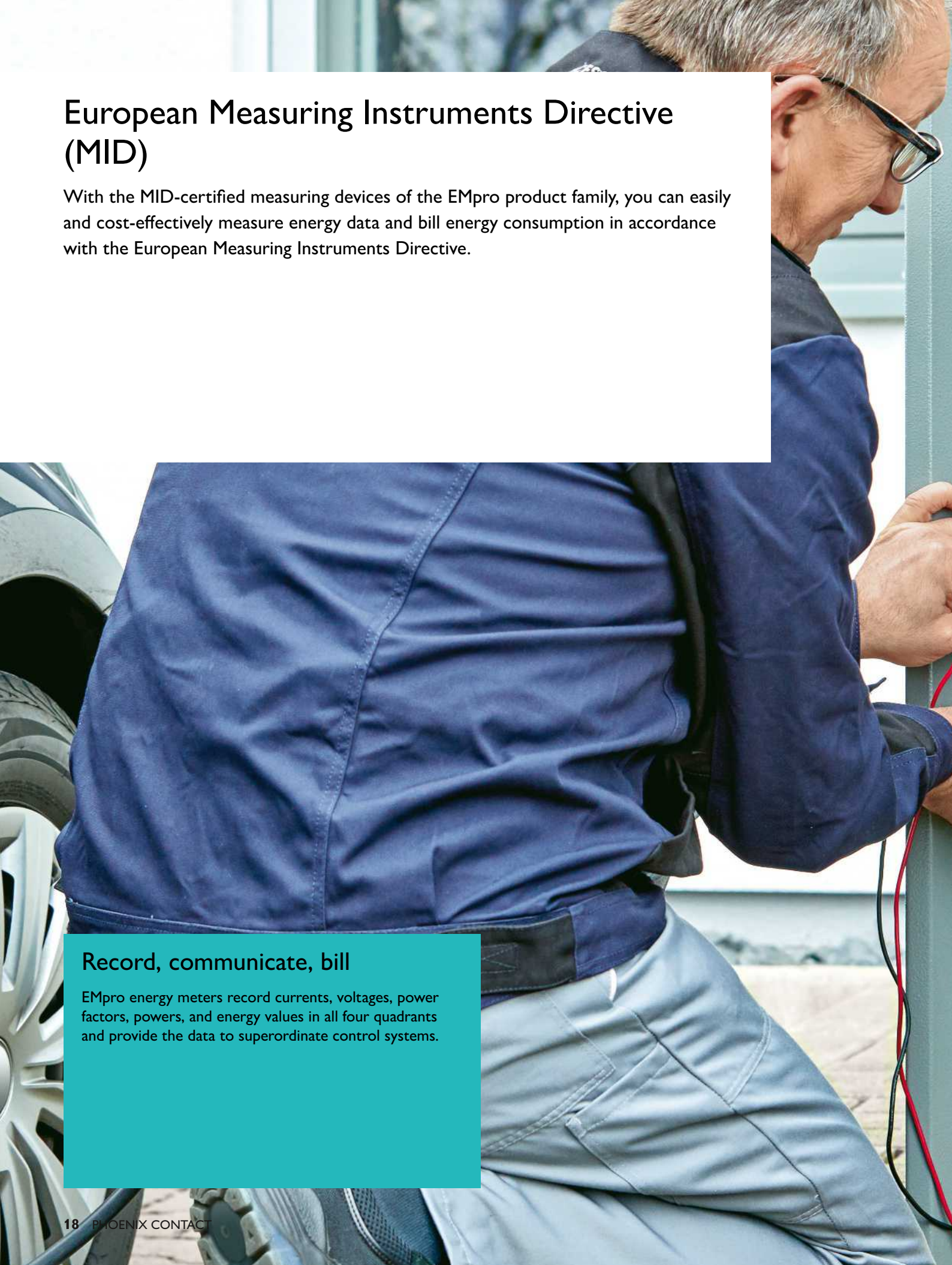
Energy meters with Modbus/TCP interface are particularly suitable for central data collection in industrial applications.

### Flexible current measurement

All product types are available either with a measurement input for an external current transformer or with an input for direct measurement.
The current transformer measurement input is configurable for 1 A and 5 A transformers. The transformer ratio can also be configured.
Currents up to 80 A are captured directly via an internal current transformer. This saves you additional time and money during installation.

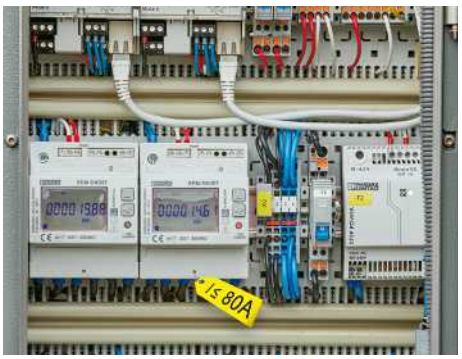
# European Measuring Instruments Directive (MID)

With the MID-certified measuring devices of the EMpro product family, you can easily and cost-effectively measure energy data and bill energy consumption in accordance with the European Measuring Instruments Directive.



## Record, communicate, bill

EMpro energy meters record currents, voltages, power factors, powers, and energy values in all four quadrants and provide the data to superordinate control systems.




## Save time and money

Current measurement is either via an external current transformer or directly via an internal current transformer up to 80 A. Direct connection saves you time and money.

## Web server

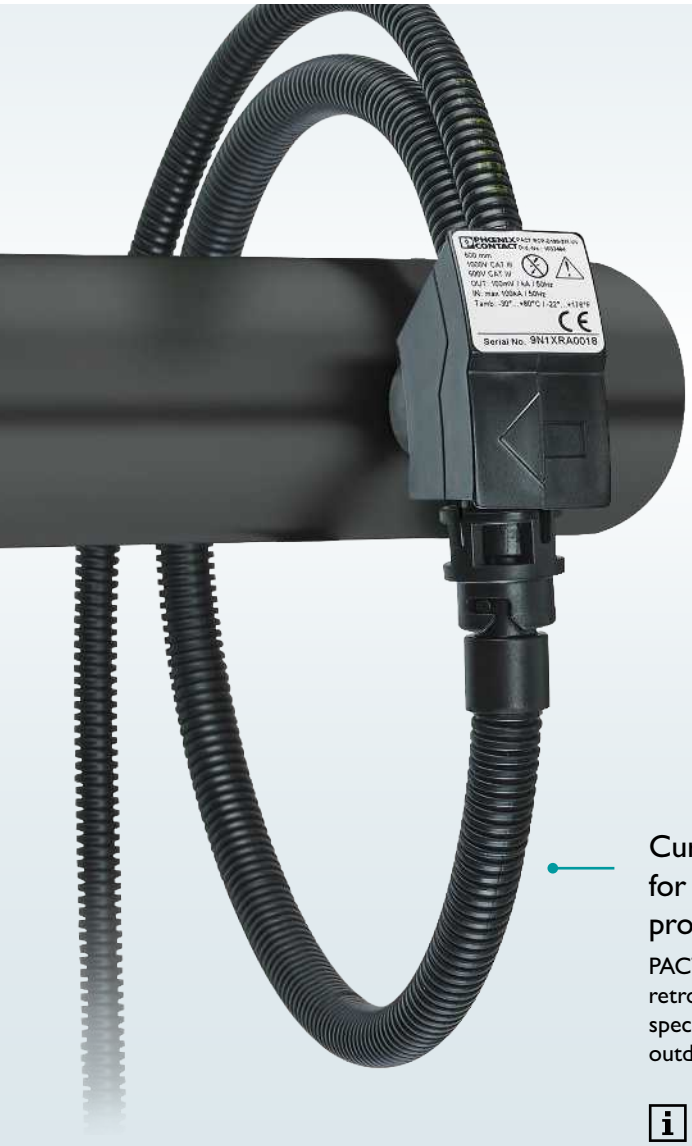
The web server integrated into the Ethernet-based measuring devices allows you to perform remote configuration, access data remotely, and save energy data in a circular buffer memory.

