

CMC 256plus: 6 Phase Current + 4 Phase Voltage 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 calibration of a wide range of measuring devices, including: electricity meters of class 0.2S, measuring transducers, power quality measurement devices 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.

Operation: PC or CMControl

Technical Data¹

Current generators		
Setting	6-phase AC (L-N)	6 x 0 ... 12.5 A
range	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
Power	DC (3L-N)	1 x 0 ... ±35 A (Group A II B), 2 x 0 ... ±17.5 A
	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 (Group A II B) 3 x 140 VA guar. at 15 A (Group A II B)
	1-phase AC (3L-N)	1 x 480 VA typ. at 51 A (Group A II B), 2 x 240 VA at 25.5 A 1 x 420 VA guar. at 45 A (Group A II B), 2 x 210 VA at 22.5 A
	1-phase AC (L-L)	1 x 320 VA typ. at 8.5 A (Group A II B), 2 x 160 VA at 8.5 A 1 x 280 VA guar. at 15 A (Group A II B), 2 x 140 VA at 7.5 A
	1-phase AC (L-L-L-L)	1 x 320 VA typ. at 8.5 A (40 VRMS, Group A and B in series) 1 x 280 VA guar. at 7.5 A (40 VRMS, Group A and B in series)
	DC (3L-N)	1 x 480 W typ. at ±35 A (Group A II B), 2 x 240 W at ±17.5 A 1 x 470 W guar. at ±35 A (Group A II B), 2 x 235 W at ±17.5 A
Accuracy ²	error < 0.015 % rd. ³ + 0.005 % rg. ³ typ. at 0 ... 12.5 A error < 0.04 % rd. + 0.01 % rg. guar. at 0 ... 12.5 A	
Distortion (THD+N) ⁴	< 0.025 % typ., < 0.07 % guar.	
Ranges	1.25 A / 12.5 A (Group A, B) or 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)	15 Vpk / 60 Vpk	
Connection	4 mm (0.16 in) banana sockets / combination socket (Group A only)	

¹ 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 Load: 0 ... 0.5 Ω

³ rd. = reading, rg. = range

⁴ THD+N: Values at 50/60 Hz, > 1 A / 20 V with 20 kHz bandwidth

⁵ Load: > 250 Ω

⁶ Amplitude derating at > 1000 Hz

⁷ Data are valid from 0.1 to 12.5 A (current amplifier A or B) and 50 to 300 V (voltage amplifier) at 50/60 Hz

Permissible load for current outputs:

Range 1.25 A: 0 to 1 Ω and 1 VA max., cos φ = 0.5 to 1

Range 12.5 A: 0 to 0.5 Ω and 6 VA max., cos φ = 0.5 to 1

Permissible load for voltage outputs:

10 VA max. at 50 to 300 V, cos φ = 0.5 to 1

Voltage generators		
Setting range	4-phase AC (L-N)	4 x 0 ... 300 V (VL4(t) automatically calculated: VL4 = (VL1+VL2+VL3)*c or freely 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 100 VA typ. at 100 ... 300 V 3 x 85 VA guar. at 85 ... 300 V
	4-phase AC (L-N)	4 x 75 VA typ. at 100 ... 300 V 4 x 50 VA guar. at 85 ... 300 V
	1-phase AC (L-N)	1 x 200 VA typ. at 100 ... 300 V 1 x 150 VA guar. at 75 ... 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
	DC (L-N)	1 x 420 W typ. at ±300 V 1 x 360 W guar. at ±300 V
Accuracy ⁵	Error < 0.015 % rd. ³ + 0.005 % rg. ³ typ. at 0 ... 300 V Error < 0.04 % rd. + 0.01 % rg. guar. at 0 ... 300 V	
Distortion (THD+N) ⁴	0.015 % typ., < 0.05 % guar.	
Ranges	150 V / 300 V	
Resolution	5 mV / 10 mV in range 150 V / 300 V	
Connection	4 mm (0.16 in) banana sockets / combination socket (1,2,3,N)	
Generators, general		
Frequency	Range sine signals	10 ... 1000 Hz
	Range harmonics / interharmonics ⁶	10 ... 3000 Hz
	Range transient signals ⁶	DC ... 3.1 kHz
	Accuracy / drift	±0.5 ppm / ±1 ppm
	Resolution	< 5 µHz
Phase	Angle range	-360° ... +360°
	Resolution	0.001°
	Error at 50 / 60 Hz	< 0.005° typ., < 0.02° guar.
Bandwidth (-3 dB)	3.1 kHz	
Simulated power S, P (calibration of energy meters)	Accuracy ⁷	Error < 0.05 % rd. typ., < 0.1 % rd. guar.
	Temperature drift	< 0.001 % / °C typ., < 0.005 % / °C guar.

