

# CPC 100

## Technical Data



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# 1 CPC 100 Technical data

## 1.1 Generator / output section - current outputs

**Note:** For detailed information refer to the section “Technical Data” in the CPC 100 Reference Manual available in pdf format on the *CPC 100 Toolsets* or the *CPC 100 Start Page*.

The output is either voltage or current, and is automatically selected by the software or manually by the user. Current and voltage outputs are overload and short-circuit proof and protected against over-temperature.

Range	Amplitude	$t_{\max}^1$	$V_{\max}^2$	$\text{Power}_{\max}^2$	f
<b>800A AC<sup>3</sup></b>	0 ... 800 A	25 s	6.0 V	4800 VA	15 ... 400 Hz
	0 ... 400 A	8 min	6.4 V	2560 VA	15 ... 400 Hz
	0 ... 200 A	> 2 h	6.5 V	1300 VA	15 ... 400 Hz
<b>6A AC<sup>10</sup></b>	0 ... 6 A	> 2 h	55 V	330 VA	15 ... 400 Hz
<b>3A AC<sup>10</sup></b>	0 ... 3 A	> 2 h	110 V	330 VA	15 ... 400 Hz
<b>400A DC</b>	0 ... 400 A	2 min	6.5 V	2600 VA	DC
	0 ... 300 A	3 min	6.5 V	1950 VA	DC
	0 ... 200 A	> 2 h	6.5 V	1300 VA	DC
<b>6A DC<sup>4, 10</sup></b>	0 ... 6 A	> 2 h	60 V	360 VA	DC
<b>2000A AC<sup>3</sup> with an optional current booster.</b>					

## 1.2 Generator / output section - voltage outputs

Range	Amplitude <sup>5</sup>	$t_{\max}$	$I_{\max}$	$\text{Power}_{\max}^5$	f
<b>2kV AC<sup>3</sup></b>	0 ... 2 kV	1 min	1.25 A	2500 VA	15 ... 400 Hz
	0 ... 2 kV	> 2 h	0.5 A	1000 VA	15 ... 400 Hz
<b>1kV AC<sup>3</sup></b>	0 ... 1 kV	1 min	2.5 A	2500 VA	15 ... 400 Hz
	0 ... 1 kV	> 2 h	1.0 A	1000 VA	15 ... 400 Hz
<b>500V AC<sup>3</sup></b>	0 ... 500 V	1 min	5.0 A	2500 VA	15 ... 400 Hz
	0 ... 500 V	> 2 h	2.0 A	1000 VA	15 ... 400 Hz
<b>130V AC<sup>10</sup></b>	0 ... 130 V	> 2 h	3.0 A	390 VA	15 ... 400 Hz

### 1.3 Output transient characteristics

	Changes from "off" or a low magnitude to a higher magnitude	Changes from a high magnitude to a lower magnitude or "off"
<b>AC current</b>	within one period	300 ms maximum; accordingly less for smaller magnitudes
<b>AC voltage</b>	1200 ms maximum; accordingly less for smaller magnitudes	300 ms maximum; accordingly less for smaller magnitudes

### 1.4 Internal measurement of outputs

Output	Range	Guaranteed accuracy			Typical accuracy <sup>6</sup>		
		Amplitude		Phase	Amplitude		Phase
		Reading error	Full scale error	Full scale error	Reading error	Full scale error	Full scale error
<b>800A AC</b>	-	0.20 %	0.20 %	0.20°	0.10 %	0.10 %	0.10°
<b>400A DC</b>	-	0.40 %	0.10 %	-	0.20 %	0.05 %	-
<b>2kV AC</b>	2000 V	0.10 %	0.10 %	0.20°	0.05 %	0.05 %	0.10°
	1000 V	0.10 %	0.10 %	0.30°	0.05 %	0.05 %	0.15°
	500 V	0.10 %	0.10 %	0.40°	0.05 %	0.05 %	0.20°
	5 A	0.40 %	0.10 %	0.20°	0.20 %	0.05 %	0.10°
	500 mA	0.10 %	0.10 %	0.20°	0.05 %	0.05 %	0.10°

