CMC 256plus

High Precision Relay Test Set and Universal Calibrator

High precision relay test set and universal calibrator

The CMC 256plus is the first choice for applications requiring very high accuracy. This unit is not only an excellent test set for protection devices of all kinds but also a universal calibration tool.

Its high precision allows the test and calibration of a wide range of measuring devices, including: power quality (PQ) measurement devices of class A and S, energy meters of class 0.2, measuring transducers and phasor measurement units (PMU).

Its unique accuracy and flexibility make the CMC 256plus ideal for protection and measurement equipment manufacturers for research and development, production and type testing.

Safe and future-proof

The six current and four voltage output channels of the CMC 256plus are continuously and independently adjustable in amplitude, phase and frequency. All outputs are protected against over-temperature, accidental short-circuits, external high-voltage transient signals and are monitored in case of overload.

The integrated network interface supports comprehensive testing in IEC 61850 environments using optional GOOSE simulation and subscription as well as Sampled Values simulation functionality. It is also possible to retrieve, evaluate and log the IED Client/Server SCADA communication according to IEC 61850.

DC supply:
0 ... 264 V

Voltage outputs:
4 x 300 V or 2 x 600 V
Typical error < 0.015 % reading
+ 0.005 % range

Current outputs:
6 x 12.5 A or 3 x 25 A or 1 x 75 A
Typical error < 0.015 % reading
+ 0.005 % range

Generator combination socket:
3 x 300 V and 3 x 25 A

Multifunctional measurements

By utilizing the EnerLyzer Classic software option, the ten binary inputs of the CMC 256plus can also function as analog measurement inputs. The test set can then be used as a portable 10-channel multimeter, transient and trend recorder, harmonic signal analyzer and much more. Analog measurements are very helpful for troubleshooting during commissioning or maintenance testing of protection devices (for example, recording of transients during switching operations or analysis of transformer inrush events).

Varied applications

Up to 12 independent channels of low-level signals are available on the rear of the test set, which can be used to test relays with non-conventional sensor inputs (for example, Rogowski coils) or to control external amplifier units.

Connectivity options

The CMC 256plus is designed to work with OMICRON's most powerful software tools. Users can control the test set using either a Windows PC/laptop or an Windows tablet and connect via Ethernet/USB cable or Wi-Fi (through the optional mini wireless USB adapter).

Time synchronized applications according to IEEE 1588 are possible, for example, via CMGPS 588. The GPS controlled time reference with integrated antenna works as a Precision Time Protocol (PTP) grandmaster clock and is optimized for outdoor usage.

Organize your tests

For centralized planning, tracking and managing of all engineering, testing and maintenance activities in the power industry, the ADMO software[1] ensures that the workflows of asset and operations managers, testers, and protection engineers are structured and coordinated. Key data will be kept up-to-date and available to all employees at all times.

4 x binary outputs

DC measuring inputs:
0 ... 10 V and 0 ... 20 mA

10 x multifunctional inputs:
binary (dry/wet)
Analog measurement, EnerLyzer Classic

16.0 kg / 35.3 lbs
450 x 145 x 390 mm / 17.7 x 5.7 x 15.4 in

Your benefits

- Protection test set and universal calibrator in one device
- Testing of all relay generations – electromechanical, static, numerical, IEC 61850
- Highly accurate test signals for testing meters and power quality measurement devices
- Integrated network interface for testing IEC 61850 IEDs

www.omicronenergy.com/CMC256plus

[1] ADMO light is included with every Test Universe package

Control options tailored to your needs

"Ideal solution for ..."

Manual settings-based testing with CMControl

CMControl P is the entry-level CMC operation platform specifically designed for easy manual settings-based testing of protection and measurement devices.

- Simple and fast testing with intuitive user guidance
- Reduced testing efforts, increased productivity
- No special training required

www.omicronenergy.com/cmcontrol

"... fast and easy manual testing with low initial effort"

Advanced settings-based testing with Test Universe

Test Universe is made for advanced testing and offers a wide range of application-optimized test modules. Customized templates allow users to achieve a high degree of automation and standardization.