Technical Data CMC 256plus (continued)

Low level outputs ¹	
Number of outputs	6 (12 with Option LLO-2)
Setting range	0 ... ±10 Vpk
Max. output current	1 mA
Accuracy	Error < 0.025 % typ., < 0.07 % guar. at 1 ... 10 Vpk
Resolution	250 µV
Distortion (THD+N) ²	< 0.015 % typ., < 0.05 % guar.
Unconventional CT/VT simulation	linear, Rogowski (transient and sinewave)
Overload indication	Yes
Isolation	SELV
Usability	Completely independent from internal amplifier outputs
Connection	16 pin combination socket (rear side)
Auxiliary DC supply	
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.
Binary inputs	
Number	10
Trigger criteria	Toggle of potential-free contacts or DC voltage compared to threshold voltage
Input characteristics	0 ... ±600 VDC threshold or potential-free
Ranges	100 mV / 1 V / 10 V / 100 V / 600 V
Resolution of threshold	±2 mV, ±20 mV, ±200 mV, ±2 V, ±20 V in ranges
Sample rate	10 kHz (resolution 100 µs)
Time stamping accuracy	±0.00015 % of rd. ³ ±70 µs
Max. measuring time	Infinite
Debounce / Deglitch time	0 ... 25 ms / 0 ... 25 ms
Counting function	< 3 kHz at pulse width > 150 µs
Galvanic isolation	5 galvanically isolated groups (2+2+2+2)
Max. input voltage	CAT IV / 150 V, CAT III / 300 V, CAT II / 600 V (850 Vpk)
Counter inputs 100 kHz	
Number	2
Max. counting frequency	100 kHz
Pulse width	> 3 µs
Threshold voltage	6 V
Voltage hysteresis	2 V
Max. input voltage	±30 V
Isolation	SELV
Connection	16 pin combination socket (rear side)
Trigger on overload	
Supported generators	Current generators
Timer accuracy	Error < 1 ms
Binary outputs, relays	
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

Binary outputs, transistor	
Type	Open collector transistor outputs
Number	4
Update rate	10 kHz
Imax	5 mA
Connection	16 pin combination socket (rear side)
DC voltage measuring input	
Measuring range	0 ... ±10 V
Accuracy	Error < 0.003 % rg. ³ typ., < 0.02 % rg. guar.
Input impedance	1 MΩ
DC current measuring input	
Measuring range	0 ... ±1 mA, 0 ... ±20 mA
Accuracy	Error < 0.003 % rg. ³ typ., < 0.02 % rg. guar.
Input impedance	15 Ω
Analog AC+DC measuring inputs ⁴	
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.
Bandwidth	DC ... 10 kHz
Sampling frequency	28.44 kHz, 9.48 kHz, 3.16 kHz
Input impedance	500 kΩ // 50 pF
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	I (AC + DC), V (AC + DC), phase, frequency, power, harmonics, transient recording, event recording, trend recording
Input overload indication	Yes
Input protection	Yes
Max. input voltage	CAT IV / 150 V, CAT III / 300 V, CAT II / 600 V (850 Vpk)
Galvanic isolation	5 groups (2+2+2+2)
Time synchronization	
Timing accuracy	IRIG-B synchronization with CMIRIG-B GPS synchronization with CMGPS 588
To external voltage	Error < 1 µs typ., < 5 µs guar. Error < 1 µs typ., < 5 µs guar.
Precision Time Protocol (PTP)	Reference signal on binary input 10: 10 ... 300 V / 15 ... 70 Hz IEEE 1588-2008 IEEE C37.238-2011 (Power Profile)

With the unique PermaSync functionality, analog and Sampled Values outputs stay permanently in sync with the internal CMC time reference. When a CMC is time-synchronized (IRIG-B, GPS, or PTP), the output quantities are continuously synchronized to the external time source. With CMIRIG-B it is also possible to transmit the internal PPS signal of the CMC to the device under test (e.g. PMUs or IEDs stimulated with a synchronized Sampled Values data stream).



