

# Test Set CMC 256

## Unique test sets from the technology leader

OMICRON's commitment to innovation is evident in the outstanding features and the absolute quality of its test sets. Making use of leading-edge technology in both development and quality assurance, OMICRON has set new standards for advanced three-phase testing equipment in terms of flexibility, accuracy, portability and reliability.

OMICRON's PC-controlled test sets generate the test signals digitally (DSP technology), resulting in highly accurate testing signals even at small amplitudes. The electronic design of the internal amplifiers and the use of switch-mode power supply units ensure a minimum of weight and volume is achieved. Independent channels with low-level signals are available at the back of the test sets, which can be used to control external amplifiers for applications requiring more signal channels or higher currents, voltages or power. The low-level signals can also be used for test objects which have a low-level input facility.

All generators are continuously and independently adjustable in amplitude, phase and frequency. No switching of ranges is necessary. All current and voltage outputs are fully overload and short-circuit proof and are protected against external high-voltage transient signals and overtemperature.

Every device is developed according to international IEC standards and verified by independent certification bodies including UL and TÜV.

## CMC 256 - 4 Phase Voltage/6 Phase Current Test Set

The universal solution for old and new generation relays, all kinds of meters and transducers. The first choice for applications requiring the highest versatility (commissioning, etc.). Unique measurement and transient recording functionality.

4 x 300 V outputs

6 x 12.5 A / 3 x 25 A outputs

6 x low level outputs (rear side)

2 x counter inputs (rear side)

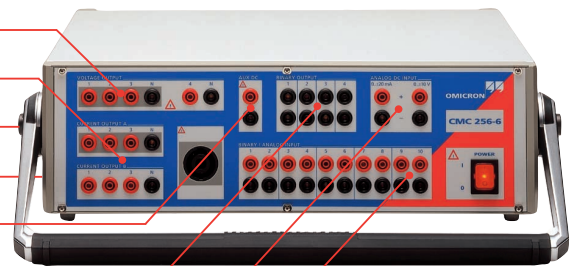
dc supply (0 ... 264 V)

4 x binary outputs

dc measuring inputs

10 x binary inputs /

Analog measurement inputs (with *EnerLyzer* option)



Supplements all ten binary inputs with analog measurement functions for voltages of up to 600 V and currents (with current clamps). Amplitude, frequency, phase, power measurement, harmonics, recording and analysis of transient signals, event trigger etc.. The inputs are usable with current clamps with voltage output or external shunt and standard current clamp.

## CMC Test Set Options

### EP (Extended Precision)



Equipped with the hardware option EP (Extended Precision), a CMC test set becomes an ideal instrument for the testing of energy meters. Due to the extremely high accuracy of the EP option, it is possible to test energy meters of up to class 0.2S according to IEC 62053 (formerly 60687, 0 ... 300 V three-phase for a CMC 256-EP) without an additional reference meter. This extremely high precision also makes a CMC 256 ideal for relay manufacturers for their development process, type testing, acceptance testing, device calibration, or product demonstration.

The technical data section on the following pages provides detailed information on where a EP version differs from a standard CMC.

The EP option can be ordered together with a new unit or an existing CMC 256 can be upgraded at any later stage.

## NET-1



Several developments in computer and communication technologies have created a need for alternative communication interfaces in protection test sets.

The new way of controlling the test set is performed via Ethernet. This proven network technology offers many new opportunities in excess of just replacing the parallel interface, like controlling the test set over a network.

Another advantage is the support of substation communication according to IEC 61850 and UCA 2.0. These protocols are also based on Ethernet.

The NET-1 option for CMC 256 replaces the parallel interface and provides the new control interface for the test set. It is required for interfacing to Ethernet-based substation communication protocols.

The NET-1 option has two Ethernet interfaces:

- 10/100 Mbit/s "copper" (10/100Base-TX, auto-sensing, auto-crossover, RJ45 connector for CAT5 twisted pair cables).
- 100 Mbit/s fiber optic (100Base-FX, MTRJ connector). Support for specific substation protocols, such as the GOOSE/GSSE messaging according to IEC 61850-8-1 or UCA 2.0 can be provided by future firmware options.

On the PC controlling the test set, this option requires *Test Universe* Software Version 2.0 running on Microsoft Windows 2000 or Windows XP operating systems.

