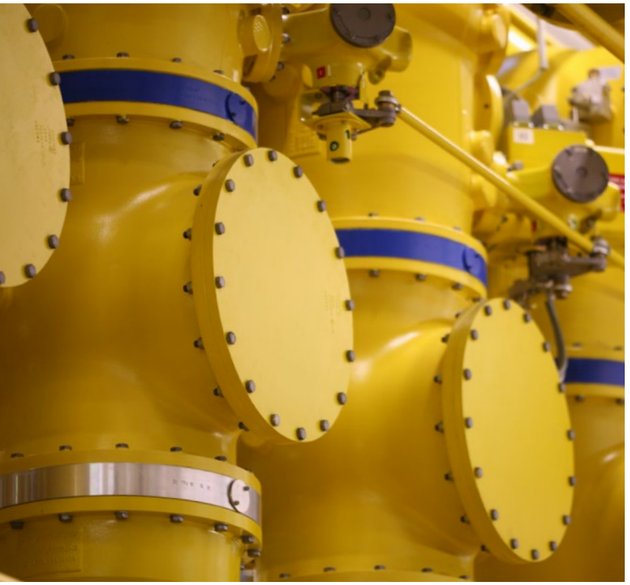
OMICRON

CP RC

Resonance circuit for GIS testing

A new approach to testing gas-insulated switchgear



Testing gas-insulated switchgear to date

Gas-insulated switchgears (GIS) are compact and are, therefore, used in applications where space is limited. For commissioning of GIS a high-voltage (HV) withstand test is required in accordance with standards (IEC 62271-203).

To date the test voltage needed for a withstand test has been produced by a resonance circuit. This test system consists of an HV test transformer, a coupling capacitor and a power control unit. The HV test transformer and the coupling capacitor have to be connected directly to the GIS.

Weak points of this testing principle:

- The complete test system is difficult to transport, because it consists of very heavy and large components.
- It is difficult to use it at test sites with limited space, such as wind turbines.
- The HV test lead must be connected to, and disconnected from, the GIS system for testing. This normally includes a time-consuming venting and refilling process of the SF_6 gas.

Innovative GIS testing

With OMICRON's CPC 100 + CP RC you can perform GIS tests without the need of a big HV transformer. This is possible because the system directly makes use of a specially designed "Power VT" for testing.

This Power VT is an integral part of the GIS and generates the required test voltage. CPC 100 injects power at the low-voltage (LV) side of the VT, producing the necessary voltage on the HV side. As you can directly connect the measuring system to the integrated VT of the GIS system it eliminates the need for draining and refilling any SF_6 gas.

The CPC 100 + CP RC system comprises several small and light-weight components (< 21 kg / 46 lbs) which can be transported by one person. With its modular design you can perform GIS tests even at test sites with limited space.

Powerful voltage withstand testing

With the combination of CPC 100 + CP RC1 you can perform voltage withstand tests with a maximum test voltage of 200 kV on GIS systems up to a rated voltage of 123 kV.

For testing GIS systems with a rated voltage of up to 145 kV and a maximum test voltage of 235 kV, CPC 100 + CP RC2 is appropriate. This package is supplied with the additional CP AT1 auto-transformer to guarantee the necessary output power of the CPC 100 for higher loads.

High-voltage source for partial discharge measurements

During production or maintenance, impurities can occur in GIS. These can cause major problems in operation. Therefore, it is recommended to perform a partial discharge measurement during commissioning (acceptance tests). While performing these measurements with OMICRON's MPD series you can use CP RC as the high-voltage source.

Auto-transformer CP AT1

The CP AT1 allows you to connect the mains supply of the CPC 100 to a three-phase 16 A power outlet, and delivers the required power for the test setup.

Control unit CPC 100

The CPC 100 supplies the required energy and acts as both measuring and controlling device.

Isolation transformer CP TR

The CP TR provides a potential-free output signal and compensates the capacitive load.

Compensating reactor CP CR

With 4 mH (CP CR4) or 6 mH (CP CR6) the CP CR compensates the capacitance in a modular fashion.

Power VT

In addition to the measurement function of a VT the Power VT offers the possibility to generate high voltage for testing.