## A good basis for your audit

EMpro energy meters are the equivalent of legally calibrated meters. The continuous data acquisition provides you with the basic data you need for your energy audit.

# PACT current sensors
# Easy retrofitting, quick wiring

PACT RCP current transformers based on the Rogowski coil are the perfect replacement current transformer for retrofitting without having to remove system parts. The PACT current transformer product family features a complete range for converting high alternating currents into 1 A and 5 A secondary currents. Versions with Push-in connection help you perform your wiring quickly and safely.





## Current transformers for retrofitting with UV protection

PACT RCP current transformers for retrofitting with UV protection are specially designed for permanent outdoor use.

**Web code:** #1145

## Your advantages

- Easily retrofit current measuring technology without having to remove system parts – with the PACT RCP set
- Transform alternating currents up to 4,000 A using a single universal PACT RCP measuring system
- For permanent use in outdoor settings: Rogowski coil with UV protection for housings and cables
- Fast, reliable and tool-free installation: plug-in current transformers with Push-in Technology

Push-in Technology
Designed by PHOENIX CONTACT

Push-in Technology
Designed by PHOENIX CONTACT

### Current transformers for retrofitting

The PACT RCP current transformers for retrofitting enable you to capture currents up to 4,000 A and convert them into a secondary alternating current of 1 A or into an analog standard signal of 4...20 mA, for example.

**Web code:** #1145

### Plug-in and winding current transformers

The PACT current transformer product family features a complete range for converting high alternating currents into 1 A and 5 A secondary currents.

**Web code:** #1264

# Current transformers for retrofitting Fast installation in a confined space

PACT RCP current transformers for retrofitting can be conveniently mounted where there is not enough space for split core current transformers. Capture AC currents up to 4,000 A and convert them into a secondary alternating current of 1 A or into an analog standard signal of 4 ... 20 mA, for example, depending on the type of downstream measuring transducer.

## Handy replacement current transformer

For versions with current output, the downstream measuring transducer supplies an output current of 0 ... 1 A AC. The phase angle is equal to the primary current. Connect these currents to the energy measuring device current inputs to calculate electrical variables.

## Quick and secure installation

The compact Rogowski coil can be placed quickly around busbars and circular conductors. The professional attachment provides for secure seating. Choose from three different coil lengths for the ideal fit.

## Well protected

The Rogowski coil for outdoor use is equipped with a UV-resistant housing and UV-protected cables. This provides the right protection for permanent outdoor installation.


## Eight current measuring ranges

Choose between eight different current measuring ranges using DIP switches. For ideal measuring accuracy, compensate for the different coil lengths simply via potentiometer.

# Energy measuring devices: Product overview

| EMpro energy measuring devices | | | | | |
|---|---|---|---|---|---|
| | |  | |  | |
| **Description** | | **Front panel installation** | | **DIN rail installation** | |
| Measurement via | | Current transformers | Rogowski coil | Current transformers | Rogowski coil |
| Modbus/TCP incl. REST | Type<br>Order No. | EEM-MA770<br>2907945 | EEM-MA771<br>2908286 | EEM-MA370<br>2907983 | EEM-MA371<br>2908307 |
| Modbus/RTU<br>Modbus/TCP incl. REST | Type<br>Order No. | EEM-MA770-R<br>2907944 | EEM-MA771-R<br>2908285 | EEM-MA370-R<br>2907980 | EEM-MA371-R<br>2907985 |
| PROFINET<br>Modbus/TCP incl. REST | Type<br>Order No. | EEM-MA770-PN<br>2907946 | EEM-MA771-PN<br>2908301 | – | – |
| EtherNet/IP™<br>Modbus/TCP incl. REST | Type<br>Order No. | EEM-MA770-EIP<br>2907953 | EEM-MA771-EIP<br>2908302 | – | – |
| Cloud MQTT<br>Modbus/TCP incl. REST | Type<br>Order No. | – | – | – | – |
| **Input data** | | | | | |
| Measuring principle | | True r.m.s. value measurement (TRMS) | | True r.m.s. value measurement (TRMS) | |
| Acquisition of harmonics | | Up to 63rd harmonic | | Up to 63rd harmonic | |
| Measurement value | | AC sine (50/60 Hz) | | AC sine (50/60 Hz) | |
| **Voltage measurement input (input voltage range)** | | | | | |
| Direct | | 35 V AC … 690 V AC (phase/phase)<br>20 V AC … 400 V AC (phase/neutral conductor) | | 35 V AC … 690 V AC (phase/phase)<br>20 V AC … 400 V AC (phase/neutral conductor) | |
| Via external transformer | | 60 V AC … 2,000,000 V AC (primary)<br>60 V AC … 400 V AC (secondary) | | 60 V AC … 2,000,000 V AC (primary)<br>60 V AC … 400 V AC (secondary) | |
| Accuracy | | 0.20% | | 0.20% | |
| **Current measuring input L1, L2, L3** | | | | | |
| Input current range | | Secondary: 1 A/5 A | 4,000 A | Secondary: 1 A/5 A | 4,000 A |
| Overload capacity | | 6 A ($I_{max}$) | – | 6 A ($I_{max}$) | – |
| Accuracy | | 0.20% | <1% | 0.20% | <1% |
| **Power measurement** | | | | | |
| Accuracy | | 0.50% | <1% | 0.50% | <1% |
| Active energy | | Class 0.5 S (IEC 62053-22) | Class 1 (IEC 62053-21) | Class 0.5 S (IEC 62053-22) | Class 1 (IEC 62053-21) |
| **Digital input in accordance with IEC/EN 61131-2 (type 3)** | | | | | |
| Voltage input signal | | 24 V DC<br>0 V DC … 30 V DC | | 24 V DC<br>0 V DC … 30 V DC | |
| **Digital output in accordance with IEC/EN 61131-2 (type 3)** | | | | | |
| Voltage output signal | | 24 V DC | | 24 V DC | |
| Current output signal | | ≤120 mA | | ≤120 mA | |
| **Supply voltage range** | | | | | |
| Supply voltage range | | 100 V AC … 400 V AC (± 20%)<br>150 V DC … 250 V DC (± 20%) | | 100 V AC … 230 V AC (± 20%)<br>150 V DC … 250 V DC (± 20%) | |
| **Conformity** | | | | | |
| Conformity | | CE-compliant | | CE-compliant | |

