CPC 100

Generator / Outputs

Current outputs

Range	Amplitude	t_{max} [1]	V_{max} [2]	$Power_{max}$ [2]	f
800 A AC[3]	0 to 800 A	25 s	6.0 V	4800 VA	15 to 400 Hz
	0 to 400 A	8 min.	6.4 V	2560 VA	15 to 400 Hz
	0 to 200 A	> 2 h	6.5 V	1300 VA	15 to 400 Hz
6 A AC[10]	0 to 6 A	> 2 h	55 V	330 VA	15 to 400 Hz
3 A AC[10]	0 to 3 A	> 2 h	110 V	330 VA	15 to 400 Hz
400 A DC	0 to 400 A	2 min.	6.5 V	2600 VA	DC
	0 to 300 A	3 min.	6.5 V	1950 VA	DC
	0 to 200 A	> 2 h	6.5 V	1300 VA	DC
6 A DC[4,10]	0 ... 6 A	> 2 h	60 V	360 VA	DC

2000 A AC[3] with an optional current booster (CP CB2)

Voltage outputs

Range	Amplitude[5]	t_{max}	I_{max}	$Power_{max}$ [5]	f
2 kV AC[3]	0 to 2 kV	1 min.	1.25 A	2500 VA	15 to 400 Hz
	0 to 2 kV	> 2 h	0.5 A	1000 VA	15 to 400 Hz
1 kV AC[3]	0 to 1 kV	1 min.	2.5 A	2500 VA	15 to 400 Hz
	0 to 1 kV	> 2 h	1.0 A	1000 VA	15 to 400 Hz
500 V AC[3]	0 to 500 V	1 min.	5.0 A	2500 VA	15 to 400 Hz
	0 to 500 V	> 2 h	2.0 A	1000 VA	15 to 400 Hz
130 V AC[10]	0 to 130 V	> 2 h	3.0 A	390 VA	15 to 400 Hz

Internal measurement of outputs (Accuracy[6])

		Amplitude		Phase
Output	Range	Reading	Full scale	Full scale
800 A AC	-	Error < 0.10 %	Error < 0.10 %	Error < 0.10 °
400 A DC	-	Error < 0.20 %	Error < 0.05 %	-
2 kV AC	2000 V	Error < 0.05 %	Error < 0.05 %	Error < 0.10 °
	1000 V	Error < 0.05 %	Error < 0.05 %	Error < 0.15 °
	500 V	Error < 0.05 %	Error < 0.05 %	Error < 0.20 °
	5 A	Error < 0.20 %	Error < 0.05 %	Error < 0.10 °
	500 mA	Error < 0.05 %	Error < 0.05 %	Error < 0.10 °

Inputs

Measuring inputs (Accuracy[6])

			Amplitude		Phase
Input	Imped.	Range	Reading	Full scale	Full scale
I AC/DC[4,7]	< 0.1 Ω	10 A AC	Error < 0.05 %	Error < 0.05 %	Error < 0.10 °
		1 A AC	Error < 0.05 %	Error < 0.05 %	Error < 0.15 °
		10 A DC	Error < 0.03 %	Error < 0.08 %	-
		1 A DC	Error < 0.03 %	Error < 0.08 %	-
V1 AC[8]	500 kΩ	300 V	Error < 0.05 %	Error < 0.05 %	Error < 0.10 °
		30 V	Error < 0.05 %	Error < 0.05 %	Error < 0.10 °
		3 V	Error < 0.10 %	Error < 0.05 %	Error < 0.10 °
		300 mV	Error < 0.15 %	Error < 0.05 %	Error < 0.10 °
V2 AC[8,11]	10 MΩ	3 V	Error < 0.03 %	Error < 0.08 %	Error < 0.10 °
		300 mV	Error < 0.08 %	Error < 0.08 %	Error < 0.10 °
		30 mV	Error < 0.10 %	Error < 0.25 %	Error < 0.15 °
V DC[4,7]		10 V	Error < 0.03 %	Error < 0.08 %	-
		1 V	Error < 0.03 %	Error < 0.08 %	-
		100 mV	Error < 0.05 %	Error < 0.10 %	-
		10 mV	Error < 0.05 %	Error < 0.15 %	-

Additional features of the measuring inputs
Automatic range switching (except Amplifier test card)
Galvanically separated potential groups: I AC/DC ; V1 & V2 ; V DC
AC frequency range: 15 to 400 Hz (except Amplifier test card)
Protection of I AC/DC input: 10 A very fast acting (FF) fuse[4]

Binary input for dry contacts or voltages up to 300V DC[7]
Trigger criteria: Toggling with potential-free contacts or voltages of up to 300 V
Input impedance: > 100 kΩ
Response time: 1 ms