CPC 100 + CP RC1: testing GIS up to 123 kV rated voltage

CPC 100 + CP RC2: testing GIS up to 145 kV rated voltage

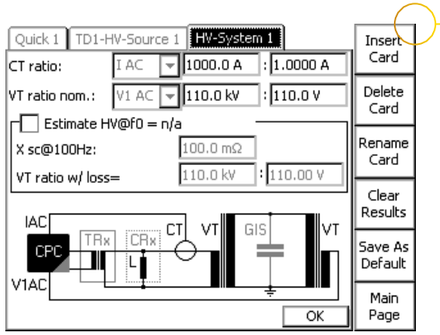
Your benefits

- Light-weight: less than 21 kg / 46 lbs per unit
- Small: less space required on site
- Powerful: up to 235 kV test voltage
- Fast: short measuring time as no draining or refilling of SF_6 gas is necessary

CPC 100: flexible and powerful unit

Full control of your tests

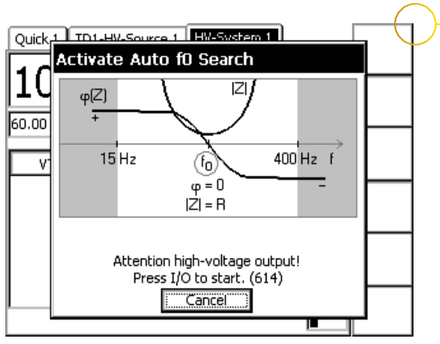
During GIS tests OMICRON's CPC 100 is used as the control unit for the CP RC resonance circuit. Using the front panel of the CPC 100 you can conveniently control the CP RC and define your own test templates. After transferring the test results to a PC, you can create customized reports including graphical result evaluation and further analyses.



High-voltage measurements on GIS

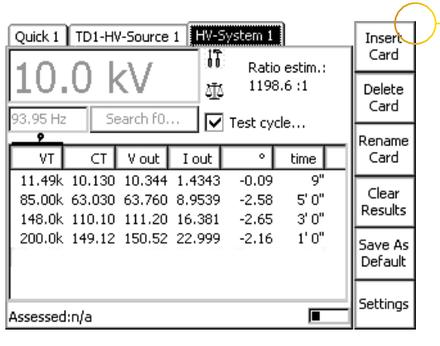
If available, you can use a second VT of the GIS system to measure high voltage. As soon as you enter the VT ratio CPC 100 will directly display the actual test voltage.

If there is no second VT accessible for the HV measurement, CPC 100 can determine the test voltage. It uses the LV input to the Power VT and automatically compensates the losses of the winding to achieve high accuracy.



Automatic detection of resonance frequency

The system's resonance frequency is automatically detected by CPC 100. This frequency is needed to determine the absolute capacitive load and for adjusting the frequency to the resonance point of the compensated system.



Programmed to individual requirements

The user-friendly software allows you to program a voltage ramp in accordance with the specific standard or your personal requirements. After performing the test you can directly assess the values and save the test protocol.