| EMpro energy measuring devices without display | | | |
|---|---|---|---|
| | |  | |
| **Description** | | **DIN rail installation without display** | |
| Measurement via | | Current transformers | Rogowski coil |
| Modbus/TCP incl. REST | Type<br>Order No. | EEM-MB370<br>2907954 | EEM-MB371<br>2907955 |
| Modbus/RTU<br>Modbus/TCP incl. REST | Type<br>Order No. | – | – |
| PROFINET<br>Modbus/TCP incl. REST | Type<br>Order No. | EEM-MB370-PN<br>2907984 | EEM-MB371-PN<br>2908308 |
| EtherNet/IP™<br>Modbus/TCP incl. REST | Type<br>Order No. | EEM-MB370-EIP<br>2907971 | EEM-MB371-EIP<br>2907976 |
| Cloud MQTT<br>Modbus/TCP incl. REST | Type<br>Order No. | EEM-SB370-C<br>1158951 | EEM-SB371-C<br>1158947 |
| **Input data** | | | |
| Measuring principle | | True r.m.s. value measurement (TRMS) | |
| Acquisition of harmonics | | Up to 63rd harmonic | |
| Measurement value | | AC sine (50/60 Hz) | |
| **Voltage measurement input (input voltage range)** | | | |
| Direct | | 35 V AC … 690 V AC (phase/phase)<br>20 V AC … 400 V AC (phase/neutral conductor) | |
| Via external transformer | | 60 V AC … 2,000,000 V AC (primary)<br>60 V AC … 400 V AC (secondary) | |
| Accuracy | | 0.20% | |
| **Current measuring input L1, L2, L3** | | | |
| Input current range | | 1 A/5 A (secondary) | 4,000 A |
| Overload capacity | | 6 A ($I_{max}$) | – |
| Accuracy | | 0.20% | <1% |
| **Power measurement** | | | |
| Accuracy | | 0.50% | <1% |
| Active energy | | Class 0.5 S (IEC 62053-22) | Class 1 (IEC 62053-21) |
| **Digital input in accordance with IEC/EN 61131-2 (type 3)** | | | |
| Voltage input signal | | 24 V DC<br>0 V DC … 30 V DC | |
| **Digital output in accordance with IEC/EN 61131-2 (type 3)** | | | |
| Voltage output signal | | 24 V DC | |
| Current output signal | | ≤120 mA | |
| **Supply voltage range** | | | |
| Supply voltage range | | 100 V AC … 230 V AC (± 20%)<br>150 V DC … 250 V DC (± 20%) | |
| **Conformity** | | | |
| Conformity | | CE-compliant | |

# Energy measuring devices: Product overview

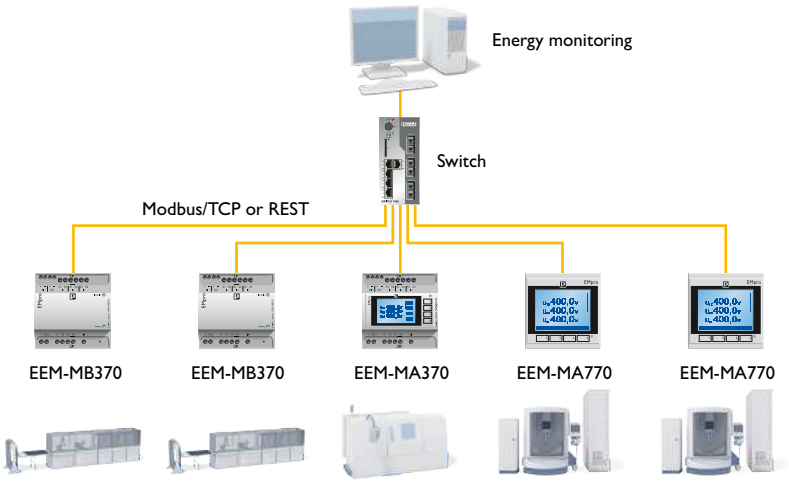
| EMpro energy measuring devices | | | | | |
|---|---|---|---|---|---|
| | |  | |  | |
| **Description** | | **Front panel installation** | | **DIN rail installation** | |
| Measurement via | | Current transformers | Rogowski coil | Current transformers | Rogowski coil |
| Modbus/TCP incl. REST | Type | EEM-MA770-24DC | EEM-MA771-24DC | EEM-MA370-24DC | EEM-MA371-24DC |
| | Order No. | 1127052 | 1127060 | 1127059 | 1127058 |
| **Input data** | | | | | |
| Measuring principle | | True r.m.s. value measurement (TRMS) | | True r.m.s. value measurement (TRMS) | |
| Acquisition of harmonics | | Up to 63rd harmonic | | Up to 63rd harmonic | |
| Measurement value | | AC sine (50/60 Hz) | | AC sine (50/60 Hz) | |
| **Voltage measurement input (input voltage range)** | | | | | |
| Direct | | 35 V AC … 690 V AC (phase/phase)<br>20 V AC … 400 V AC (phase/neutral conductor) | | 35 V AC … 690 V AC (phase/phase)<br>20 V AC … 400 V AC (phase/neutral conductor) | |
| Via external transformer | | 60 V AC … 2,000,000 V AC (primary)<br>60 V AC … 400 V AC (secondary) | | 60 V AC … 2,000,000 V AC (primary)<br>60 V AC … 400 V AC (secondary) | |
| Accuracy | | 0.20% | | 0.20% | |
| **Current measuring input L1, L2, L3** | | | | | |
| Input current range | | Secondary: 1 A/5 A | 4,000 A | Secondary: 1 A/5 A | 4,000 A |
| Overload capacity | | 6 A ($I_{max}$) | – | 6 A ($I_{max}$) | – |
| Accuracy | | 0.20% | <1% | 0.20% | <1% |
| **Power measurement** | | | | | |
| Accuracy | | 0.50% | <1% | 0.50% | <1% |
| Active energy | | Class 0.5 S (IEC 62053-22) | Class 1 (IEC 62053-21) | Class 0.5 S (IEC 62053-22) | Class 1 (IEC 62053-21) |
| **Digital input in accordance with IEC/EN 61131-2 (type 3)** | | | | | |
| Voltage input signal | | 24 V DC<br>0 V DC … 30 V DC | | 24 V DC<br>0 V DC … 30 V DC | |
| **Digital output in accordance with IEC/EN 61131-2 (type 3)** | | | | | |
| Voltage output signal | | 24 V DC | | 24 V DC | |
| Current output signal | | ≤120 mA | | ≤120 mA | |
| **Supply voltage range** | | | | | |
| Supply voltage range | | 18 V DC … 30 V DC | | 18 V DC … 30 V DC | |
| **Conformity** | | | | | |
| Conformity | | CE-compliant | | CE-compliant | |

| EMpro energy measuring devices without display | | | |
|---|---|---|---|
| | |  | |
| **Description** | | **DIN rail installation without display** | |
| Measurement via | | Current transformers | Rogowski coil |
| Modbus/TCP incl. REST | Type<br>Order No. | EEM-MB370-24DC<br>1127061 | EEM-MB371-24DC<br>1127055 |
| **Input data** | | | |
| Measuring principle | | True r.m.s. value measurement (TRMS) | |
| Acquisition of harmonics | | Up to 63rd harmonic | |
| Measurement value | | AC sine (50/60 Hz) | |
| **Voltage measurement input (input voltage range)** | | | |
| Direct | | 35 V AC … 690 V AC (phase/phase)<br>20 V AC … 400 V AC (phase/neutral conductor) | |
| Via external transformer | | 60 V AC … 2,000,000 V AC (primary)<br>60 V AC … 400 V AC (secondary) | |
| Accuracy | | 0.20% | |
| **Current measuring input L1, L2, L3** | | | |
| Input current range | | 1 A/5 A (secondary) | 4,000 A |
| Overload capacity | | 6 A ($I_{max}$) | – |
| Accuracy | | 0.20% | <1% |
| **Power measurement** | | | |
| Accuracy | | 0.50% | <1% |
| Active energy | | Class 0.5 S (IEC 62053-22) | Class 1 (IEC 62053-21) |
| **Digital input in accordance with IEC/EN 61131-2 (type 3)** | | | |
| Voltage input signal | | 24 V DC<br>0 V DC … 30 V DC | |
| **Digital output in accordance with IEC/EN 61131-2 (type 3)** | | | |
| Voltage output signal | | 24 V DC | |
| Current output signal | | ≤120 mA | |
| **Supply voltage range** | | | |
| Supply voltage range | | 18 V DC … 30 V DC | |
| **Conformity** | | | |
| Conformity | | CE-compliant | |

