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Hardware

CMC 256-6

4 Phase Voltage /
6 Phase Current Test Set

CMC 256-6 EP

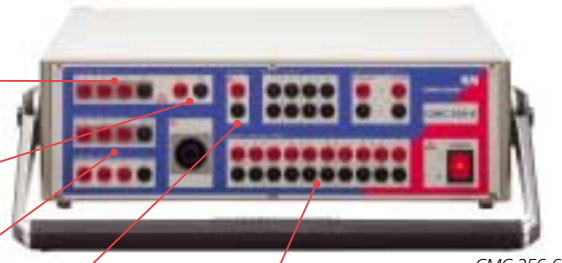
CMC 256–6 with Extended Precision

CMC 256-3

CMC 256 with 3 Current Phases

CMC 256-UCA

CMC 256–6 with Network Interface



CMC 256-6

Voltage outputs 0 ... 300 V
For testing protective relays with higher voltage requirements (up to 600 V single phase) in industry, measuring transducers and meters.

Fourth, independently controllable voltage output 0 ... 300 V
e.g. for convenient testing of synchronizing devices or generation of residual voltage.

Current outputs 6 x 12.5 A or 3 x 25 A
Higher power for testing electromechanical relays without an additional amplifier.
Six current outputs (CMC 256-6) allows testing of two-winding transformer differential protection without an additional external current amplifier.

Independent DC supply (0 ... 264 V, 50 W)
e.g. for relay power supply.

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, recording and analysis of transient signals, event trigger etc.

CMC 256

The CMC 256 is available in two versions: the six phase CMC 256-6 with 6 x 12.5 A current outputs, and the three phase CMC 256-3 with 3x25 A current outputs.
Compared to the CMC 156, the CMC 256 offers the following additional features:

Specifications[1]

Generator/amplifier section

Voltage generators/amplifiers (see diagram)

Setting range	
4-phase ac (L-N)	4 x 0 ... 300 V (V_{L4}(t) automatically calculated: $V_{L4}=(V_{L1}+V_{L2}+V_{L3})$ * C or free programmable)
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
V_{L4} 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 150 VA at 75 ... 300 V (typ. 200 VA at 100 ... 300V)
1-phase ac (L-L)	1 x 150 VA at 150 ... 600 V
dc (L-N)	1 x 360 W at ±300 V
Accuracy	error < 0.025% typ. (<0.1% guar.) at 30 ... 300 V
Distortion (THD+N)[2]	<0.015% typ. (<0.05% guar.)
Output voltage range	150 V, 300 V
Resolution	5 mV in 150 V range 10 mV in 300 V range

CMC 256-6 current generators/amplifiers
Current amplifiers group A and/or B
Range 12.5 A

Setting range	
3-phase ac (L-N)	6 x 0 ... 12.5 A
1-phase ac (3L-N)	2 x 0 ... 37.5 A
dc (3L-N)	2 x 0 ... ±17.5 A
Power	
3-phase ac (L-N)	6 x 70 VA at 7.5 A
1-phase ac (3L-N)	2 x 210 VA at 22.5 A
1-phase ac (L-L)	2 x 140 VA at 7.5 A
dc (3L-N)	2 x 235 W at ±17.5 A
Resolution	500 µA

Range 1.25 A

Setting range	
3-phase ac (L-N)	6 x 0 ... 1.25 A
Power	
3-phase ac (L-N)	6 x 12.5 VA at 1.25 A
Resolution	50 µA

Group A and B in series	External connection (I_{L2A} - I_{L2B})
Power	
1-phase ac (I_{L1A}-I_{L1B})	280 VA at 7.5 A (40 V_{rms})

CMC 256-3 Current generators/amplifiers (or CMC 256-6 group A and B in parallel) (see diagram)
Range 25 A

Setting range	
3-phase ac (L-N)	3 x 0 ... 25 A
1-phase ac (3L-N)	1 x 0 ... 75 A
dc (L-N)	1 x 0 ... ±35 A
Power	
3-phase ac (L-N)	3 x 140 VA at 15 A
1-phase ac (L-L)	1 x 280 VA at 15 A
1-phase ac (L-N)	1 x 420 VA at 45 A
dc (3L-N)	1 x 470 W at ±35 A

Range 2.5 A

Setting range	
3-phase ac (L-N)	3 x 0 ... 2.5 A
Power	
3-phase ac (L-N)	3 x 25 VA
Resolution	100 µA / 1 mA in 2.5 A / 25 A range

Current generators/amplifiers general:

Accuracy	error < 0.03% typ. (<0.1% guar.)
Distortion (THD+N)[2]	< 0.025% typ. (<0.07% guar.)
Max. compliance voltage A, B	10 V_{rms} , 15 V_{pk}

