CPC 100

Generator / Outputs

Current outputs

Range	Amplitude	t_{max} [1]	V_{max} [2]	$Power_{max}$ [2]	f
800 A AC[3]	0 ... 800 A	25 s	6.0 V	4800 VA	15 Hz ... 400 Hz
	0 ... 400 A	8 min.	6.4 V	2560 VA	15 Hz ... 400 Hz
	0 ... 200 A	> 2 h	6.5 V	1300 VA	15 Hz ... 400 Hz
6 A AC[10]	0 ... 6 A	> 2 h	55 V	330 VA	15 Hz ... 400 Hz
3 A AC[10]	0 ... 3 A	> 2 h	110 V	330 VA	15 Hz ... 400 Hz
400 A DC	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
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 ... 2 kV	1 min.	1.25 A	2500 VA	15 Hz ... 400 Hz
	0 ... 2 kV	> 2 h	0.5 A	1000 VA	15 Hz ... 400 Hz
1 kV AC[3]	0 ... 1 kV	1 min.	2.5 A	2500 VA	15 Hz ... 400 Hz
	0 ... 1 kV	> 2 h	1.0 A	1000 VA	15 Hz ... 400 Hz
500 V AC[3]	0 ... 500 V	1 min.	5.0 A	2500 VA	15 Hz ... 400 Hz
	0 ... 500 V	> 2 h	2.0 A	1000 VA	15 Hz ... 400 Hz
130 V AC[10]	0 ... 130 V	> 2 h	3.0 A	390 VA	15 Hz ... 400 Hz

Internal measurement of outputs (Accuracy[6])

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

Inputs

Measuring inputs (Accuracy[6])

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

Trigger criteria: Toggling with potential-free contacts or voltages of up to 300 V
Input impedance: > 100 kΩ
Response time: 1 ms

Output to input synchronization

	Test cards Quick, Sequencer, Ramping	Amplifier test card
Frequency range	48 Hz ... 62 Hz	48 Hz ... 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	

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 %
1 A	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 %

Power supply and mechanical data

Single-phase, nominal[9]	100 V_{AC} ... 240 V_{AC}, 16 A
Single-phase, permissible	85 V_{AC} ... 264 V_{AC} (L-N or L-L)
Frequency, nominal	50 Hz / 60 Hz
Power consumption	< 3 500 VA (< 7 000 VA for a time < 10 s)
Connection	IEC 320 / C20
Weight	29 kg / 64 lbs (case without protection cover)
Dimensions (W × H × D)	468 × 394 × 233 mm (18.4 × 15.5 × 9.2 in), cover, without handles.

Equipment reliability

Shock	IEC / EN 60068-2-27, 15 g / 11 ms, half-sinusoid, each axis
Vibration	IEC / EN 60068-2-6, frequency range from 10 Hz to 150 Hz, continuous acceleration 2 g (20 $^{m}/_{s^2}$ / 65 $^{ft}/_{s^2}$), 10 cycles per axis

Environmental conditions for CPC 100 and CPC 100 accessories

Operating temperature	-10 °C ... +55 °C /+14 °F ... +131 °F
Storage temperature	-20 °C ... +70 °C / -4 °F ... +158 °F
Humidity range	5 % ... 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 Hz 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 × 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 TD12/15 – Tan-delta unit

Combined with the CPC 100, the CP TD12/15 measures the capacitance and dissipation/power factor with laboratory precision.

High-voltage output

U/f	THD	I	Smax	tmax
0 ... 12 kV AC	< 2 %	300 mA	3600 VA	> 2 min
		100 mA	1200 VA	> 60 min
0 ... 15 kV AC	< 2 %	300 mA	4500 VA [1]	> 2 min
		100 mA	1500 VA	> 60 min

Capacitance Cp (equivalent parallel circuit)

Range	Typical accuracy [2]	Conditions
1 pF ... 3 µF	Error < 0.05 % of reading + 0.1 pF	I_x < 8 mA, V_{test} = 2 kV ... 10 kV
1 pF ... 3 µF	Error < 0.2 % of reading	I_x > 8 mA, V_{test} = 2 kV ... 10 kV