# Energy measuring devices: Application examples

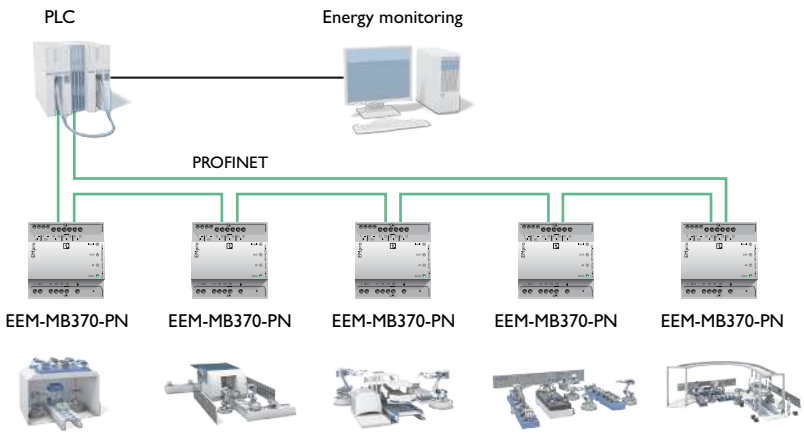
## Application example 1

Energy data acquisition in an Ethernet network via Modbus/TCP or RESTful API



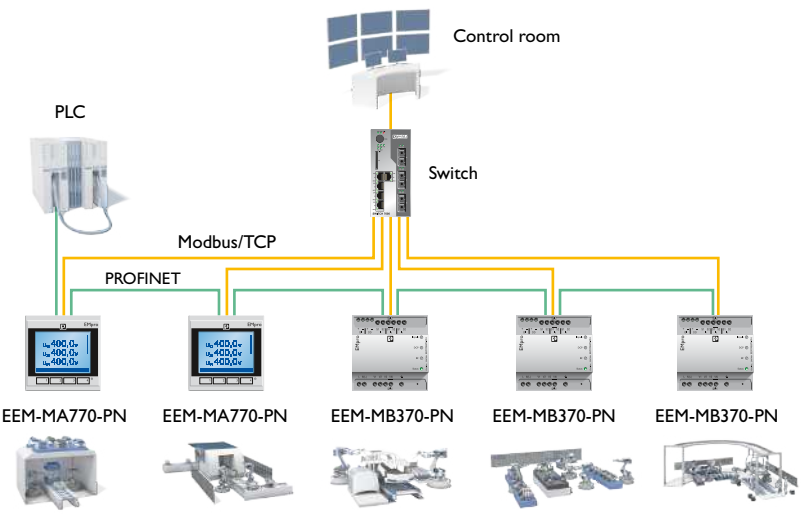

## Application example 2

Energy data acquisition in a PROFINET network



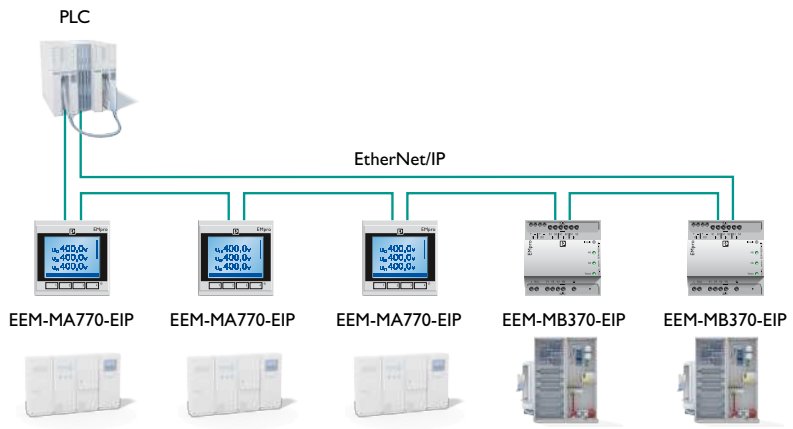

## Application example 3

Energy data acquisition in a Modbus/TCP network with simultaneous PROFINET connection



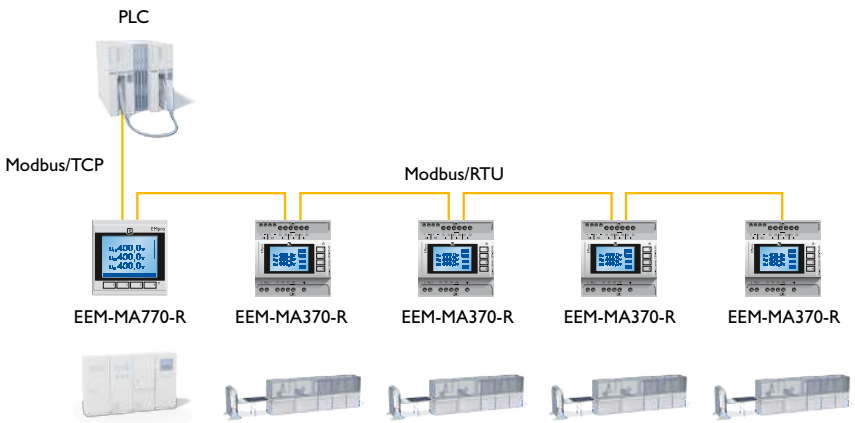
## Application example 4

Energy data acquisition in an EtherNet/IP™ network



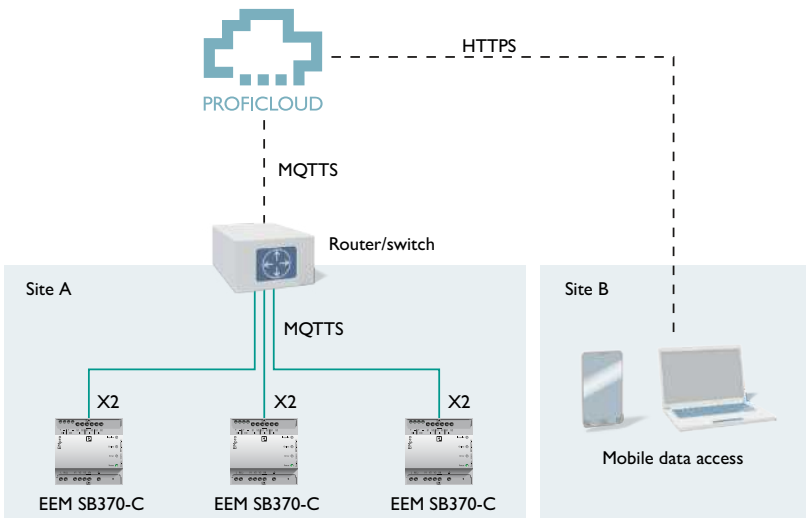

## Application example 5

Energy data acquisition in a Modbus master gateway architecture




## Application example 6

Energy data acquisition via Ethernet for Proficloud



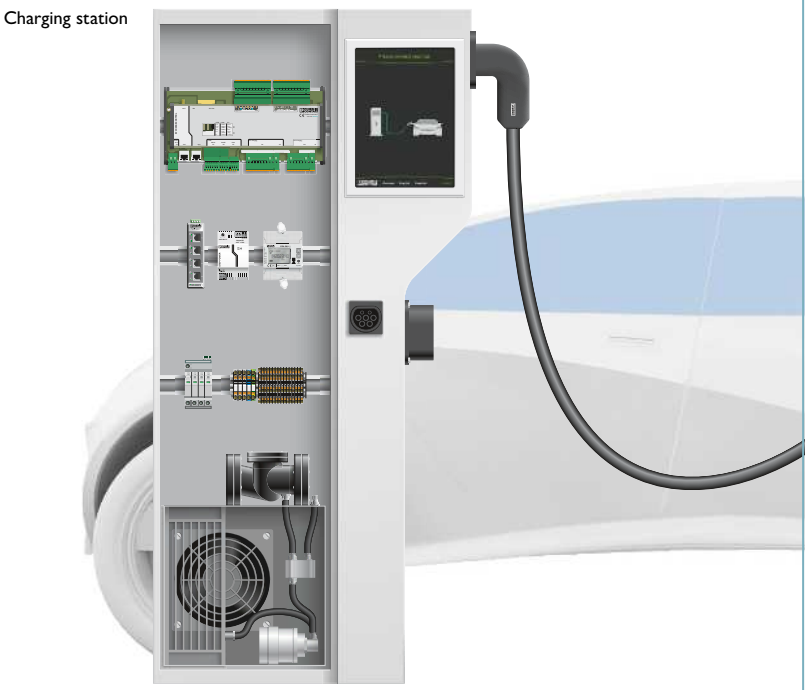
# EMpro energy meters: Product overview and application examples