- Fully automated settings-based protection testing
- Flexible test plans
- Function specific modules

www.omicronenergy.com/testuniverse

"... frequent and recurring testing, a wide application range and greater depth of testing"

Innovative system-based testing with RelaySimTest

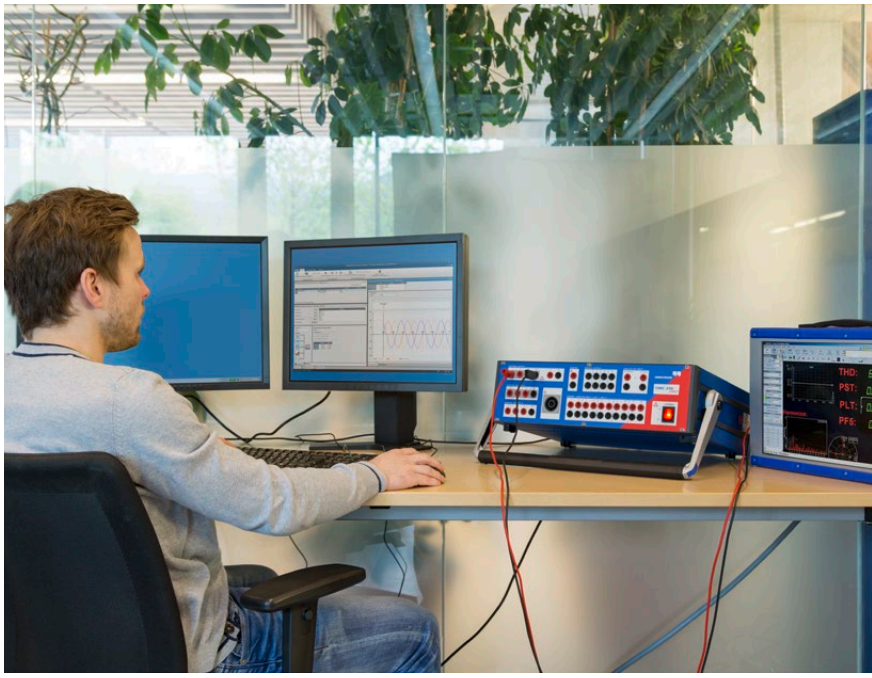
The innovative system-based testing approach of **RelaySimTest** allows the verification of the whole protection system with a higher testing quality than ever before.

- Logic and scheme testing with outstanding troubleshooting capabilities
- Supports easy end-to-end testing
- Independent of relay type and settings

www.omicronenergy.com/relaysimtest

"... logic testing, scheme testing and troubleshooting tasks"

Achieve the highest level of system reliability **using a combination** of settings-based and system-based testing.



Use the full potential of your CMC with ...

... Protection Testing Library (PTL)

The PTL provides predefined test templates for more than 500 protection relays from various manufacturers. The templates can be adapted and extended. Studies have shown that utilizing fully automated templates **can reduce testing time by up to 70%** compared to manual testing.

- Saves time and effort compared to manual creation of test plans
- Manual or automatic transfer of relay settings directly from the relay manufacturer's software
- Test templates and relay parameter converters (XRIO) customizable for individual requirements

www.omicronenergy.com/ptl

... Meter and PQ Signal Generator modules

Meter and PQ Signal Generator transforms a CMC into a multifunctional test and calibration tool for energy meters and power quality measurement devices. A CMC test set can be used for conventional testing and measuring simultaneously.

- Generating all kinds of power quality phenomena for type and field testing
- PQ test templates according to IEC 61000-4-30 and IEC 62586-2
- Closed-loop testing of energy meters with rotating discs or optical pulse outputs

www.omicronenergy.com/meter

www.omicronenergy.com/pq

Testing software packages and add-ons

A wide range of testing software is available consisting of Test Universe modules and additional tools. We have bundled typical testing requirements into useful software packages, but each package can of course be adapted to individual needs.

Essential offers a good introduction with basic functions and modules; can serve as a base for custom compiled packages

Standard contains all modules that are typically used for settings-based testing of protection devices

Enhanced like Standard, specifically extended by functions for system-based testing and transient simulation as well as for free programming

Complete covers all functions and software modules that are offered for controlling CMC test sets