Low Level outputs "LL out 1-6"

Setting range	6 x 0 ... 10 V_{pk} (LL out 1-6)
Max. output current	1 mA
Accuracy	error < 0.025% typ. (<0.07% guar.) at 1 ... 10 V_{pk}
Resolution	250 µV
Distortion (THD+N)[2]	<0.015% typ. (<0.05% guar.)
Unconventional CT/VT simulation	linear, Rogowski
Overload indication	Yes
Isolation	SELV
Usability	Complete independent usable from the internal amplifier outputs

Generators, general

Frequency range	
Sine signals	10 ... 1000 Hz
Transient signals	dc ... 3.1 kHz
Frequency accuracy/drift	±0.5 ppm / ±1 ppm
Frequency resolution	< 5 µHz
Phase angle range	-360° ... +360°
Phase resolution	0.001°
Phase error	<0.02° typ. (<0.1° guar.) at 50/60Hz
Bandwidth (-3dB)	3.1kHz
Connections	
Amplifier outputs	All signals on 4mm banana sockets on front panel; Output V_{L1}..V_{L3} and N and Output I_{L1}-I_{L3} and N of Group A on 8 pin amplifier combination socket
Low Level outputs "LL out 1-6"	16 pin combination socket (rear side)

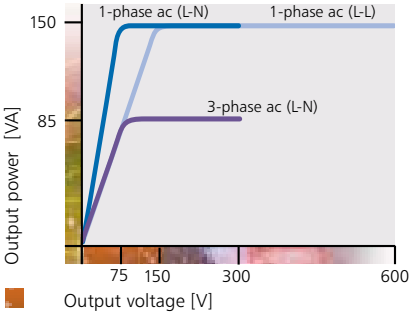
All voltage and current generators are continuously and independently adjustable in amplitude, phase and frequency. All current and voltage outputs are fully overload and short-circuit proof and protected against external high-voltage transient signals and overtemperature (indication in the software via error message). The generator/ amplifier circuits and mains circuits are galvanically separated. Current, voltage, dc auxiliary and binary/analog input circuits are galvanically separated from each other.

Aux. dc supply

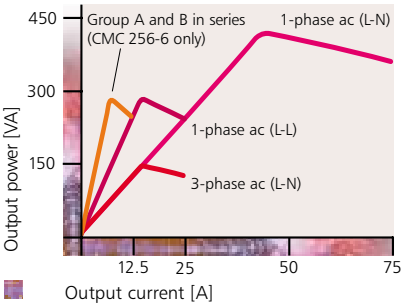
Output voltage ranges	0 ... 264 V_{dc}, 0.2 A 0 ... 132 V_{dc}, 0.4 A 0 ... 66 V_{dc}, 0.8 A
Power	max. 50 W
Accuracy	error < 2% typ. (< 5% guar.)
Connection	4mm banana sockets on front panel

Short circuit protected, isolated from all other galvanic groups, overload signal indication.

Voltage amplifiers



Current amplifiers



Timer/measuring section

Binary inputs

Number	10 inputs
Trigger criteria	Toggling of potential-free contacts or dc-voltage compared to threshold voltage
Input characteristic	0 ... ±600 V_{dc} threshold, or potential free
Resolution of threshold	±2 mV, ±20 mV, ±200 mV, ±2 V, ±20 V in range 100 mV, 1 V, 10 V, 100 V, 600 V (rms)
Sample rate	10 kHz
Resolution	100 µs
Max. measuring time	Infinite
Counting function	<3 kHz, at pulse width >150 µs
Galvanic isolation	5 groups (2+2+2+2+2)
Max. input voltage	600V_{rms} (850V_{pk})
Connection	4 mm banana sockets on front panel (combined with analog inputs)

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)

Binary outputs

Relays

Number	4
Type	Potential-free relay contacts, controlled via software
Break capacity ac	Vmax: 300 V_{ac}, Imax: 8 A, Pmax: 2000 VA
Break capacity dc	Vmax: 300 V_{dc}, Imax: 8 A, Pmax: 50 W
Connection	4 mm banana sockets on front panel

Transistor

Number	4
Type	Open collector transistor outputs
Update rate	10 kHz
Imax	5 mA
Connection	16 pin combination socket (rear side)

dc voltage / dc current measuring inputs

voltage measuring input range	0 ... ±10 V
current measuring input ranges	0 ... ±1 mA, 0 ... ±20 mA
Accuracy	error < 0.003% typ. (<0.02% guar.)
Connection	4 mm banana sockets on front panel

Continued on next page

Guaranteed values valid over one year within 73°F±10°F (23°C±5°C), 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°).