| EMpro energy meters with MID approval | | | | | | |
|---|---|---|---|---|---|---|
| |  | |  | |  | |
| **Description** | **Energy meters with M-Bus interface** | | **Energy meters with Modbus/RTU interface** | | **Energy meters with Modbus/TCP interface** | |
| Measurement via | Current transformers | Direct, up to 80 A | Current transformers | Direct, up to 80 A | Current transformers | Direct, up to 80 A |
| Tariff input | Yes | Yes | Yes | Yes | – | – |
| Web-based management | – | – | – | – | Yes | Yes |
| Type<br>Order No. | EEM-EM325<br>2908576 | EM-EM327<br>2908586 | EEM-EM355<br>2908578 | EEM-EM357<br>2908588 | EEM-EM375<br>2908581 | EEM-EM377<br>2908590 |
| **Input data** | | | | | | |
| Input voltage range | 3 x 184 V … 288 V<br>(320 V … 500 V) | | 3 x 184 V … 288 V<br>(320 V … 500 V) | | 3 x 184 V … 288 V<br>(320 V … 500 V) | |
| Frequency range | 45 Hz … 65 Hz | | 45 Hz … 65 Hz | | 45 Hz … 65 Hz | |
| Start current $I_{st}$ | 0.002 A | 0.02 A | 0.002 A | 0.02 A | 0.002 A | 0.02 A |
| Maximum current $I_{max}$ | 6 A | 80 A | 6 A | 80 A | 6 A | 80 A |
| **Communication interface** | | | | | | |
| Communication protocol | M-Bus | | Modbus/RTU | | Modbus/TCP | |
| Communication standard | EN 13757-1-2-3 | | RS-485 | | IEEE 802.3 | |
| Transmission speed | 300 bps … 9,600 bps | | 300 bps … 57,600 bps | | 10 Mbps … 100 Mbps | |
| **Measurement connection** | | | | | | |
| Screw connection: conductor cross section solid/stranded/AWG | 1.5 … 6 mm² | 1.5 … 35 mm² | 1.5 … 6 mm² | 1.5 … 35 mm² | 1.5 … 6 mm² | 1.5 … 35 mm² |
| **Supply voltage range** | | | | | | |
| Supply | Supplied by the measuring circuit | | | | | |
| **Conformity** | | | | | | |
| Conformity | CE-compliant, MID-compliant | | | | | |
| Standards/regulations | EN 50470-1 / EN 50470-3 | | | | | |

## Application example 1

**Energy data acquisition in electromobility**

Energy meters with Modbus/RTU interface and direct measurement of up to 80 A are particularly well suited for billing-related energy data acquisition.



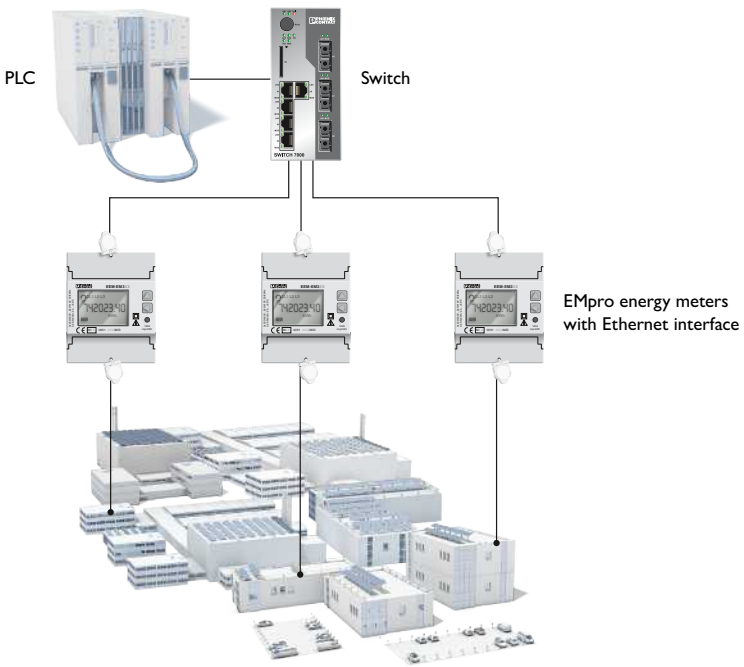

## Application example 2

**Central data collection in building technology**

Easily configure the time intervals you want for storing measurement values for your energy management system, e.g., every 10 seconds or 15 minutes.

The energy-meter values and mean values are saved in a circular buffer memory and, depending on the device setting, are available for retrieval for several months.

Ethernet-based devices offer data access along with storage and export via web-based management.



# PACT RCP current transformers: Product overview

| PACT RCP current transformers for retrofitting | | | | |
|---|---|---|---|---|
| | |  |  | |
| **Description** | | **Rogowski coil and measuring transducer** | **Rogowski coil and measuring transducer** | |
| Application | | For energy measurement | For current measurement | |
| Connection method | | Screw | Screw | Push-in |
| Measuring coil 300 mm<br>Signal line 3 m | Type<br>Order No. | PACT RCP-4000A-1A-D95<br>2904921 | PACT RCP-4000A-UIRO-D95<br>2906231 | PACT RCP-4000A-UIRO-PT-D95<br>2906234 |
| Measuring coil 450 mm<br>Signal line 3 m | Type<br>Order No. | PACT RCP-4000A-1A-D140<br>2904922 | PACT RCP-4000A-UIRO-D140<br>2906232 | PACT RCP-4000A-UIRO-PT-D140<br>2906235 |
| Measuring coil 600 mm<br>Signal line 3 m | Type<br>Order No. | PACT RCP-4000A-1A-D190<br>2904923 | PACT RCP-4000A-UIRO-D190<br>2906233 | PACT RCP-4000A-UIRO-PT-D190<br>2906236 |
| Measuring coil 300 mm<br>Signal line 5 m | Type<br>Order No. | PACT RCP-4000A-1A-D95-5M<br>2910325 | – | – |
| Measuring coil 300 mm<br>Signal line 10 m | Type<br>Order No. | PACT RCP-4000A-1A-D95-10M<br>2910326 | – | – |
| Measuring coil 450 mm<br>Signal line 10 m | Type<br>Order No. | PACT RCP-4000A-1A-D140-10M<br>1033483 | – | – |
| Measuring coil 600 mm<br>Signal line 10 m | Type<br>Order No. | PACT RCP-4000A-1A-D190-10M<br>2910327 | – | – |
| **Measuring coil technical data** | | | | |
| Frequency range | | 40 Hz … 20,000 Hz | | |
| Position error | | <1% | | |
| Rated insulation voltage | | 1000 V AC (rms CAT III) / 600 V AC (rms CAT IV) | | |
| Test voltage | | 10.45 kV (DC / 1 min.) | | |
| Ambient temperature operation | | -30°C … +80°C | | |
| Ambient temperature storage/transport | | -40°C … +80°C | | |
| **Measuring transducer technical data** | | | | |
| Measuring ranges (current) via DIP switch | | 0 … 100 A, 250 A, 400 A, 630 A, 1,000 A, 1,500 A, 2,000 A, 4,000 A | | |
| Current output signal | | 1 A AC (effective at sine) | 0 … 20 mA, 4 … 20 mA, 0 … 10 mA, 2 … 10 mA, 0 … 21 mA | |
| Voltage output signal | | – | 0 … 10 V, 2 … 10 V, 0 … 5 V, 1 … 5 V, 0 … 10.5 V | |
| Nominal supply voltage range | | 19.2 V DC … 30 V DC | 19.2 V DC … 30 V DC | |
| Maximum transmission error | | ≤0.5% | ≤0.5% | |
| Rated power | | 1.5 VA | – | |
| Frequency range | | 45 Hz ... 65 Hz | 16 Hz … 1000 Hz | |
| Max. detectable harmonics | | <2 kHz | 16 Hz … 1000 Hz | |
| Ambient temperature operation | | -20°C … +70°C | -20°C … +70°C | |
| Ambient temperature storage/transport | | -25°C … +85°C | -25°C … +85°C | |