			Packages			
			Essential	Standard	Enhanced	Complete
Test Universe modules	OMICRON Control Center [1]	Automation tool, document-oriented test plan, template and report form	■	■	■	■
	QuickCMC	Convenient manual testing in the Test Universe environment	■	■	■	■
	State Sequencer	Determining operating times and logical timing relations by state-based sequences	■	■	■	■
	Harmonics	Generation of signals with superimposed harmonics	■	■	■	■
	CB Configuration	Module for setting the CB simulation	■	■	■	■
	Ramping	Determining magnitude, phase, and frequency thresholds by ramping definitions	■	■	■	■
	TransPlay	Playback of Comtrade files, recording of binary input status	■	■	■	■
	Advanced TransPlay	Playback of Comtrade files, recording of binary input status, processing options and automatic assessment	□	■	■	■
	Pulse Ramping	Determining magnitude, phase, and frequency thresholds by ramping definitions	□	■	■	■
	Overcurrent [2]	Automatic testing of positive/negative/zero sequence overcurrent characteristics	□	■	■	■
	Distance	Impedance element evaluations using single-shot definitions in the Z-plane	□	■	■	■
	Advanced Distance	Impedance element evaluations using automatic testing modes	□	■	■	■
	VI Starting	Testing of the voltage dependent overcurrent starting function of distance relays	□	■	■	■
	Autoreclosure	Testing of the autoreclosure function with integral fault model	□	■	■	■
	Advanced Differential [3]	Comprehensive three-phase differential relay testing (four modules)	□	■	■	■
	Annunciation Checker	Verification of the correct marshalling and wiring of protection devices	□	■	■	■
	Power	Testing with visualization and assessment in the P-Q plane (basic)	□	■	■	■
	Advanced Power	Testing with visualization and assessment in the P-Q plane (enhanced)	□	■	■	■
	Transient Ground Fault [4]	Simulation of ground-faults in isolated or compensated networks	□	□	■	■
	Synchronizer	Automatic testing of synchronizing devices and synchro-check relays	□	□	■	■
	Meter	Testing of single and multifunction energy meters	□	□	□	■
	Transducer	Testing of measurement transducers	□	□	□	■
	PQ Signal Generator	Simulation of power quality phenomena according to IEC 61000-4-30 and IEC 62586	□	□	□	■
IEC 61850	IEC 61850 Client/Server	Automatic SCADA testing in accordance with IEC 61850	□	□	□	■
	GOOSE Configuration	Testing with GOOSE according to IEC 61850	□	□	□	■
	Sampled Values Configuration	Testing with Sampled Values according to IEC 61850-9-2 (“9-2 LE”) and IEC 61869-9	□	□	□	■
	IEDScout	Universal software tool for working with IEC 61850 IEDs	□	□	□	□
Additional tools	CMControl P App	Quick and easy manual testing of protection and measurement devices	□	■	■	■
	RelaySimTest [4]	System-based protection testing by simulating realistic power system events	□	□	■	■
	Adv. Transformer Features	Advanced transformer features for differential protection	□	□	□	■
	Motor Features	Motor features for asynchronous motor simulation	□	□	□	■
	CMEngine	Programming interface for controlling CMC test sets with user specific software	□	□	■	■
	EnerLyzer Classic	Analog measurements and transient recording with CMC test sets	□	□	□	■
	TransView	Transient signal analysis for COMTRADE files	□	□	□	■
	ADMO light [5]	Asset and maintenance management for protection systems	■	■	■	■

Contained in all packages: OCC Batch, AuxDC Configuration, ISIO Connect (for ISIO 200), Polarity Checker (for CPOL3).

[1] Includes licenses for Pause Module, ExeCute, TextView
[2] Includes license for Overcurrent Characteristics Grabber
[3] Includes Single-Phase Differential
[4] RelaySimTest license also includes the licenses for Transient Ground Fault and NetSim
[5] ADMO light is limited to 50 assets but can be upgraded to a full ADMO version at any time

■ Contained
□ Optionally available

CMC 256plus accessories

The following accessories are included with the CMC 256plus standard delivery but can also be ordered separately.

	Description	Item no.
	> Country-specific power cord 3 m / 10 ft	
	> Ethernet patch cable 1.5 m / 5 ft	E1636800
	> Ethernet patch cable 3 m /10 ft	E1664400
	> USB connection cable 2 m / 6.6 ft	B1021101
	> Leads with 4 mm safety plugs (6 x red, 6 x black) 2 m / 6.6 ft	P0006168
	> Flexible terminal adapters (12 x black)	E0439201
	> Jumper flexible (4 x black) 6 cm / 2.4 in	E0439300
	> Flexible test lead adapters with retractable sleeve (6 x red, 6 x black)	P0006167
	> Grounding cable with battery clamp and M6 cable lug 6 m / 20 ft	B0349701
	> Soft bag	E0074602

Optional accessories[1]