Resistance Measurement

4-wire measurement with 400 A DC output and 10 V DC input

Current	Resistance	Voltage	Accuracy (full scale)
400 A	10 μΩ	4 mV	Error < 0.70 %
400 A	100 μΩ	40 mV	Error < 0.55 %
400 A	1 mΩ	400 mV	Error < 0.50 %
400 A	10 mΩ	4 V	Error < 0.50 %

4-wire measurement with 6 A DC output and 10 V VDC input

Current	Resistance	Voltage	Accuracy (full scale)
6 A	100 mΩ	0.6 V	Error < 0.35 %
6 A	1 Ω	6 V	Error < 0.35 %
1A	10 Ω	10 V	Error < 0.25 %

2-wire measurement with 10 V VDC input

Current	Resistance	Voltage	Accuracy (full scale)
< 5 mA	100 Ω		Error < 0.60 %
< 5 mA	1 kΩ		Error < 0.51 %
< 5 mA	10 kΩ		Error < 0.50 %

Output to input synchronization

	Test cards Quick, Sequencer, Ramping	Amplifier test card
Frequency range	48 - 62 Hz	
Synchronization inputs	V1 AC (automatic range switch)	V1 AC, V2 AC, I AC (fixed to maximum range)
Input magnitude	10 % of input range full scale	
Output magnitude	5 % of output range full scale	
Settling time	100 ms after 5 % of output range full scale is reached	1000 ms after 5 % of output range full scale is reached
Signal changes	All quantities must be ramped within 20 signal periods	No changes of frequency and phase. Magnitude changes without limitation. Output follows within 250 ms
Phase tolerance	0.5 ° within the limits as specified above	

Power supply and mechanical data

Single-phase, nominal[9]	100 V AC to 240 V AC, 16 A
Single-phase, permissible	85 V AC to 264 V AC (L-N or L-L)
Frequency, nominal	50 / 60 Hz
Power consumption	< 3500 VA (< 7000 VA for a time < 10 s)
Connection	IEC320 / C20
Dimensions (W x H x D)	468 x 394 x 233 mm (18.4 x 15.5 x 9.2 in), cover, without handles.
Weight	29 kg / 64 lbs (case without protection cover)
EMC	EN 50081-2, EN 55011, EN 61000-3-2, FCC Subpart B of Part 15 Class A, EN 50082-2, IEC 61000-4-2/3/4/8, CE conform (89/336/EEC)
Safety	EN 61010-1, EN 60950, IEC 61010-1, produced and tested in an EN ISO 9001 certified company
Prepared for	IEEE 510, EN 50191, VDE 104
Shock	IEC68-2-27 (operating), 15 g / 11 ms, half-sinusoid
Vibration	IEC68-2-6 (operating), 10 to 150 Hz, acceleration 2 g continuous (20 m/s²); 10 cycles per axis

Environmental conditions for CPC 100 and CPC 100 accessories

Operating temperature	-10 °C to +55 °C /+14 °F to +131 °F
Storage temperature	-20 °C to +70 °C / -4 °F to +158 °F
Humidity range	5 to 95 % relative humidity, no condensation

All input / output values are guaranteed for one year within an ambient temperature of 23 °C ± 5 °C / 73 °F ± 10 °F, a warm-up time longer than 25 min. and in a frequency range of 45 to 60 Hz or DC. Accuracy values indicate that the error is smaller than ± (value read x reading error + full scale of the range x full scale error).

1. With a mains voltage of 230 V using a 2 x 6 m high-current cable at an ambient temperature of 23 °C ± 5 °C / 73 °F ± 10 °F.
2. The power and maximum voltage may be reduced above 60 Hz or below 50 Hz.
3. Output can be synchronized with V1 AC in Quick, Sequencer, Ramping and Amplifier test cards.
4. The inputs and outputs are protected with lightning arrestors between the connector and against the protective earth. In the event of application of energy exceeding a few hundred Joule the lightning arrestors apply a permanent short-circuit to the input / output.
5. The power and amplitude may be reduced above 200 Hz or below 50 Hz.
6. 98 % of all units have an accuracy better than specified as “typical”.
7. This input is galvanically separated from all other inputs.
8. V1 and V2 are galvanically coupled but separated from all other inputs.
9. There are power restrictions for mains voltages below 190 V AC.
10. Fuse-protected.
11. When using the CTRogowski test card, the 3 V V2 AC input uses an additional software based integration method. In the range of 50 Hz < f < 60 Hz, this results in a phase shift of 90 ° as well as an additional phase error of ± 0.1 ° and an additional amplitude error of ± 0.01 %. For frequencies in the range of 15 Hz < f < 400 Hz, the phase error is not specified, and the amplitude error can be up to ± 0.50 % higher.

