



Energy monitoring and management made easy

Products for energy management

The 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 and measurement technology products streamline installation and simplify energy data acquisition. Future-oriented communication solutions and digital services help you to integrate, manage, and process your data.



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EMpro
R_0024_001_07Z_0028



Limited Lifetime Warranty

For customers participating in our Cabinet Confidence Limited Lifetime Warranty (LLW) program, Phoenix Contact USA will warrant many of our products to be free from defects in workmanship and materials for the lifetime of the product. Registration is required, and certain restrictions apply.* Improperly applied or installed products may void warranty. See the complete terms and conditions for full details.

www.phoenixcontact.com/llw



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Products and measuring devices for managing your energy

Energy monitoring and management systems can be as simple as monitoring for an undesirable condition or as complex as a cloud-connected platform with energy insights and predictive maintenance capabilities that can be accessed remotely, anywhere in the world. Regardless of your system's complexity, Phoenix Contact offers a large selection of energy meters, current transformers, and other energy monitoring equipment that make monitoring simple. Whether for new installations and equipment or retrofitting existing systems, the right product with high reliability and easy installation is always at hand.

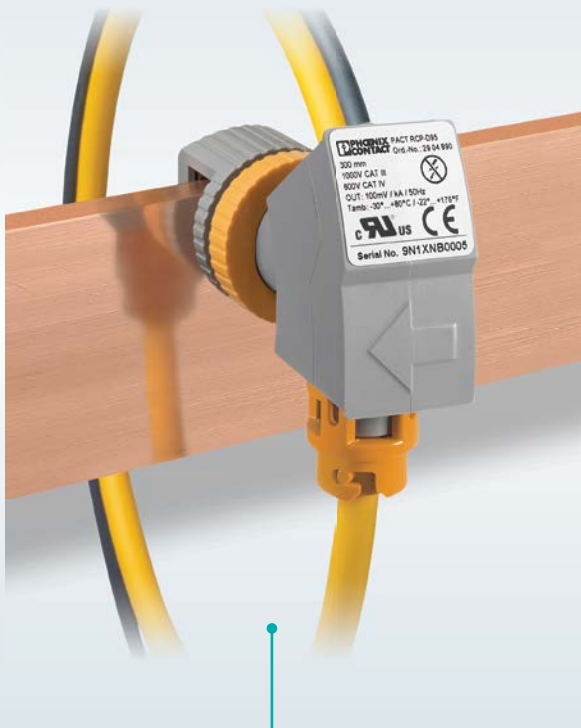


Multi-functional EMpro energy measuring devices

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

Embedded tools and services

A wide range of user-oriented web server and device functions simplifies installation, startup, monitoring, and servicing.



PACT RCP current transformers for retrofitting

PACT RCP current transformers are the perfect replacement current transformers for retrofitting. Install the Rogowski coil conveniently even where space is too tight for a split core current transformer.



PACT solid core 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 measuring devices

The fastest way to measure energy

EMpro energy measuring devices can be configured and integrated into your network in minutes. Save on wiring expense, thanks to the direct connection of manufacturer-independent current sensors, and benefit from the many practical web server and device functions.



Front panel device

Measuring devices for front panel installation enable you to access data and configure directly via the operating keys or remotely via the integrated web server.



DIN rail device

Measuring devices for DIN rail mounting enable you to access your data and to configure directly via the operating keys or remotely via the integrated web server.

Your advantages

- ✓ Energy measurement in just three steps, thanks to an intuitive installation wizard
- ✓ Direct connection of commercially available Rogowski coils saves wiring and configuration effort
- ✓ Easy to maintain, thanks to smart web server and display functions
- ✓ Operating elements and interfaces can be disabled to ensure data security

EtherNet/IP™

PROFINET®

Modbus

Flexible network connection

You can integrate your energy measuring devices into the most common industrial network structures and fieldbus systems. Additionally, a Modbus/TCP interface is integrated into every product.

User-guided web server installation

The user-guided installation wizard enables you to configure and start the device up intuitively.



DIN rail device without display

DIN rail devices without display are designed solely for network integration and enable you to access your data and to configure 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 intuitively configured and integrated into the network in just three steps. You can also perform the basic configuration directly on the device via the user-guided operating keys.



Simple configuration

Configure and integrate devices quickly and easily via the web-based, user-guided installation wizard, even in the case of complex applications.



Complex made easy

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



Transfer parameters with ease

Simply send the settings for selected parameters to other energy measuring devices in the same network via the web server.