	Description	Item no.
	CMC wiring accessory package For connecting test objects to CMC test sets, consisting of: > 12 flexible test lead adapters for connections to narrow terminals > 12 flexible test lead adapters with retractable sleeve for connections to non-safety sockets > 8 flexible jumpers for paralleling current outputs or shorting neutrals of binary inputs > 8 crocodile clips for contacting pins or screw bolts > 12 flexible terminal adapters for screw-type terminals > 12 solid terminal adapters for screw-type terminals > 20 cable lug adapters for M4 (0.15 in) screws > 10 cable lug adapters for M5 (0.2 in) screws > 1 test lead to ground test objects, e.g. in a lab environment > 10 cable ties 150 mm / 6 in long > 1 accessory bag	P0010657
	Mini wireless USB adapter For wireless control of the CMC 256plus.[2]	E1636800
	Generator combination cable Connection between the generator combination plug of the CMC 256plus to the test object.	B1328100
	Transport case Heavy-duty transport case with wheels and extendable handle.	B0679403
	CMGPS 588 GPS controlled time reference with integrated antenna. It is optimized for outdoor usage and works as a PTP grandmaster clock according to IEEE 1588-2008, IEEE C37.238 (Power Profile), IEC 61850-9-3 (Utility Profile).	P0006433
	OSH 256 The OSH 256 is an optical scanning head used to detect the status of optical pulse LEDs in energy meters. It is suitable for a wavelength range of 550 nm to 1000 nm.	P0006391
	CPOL3 polarity and wiring checker For checking a series of terminals for correct wiring. The signal can be injected into the primary side of a CT. Thus, the correct polarity of CT wiring can be included in the test.	P0009398

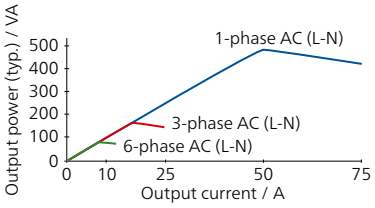
[1] Non-exhaustive list. For the complete list please visit our website: www.omicronenergy.com/cmc256plus
[2] Requires a CMC test set with NET-2 interface board.
Wi-Fi is subjected to technical and legal constraints. For more information please contact your local OMICRON office or sales partner.

Overview of technical specifications[1]

CMC 256plus

Current amplifier

Setting range	6-phase AC (L-N)	6 x 0 ... 12.5 A
	3-phase AC (L-N)	3 x 0 ... 25 A (Group A II B)
	1-phase AC (L-N)	1 x 0 ... 75 A (Group A II B)
	DC (L-N)	1 x 0 ... ±35 A (Group A II B)
Power	6-phase AC (L-N)	6 x 80 VA typ. at 8.5 A 6 x 70 VA guar. at 7.5 A
	3-phase AC (L-N)	3 x 160 VA typ. at 17 A 3 x 140 VA guar. at 15 A
	1-phase AC (L-N)	1 x 480 VA typ. at 51 A 1 x 420 VA guar. at 45 A



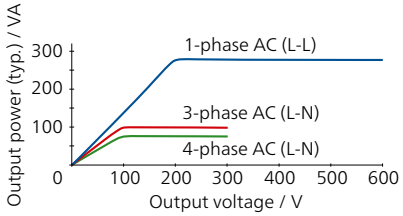
Accuracy	Error < 0.015 rd.[2] + 0.005 % rg.[2] typ. Error < 0.04 % rd. + 0.01 % rg. guar.
Distortion (THD+N)[3]	< 0.025 % typ., < 0.07 % guar.
Resolution (for respective range)	50 µA / 100 µA / 500 µA / 1 mA
Max. compliance voltage (L-N)/(L-L)	15 Vpk / 60 Vpk

Amplifiers, general

Frequency	Range sine signals	10 ... 1000 Hz
	Range harmonics / interharmonics	10 ... 3000 Hz[4]
	Range transient signals	DC ... 3.1 kHz[4]
	Resolution	< 5 µHz
Phase	Resolution	0.001°
	Error at 50 / 60 Hz	< 0.005° typ., < 0.02° guar.
Bandwidth (-3 dB)		3.1 kHz

Voltage amplifier

Setting range	4-phase AC (L-N)	4 x 0 ... 300 V
	2-phase AC (L-L)	2 x 0 ... 600 V
	DC (L-N)	4 x 0 ... ±300 V
Power	4-phase AC (L-N)	4 x 75 VA typ. at 100 ... 300 V 4 x 50 VA guar. at 85 ... 300 V
	3-phase AC (L-N)	3 x 100 VA typ. at 100 ... 300 V 3 x 85 VA guar. at 85 ... 300 V
	1-phase AC (L-L)	1 x 275 VA typ. at 200 ... 600 V 1 x 250 VA guar. at 200 ... 600 V