## PACT RCP Rogowski coils

| | |  |  |  |
|---|---|---|---|---|
| **Description** | | **Measuring coil, length 300 mm** | **Measuring coil, length 450 mm** | **Measuring coil, length 600 mm** |
| Signal line 3 m | Type | PACT RCP-D95 | PACT RCP-D140 | PACT RCP-D190 |
| | Order No. | 2904890 | 2904891 | 2904892 |
| Signal line 5 m | Type | PACT RCP-D95-5M | – | – |
| | Order No. | 2910322 | | |
| Signal line 10 m | Type | PACT RCP-D95-10M | PACT RCP-D140-10M | PACT RCP-D190-10M |
| | Order No. | 2910323 | 1033482 | 2910324 |

## PACT RCP current transformers for retrofitting

| |  |
|---|---|
| **Description** | **Rogowski coil and measuring transducer, current output 1 A** |
| Application | With UV protection for outdoor use |
| Connection method | Screw |
| Measuring coil 600 mm Signal line 3 m Type | PACT RCP-4000A-1A-D190-3M-UV |
| Order No. | 1033485 |
| **Measuring coil technical data** | |
| Frequency range | 40 Hz … 20,000 Hz |
| Position error | <1% |
| Rated insulation voltage | 1000 V AC (rms CAT III) / 600 V AC (rms CAT IV) |
| Test voltage | 10.45 kV (DC / 1 min.) |
| Ambient temperature operation | -30°C … +80°C |
| Ambient temperature storage/transport | -40°C … +80°C |
| **Measuring transducer technical data** | |
| Measuring ranges (current) via DIP switch | 0 … 100 A, 250 A, 400 A, 630 A, 1,000 A, 1,500 A, 2,000 A, 4,000 A |
| Current output signal | 1 A AC (effective at sine) |
| Nominal supply voltage range | 9.6 V DC … 30 V DC |
| Maximum transmission error | ≤0.5% |
| Rated power | – |
| Frequency range | 16 Hz … 1000 Hz |
| Max. detectable harmonics | <2 kHz |
| Ambient temperature operation | -40°C … +70°C |
| Ambient temperature storage/transport | -40°C … +85°C |

## Accessories

**Holder for busbars**

Busbar thicknesses: 10 ... 15 mm

Type: PACT RCP-CLAMP
Order No.: 2904895

Busbar thicknesses: 5 ... 10 mm

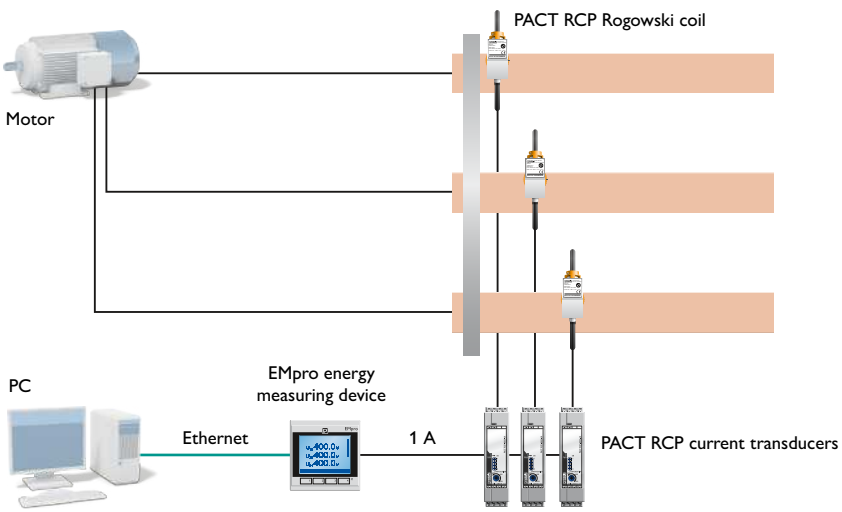
Type: PACT RCP-CLAMP-5-10
Order No.: 2907888

# PACT current transformers: Product overview and application examples

| PACT current transformers | | | | | | |
|---|---|---|---|---|---|---|
| | |  | |  |  | |
| **Description** | | **Current transformers** | | | | |
| Circular conductor dimensions | | Ø 21 mm | | Ø 28 mm | Ø 33 mm | |
| Rail dimensions | | – | | 30 x 15 mm<br>20 x 20 mm | 40 x 12 mm<br>2 x 30 x 10 mm | |
| Secondary current $I_{sn}$ | | 1 A / 5 A | | 1 A / 5 A | 1 A / 5 A | |
| Accuracy class | | C05 = 0.5 / C10 = 1 | | C05 = 0.5 / C10 = 1 | C05 = 0.5 / C10 = 1 | |
| Screw connection | Type<br>Order No. | PACT MCR-V1-21-44<br>2277268 | | PACT MCR-V2- 3015- 60<br>2277271 | PACT MCR-V2- 4012- 70<br>2277284 | |
| Push-in connection | Type<br>Order No. | – | | PACT MCR-V2-3015-60-PT<br>2907413 | PACT MCR-V2-4012-70-PT<br>2907414 | |
| **Technical data** | | | | | | |
| Primary rated current and rated power | | $I_{pn}$ | $S_n$ | $I_{pn}$ | $S_n$ | $I_{pn}$ | $S_n$ |
| $I_{sn}$: 1 A / Class: 0.5 | | 100 … 200 A | 1.25 … 5 VA | 100 … 400 A | 1.25 … 5 VA | 150 … 600 A | 2.5 … 5 VA |
| $I_{sn}$: 1 A / Class: 1 | | 50 … 200 A | 1.25 … 5 VA | 60 … 750 A | 1.25 … 7.5 VA | 100 … 600 A | 2.5 … 10 VA |
| $I_{sn}$: 5 A / Class: 0.5 | | 100 … 200 A | 1.25 … 3.75 VA | 200 … 400 A | 3.75 … 10 VA | 150 … 600 A | 2.5 … 10 VA |
| $I_{sn}$: 5 A / Class: 1 | | 50 … 400 A | 1.25 … 10 VA | 60 … 750 A | 1.25 … 10 VA | 100 … 1,000 A | 2.5 … 10 VA |