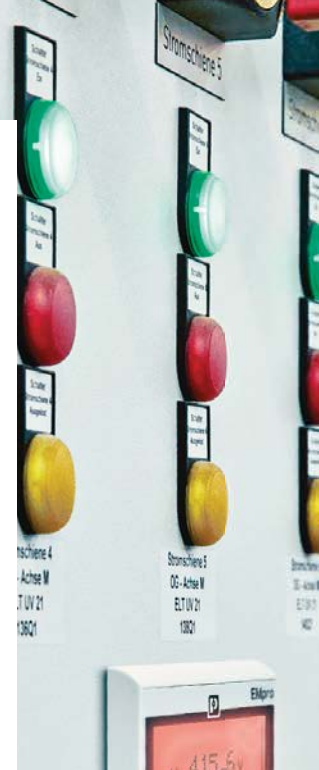


Intuitive configuration on the device

You also have the option to perform the basic configuration directly on the device via the operating keys. The clear menu guide takes you to your destination intuitively.

Smart web server and device functions

Smart web server and device functions lighten your daily workload. With functions such as real-time visualization, data logging capabilities, basic user and administrative user access levels, alarming, and more, the web server simplifies system monitoring all around.



Easy maintenance

Recognize errors as they are occurring via a color change on the display as soon as the configured thresholds are violated.



Rapid troubleshooting

Export configuration data along with historical signal and error lists. This allows you to quickly gain initial insights into troubleshooting.



Always up to date

Through firmware updates, your device is always at the latest state of the art. Take advantage of our focus on continuously developing usability.



Superior protection

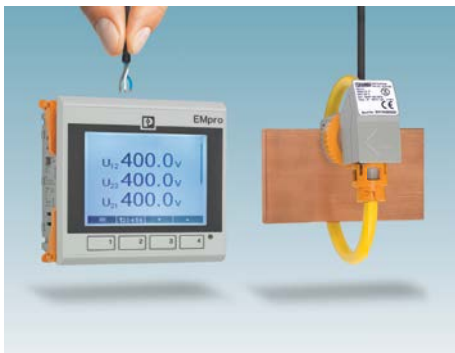
Smart disabling of hardware controls and communication interfaces protects your energy data from unauthorized access.

Flexible current measuring input Fast wiring and configuration

EMpro energy measuring devices measure the current either via external current transformers or Rogowski coils. This means you can directly connect any commercially available Rogowski coil, regardless of 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 commercially available Rogowski coil from any manufacturer – no additional measuring transducer required.



Just one click with PACT RCP

Our PACT RCP Rogowski coil makes things even easier: you can configure the current input with just one click – the coil parameters are already saved in the web server.



Flexible current transformer input

Whether your CTs have 1 amp or 5 amp secondary currents, EMpro can handle it. Primary currents up to 20,000 A are supported.



Smart mismatch 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.

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 secondary currents. Versions with Push-in connection help you perform your wiring quickly and safely.



Your advantages

- ✓ Easily retrofit current measuring technology with the PACT RCP set without having to remove system parts
- ✓ Transform alternating currents up to 4,000 A using a single universal PACT RCP measuring system
- ✓ Fast, reliable and tool-free installation: plug-in current transformers with Push-in Technology



Push-in Technology^{IP}
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.



Push-in Technology^{IP}
Designed by PHOENIX CONTACT

Solid core 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.

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. For energy meters with direct Rogowski coil connection, the PACT RCP current transformers can measure currents up to 10,000 A – they are connected directly to the appropriate meter without the need for a measuring transducer. For systems that require a more traditional CT or transducer input, it is possible to 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 connection provides for secure seating. Choose from three different coil lengths for the ideal fit.



Touch-safe solution



The Rogowski coil provides a touch-safe solution that poses no shock hazard. It replaces the need for CT shorting terminal blocks.



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 transformer	Rogowski coil	Current transformer	Rogowski coil
Modbus/TCP	Type Order No.	EEM-MA770 2907945	EEM-MA771 2908286	EEM-MA370 2907983
Modbus/RTU	Type Order No.	EEM-MA770-R 2907944	EEM-MA771-R 2908285	EEM-MA371 2908307
PROFINET	Type Order No.	EEM-MA770-PN 2907946	EEM-MA771-PN 2908301	–
EtherNet/IP™	Type Order No.	EEM-MA770-EIP 2907953	EEM-MA771-EIP 2908302	–
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) 20 V AC ... 400 V AC (phase/neutral conductor)		35 V AC ... 690 V AC (phase/phase) 20 V AC ... 400 V AC (phase/neutral conductor)	
Via external transformer	60 V AC ... 2,000,000 V AC (primary) 60 V AC ... 400 V AC (secondary)		60 V AC ... 2,000,000 V AC (primary) 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)
Reactive energy (IEC 62053-23)	Class 2		Class 2	
Digital input in accordance with IEC/EN 61131-2 (type 3)				
Voltage input signal	24 V DC 0 V DC ... 30 V DC		24 V DC 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%) 150 V DC ... 250 V DC (± 20%)		100 V AC ... 230 V AC (±20%) 150 V DC ... 250 V DC (± 20%)	
Conformity				
Conformity	CE-compliant		CE-compliant	