Power factor (cos φ) / Dissipation factor (tan δ)

Range	Typical accuracy [2]	Conditions
0 ... 10 % (capacitive)	Error < 0.1 % of reading + 0.005 %	f = 45 Hz ... 70 Hz I < 8 mA V_{test} = 2 kV ... 10 kV
0 ... 100 % (cos φ)	Error < 0.5 % of reading + 0.02 %	V_{test} = 2 kV... 10 kV
0 ... 10000 % (tan δ)	Error < 0.5 % of reading + 0.02 %	V_{test} = 2 kV... 10 kV

Mechanical data

Dimensions (W x H x D)	460 x 317 x 223 mm / 18.1 x 12.5 x 8.8 in
Weight CP TD12	23 kg / 51 lbs
Weight CP TD15	24 kg / 53 lbs

[1] Depending on control device and power supply

[2] Means "typical accuracy"; at typical temperatures of 23 °C ± 5 K; 98 % of all units have an accuracy which is better than specified

CP SB1 – Switch box

The CP SB1 switch box enables fully automatic testing of three-phase power transformers.

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

CP TC12 – 12 kV oil test cell

The CP TC12 oil test cell precisely determines the dielectric constant, the dissipation factor (tan delta) and the power factor of insulating liquids such as transformer oil.

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 liters ... 2 liters / 41 ... 68 fl.oz.
Max. RMS test voltage	12 kV
Inner dimensions (diameter × height)	172 mm × 180.8 mm / 6.8 × 7.1 in
Outer dimensions (W × H × D)	220 × 235.5 × 220 mm / 8.7 × 9.3 × 8.7 in
Weight	Approx. 9.2 kg / 20 lbs

CP DB1 – Discharge box

The CP DB1 transformer discharge box facilitates fast discharging of power transformers during the test process.

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}, 2 500 J_{max} Overvoltage protection: 200 V / 30 kA between connectors

Mechanical data

Dimensions (W × H × D)	357 × 235 × 147 mm / 14.0 × 9.2 × 5.8 in
Weight	4 kg / 8.8 lbs

CP CU1 – Coupling unit

In combination with the CPC 100 the CP CU1 is used for line parameter measurements and ground testing.

Output ranges

Range	Current	Compliance voltage at > 45 Hz
10 A	0 ... 10 A_{rms}	500 V_{rms}
20 A	0 ... 20 A_{rms}	250 V_{rms}
50 A	0 ... 50 A_{rms}	100 V_{rms}
100 A	0 ... 100 A_{rms}	50 V_{rms}

Output power

Characteristic	Rating
Maximum power	5000 VA (45 Hz ... 70 Hz), cos φ < 1.0 for 8 s at 230 V_{AC} 5000 VA (45 Hz ... 70 Hz), cos φ < 0.4 for 8 s at 115 V_{AC}
Continuous power	0 ... 1600 VA

Measuring transformers

Transformer	Ratio	Accuracy at 50 Hz / 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 ... 600 V_{rms}
BOOSTER	Overvoltage category	CAT I
	Voltage range	0 ... 200 V_{rms}
	Current range	0 ... 30 A_{rms}
	Frequency range	15 Hz ... 400 Hz
	Fuse	30 A fast acting, automatic circuit breaker

Accuracy

Range	Accuracy of absolute value	Accuracy of phase angle	V SENSE voltage	I OUT current	Current range
0.05 ... 0.2 Ω	1.0 ... 0.5 %	1.5 ... 0.8°	5 ... 20 V	100 A	100 A
0.2 ... 2 Ω	0.5 ...0.3 %	0.8 ...0.5°	20 ... 50 V	100 ... 25 A	100 A
2 ... 5 Ω	0.3 %	0.5°	100 V	50 ... 20 A	50 A
5 ... 25 Ω	0.3 %	0.5°	100 ... 250 V	20 ... 10 A	20 A
25 ... 300 Ω	0.3 ... 1.0 %	0.5 ... 1.5°	250 ... 500 V	10 ... 1,5 A	10 A

Mechanical data

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

CP GB1 – Grounding box

The CP GB1 grounding box features high current surge arrestors to protect the CP CU1 and the CPC 100 from unexpected overvoltages on the line under test.