Accuracy (at 0 ... 300 V)	Error < 0.015 % rd.[2] + 0.005 % rg.[2] typ. Error < 0.04 % rd. + 0.01 % rg. guar.
Distortion (THD+N)[3]	0.015 % typ., < 0.05 % guar.
Resolution	5 mV / 10 mV in range 150 V / 300 V
Ranges	150 V / 300 V

Low level outputs

Number of outputs	6 (12 with Option LLO-2)
Setting range	0 ... ±10 Vpk

Auxiliary DC supply

Voltage ranges, max. current	0 ... 264 VDC, 0.2 A 0 ... 132 VDC, 0.4 A 0 ... 66 VDC, 0.8 A

Binary inputs

Number	10 (5 potential groups)
Trigger criteria	Toggling of potential-free contacts or DC voltage compared to threshold voltage
Ranges	100 mV / 1 V / 10 V / 100 V / 600 V
Sample rate	10 kHz (resolution 100 µs)

Binary outputs

Type	4 relay 4 transistor
Relay breaking capacity	Imax: 8 A / Pmax: 2000 VA at 300 VAC Imax: 8 A / Pmax: 50 W at 300 VDC

[1] The full technical specifications are available on request. All data specified are guaranteed, except where indicated otherwise. OMICRON guarantees the specified data for one year after factory calibration, within 23 °C ±5 °C / 73 °F ±10 °F in the frequency range from 10 to 100 Hz and after a warm-up phase > 25 minutes

[2] rd. = reading, rg. = range

[3] Values at 50/60 Hz, 20 kHz measurement bandwidth, nominal value, and nominal load

[4] Amplitude derating at > 1000 Hz

DC measuring inputs

Measuring range voltage	0 ... ±10 V
Measuring range current	0 ... ±1 mA, 0 ... ±20 mA

Analog AC + DC measuring inputs [1]

Type	AC + DC analog voltage inputs (current measurement with external current clamps or shunt resistors)
Number	10
Nominal input ranges (RMS values)	100 mV / 1 V / 10 V / 100 V / 600 V
Amplitude accuracy	Error < 0.06 % typ., < 0.15 % guar.

IEC 61850 [2]

Publishing

GOOSE	360 virtual binary outputs, 128 GOOSEs
Sampled Values	IEC 61850-9-2 („9-2LE"), IEC 61869-9

Subscribing

GOOSE	360 virtual binary inputs, 128 GOOSEs

Maximum number of streams

Publishing	RelaySimTest: 4, Test Universe: 3 (1 stream: 4 V + 4 I)

Time synchronization

Internal system clock

Frequency drift	< 0.37 ppm / 24 h < 4.6 ppm / 20 years

CMC 256plus to external reference

Absolute timing accuracy (voltage/ current)	< 1 µs typ., < 5 µs guar.
To external voltage	Reference signal on binary input 10: 10 ... 300 V / 15 ... 70 Hz
Precision Time Protocol (PTP)	IEEE 1588-2008 IEEE C37.238 (Power Profile) IEC 61850-9-3 (Utility Profile)

CMC 256plus to test objects

IRIG-B, PPS, PPX	Via CMIRIG-B, TICRO 100

Power supply

Nominal input voltage	100 ... 240 VAC, 1-phase (50/60 Hz)

Environmental conditions

Operation temperature [3]	0 ... +50 °C / +32 ... +122 °F
Storage temperature	-25 ... +70 °C / -13 ... +158 °F
Humidity range	Relative humidity 5 ... 95 %, non-condensing

Equipment reliability

Electromagnetic interference (EMI)

International / Europe	IEC/EN 61326-1, IEC/EN 61000-6-4, IEC/EN 61000-3-2/3, CISPR 32 (Class A)/EN 55032 (Class A)
North America	47 CFR 15 Subpart B (Class A) of FCC

Electromagnetic susceptibility (EMS)

International / Europe	IEC/EN 61326-1, IEC/EN 61000-6-2/5, IEC/EN 61000-4-2/3/4/5/6/8/11/16/18

Safety

International / Europe	IEC/EN 61010-1, IEC/EN 61010-2-030
North America	UL 61010-1, UL 61010-2-030, CAN/CSA-C22.2 No. 61010-1, CAN/CSA-C22.2 No. 61010-2-030