Technical Data CPC 100 Accessories

CP TD1 – Tan-Delta

High-voltage output

U/f	I	S	t_{max}	f
0 to 12 kV AC	300 mA	3600 VA	> 2 min.	15 to 400 Hz
0 to 12 kV AC	100 mA	1200 VA	> 60 min.	15 to 400 Hz

Internal measurement of voltage output / current inputs

Range	Resolution	Accuracy	Conditions
0 to 12000 V AC	1 V	Error < 0.3 % of reading + 1 V	
0 to 5 A AC	5 digits	Error < 0.3 % of reading + 100 nA	Ix < 8 mA
	5 digits	Error < 0.5 % of reading	Ix > 8 mA

Capacitance Cp (equivalent parallel circuit)

Range	Resolution	Accuracy	Conditions
1 pF to 3 µF	6 digits	Error < 0.05 % of reading + 0.1 pF	Ix < 8 mA, V_{test} = 300 V to 10 kV
		Error < 0.2 % of reading	Ix > 8 mA, V_{test} = 300 V to 10 kV

Power factor PF / Dissipation factor DF

Range	Resolution	Accuracy	Conditions
0 to 10 % (capacitive)	5 digits	Error < 0.1 % of reading + 0.005 %	f = 45 to 70 Hz I < 8 mA V_{test} = 300 V to 10 kV
0 to 100 (0 to 10000 %)	5 digits	Error < 0.5 % of reading + 0.02 %	V_{test} = 300 V to 10 kV

Impedance

Range	Resolution	Accuracy	Conditions
1 kΩ to 1,200 MΩ	6 digits	Error < 0.5 % of reading	V_{test} = 300 V to 10 kV

Phase angle

Range	Resolution	Accuracy	Conditions
-90 ° to +90 °	4 digits	Error < 0.01 °	V_{test} = 300 V to 10 kV

Quality factor

Range	Resolution	Accuracy
0 to 1000	5 digits	Error < 0.5 % of reading + 0.2 %
> 1000	5 digits	Error < 5 % of reading

Inductance

Range	Resolution	Accuracy
1 H to 1000 kH	6 digits	Error < 0.3 % of reading

Watts / Power (P, Q, S)

Range	Resolution	Accuracy
0 to 3.6 kW / kVA / kvar	5 digits	0.5 % reading + 1 mW / mVA / mvar

Mechanical data

Dimensions (W x H x D)	450 x 330 x 220 mm / 17.7 x 13 x 8.7 in
Weight	26 kg / 57.32 lbs

CP CU1 – Coupling unit

Output ranges

Range	Current	Compliance voltage at > 45 Hz
10 A	0 to 10 Arms	500 Vrms
20 A	0 to 20 Arms	250 Vrms
50 A	0 to 50 Arms	100 Vrms
100 A	0 to 100 Arms	50 Vrms

Measuring transformers

Transformer	Ratio	Accuracy at 50 / 60 Hz
VT	600 V : 30 V	Class 0.1
CT	100 A : 2.5 A	Class 0.1

Inputs

	Characteristic	Rating
V SENSE	Overvoltage category	CAT III (IEC 61010-1)
	Voltage range	0 to 600 Vrms
BOOSTER	Overvoltage category	CAT I
	Voltage range	0 to 200 Vrms
	Current range	0 to 30 Arms
	Frequency range	15 to 400 Hz
	Fuse	30 A fast acting, automatic circuit breaker

Output power

Characteristic	Rating
Maximum power	5000 VA (45 to 70 Hz), cosφ < 1.0 for 8 s at 230 V AC
	5000 VA (45 to 70 Hz), cosφ < 0.4 for 8 s at 115 V AC
Continuous power	0 to 1600 VA

Accuracy

Range	Accuracy of absolute value	Accuracy of phase angle	V SENSE voltage	I OUT current	Current range
0.05 to 0.2 Ω	1.0 to 0.5 %	1.5 to 0.8 °	5 to 20 V	100 A	100 A
0.2 to 2 Ω	0.5 to 0.3 %	0.8 to 0.5 °	20 to 50 V	100 to 25 A	100 A
2 to 5 Ω	0.3 %	0.5 °	100 V	50 to 20 A	50 A
5 to 25 Ω	0.3 %	0.5 °	100 to 250 V	20 to 10 A	20 A
25 to 300 Ω	0.3 to 1.0 %	0.5 to 1.5 °	250 to 500 V	10 to 1.5 A	10 A

Mechanical data

Dimensions (W x H x D)	450 x 220 x 220 mm / 17.7 x 8.7 x 8.7 in
Weight	28.5 kg / 62.78 lbs

CP CB2 – Current booster

Output current	up to 2000 A
Output power at 2000 A	5 kVA
Accuracy of current at 50 / 60 Hz	Error < ± 0.13 % (rd) ± 0.13 % (fs)
Phase tolerance at full scale	Error < ± 0.25 %
Dimensions (W x H x D)	186 x 166 x 220 mm / 7.3 x 6.5 x 8.7 in
Weight	16.0 kg / 35.3 lbs