1 The specifications are both valid for the CMC 256-6 and the CMC 256-3, except where otherwise noted.

2 THD+N: Values at 50/60Hz with 20kHz bandwidth.

CMC 256
(continued)

Analog ac+dc measuring inputs (optional, in connection with *EnerLyzer*)[1]

Type	ac+dc analog voltage inputs
Number	10
Nominal input ranges	100 mV, 1 V, 10 V, 100 V, 600 V (rms)
Amplitude accuracy	error < 0.06% typ. (<0.15% guar.)
Bandwidth	dc ... 10 kHz
Sampling frequency	28.44kHz, 9.48 kHz, 3.16 kHz
Input impedance	500 kΩ // 50 pF
Transient input buffer	3.5 s for all ten input channels at 28 kHz sampling frequency or 316 s with one channel and 3 kHz sampling frequency
Current clamps	Inputs usable with current clamps with voltage output or external shunt and standard current clamp
Measurement functions	I_{dc}, V_{dc}, I_{ac}, V_{ac}, phase, frequency, power, energy, harmonics; Transient recording capability for all channels
Input overload indication	Yes
Input protection	Yes
Max. input voltage	600 V_{rms} (850 V_{pk})
Galvanic isolation	5 groups (2+2+2+2+2)
Connection	4mm banana sockets on front panel (combined with binary inputs)

General

Power supply

Nominal input voltage	110 - 240 V_{ac}, 1-phase
Permissible input voltage	99 ... 264 V_{ac}
Nominal frequency	50/60 Hz
Permissible frequency range	45 - 65 Hz
Power consumption[2]	1.2 kVA at 115 V 1.6 kVA at 230 V
Rated current	10 A
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	Rel. humidity 5..95%, non-condensing
Vibration	IEC 68-2-6 (20m/s² at 10 ... 150Hz)
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, IEC 61010-1, UL 3111-1 CAN/CSA-C22.2 No 1010.1
Certifications	TÜV-GS; UL,CUL
Weight	15.7 kg (34.8 lb.)
Dimensions	450 x 145 x 390 mm (17.7" x 5.7" x 15.4")

Miscellaneous

PC-Connection	Parallel port (IEEE1284-C connector)
CMC 56/156 software-compatible	Windows - software (Test Universe)
Signal indication (LED)	>42V for AUX-dc, and voltage outputs
Ground socket (earth)	4mm banana socket; rear side

Self diagnostics of the hardware upon each start-up. Automatic supervision of the voltage and current outputs while testing.

CMC 256-6 EP (Extended Precision)

The CMC 256-6 is also available with the EP (Extended Precision) hardware option. The extreme high accuracy of the voltage and current amplifiers make the CMC 256-6 EP the ideal instrument for test and calibration of the newest energy meters (up to class 0.2S according to IEC687, 0 ... 300 V three-phase); for special applications like development, type testing, acceptance testing, device calibration, or product demonstration, the additional features of CMC 256-6 EP provide a complete solution.
The EP option can be ordered together with a new CMC 256-6 unit, or an existing CMC 256-6 can be upgraded to include it.

Following specifications are enhanced against a standard CMC 256-6[4]:

Accuracy of current / voltage generators/amplifiers

Error	<0.02 % typ. (<0.05% guar.)

Generators general

Phase error	<0.005° typ. (<0.02° guar.) at 50/60 Hz
Temperature drift	0.0025% / °C

Output power

Accuracy[5]	error <0.05% typ. (<0.1% guar.) related to set values (relative error) at 0.1 … 12.5 A (current amplifier group A or B, 50/60 Hz) and 50 … 300 V
Temperature drift	<0.001%/°C typ. (<0.005%/°C guar.)

CMC 256-UCA

This is a full featured CMC 256-6 with a network interface (Ethernet 10Mbit/s, TP) and functions for testing UCA 2.0 compliant IEDs with GSSE messages.

The device supports:

- Subscription of up to 10 bitpairs from different GSSEs
- Sending of GSSEs for up to 4 simulated IEDs

The setup of the subscriptions and simulations is performed by the UCA Configuration module that can also be used in OCC documents. All OMICRON test modules can be used with the UCA features.

A separate brochure is available on request.

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

1 Up to three inputs can be used for measuring rms values without the *EnerLyzer* option.

2 For line input voltages below 150V, 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.

3 For an operational temperature above +30°C a duty cycle of up to 50% may apply.

4 All other specifications are identical to the data given for the CMC 256-6 standard unit.

5 Permissible load current outputs:
Range 1.25 A: 0 … 1 Ω and max. 1 VA, cos φ = 0.5 … 1
Range 12.5 A: 0 … 0.5 Ω and max. 6 VA, cos φ = 0.5 … 1.
Permissible load voltage outputs:
max. 10 VA at 50 … 300 V, cos φ = 0.5 … 1.

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