¹ For directly testing relays with low level inputs by simulating signals from non conventional CTs and VTs with low level interfaces and for controlling external amplifier units

² THD+N: Values at 50/60 Hz, 20 kHz measurement bandwidth, nominal value, and nominal load

³ rd. = reading, rg. = range

⁴ Up to three inputs can be used for measuring RMS values, frequency, and phase angle without the EnerLyzer software license. Full functionality requires EnerLyzer software license

IEC 61850 GOOSE ¹	
Simulation	Mapping of binary outputs to data attributes in published GOOSE messages. Number of virtual binary outputs: 360 Number of GOOSEs to be published: 128
Subscription	Mapping of data attributes from subscribed GOOSE messages to binary inputs. Number of virtual binary inputs: 360 Number of GOOSEs to be subscribed: 128
Performance	Type 1A; Class P2/3 (IEC 61850-5). Processing time (application to network or vice versa): < 1 ms
VLAN support	Selectable priority and VLAN-ID
IEC 61850 Sampled Values (Publishing) ¹	
Specification	According to the "Implementation Guideline for Digital Interface to Instrument Transformers Using IEC 61850-9-2" of the IEC International Users Group
Sampling Rate	80 samples per cycle for nominal frequencies of 50 Hz and 60 Hz.
Synchronization	Synchronization attribute (smpSynch) is set when the CMC is in synchronized operation mode. Sample count (smpCnt) zero is aligned with top of the second. Accuracy data see above
VLAN support	Selectable priority and VLAN-ID
Max. number of SV streams	2 (with option LLO-2: 3 SV streams)
Power supply	
Nominal input voltage ²	100 – 240 VAC, 1-phase
Permissible input voltage	85 ... 264 VAC
Nominal frequency	50/60 Hz
Permissible frequency range	45 ... 65 Hz
Rated current	12 A at 115 V / 10 A at 230 V
Connection	Standard AC socket (IEC 60320)
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
Vibration	IEC 60068-2-6 (20 m/s ² at 10 ... 150 Hz)
Shock	IEC 60068-2-27 (15 g/11 ms half-sine)
Safety standards, electromagnetic compatibility	
EMC	The product adheres to the electromagnetic compatibility (EMC) Directive 2004/108/EC (CE conform). International USA IEC 61326-1; IEC 61000-6-4; IEC 61000-3-2/3 FCC Subpart B of Part 15 Class A
Safety	The product adheres to the low voltage Directive 2006/95/EC (CE conform). International / USA Canada IEC 61010-1 / UL 61010-1 CAN/CSA-C22.2 No 61010-1-04

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	Two PoE ⁴ Ethernet ports: <ul style="list-style-type: none"> • 10/100/1000 Base-TX • IEEE 802.3af compliant • Port capability limited to one Class 1 (3.84 W) and one Class 2 (6.49 W) powered device USB port: <ul style="list-style-type: none"> • USB 2.0 High Speed up to 480 Mbit/s • USB 1.1-compatible
Signal indication (LED)	> 42 V for voltage outputs and AUX DC
Connection to ground (earth)	4 mm (0.16 in) banana socket (rear side)
Hardware diagnostics	Self diagnostics upon each start-up
Galvanically 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
Protection	All current and voltage outputs are fully overload and short circuit proof and protected against external high-voltage transient signals and over temperature
Certifications	
 	
Developed and manufactured under an ISO 9001 registered system	

Ordering Information

CMC 256plus with Test Universe software	
VE002701	CMC 256plus Basic
VE002702	CMC 256plus Protection
VE002703	CMC 256plus Advanced Protection
VE002704	CMC 256plus Universal
VE002705	CMC 256plus Meter
VE002706	CMC 256plus Measurement
VE002720	CMC 256plus Recloser

CMC 256plus with CMControl (without Test Universe software)	
VE002715	CMC 256plus with CMControl P
VE002719	CMC 256plus with CMControl R
VE002721	CMC 256plus with CMControl P App activation key
VE002723	CMC 256plus with CMControl R App activation key

The CMControl can also be ordered as add-on together with a CMC 256plus with Test Universe software or as a later upgrade.

CMC 256plus hardware options	
VEHO2703	Option LLO-2 if ordered with a new unit
VEHO2704	Option LLO-2 if ordered as an upgrade

¹ Testing with GOOSE and Sampled Values functionality requires software licences for the corresponding configuration modules

² For line inputs below 115 VAC, it is not possible to drive all outputs (voltage output, current output, Aux DC) simultaneously at full load. All other technical specifications (e.g. the maximum output power of a single amplifier) are not affected

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

⁴ PoE = Power over Ethernet