EMpro energy measuring devices without display

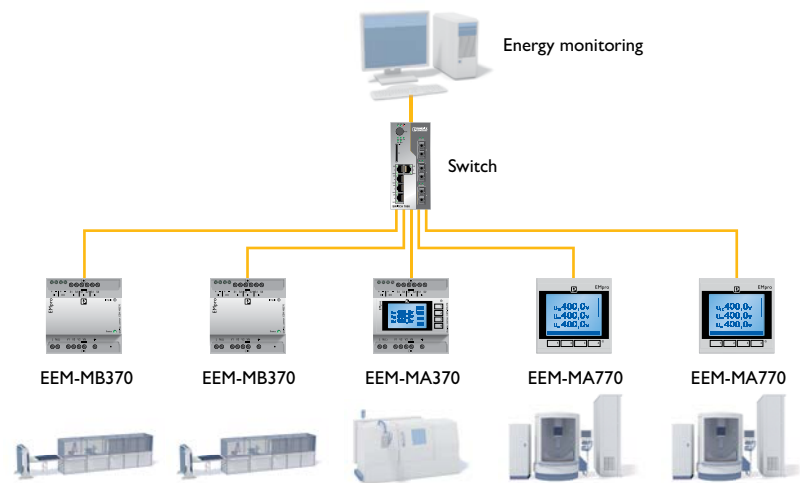


Description			DIN rail installation without display	
Measurement via		Current transformer	Rogowski coil	
Modbus/TCP	Type Order No.	EEM-MB370 2907954	EEM-MB371 2907955	
Modbus/RTU	Type Order No.	–	–	
PROFINET	Type Order No.	EEM-MB370-PN 2907984	EEM-MB371-PN 2908308	
EtherNet/IP™	Type Order No.	EEM-MB370-EIP 2907971	EEM-MB371-EIP 2907976	
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) 20 V AC ... 400 V AC (phase/neutral conductor)			
Via external transformer	60 V AC ... 2,000,000 V AC (primary) 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)		
Reactive energy (IEC 62053-23)	Class 2			
Digital input in accordance with IEC/EN 61131-2 (type 3)				
Voltage input signal	24 V DC 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%) 150 V DC ... 250 V DC (± 20%)			
Conformity				
Conformity	CE-compliant			