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 ball studs	30 kA (< 100 ms) / 75 kA_{peak}
Torsional moment for changing arrestors	> 15 Nm
Dimensions (Ø × H)	200 × 190 mm / 7.9 × 7.5 in
Weight	6.8 kg / 13.2 lbs (including grounding cable)

HGT1 – Handheld grounding tester

The HGT1 handheld grounding tester can be combined with the CPC 100 and CP CU1 to measure step and touch voltages.

Voltage input	Max. 25 V_{rms}
Power supply	1 × 3.7 V lithium polymer (Li-Po) battery
Dimensions (W × H × D)	90 × 180 × 45 mm / 3.5 × 7.1 × 1.8 in
Weight (including battery)	0.48 kg / 1 lb

Technical data CPC 100 accessories

CP CR600 – Compensation reactor

The CP CR600 compensating reactor allows to test the insulation quality of generators, motors and other systems with large capacitance up to 1 µF.

Maximum test voltage	15 kV_{rms} (≥ 50 Hz)
Inductors	100 H ... 105 H ± 5% 50 H ... 52.5 H ± 5% 20 H ... 26.3 H -2% + 7%

Capacitance compensation (possible combination)

50 Hz / 15 kV	100 H	50 H	25 H
60 nF ... 160 nF	■		
130 nF ... 260 nF		■	
230 nF ... 350 nF	■	■	
330 nF ... 450 nF			■
420 nF ... 550 nF	■		■
520 nF ... 640 nF		■	■
620 nF ... 740 nF	■	■	■

60 Hz / 15 kV	100 H	50 H	25 H
50 nF ... 120 nF	■		
85 nF ... 190 nF		■	
150 nF ... 250 nF	■	■	
220 nF ... 320 nF			■
290 nF ... 390 nF	■		■
350 nF ... 460 nF		■	■
420 nF ... 520 nF	■	■	■

Mechanical data

Dimensions (W x H x D)	455 × 275 × 220 mm / 17.9 × 10.8 × 8.7 in
Weight	48 kg / 105.8 lbs

CP CB2 – Current booster

The CP CB2 is an current booster for applications requiring currents up to 2000 A.

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

CP RC – Compensating reactor

The CP RC resonance circuit units in combination with the CPC 100 can be used for voltage withstand testing of gas-insulated switchgears (GIS).

	CP TR7 / CP TR8	CP CR4 /CP CR6	CP AT1
Voltage output	180 V[1]/ 220 V	220 V	254 V - 278 V
Current output	60 A	150 A	16 A
Apparent power on secondary side	13.2 kVA_r	33 kVA_r	4.4 kVA_r
Frequency	80 Hz ... 120 Hz	80 Hz ... 120 Hz	50 Hz / 60 Hz
Insulation class	F	F	F
Weight	19 kg / 42 lbs	20.5 kg / 45 lbs	15.5 kg / 34 lbs
Dimensions (W × H × D)	262 × 277.5 × 222 mm / 10.31 × 10.9 × 8.74 in		

CPOL2 – Polarity checker

The CPOL2 can check the correct polarity along the different connection points in an instrument transformer's secondary wiring.

Measuring range	250 μV_{rms} ... 300 V_{rms}
Evaluated signal form	Polarity test signal with slope ratio ≥ 3:1
Nominal frequency	52.6 Hz
Power consumption	Measurement active: < 100mW Standby: < 50 µW
Input impedance	> 300 kΩ
Batteries	Type and number: 2 × 1,5 V Mignon LR6 AA AM4 MN1500
Dimensions (W × H × D)	180 × 55 × 35 mm / 7.1 × 2.2 × 1.4 in
Weight	150 g / 0.33 lb