The NET-1 option can be ordered with a new device or as an upgrade for a CMC 256. Test sets with the NET-1 option no longer have a parallel port interface.

## CMC ordering options

Ordering Number	Package/Option
VE002517	<i>Basic Package</i>
VE002417	<i>Protection Package</i>
VE002317	<i>Advanced Protection Package</i>
VE002617	<i>Meter Package</i>
VE002217	<i>Measurement Package</i>
VE002117	<i>Universal Package</i>
VEHO1002 <sup>1</sup>	Option EP if ordered with a new unit
VEHO0002 <sup>1</sup>	Option EP if ordered as an upgrade
VEHO1009 <sup>1</sup>	Option NET-1 if ordered with a new unit
VEHO1010 <sup>1</sup>	Option NET-1 if ordered as an upgrade

<sup>1</sup> The CMC 256 can have both options, EP and NET-1, simultaneously installed.

# Technical Data



		CMC 256 Standard	with EP Option
<b>Voltage generators/-amplifiers</b>			
Setting range	4-phase ac (L-N)	4 x 0 ... 300 V (VL4(t) automatically calculated: VL4 = (VL1+VL2+VL3)*C or free programmable)	
	3-phase ac (L-N)	3 x 0 ... 300 V	
	1-phase ac (L-L)	1 x 0 ... 600 V	
	dc (L-N)	4 x 0 ... ±300 V	
Power	3-phase ac (L-N)	3 x 85 VA at 85 ... 300 V	
	VL4 ac (L-N)	1 x 85 VA at 85 ... 300 V	
	4-phase ac (L-N)	4 x 50 VA at 75 ... 300 V	
	1-phase ac (L-N)	1 x 200 VA at 100 ... 300 V typ. (1 x 150 VA at 75 ... 300 V guar.)	
	1-phase ac (L-L)	1 x 200 VA at 200 ... 600 V typ. (1 x 150 VA at 150 ... 600 V guar.)	
	dc (L-N)	1 x 360 W at ±300 V	
Accuracy	error < 0.025 % typ. (< 0.1 % guar.) at 30 ... 300 V		error < 0.02 % typ. (< 0.05 % guar.) at 30 ... 300 V
Distortion (THD+N) <sup>1</sup>	< 0.015 % typ. (< 0.05 % guar.)		
Ranges	150 V / 300 V		
Resolution	5 mV / 10 mV in range 150 V / 300 V		
Connection	4mm banana sockets/amplifier combination socket (VL1,2,3+N)		
<b>Current generators/-amplifiers</b>			
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 (3L-N)	1 x 0 ... 75 A (Group A II B), 2 x 0 ... 37.5 A	
	dc (3L-N)	1 x 0 ... ±35 A (Group A II B), 2 x 0 ... ±17.5 A	
Power	6-phase ac (L-N)	6 x 70 VA at 7.5 A	
	3-phase ac (L-N)	3 x 140 VA at 15 A (Group A II B)	
	1-phase ac (3L-N)	1 x 420 VA at 45 A (Group A II B), 2 x 210 VA at 22.5 A	
	1-phase ac (L-L)	1 x 280 VA at 15 A (Group A II B), 2 x 140 VA at 7.5 A	
	1-phase ac (L1A-L1B)	1 x 280 VA at 7.5 A (40 Vrms, Group A and B in series)	
	dc (3L-N)	1 x 470 W at ±35 A (Group A II B), 2 x 235 W at ±17.5 A	
Accuracy	error < 0.03 % typ. (< 0.1 % guar.)		error < 0.02 % typ. (< 0.05 % guar.)
Distortion (THD+N)	< 0.025 % typ. (< 0.07 % guar.)		
Ranges	1.25 A / 12.5 A (Group A, B) / 2.5 A / 25 A (Group A II B)		
Resolution (for respective range)	50 μA / 100 μA / 500 μA / 1 mA		
Max. compliance voltage (L-N)/(L-L)	10 Vrms, 15 Vpk / 40 Vrms, 60 Vpk		
Connection	4mm banana sockets/amplifier combination socket (Group A only)		