CPC 100: the all-in-one system

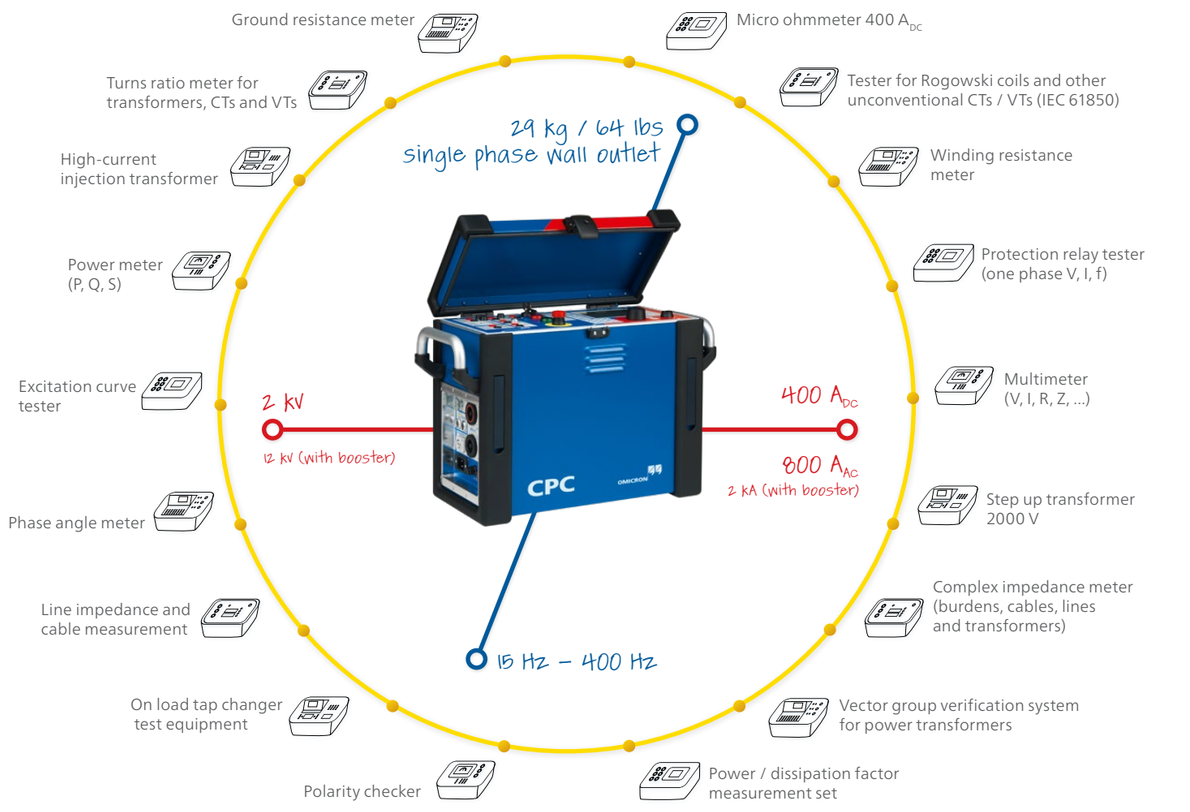
Apart from GIS, the CPC 100 covers a lot of other applications in and around substations as well as at the manufacturer's production site. The powerful device provides up to 800 A or 2 kV with up to 5 kVA over a frequency range of 15 Hz to 400 Hz or 400 A_{DC}.

It can test various substation assets, thereby replacing several individual testing devices. This makes testing with CPC 100 a time- saving and cost-effective alternative, especially as the application range of CPC 100 is further expanded by a high number of valuable accessories. Despite its expansive capabilities, the CPC 100 is very simple to use.

Thus it is the ideal instrument for all major applications in the area of substation asset testing.

Featured assets

- Current transformers
- Voltage transformers
- Power transformers
- Power lines
- High-voltage cables
- Grounding systems
- Rotating machines
- Switchgear and circuit breakers
- IEC 61850 installations
- Protection relays



Technical specifications and ordering information

CPC 100

Power specifications

Single-phase, nominal[1]	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

Mechanical data

Dimensions (W × H × D) (cover without handles)	468 × 394 × 233 mm / 18.4 × 15.5 × 9.2 in
Weight (case without protection cover)	29 kg / 64 lbs

CP TR

Power specifications

Frequency range	90 Hz ... 120 Hz
Inductivity	7 mH (CP TR7) / 8 mH (CP TR8)
Apparent power on secondary side	10.8 kVA_r (CP TR7) / 13.2 kVA_r (CP TR8)

Outputs

Output voltage	180 V (CP TR7) / 220 V (CP TR8)
Output current	60 A

Mechanical data

Dimensions (W × H × D) (cover without handles)	262 × 225.5 × 222 mm / 10.3 × 8.9 × 8.7 in
Weight	19 kg / 42 lbs

CP AT1

Power specifications

Three-phase, nominal	3 × 400 V_{AC}, 16 A
Frequency, nominal	50 Hz / 60 Hz

Outputs

Output voltage	254 V_{AC} ... 278 V_{AC} (4 steps)
Output current	16 A

Mechanical data

Dimensions (W × H × D)	262 × 277.5 × 222 mm / 10.3 × 8.7 × 10.9 in
Weight	15.5 kg / 34 lbs