**Note:** For the individual notes, see "Notes related to inputs and outputs" below.

## 1.4.1 Measuring inputs

Input	Imped.	Range	Guaranteed accuracy			Typical accuracy <sup>6</sup>		
			Amplitude		Phase	Amplitude		Phase
			Reading error	Full scale error	Full scale error	Reading error	Full scale error	Full scale error
IAC/DC <sup>4, 7</sup>	< 0.1 Ω	10A AC	0.10 %	0.10 %	0.20°	0.05 %	0.05 %	0.10°
		1A AC	0.10 %	0.10 %	0.30°	0.05 %	0.05 %	0.15°
		10A DC	0.05 %	0.15 %	-	0.03 %	0.08 %	-
		1A DC	0.05 %	0.15 %	-	0.03 %	0.08 %	-
V1 AC <sup>8</sup>	500 kΩ	300 V	0.10 %	0.10 %	0.20°	0.05 %	0.05 %	0.10°
		30 V	0.10 %	0.10 %	0.20°	0.05 %	0.05 %	0.10°
		3 V	0.20 %	0.10 %	0.20°	0.10 %	0.05 %	0.10°
		300 mV	0.30 %	0.10 %	0.20°	0.15 %	0.05 %	0.10°
V2 AC <sup>8, 11</sup>	10 MΩ	3 V	0.05 %	0.15 %	0.20°	0.03 %	0.08 %	0.10°
		300 mV	0.15 %	0.15 %	0.20°	0.08 %	0.08 %	0.10°
		30 mV	0.20 %	0.50 %	0.30°	0.10 %	0.25 %	0.15°
V DC <sup>4, 7</sup>		10 V	0.05 %	0.15 %	-	0.03 %	0.08 %	-
		1 V	0.05 %	0.15 %	-	0.03 %	0.08 %	-
		100 mV	0.10 %	0.20 %	-	0.05 %	0.10 %	-
		10 mV	0.10 %	0.30 %	-	0.05 %	0.15 %	-

## 1.4.2 Output to input synchronization

	Test cards Quick, Sequencer, Ramping	Test card Amplifier
Frequency range	48 ... 62 Hz	
Synchronization inputs	V1 AC (automatic range switching)	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 magnitude is reached	1000 ms after 5 % of output magnitude 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	

## 1.5 Notes related to inputs and outputs

All input/output values are guaranteed over one year within an ambient temperature of  $23\text{ °C} \pm 5\text{ °}$  ( $73\text{ °F} \pm 10\text{ °F}$ ), a warm-up time longer than 25 min and in a frequency range of 45 ... 60 Hz or DC. Accuracy values indicate that the error is smaller than  $\pm$  (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  $23\text{ °C} \pm 5\text{ °}$  ( $73\text{ °F} \pm 10\text{ °F}$ )
2. Signals below 50 Hz or above 60 Hz with reduced values possible.
3. Output can be synchronized with V1 AC in **Quick, Sequencer, Ramping and Amplifier**.
4. The input / output is protected with lightning arrestors between the connector and against protective earth. In case of energy above a few hundred Joule the lightning arrestors apply a permanent short-circuit to the input / output.
5. Signals below 50 Hz or above 200 Hz with reduced values possible.
6. 98 % of all units have an accuracy better than specified as *typical*.
7. 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 190V AC.
10. Fuse-protected
11. When using the **CTRogowski** test card, the 3V **V2 AC** input uses an additional software based integration method. In the range of  $50\text{ Hz} < f < 60\text{ Hz}$ , this results in a phase shift of  $90^\circ$  as well as an additional phase error of  $\pm 0.1^\circ$  and an additional amplitude error of  $\pm 0.01\%$ . For frequencies in the range of  $15\text{ Hz} < f < 400\text{ Hz}$ , the phase error is not specified, and the amplitude error can be up to  $\pm 0.50\%$  higher.