<sup>1</sup> THD+N: Values at 50/60 Hz with 20 kHz bandwidth



		CMC 256 Standard	with EP Option
<b>Generators, general</b>			
Frequency	range sine signals	10 ... 1000 Hz	
	range transient signals	dc ... 3.1 kHz	
	accuracy/-drift	$\pm 0.5$ ppm / $\pm 1$ ppm	
	resolution	5 $\mu$ Hz	
Phase	angle range	- 360° ... +360°	
	resolution	0.001°	
	error at 50/60 Hz	< 0.02° typ. (< 0.1° guar.)	< 0.005° typ. (< 0.02° guar.)
Synchronized operation	Reference signal on binary input 10 (40 ... 70 Hz)		
Bandwidth (-3dB)	3.1 kHz		
Output power	accuracy <sup>2</sup>	-	rel. error < 0.05 % typ. (< 0.1 % guar.) at 50/60 Hz, 50 ... 300 V, and 0.1 ... 12.5 A (Group A or B)
	temperature drift	-	0.001 %/°C typ. (< 0.05 %/°C guar.)
<b>Low level outputs</b>			
Setting range	6 x 0 ... 10 Vpk		
Max. output current	1 mA		
Accuracy	error < 0.025 % typ. (< 0.07 % guar.) at 1 ... 10 Vpk		
Resolution	250 $\mu$ V		
Distortion (THD+N)	< 0.015 % typ. (< 0.05 % guar.)		
Unconventional CT/VT simulation	linear, Rogowski		
Overload indication	Yes		
Isolation	SELV		
Usability	completely independent from internal amplifier outputs		
Connection	16 pin combination socket (rear side)		
<b>Auxiliary dc supply</b>			
Voltage ranges	0 ... 264 Vdc, 0.2 A / 0 ... 132 Vdc, 0.4 A / 0 ... 66 Vdc, 0.8 A		
Power	max. 50 W		
Accuracy	error < 2 % typ. (< 5 % guar.)		
Connection	4 mm banana sockets		
<b>Binary Inputs</b>			
Number	10		
Trigger criteria	Toggling of potential-free contacts or dc voltage compared to threshold voltage		
Input characteristics	0 ... $\pm 600$ Vdc threshold or potential free		
Ranges (in rms values)	100 mV, 1 V, 10 V, 100 V, 600 V		
Resolution of threshold	$\pm 2$ mV, $\pm 20$ mV, $\pm 200$ mV, $\pm 2$ V, $\pm 20$ V in ranges		
Sample rate	10 kHz		
Time resolution	100 $\mu$ s		
Max. measuring time	infinite		
Debounce/Deglitch time	0 ... 25 ms / 0 ... 25 ms		
Counting function	< 3 kHz at pulse width > 150 $\mu$ s		
Galvanic isolation	5 galvanically isolated groups (2+2+2+2+2)		
Max. input voltage	600 Vrms (850 Vpk)		
Connection	4 mm banana sockets		
<b>Counter inputs 100 kHz</b>			
Number	2		
Max. counting frequency	100 kHz		
Pulse width	> 3 $\mu$ s		
Threshold voltage	6 V		
Voltage hysteresis	2 V		
Max. input voltage	$\pm 30$ V		
Isolation	SELV		
Connection	16 pin combination socket (rear side)		

<sup>2</sup> Data are valid for set value from 0.1 ... 12.5 A (current amplifier group A or B) at 50/60 Hz

Permissible load current outputs:

Range 1.25 A: 0 ... 1  $\Omega$  and max. 1 VA,  $\cos \varphi = 0.5 \dots 1$

Range 12.5 A: 0 ... 0.5  $\Omega$  and max. 6 VA,  $\cos \varphi = 0.5 \dots 1$ .

Permissible load voltage outputs:

max. 10 VA at 50 V ... full scale voltage (CMC 156: 125V/CMC 256: 300V),  $\cos \varphi = 0.5 \dots 1$ .