## Central energy data acquisition

Central energy data acquisition with the PACT RCP-4000A-1A set and one EMpro energy measuring device

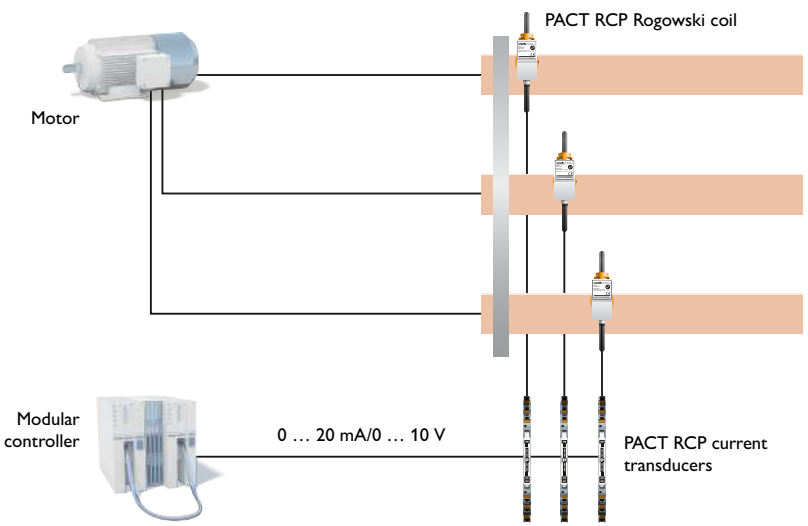


| | | | |
|---|---|---|---|
|  |  |  |  |
| **Current transformers** | | | |
| Ø 42 mm | Ø 52 mm | Ø 85 mm | – |
| 50 x 12 mm<br>2 x 40 x 10 mm | 60 x 15 mm<br>2 x 50 x 10 mm<br>40 x 40 mm | 2 x 100 x 10 mm<br>80 x 64 mm | – |
| 1 A / 5 A | 1 A / 5 A | 1 A / 5 A | 1 A / 5 A |
| C05 = 0.5 / C10 = 1 | C05 = 0.5 / C10 = 1 | C05 = 0.5 / C10 = 1 | C05 = 0.5 / C10 = 1 |
| PACT MCR-V2- 5012- 85<br>2277297 | PACT MCR-V2- 6015- 85<br>2277336 | PACT MCR-V2-10020-129<br>2277378 | PACT MCR-V3-60<br>2277417 |
| PACT MCR-V2-5012-85-PT<br>2907416 | PACT MCR-V2-6015-85-PT<br>2907417 | – | – |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $I_{pn}$ | $S_n$ | $I_{pn}$ | $S_n$ | $I_{pn}$ | $S_n$ | $I_{pn}$ | $S_n$ |
| 150 … 1,250 A | 1.25 … 10 VA | 300 … 1,000 A | 1.25 … 2.5 VA | 1,000 … 3,000 A | 5 … 15 VA | 1 … 40 A | 2.5 … 5 VA |
| 100 … 1,250 A | 1.25 … 15 VA | 300 … 1,250 A | 2.5 … 3.75 VA | 1,000 … 3,000 A | 10 … 30 VA | 5 … 40 A | 2.5 … 5 VA |
| 150 … 1,000 A | 1.25 … 10 VA | 600 … 1,250 A | 5 … 15 VA | 1,500 … 4,000 A | 5 … 25 VA | 5 … 40 A | 2.5 … 5 VA |
| 100 … 1,500 A | 1.25 … 15 VA | 200 … 1,500 A | 2.5 … 15 VA | 800 … 3,000 A | 10 … 25 VA | 5 … 40 A | 2.5 … 5 VA |

## Standard signal generation

Standard signal generation with the PACT RCP-4000A-UIRO set



# Current and voltage transducers

## AC/DC current transducers

MCR AC/DC current transducers measure direct and alternating currents of any waveform.
Choose between adjustable devices for precise mapping of small measuring ranges up to 55 A or compact devices in graded measuring ranges for measuring high currents up to 600 A.

**Your advantages**

- Suitable for every waveform, thanks to true r.m.s. value measurement (TRMS)
- Lossless current measurement without shunt using Hall sensor
- Optimum mapping of the measuring range up to 55 A, thanks to software-programmable upper and lower limits
- Decentral current measurement up to 600 A using particularly compact devices with variable mounting options

**Web code:** #1265

**Current transducers up to 600 A AC/DC**

**Programmable current transducers up to 100 A AC/DC**

## AC current transducers

MCR AC current transducers can also be used to acquire distorted alternating currents and convert them into a standard analog signal.
There are two product families: one with adjustable versions with a variable supply concept, and one with versions with a hinged Rogowski sensor for easy installation and retrofitting.

**Your advantages**

- Precise acquisition of sinusoidal alternating currents using adjustable AC measuring transducers up to 12 A that can be supplied flexibly
- Convenient installation or retrofitting even when measuring distorted currents, thanks to hinged AC measuring transducer up to 200 A

**Web code:** #2269


**Current transducers up to 200 A AC, distorted**

**Current transducers up to 12 A AC, sinusoidal**

## Voltage transducers

MCR voltage transducers can be used to acquire DC and AC voltages in various signal ranges and convert them into standard analog signals.

**Your advantages**

- Bidirectional output signals
- Eight finely graded voltage measuring ranges for optimum measurement accuracy
- ZERO/SPAN adjustment ± 20%
- High operational safety, thanks to 3-way electrical isolation

**Web code:** #2270

**Voltage transducers for DC voltages**

**Voltage transducers for AC voltages**

## PV string monitoring

SOLARCHECK provides reliable information on the status of your photovoltaic system. This enables you to respond to malfunctions in individual strings promptly and take appropriate countermeasures.

**Your advantages**

- Low cost and wiring outlay, without additional power supply unit in the device connection box
- Space-saving installation, thanks to the compact design
- Easy integration into monitoring systems, thanks to Modbus/RTU communication
- Monitoring of remote indication contacts, thanks to an additional digital input
- Flexible expansion, thanks to optional voltage measurement of up to 1,500 V DC