CP DB1 – Discharge box

6 A path	Switch closed	6 A continuous
	Switch open	The discharge process is faster by a factor of 4 compared to the CPC 100 6 A_{peak} Overtemperature protection: 85 °C / 185 °F Overvoltage protection: 150 V / 5 kA between connectors
100 A path	Switch closed	100 A continuous
	Switch open	The discharge process is faster by a factor of 10 compared to the CPC 100 100 A_{peak} 2500 J_{max} Overvoltage protection: 200 V / 30 kA between connectors
Dimensions (W x H x D)	357 x 235 x 147 mm / 14.0 x 9.2 x 5.8 in	
Weight	4 kg / 8.8 lbs	

CP SB1 – Switch box

AC input / V1 AC output	Max. 300 V_{rms}
DC input	Max. 6 A DC
Transformer high and low voltage connections	Max. 300 V_{eff} between all connectors and ground
Supply	Via serial interface from CPC 100 (+15 V)
Dimensions (W x H x D)	357 x 235 x 111 mm / 14.1 x 9.2 x 4.4 in
Weight	3.5 kg / 7.7 lbs

CP TC12 – 12 kV oil test cell

Cell type	Three-electrode design with guard
Test gap	11 mm / 0.43 in
Capacitance of empty cell (air)	Approx. 65 pF ± 10 %
Sample volume	1.2 to 2 liters / 41 to 68 fl.oz.
Max. RMS test voltage	12 kV
Inner dimensions (diameter x height)	172 mm x 180.8 mm / 6.8 x 7.1 in
Outer dimensions (W x H x D)	220 x 235.5 x 220 mm / 8.7 x 9.3 x 8.7 in
Weight	Approx. 9.2 kg / 20 lbs

CPOL - Polarity checker

Measuring range	Typical: 5 mV to 300 V Guaranteed: 50 mV to 300 V
Nominal frequency	Typical: 52.6 Hz Possible: 40 to 60 Hz
Minimum slope ratio	25 to 90 % or via pulse width
Power consumption	Key pressed: 25 mA Key not pressed: 0 mA
Input impedance	400 kΩ
Batteries	4 x 1.5 V Micro LR03 AAA AM4 MN2400
Dimensions (W x H x D)	200 x 45 x 35 mm / 78.7 x 17.7 x 13.8 in
Weight	0.25 kg / 0.11 lb including batteries and bag

CP CR500 – Compensation reactor

Inductors	**2 x 40 H**	**2 x 80 H**	**1x 40 H and 1 x 80 H**
Current compensation			
50 Hz	2 x 1 A	2 x 500 mA	1x 1 A + 1 x 500 mA
60 Hz	2 x 800 mA	2 x 400 mA	1 x 1 A + 1 x 400 mA
Capacitance compensation			
50 Hz	2 x 250 nF	2 x 125 nF	1 x 250 nF + 1 x 125 nF
60 Hz	2 x 175 nF	2 x 90 nF	1 x 175 nF + 1 x 90 nF
35 Hz	2 x 500 nF		
Maximum test voltage	12 kV rms (≥ 50 Hz)		
Dimensions (W x H x D)	457 x 222 x 225 mm / 18 x 8.7 x 8.9 in		
Weight	36.8 kg / 81.4 lbs		

CP AL1 – FFT Voltmeter with adapter

Connections	XLR Input and RCA Input
Power supply	3 x 1.5 V batteries (AA/LR6 alkaline type)
Dimensions (W x H x D)	86 x 205 x 42 mm / 3.35 x 8.07 x 1.57 in
Weight (including batteries)	0.45 kg / 0.98 lbs

CP GB1 – Grounding box

Nominal ac spark-over voltage	< 1000 V_{rms}
Impulse spark-over voltage	< 2000 V_{peak}
Short circuit proof with:	
16 mm cylindrical or 20 mm ball studs	26.5 kA (< 100 ms) / 67 kA_{peak}
25 mm or 1 in ball studs	30 kA (< 100 ms) / 75 kA_{peak}
Torsional moment for changing arrestors	> 15 Nm
Dimensions (Ø × H)	200 x 190 mm / 7.9 x 7.5 in
Weight	6.8 kg / 13.2 lbs (including grounding cable)

CP RC – Compensating reactor

	CP TR8	**CP CR6**	**CP CR4**
Voltage output	220 V	220 V	220 V
Current output	60 A	150 A	150 A
Apparent power on secondary side	13.2 kVAr	33 kVAr	33 kVAr
Frequency	90 to 120 Hz	90 to 120 Hz	90 to 120 Hz
Insulation class	F	F	
Dimensions (W x H x D)	262 x 277.5 x 222 mm / 10.31 x 10.9 x 8.74 in		
Weight	20.5 kg / 45 lbs		