Energy measuring devices: Application examples

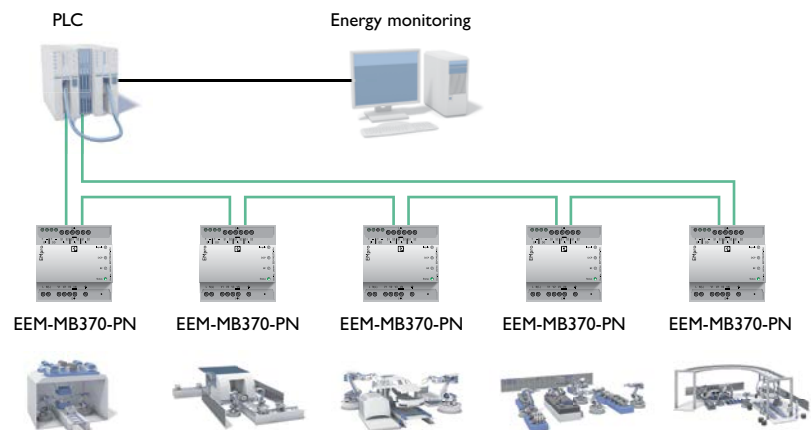
Application example 1

Energy data acquisition in a Modbus/TCP network



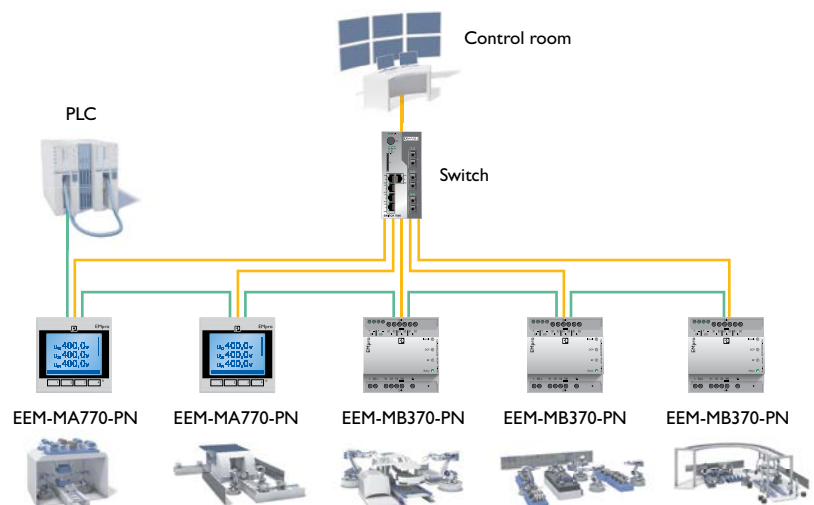
Application example 2

Energy data acquisition in a PROFINET network



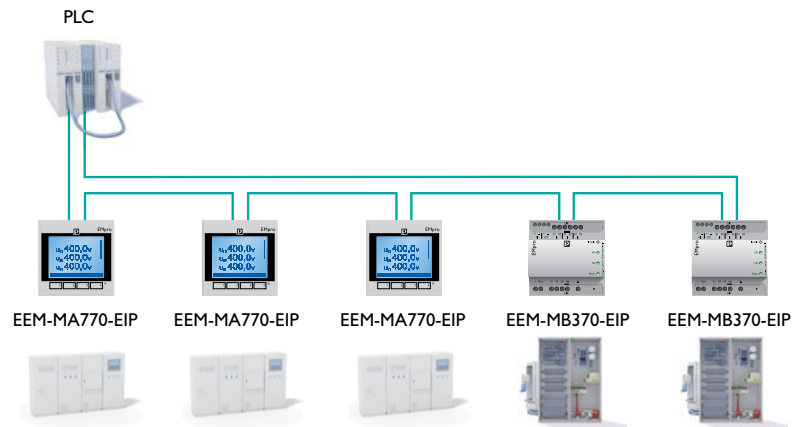
Application example 3

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



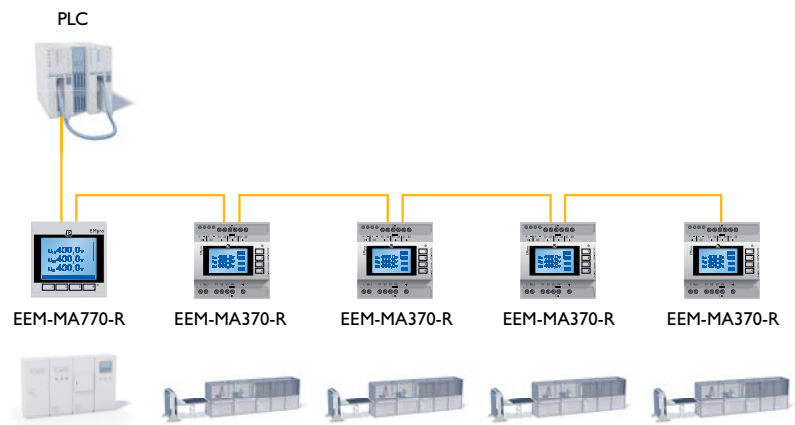
Application example 4

Energy data acquisition in an EtherNet/IP™ network





Application example 5

Energy data acquisition in a Modbus master gateway architecture



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
Meas. coil 300 mm Signal line 3 m	Type Order No.	PACT RCP-4000A-1A-D95 2904921	PACT RCP-4000A-UIRO-D95 2906231	PACT RCP-4000A-UIRO-PT-D95 2906234
Meas. coil 450 mm Signal line 3 m	Type Order No.	PACT RCP-4000A-1A-D140 2904922	PACT RCP-4000A-UIRO-D140 2906232	PACT RCP-4000A-UIRO-PT-D140 2906235
Meas. coil 600 mm Signal line 3 m	Type Order No.	PACT RCP-4000A-1A-D190 2904923	PACT RCP-4000A-UIRO-D190 2906233	PACT RCP-4000A-UIRO-PT-D190 2906236
Meas. coil 300 mm Signal line 5 m	Type Order No.	PACT RCP-4000A-1A-D95-5M 2910325	–	–
Meas. coil 300 mm Signal line 10 m	Type Order No.	PACT RCP-4000A-1A-D95-10M 2910326	–	–
Meas. coil 450 mm Signal line 10 m	Type Order No.	PACT RCP-4000A-1A-D140-10M 1033483	–	–
Meas. coil 600 mm Signal line 10 m	Type Order No.	PACT RCP-4000A-1A-D190-10M 2910327	–	–
Measuring coil technical data				
Frequency range		40 Hz ... 20,000 Hz		
Position error		<1%		
Rated insulation voltage		1,000 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 ... 1,000 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 Order No.	PACT RCP-D95 2904890	PACT RCP-D140 2904891	PACT RCP-D190 2904892
Signal line 5 m	Type Order No.	PACT RCP-D95-5M 2910322	–	–
Signal line 10 m	Type Order No.	PACT RCP-D95-10M 2910323	PACT RCP-D140-10M 1033482	PACT RCP-D190-10M 2910324

