Overview of technical specifications [1]

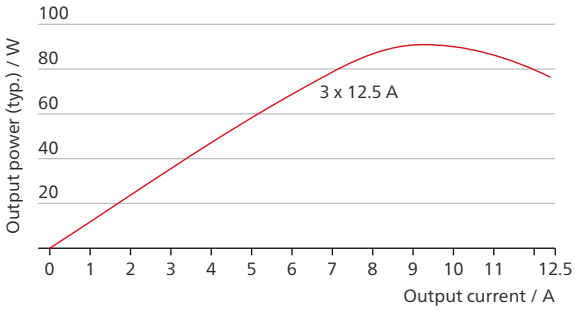
CMC 430

Current amplifier

Number of outputs	3
Ranges	Range 1: 0 … 1.25 A Range 2: 0 … 12.5 A
Configurations	3 x 12.5 A; 90 W at 9 A (typical) 1 x 12.5 A; 180 W at 9 A (typical) 1 x 37.5 A; 250 W at 24 A
Max. compliance voltage (L-N/L-L)	17 Vpk/34 Vpk
Adjustable resolution (AC)	100 µA

Current magnitude accuracy

Range	typical [2,3]	1 year [2]	2 years [2]
10...100 Hz; I < 6 A	0.02 + 0.005	0.04 + 0.01	0.07 + 0.01
10...100 Hz; I > 6 A		0.08 + 0.01	0.11 + 0.01



Trigger on overload

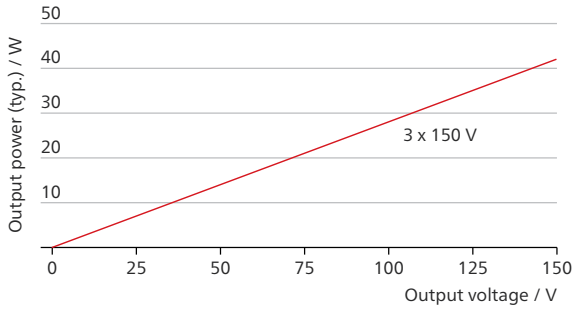
Supported generators	Current generators
Timer accuracy	1 ms or better

Voltage amplifier

Number of outputs	6
Range	0 … 150 V
Configurations	6 x 42 W at 150 V (typical) 3 x 45 W at 150 V (typical) V_E automatically calculated 1 x 84 W at 300 V (L-L) (typical) 3 x 84 W at 300 V (without common N) (typical)
Adjustable resolution (AC)	100 µV

Voltage magnitude accuracy

Range	typical [2,3]	1 year [2]	2 years [2]
10...100 Hz (V1-V3)	0.015 + 0.005	0.04 + 0.01	0.06 + 0.01
10...100 Hz (V4-V6)		0.07 + 0.01	0.11 + 0.01



General amplifier specifications

Frequency range	Sine signals	DC … 1000 Hz
	Harmonics, Inter-harmonic, Transients	DC … 3000 Hz
Adjustable resolution	1 mHz	
Phase accuracy 50/60 Hz (ref V1)	0.005° typ.	0.02° guar.
THD+N at 50/60 Hz	< 0.1 % at full scale	
Simulated Power/ Energy (1 Year)	0.1 % of set value at 50/60 Hz; PF = 1 50 V to 70 V at < 2 W 0.05 A to 6 A at < 0.3 Ohm	
Protection	All current and voltage outputs are fully overload and short circuit proof and protected against external high-voltage transient signals and over temperature	

[1] Unless otherwise stated all specifications are valid after 30 min. warm-up at 23 °C ±5 °C / 73 °F ±10 °F under symmetrical conditions and ohmic load
[2] ± (% of set value + % of range) or better
[3] Typical values apply to 98 % of all devices immediately after a factory calibration (adjustment)

Technical specifications [1]

CMC 430

Analog / binary inputs

Binary functions	
Number of inputs	6, each fully isolated
Measurement category	600 V / CAT II, 300 V / CAT III, 150 V / CAT IV
Ranges	10 mV, 100 mV, 1 V, 10 V, 100 V, 600 V
Sampling frequency	10 kHz (resolution 100 µs)
Max. measuring time	Infinite
Input configurations	0 ... ±600 V_{DC} (threshold to be set), potential-free, DC and AC trigger, counter

Analog functions	
Number of inputs	6, each fully isolated
Measurement category	600 V / CAT II, 300 V / CAT III, 150 V / CAT IV
Sampling frequency	10 kHz, 40 kHz (configurable)
Overload indication	yes
Phase / frequency accuracy 15 .. 70 Hz	0.02° (2 years) 0.01 % (2 years)

