

## CMS 356: 6 Phase Current + 4 Phase Voltage Amplifier



The CMS 356 is a voltage and current amplifier for analog low-level signals provided by a CMC test set or by any other signal source, such as a digital real-time power system simulator. When used in combination with a CMC test set, the amplifier extends the capabilities of the test set to provide additional output channels and higher amplitudes.

The high-amplitude and high-power current outputs make it equally suitable for testing modern numerical relays as well as high-burden electromechanical relays. The outputs of the voltage amplifier and the current amplifier are galvanically separated from each other and also from mains. Configuration and monitoring of the device status of the CMS 356 amplifier can be performed via the easy-to-use web interface.

### Key features:

- > Six analog low-level inputs with selectable range ( $\pm 7.071$  Vpk or  $\pm 10$  Vpk)
- > Numerous output configurations, for example, 3 x 300 V + 3 x 64 A or 6 x 32 A
- > Calculation and output of residual voltage and current
- > Parallel connection of several CMS 356 units for even higher current amplitudes
- > All current and voltage outputs are fully overload and short circuit proof
- > Protection against voltage transient signal and over temperature

### Technical Data<sup>1</sup>

Current generators		
Setting range	6-phase AC (L-N)	6 x 0 ... 32 A
	3-phase AC (L-N)	3 x 0 ... 64 A (Group A II B)
	1-phase AC (LL-LN)	1 x 0 ... 128 A (Group A II B)
	DC (LL-LN)	1 x 0 ... $\pm 180$ A (Group A II B)
Power <sup>2</sup>	6-phase AC (L-N)	6 x 430 VA typ. at 25 A 6 x 250 W guar. at 20 A
	3-phase AC (L-N)	3 x 860 VA typ. at 50 A 3 x 500 W guar. at 40 A
	1-phase AC (LL-LN)	1 x 1000 VA typ. at 80 A 1 x 700 W guar. at 80 A
	1-phase AC (L-L)	1 x 1740 VA typ. at 50 A 1 x 1100 W guar. at 40 A
	1-phase AC (L-L-L)	1 x 1740 VA typ. at 25 A 1 x 1100 W guar. at 20 A
	DC (LL-LN)	1 x 1400 W typ. at $\pm 80$ A 1 x 1000 W guar. at $\pm 80$ A
Accuracy <sup>3</sup>	Error < 0.1 % rd. <sup>4</sup> + 0.04 % rg. <sup>4</sup> typ. Error < 0.3 % rd. + 0.1 % rg. guar.	
Distortion (THD+N) <sup>5</sup>	< 0.1 % typ., < 0.3 % guar.	
Max. compliance voltage (L-N)/(L-L)/(L-L-L)	35 Vpk / 70 Vpk / 140 Vpk	
Connection banana sockets	4 mm (0.16 in) banana sockets	
Connection combination socket	Group A only (32 A max.)	

Voltage generators		
Setting range	4-phase AC (L-N)	4 x 0 ... 300 V
	1-phase AC (L-L)	1 x 0 ... 600 V
	DC (L-N)	4 x 0 ... $\pm 300$ 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 $\pm 300$ V 1 x 360 W guar. at $\pm 300$ V
	Accuracy	Error < 0.06 % rd. <sup>4</sup> + 0.02 % rg. <sup>4</sup> typ. at 0 ... 300 V Error < 0.16 % rd. + 0.04 % rg. guar. at 0 ... 300 V
Distortion (THD+N) <sup>5</sup>	0.03 % typ., < 0.1 % guar.	
Ranges	150 V / 300 V	
Connection	4 mm (0.16 in) banana sockets / combination socket (1,2,3,N)	

<sup>1</sup> All data specified are guaranteed, except where indicated otherwise. OMICRON guarantees the specified data for one year after factory calibration, within 23 °C  $\pm 5$  °C (73 °F  $\pm 10$  °F) in the frequency range from 10 to 100 Hz and after a warm-up phase > 25 minutes


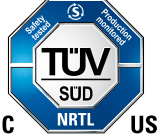
<sup>2</sup> Typical AC values valid for inductive loads (e.g. e/m relays)

<sup>3</sup> Rload: 0 ... 0.5  $\Omega$

<sup>4</sup> rd. = reading, rg. = range

<sup>5</sup> THD+N: at nominal values, 50/60 Hz and 20 kHz measurement bandwidth

Amplifiers general	
Bandwidth (-3dB) <sup>1</sup>	> 1 kHz
Input – Output propagation delay	500 µs (error: < ±2 µs typ., ±5 µs guar.)
Amplification at 5 Vrms input range	Voltage output: 60 V/V Current output: 6.4 A/V
Phase error at 50/60 Hz	Voltage: 0.05° typ., < 0.15° guar. Current: 0.1° typ., < 0.25° guar. <sup>2</sup>
Analog inputs	
Number	6
Input impedance	47 kΩ
Input voltage range (selectable)	±10 Vpeak (7.071 Vrms) ±7.071 Vpeak (5 Vrms)
Galvanic isolation input/output	Yes
Power supply	
Nominal input voltage <sup>3</sup>	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 <sup>4</sup>	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 <sup>2</sup> at 10 ... 150 Hz)
Shock	IEC 60068-2-27 (15 g/11 ms half-sine)
Acoustics – noise emission	ISO 7779
Idle – full load	47 – 55 dB(A)
Safety standards, electromagnetic compatibility	
EMC	The product adheres to the electromagnetic compatibility (EMC) Directive 2014/30/EU (CE conform).
International	IEC 61326-1; IEC 61000-4/6; IEC 61000-3-2/3
USA	FCC Subpart B of Part 15 Class A
Safety	The product adheres to the low voltage Directive 2014/35/EU (CE conform).
International / USA	IEC 61010-1 / UL 61010-1
Canada	CAN/CSA-C22.2 No 61010-1

Miscellaneous	
Weight	16.3 kg (35.9 lb)
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 Ethernet ports: 10/100/1000 Base-TX
Signal indication (LED)	> 42 V for voltage and current outputs
Status LEDs	For each amplifier output to indicate hardware status (e.g. overload condition)
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
Protection	All current and voltage outputs are fully overload and short circuit proof and protected against external voltage transient signals and over temperature
Certifications	
 	
Developed and manufactured under an ISO 9001 registered system	
Delivery contents	
CMS 356 amplifier, carry bag, connection cables, generator combination cable, wiring accessories	

## Ordering Information

CMS 356	
VEHV1040	CMS 356 voltage and current amplifier
VEHZ0026	Mounting kit for 19-inch rack

<sup>1</sup> For current outputs amplitude derating at > 380 Hz

<sup>2</sup> Rload: 0 ... 0.5 Ω

<sup>3</sup> For line input voltages below 230 V, a derating of the simultaneously available sum output power of the voltage/current amplifiers will occur  
All other technical specifications (e.g. the maximum output power of a single amplifier) are not affected

<sup>4</sup> For an operational temperature above +30 °C (+86 °F) a duty cycle of down to 50 % may apply