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 transformer					
Circular conductor dimensions	Ø 21 mm		Ø 28 mm		Ø 33 mm	
Rail dimensions	–		30 x 15 mm 20 x 20 mm		40 x 12 mm 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 Order No.	PACT MCR-V1-21-44 2277268		PACT MCR-V2- 3015- 60 2277271		PACT MCR-V2- 4012- 70 2277284
Push-in connection	Type Order No.	–		PACT MCR-V2-3015-60-PT 2907413		PACT MCR-V2-4012-70-PT 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



Current transformers

Ø 42 mm		Ø 52 mm		Ø 85 mm		–	
50 x 12 mm 2 x 40 x 10 mm		60 x 15 mm, 2 x 50 x 10 mm 40 x 40 mm		2 x 100 x 10 mm 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 2277297		PACT MCR-V2- 6015- 85 2277336		PACT MCR-V2C-10020-129 2277514		PACT MCR-V3-60 2277417	
PACT MCR-V2-5012-85-PT 2907416		PACT MCR-V2-6015-85-PT 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

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



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 ranges: 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



Current transducers up to 400 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 $\pm 20\%$
- High operational safety, thanks to 3-way electrical isolation



Voltage measuring transducers for DC voltages

Voltage measuring transducers for AC voltages

PV string monitoring

SOLARCHECK provides reliable information on the status of your photovoltaic system. This enables you to respond to problems 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 with Modbus/RTU communication
- Monitoring of remote indication contacts, due to an additional digital input
- Flexible expansion with optional voltage measurement of up to 1,500 V DC



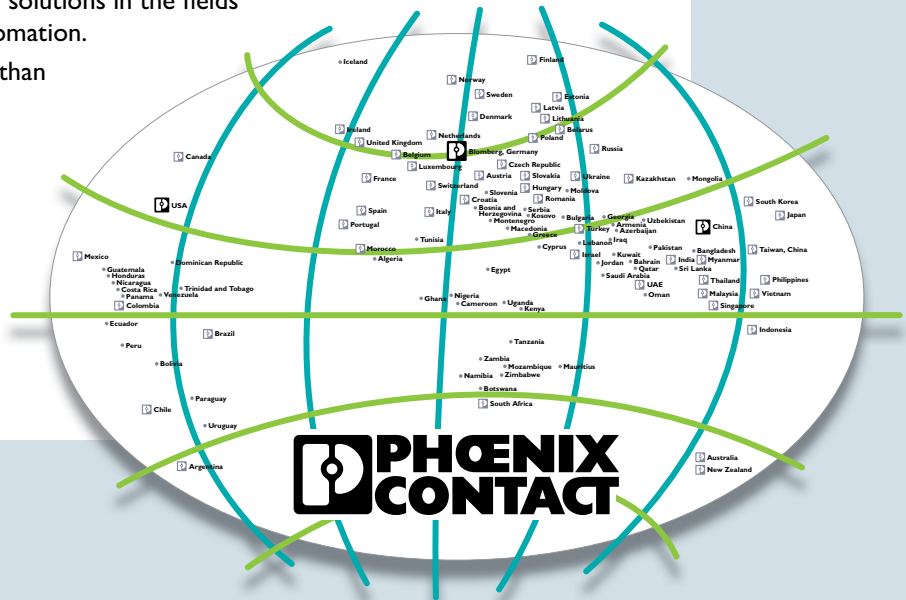
Measuring module for string current

Communication module

Ongoing communication with customers and partners worldwide

Phoenix Contact is a global market leader based in Germany. Our group is known for its future-oriented components, systems, and solutions in the fields of electrical engineering, electronics, and automation.

With a global network reaching across more than 100 countries and 17,400 employees, we can stay in close contact with our customers, something we believe is essential to success. The wide variety of our innovative products makes it easy for our customers to find future-oriented solutions for multiple applications and industries. We especially focus on the fields of energy, infrastructure, process, and factory automation.



You will find our complete product range at:
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INSPIRING INNOVATIONS

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