	CMC 256
<b>Binary outputs, relays</b>	
Type	potential-free relay contacts, software controlled
Number	4
Break capacity ac	Vmax: 300 Vac / Imax: 8 A / Pmax: 2000 VA
Break capacity dc	Vmax: 300 Vdc / Imax: 8 A / Pmax: 50 W
Connection	4 mm banana sockets
<b>Binary outputs, transistor</b>	
Type	open collector transistor outputs
Number	4
Update rate	10 kHz
Imax	5 mA
Connection	16 pin combination socket (rear side)
<b>dc voltage measuring input</b>	
Measuring range	0 ... ±10 V
Accuracy	error < 0.003 % typ. (< 0.02% guar.)
Input impedance	1 MΩ
Connection	4 mm banana sockets
<b>dc current measuring input</b>	
Measuring range	0 ... ±1 mA, 0 ... ±20 mA
Accuracy	error < 0.003 % typ. (< 0.02% guar.)
Input impedance	15 Ω
Connection	4 mm banana socket
<b>Analog ac+dc measuring inputs<sup>3</sup></b>	
Type	ac + dc analog voltage inputs
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.)
Bandwidth	dc ... 10 kHz
Sampling frequency	28.44 kHz, 9.48 kHz, 3.16 kHz
Input impedance	500 kΩ // 50pF
Transient input buffer at 28 kHz	3.5 s for 10 input channels / 35 s for 1 input channel
Transient input buffer at 3 kHz	31 s for 10 input channels / 5 min. for 1 input channel
Transient trigger	threshold voltage, power quality trigger: sag, swell, harmonic, frequency, frequency change, notch
Measurement functions	Idc, Vdc, Iac, Vac, phase, frequency, power, energy, harmonics, transient recording capability for all channels
Input overload indication	Yes
Input protection	Yes
Max. input voltage	600 Vrms (850 Vpk)
Galvanic isolation	5 groups (2+2+2+2+2)
Connection	4 mm banana sockets (combined with binary inputs)
<b>Power supply</b>	
Nominal input voltage	110 ... 240 Vac, 1-phase
Permissible input voltage	99 ... 264 Vac
Nominal frequency	50/60 Hz
Permissible frequency range	45 ... 65 Hz
Power consumption	1.2 kVA at 115 V <sup>4</sup> / 1.6 kVA at 230 V
Rated current	10 A
Connection	Standard ac socket (IEC 60320)

<sup>3</sup> Only in connection with the *EnerLyzer* option. Up to three inputs can be used for measuring rms values without the *EnerLyzer* option.

<sup>4</sup> For line input voltages below 150 V, a derating of the simultaneously available sum output power of the voltage/current amplifiers and the AuxDC will occur. All other technical specifications (e.g. the maximum output power of a single amplifier) are not affected.



	CMC 256
<b>Environmental conditions</b>	
Operation temperature	0 ... +50°C (+32 ... +122°F) <sup>5</sup>
Storage temperature	-25 ... +70°C (-13 ... +158°F)
Humidity range	Relative humidity 5 ... 95 %, non-condensing
Vibration	IEC 68-2-6 (20 m/s <sup>2</sup> at 10 ... 150 Hz)
Shock	IEC 68-2-27 (15g/11ms half-sine)
EMC	CE conform (89/336/EEC), EN 61326-1
Emission	EN 50081-2, EN 61000-3-2/3, FCC Subpart B of Part 15 Class A
Immunity	EN 50082-2, IEC 61000-4-2/3/4/5/6/11
Safety	EN 61010-1, EN 60950+A1, IEC 61010-1, UL 3111-1, CAN/CSA-C22.2 No 1010.1
<b>Miscellaneous</b>	
Weight	15.7 kg (34.8 lb.)
Dimensions (W x H x D, without handle)	450 x 145 x 390 mm (17.7 x 5.7 x 15.4")
PC connection	Standard: parallel port (IEEE1284-C connector)/ Option NET-1: Ethernet
Signal indication (LED)	> 42 V for voltage outputs and AUX DC
Connection to ground (earth)	4 mm banana socket (rear side)
Hardware diagnostics	Self diagnostics upon each start up
Galvanic separated groups	The following groups are galvanically separated from each other: mains, voltage amplifier output, current amplifier group A/B, auxiliary dc supply, binary/analog input
	All voltage and current generators are continuously and independently adjustable in amplitude, phase and frequency. All current and voltage outputs are fully overload and short-circuit proof and protected against external high-voltage transient signals and overtemperature.
<b>Certifications</b>	
	TÜV-GS, UL, CUL

<sup>5</sup> For an operational temperature above +30°C a duty cycle of up to 50 % may apply.

Guaranteed values valid over one year within 23°C ±5°C (73°F±10°F), in the frequency range of 10 ... 100 Hz at nominal value, analog measurement inputs at full-scale value. Specifications for three-phase systems under symmetrical conditions (0°, 120°, 240°).