## 1.6 Measuring inputs

### 1.6.1 Additional features of the measuring inputs

- Automatic range switching (except test card **Amplifier**)
- Galvanically separated potential groups: **I AC / DC**; **V1 & V2**; **V DC**
- AC frequency range 15 ... 400 Hz (except test card **Amplifier**)
- Protection of **I AC / DC** input: 10A FF fuse<sup>4</sup>

### 1.6.2 Binary input for dry contacts or voltages up to 300V DC<sup>7</sup>

Trigger criteria	Toggleing with potential-free contacts or voltages of up to 300 V
Input impedance	> 100 k $\Omega$
Response time	1 ms

## 1.7 Resistance measurement

The accuracy of the resistance measurements can be calculated from the respective input and output specifications.

4-wire measurement with 400A DC output and 10V VDC input				
Current	Resistance	Voltage	Typ. error	Guaranteed
400 A	10 $\mu\Omega$	4 mV	0.70 %	1.35 %
400 A	100 $\mu\Omega$	40 mV	0.55 %	1.10 %
400 A	1 m $\Omega$	400 mV	0.50 %	0.95 %
400 A	10 m $\Omega$	4 V	0.50 %	0.95 %

4-wire measurement with 6A DC output and 10V VDC input				
Current	Resistance	Voltage	Typ. error	Guaranteed
6 A	100 m $\Omega$	0.6 V	0.35 %	0.60 %
6 A	1 $\Omega$	6 V	0.35 %	0.60 %
1 A	10 $\Omega$	10 V	0.25 %	0.40 %

2-wire measurement with 10V VDC input				
Current	Resistance	Voltage	Typ. error	Guaranteed
< 5 mA	100 $\Omega$		0.60 %	1.20 %
< 5 mA	1 k $\Omega$		0.51 %	1.02 %
< 5 mA	10 k $\Omega$		0.50 %	1.00 %

## 1.8 General


Display	¼ VGA greyscale LCD display
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Power supply	
Single-phase, nominal <sup>9</sup>	100V AC ... 240V AC, 16A
Single-phase, permissible	85V AC ... 264V AC (L-N or L-L)
Frequency, nominal	50/60 Hz
Power consumption	< 7000 VA for a time < 10 s
Connection	IEC320/C20

### 1.8.1 Environmental conditions

Climate		
Temperature	Operating	-10 °C ... +55 °C / +14 °F ... +131 °F
	Storage	-30 °C ... +70 °C / -22 °F ... +158 °F
Max. altitude	Operating	2,000 m / 6,550 ft
	Storage	12,000 m / 40,000 ft

### 1.8.2 Standards conformity

EMC, safety		
EMC	IEC/EN 61326-1 (industrial electromagnetic environment) FCC subpart B of part 15, class A	
Safety	IEC/EN/UL 61010-1	
Other		
Shock	IEC/EN 60068-2-27 (15 g/11 ms, half-sinusoid, 3 shocks in each axis)	
Vibration	IEC/EN 60068-2-6 (frequency range 10 Hz ... 150 Hz, acceleration 2 g continuous (20 m/s <sup>2</sup> /65 ft/s <sup>2</sup> ), 20 cycles per axis)	
Humidity	IEC/EN 60068-2-78 (5 % ... 95 % relative humidity, no condensation), tested at 40 °C/104 °F for 48 hours	
Protection class	IP22 (in upright position) according to IEC/EN 60529	
Prepared for tests conforming to	IEE 510, EN 50191, VDE 104	



### 1.8.3 Mechanical data

Characteristic	Rating
Dimensions (w × h × d)	468 × 394 × 233 mm 18.6 × 15.5 × 9.2 in
Weight	29 kg/64 lb case without protection cover