CP CR

Power specifications

Frequency range	90 Hz ... 120 Hz
Inductivity	4 mH (CP CR4) / 6 mH (CP CR6)
Apparent power on secondary side	33 kVA_r

Outputs

Output voltage	220 V
Output current	150 A

Mechanical data

Dimensions (W × H × D) (cover without handles)	262 × 225.5 × 222 mm / 10.3 × 8.9 × 8.7 in
Weight	20.5 kg / 45 lbs

Package specifications

	CP RC1	CP RC2
GIS voltage, nominal	123 kV_{AC}	145 kV_{AC}
Maximum test voltage[2]	200 kV	235 kV
Maximum system power	> 40 kVA_r for > 1 min	> 50 kVA_r for > 5 min
Maximum capacitive compensation range	1 300 µF at 100 Hz	1 600 µF at 100 Hz
Weight	68 kg / 150 lbs	103 kg / 227 lbs
Temperature	Operating: -10 °C ... +55 °C / +14 °F ... +131 °F Storage: -20 °C ... +70 °C / -4 °F ... +158 °F	Operating: -10 °C ... +55 °C / +14 °F ... +131 °F Storage: -20 °C ... +70 °C / -4 °F ... +158 °F
Humidity range	5 % ... 95 % relative humidity, non-condensing	5 % ... 95 % relative humidity, non-condensing

[1] There are power restrictions for mains voltages below 190 V_{AC}.
[2] There can be voltage restrictions depending on the integrated Power VT.

CP RC1 resonance circuit (order no. P0006340)

Hardware[1]

1 × CP CR4
1 × CP CR6
1 × CP TR8

Software

1 × HV resonance test system test card

Cables and accessories

2 × CP RC Y cable 4 m / 13.1 ft black (16 mm^2)
2 × CP RC Y cable 4 m / 13.1 ft red (16 mm^2)
1 × CP RC cable 1 m / 3.3 ft (16 mm^2)
1 × Booster connection cable 6 m / 19.7 ft (3 × 1.5 mm^2)
3 × Grounding cable (green/yellow) 6 m / 19.7 ft (6 mm^2)
1 × Current transformer KSO104
1 × Terminal adapters
2 × Transport case
1 × CP RC1 user manual

CP RC2 resonance circuit (order no. P0006346)

Hardware[1]

1 × CP AT1
1 × CP TR7
3 × CP CR6

Software

1 × HV resonance test system test card

Cables and accessories

2 × CP RC Y cable 4 m / 13.1 ft black (16 mm^2)
2 × CP RC Y cable 4 m / 13.1 ft red (16 mm^2)
1 × CP RC cable 1 m / 3.3 ft (16 mm^2)
1 × Booster connection cable 6 m / 19.7 ft (3 × 1.5 mm^2)
5 × Grounding cable (green/yellow) 6 m / 19.7 ft (6 mm^2)
1 × Power cord 3-pole
1 × Power cord 5-pole
1 × Current transformer KSO104
1 × Terminal adapters
3 × Transport case
1 × CP RC2 user manual

[1] The CPC 100 control unit has to be ordered separately. For further information on the CPC 100, please have a look at the CPC 100 brochure.

OMICRON is an international company that works passionately on ideas for making electric power systems safe and reliable. Our pioneering solutions are designed to meet our industry's current and future challenges. We always go the extra mile to empower our customers: we react to their needs, provide extraordinary local support, and share our expertise.

Within the OMICRON group, we research and develop innovative technologies for all fields in electric power systems. When it comes to electrical testing for medium- and high-voltage equipment, protection testing, digital substation testing solutions, and cybersecurity solutions, customers all over the world trust in the accuracy, speed, and quality of our user-friendly solutions.

Founded in 1984, OMICRON draws on their decades of profound expertise in the field of electric power engineering. A dedicated team of more than 900 employees provides solutions with 24/7 support at 25 locations worldwide and serves customers in more than 160 countries.

The following publications provide further information on the solutions described in this brochure:

CPC 100 brochure

MPD 600 brochure

For more information, additional literature, and detailed contact information of our worldwide offices please visit our website.

www.omicronenergy.com

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