**Web code:** #1925

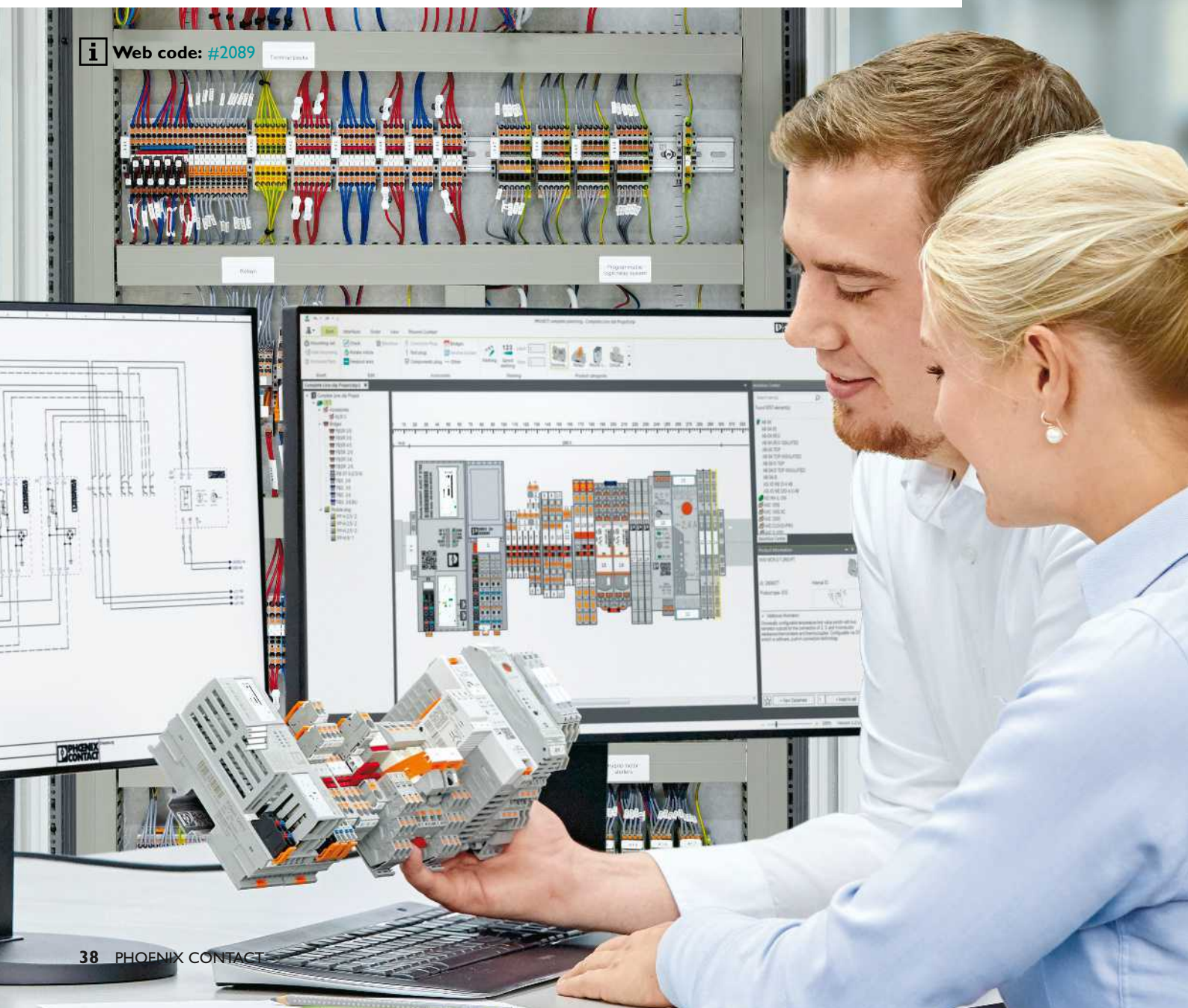
**Measuring module for string current**

**Communication module**

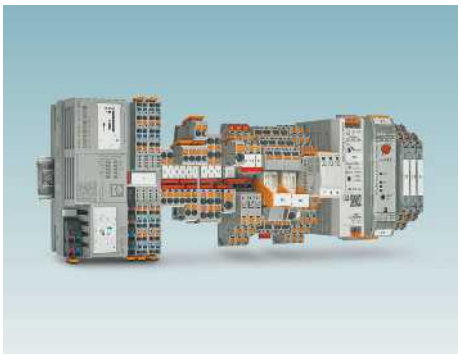
# COMPLETE line
# The comprehensive solution for the control cabinet

COMPLETE line is a system comprising technologically leading and coordinated hardware and software products, consulting services, and system solutions that help you optimize your processes in control cabinet manufacturing. Engineering, purchasing, installation, and operation become significantly easier for you.

**Web code:** #2089



# Your advantages in detail:



## Comprehensive product portfolio

With COMPLETE line, we offer a complete product portfolio of technologically leading products. This includes:

- Controllers and I/O modules
- Power supplies and device circuit breakers
- Terminal blocks and distribution blocks
- Relay modules and motor starters
- Signal conditioners
- Safety technology
- Surge protection
- Heavy-duty connectors

## Intuitive handling

Thanks to the simple, intuitive handling of the coordinated hardware components, you will save time during installation, startup, and maintenance. Push-in connection technology enables you to wire applications quickly – without using tools. The broad, technologically leading product portfolio will always provide you with the right product for standard or special applications.

## Save time throughout the entire engineering process

The PROJECT complete planning and marking software supports the entire process of control cabinet manufacturing. The program features an intuitive user interface that enables the individual planning, automatic checking, and direct ordering of terminal strips.

## Reduced logistics costs

Reduced variety of parts, thanks to standardized marking, bridging, and testing accessories. The COMPLETE line system coordinates products, design, and accessories so that you benefit from maximum reusability and thus reduce your logistics costs.

## Optimized processes in control cabinet manufacturing

COMPLETE line supports you, from engineering through to manufacturing, in making your control cabinet production as efficient as possible. Thus, your customized concept for optimizing your processes in control cabinet manufacturing is created. Our terminal strip production helps you to flexibly manage order peaks or to supply your control cabinet production with fully assembled DIN rails just in time.

COMPLETE **line**

## The new standard for the control cabinet

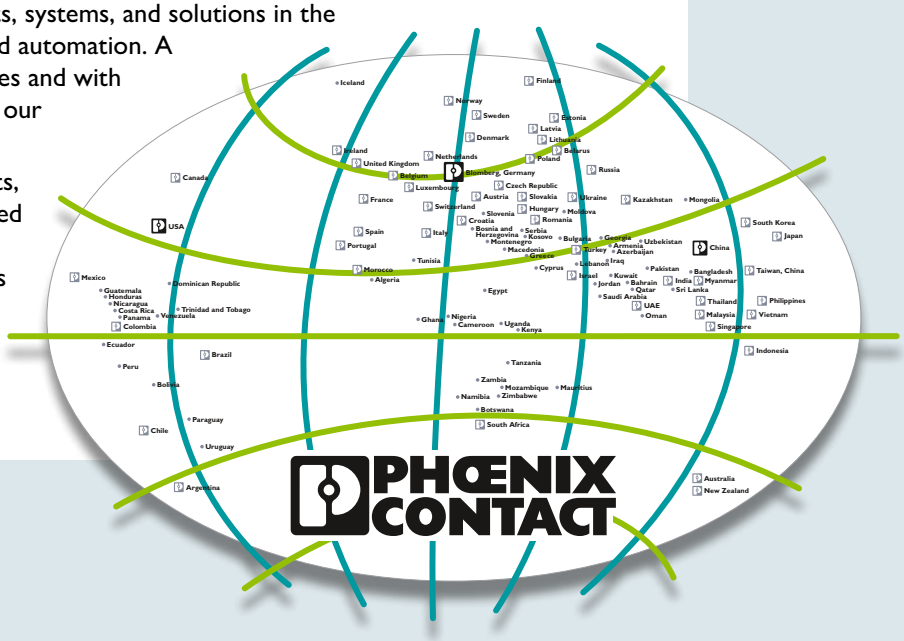
Discover the extensive COMPLETE line product portfolio and find out more about COMPLETE line and your comprehensive solutions for the control cabinet.

Visit our website:
**phoenixcontact.com/completeline**

# Open communication with customers and partners worldwide

Phoenix Contact is a global market leader based in Germany. Our group is synonymous with future-oriented components, systems, and solutions in the fields of electrical engineering, electronics, and automation. A global network across more than 100 countries and with 17,400 employees ensures close proximity to our customers.

With a broad and innovative range of products, we provide our customers with future-oriented solutions for a variety of applications and industries. We focus in particular on the fields of energy, infrastructure, process, and factory automation.




You will find our complete product range at:

phoenixcontact.com

PHOENIX CONTACT GmbH & Co. KG
Flachsmarktstraße 8
32825 Blomberg, Germany
Phone: +49 52 35 3-00
Fax: +49 52 35 3-4 12 00
E-mail: info@phoenixcontact.com
phoenixcontact.com



IF 02-20.001.L3
MNR 1104458/2020-03-20/02

INSPIRING INNOVATIONS