Mechanical tests

Vibration	IEC 60068-2-6
Shock	IEC 60068-2-27

Miscellaneous

Weight	16.0 kg / 35.3 lbs
Dimensions (W x H x D, without handle)	450 x 145 x 390 mm / 17.7 x 5.7 x 15.4 in
PC connection	2 PoE (Power over Ethernet) ports USB Type-B port (PC) USB Type-A port (optional Wi-Fi adapter for wireless control)

Certifications

Developed and manufactured under an ISO 9001 registered system	TÜV SÜD C US

[1] Up to three inputs can be used for measuring RMS values, frequency, and phase angle without the EnerLyzer Classic software license. Full functionality requires EnerLyzer Classic software license

[2] The GOOSE and Sampled Values functionality require software licences for the respective configuration modules

[3] For an operational temperature above +30 °C /+86 °F a duty cycle of down to 50 % may apply

We create customer value through ...

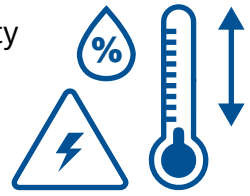
Quality

You can rely on the highest safety and security standards

Superior reliability with up to

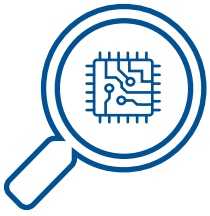
72

hours burn-in tests before delivery



100%

routine testing for all test set components



ISO 9001
TÜV & EMAS
ISO 14001
OHSAS 18001

Compliance with international standards

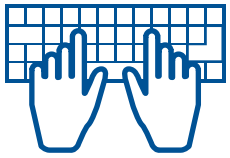
Innovation

... a product portfolio tailored to my needs

More than

200

developers keep our solutions up-to-date



More than

15%

of our annual sales is reinvested in research and development

Save up to

80%

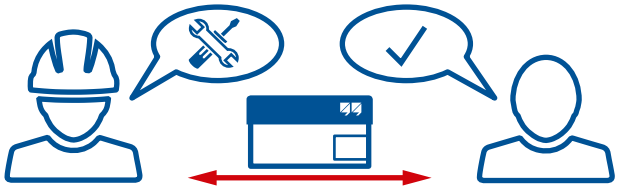
testing time through templates, and automation

Support

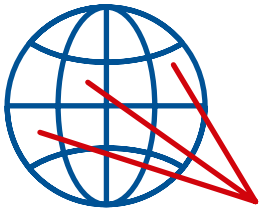
24/7

Professional technical support at any time

Loaner devices help to reduce downtime



Cost-effective and straight-forward repair and calibration



22

offices worldwide for local contact and support

Knowledge

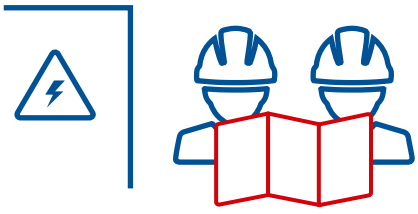
More than

300

Academy and numerous hands-on trainings per year

Frequently OMICRON hosted user meetings, seminars and conferences

to thousands of technical papers and application notes



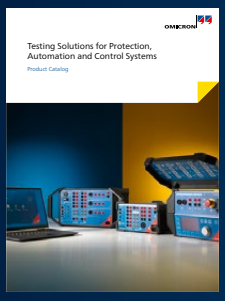
Extensive expertise in consulting, testing and diagnostics

OMICRON is an international company that works passionately on ideas for making electric power systems safe and reliable. Our pioneering solutions are designed to meet our industry's current and future challenges. We always go the extra mile to empower our customers: we react to their needs, provide extraordinary local support, and share our expertise.

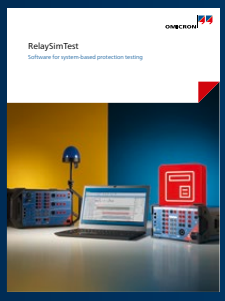
Within the OMICRON group, we research and develop innovative technologies for all fields in electric power systems. When it comes to electrical testing for medium- and high-voltage equipment, protection testing, digital substation testing solutions, and cybersecurity solutions, customers all over the world trust in the accuracy, speed, and quality of our user-friendly solutions.

Founded in 1984, OMICRON draws on their decades of profound expertise in the field of electric power engineering. A dedicated team of more than 1250 employees provides solutions with 24/7 support at 22 locations worldwide and serves customers in more than 170 countries.

The following publications provide further information on the solutions described in this brochure:



Product catalog



RelaySimTest

For more information, additional literature, and detailed contact information of our worldwide offices please visit our website.

www.omicronenergy.com

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