Range	Frequency	1 Year [2]	2 Years [2]
10 mV	10 Hz .. 1 kHz	0.26 + 0.08	0.30 + 0.08
100 mV	10 Hz .. 1 kHz	0.15 + 0.04	0.18 + 0.05
1/10/100 V	10 Hz .. 1 kHz 1 kHz .. 4 kHz 4 kHz .. 10 kHz	0.08 + 0.03 0.11 + 0.04 0.19 + 0.06	0.11 + 0.04 0.14 + 0.05 0.23 + 0.06
600 V	10 Hz .. 1 kHz 1 kHz .. 4 kHz 4 kHz .. 10 kHz	0.10 + 0.04 0.13 + 0.05 0.24 + 0.07	0.13 + 0.05 0.16 + 0.06 0.28 + 0.07
Analogue measurement quantities		I, V (AC/DC, RMS and instantaneous), φ, f; P, Q, S, harmonics (up to 64th), df/dt	
Hybrid [3] recording while analog outputs are active		With software option EnerLyzer Live	

Counter inputs

Number	2
Max. counting frequency	100 kHz
Max. input voltage	±30 V
Threshold voltage	6 V (2 V hysteresis)
Pulse width	> 3 µs

Binary outputs

Relay type	4 potential free relay contacts, software controlled
Relay breaking capacity	Imax: 8 A / Pmax: 2000 VA at 300 VAC Imax: 8 A / Pmax: 50 W at 300 VDC
Transistor type	4 open collectors (15 V / 5 mA)

DC measuring input

Voltage mode	
Ranges	±10 mV, ±100 mV, ±1 V, ±10 V
Accuracy [2] (10 V range)	0.03 + 0.01 (1 year) 0.04 + 0.01 (2 years)

Current mode	
Ranges	±1 mA, ±20 mA
Accuracy [2]	0.04 + 0.01 (1 year) 0.05 + 0.02 (2 years)

Auxilary DC

Voltage ranges	12 ... 264 V_{DC}
Power	Inrush (< 2 s) 120 W / 2 A Continuous 50 W / 0.8 A
Accuracy	< 5 % of set value + 0.25 V

IEC 61850 [4]

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
Sampled Values	IEC 61850; IEC 61869-9

Maximum number of streams	
Publishing Subscribing	RelaySimTest: 4, Test Universe: 1 2

[1] Unless otherwise stated all specifications are valid after 30 min. warm-up at 23 °C ±5 °C / 73 °F ±10 °F under symmetrical conditions and ohmic load
[2] ± (% of reading + % of range) or better
[3] Analog, binary, SV and GOOSE
[4] The GOOSE and Sampled Values functionality require software licences for the respective configuration modules

Time synchronization

Internal system clock	
Frequency drift	< 0.37 ppm / 24 h < 4.6 ppm / 20 years
All inputs and outputs (analog, binary, Sampled Values, and GOOSE) stay permanently in sync with the CMC 430 system clock.	

CMC 430 to external reference	
Absolute timing accuracy (voltage/ current)	< 1 µs typ., < 5 µs guar.
To external voltage	Reference signal on binary input 6: 10 ... 600 V / 15 ... 70 Hz
Precision Time Protocol (PTP)	IEEE 1588-2008 IEEE C37.238-2011 (Power Profile) IEC 61869-9-3 (Utility Profile)

CMC 430 to test objects	
IRIG-B, PPS, PPX	Via CMIRIG-B, TICRO 100

Power supply

Nominal	100 – 240 V, 50/60 Hz, 1000 W
Permissible	85 ... 264 V, 45 ... 65 Hz

Environmental conditions

Operating temperature	-25 ... +50 °C / -13 ... +122 °F
Storage and transportation temperature	-40 ... +70 °C / -40 ... +158 °F
Relative humidity	5 ... 95 %, non-condensing
Max. altitude for operating	4000 m
Max. altitude for non-operating	15000 m

Weight and dimensions

Weight	8.7 kg / 19.2 lbs
Dimensions	270 x 150 x 380 mm / 10.6 x 5.9 x 15.0 in

Miscellaneous

Hardware diagnostics	Self diagnostics upon each start-up
Galvanically separated groups	Mains, voltage amplifier, current amplifier, auxiliary DC supply, binary/analog input

Interfaces

Electrical / data	
2 PoE ethernet ports	10/100/1000 Base-TX IEEE 802.3a compliant
1 USB Type-B port	USB 2.0 up to 480 Mbit/s
1 USB Type-A port	USB 2.0 up to 480 Mbit/s
1 External interface	For ARC 256x, SEM1, SEM2, SEM3, SER1, CMIRIG-B
4 Expansion ports	For accessories (LLX1–LLX4) and expansion mode

Visible / audible
LEDs for the indication of the status of analog output signals (voltage, current, Aux DC)
In addition a configurable beeper can be activated / deactivated

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 61000-4-2/3/4/5/6/8/11

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	
Classification	IEC 60721-3-7
Vibration	IEC 60068-2-64
Shock	IEC 60068-2-27
Free fall	IEC 60068-2-31

Certifications

Developed and manufactured under an ISO 9001 registered system