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 SF₆ gas.

**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.

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

**CPC 100 + CP RC2**: testing GIS up to 145 kV rated voltage
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 SF₆ 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.

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.

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 SF₆ 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\text{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

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### CPC 100

**Power specifications**
- Single-phase, nominal: $100 \, V_{ac} \ldots 240 \, V_{ac}, 16 \, A$
- Single-phase, permissible: $85 \, V_{ac} \ldots 264 \, V_{ac} (L-N \text{ or } L-L)$
- Frequency, nominal: 50 Hz / 60 Hz

**Mechanical data**
- Dimensions (W × H × D): 468 × 394 × 233 mm / 18.4 × 15.5 × 9.2 in
- Weight: 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: $10.8 \, kVA, (CP \, TR7) / 13.2 \, kVA, (CP \, TR8)$

**Outputs**
- Output voltage: 180 V (CP TR7) / 220 V (CP TR8)
- Output current: 60 A

**Mechanical data**
- Dimensions (W × H × D): 262 × 225.5 × 222 mm / 10.3 × 8.9 × 8.7 in
- Weight: 19 kg / 42 lbs

### CP AT1

**Power specifications**
- Three-phase, nominal: $3 \times 400 \, V_{ac}, 16 \, A$
- Frequency, nominal: 50 Hz / 60 Hz

**Outputs**
- Output voltage: $254 \, V_{ac} \ldots 278 \, V_{ac} (4 \, steps)$
- 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: $33 \, kVA$

**Outputs**
- Output voltage: 220 V
- Output current: 150 A

**Mechanical data**
- Dimensions (W × H × D): 262 × 225.5 × 222 mm / 10.3 × 8.9 × 8.7 in
- Weight: 20.5 kg / 45 lbs

### Package specifications

<table>
<thead>
<tr>
<th>CP RC1</th>
<th>CP RC2</th>
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</thead>
<tbody>
<tr>
<td>GIS voltage, nominal: $123 , kV_{ac}$</td>
<td>$145 , kV_{ac}$</td>
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<tr>
<td>Maximum test voltage: 200 kV</td>
<td>235 kV</td>
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<tr>
<td>Maximum system power: &gt; 40 kVA, for &gt; 1 min</td>
<td>&gt; 50 kVA, for &gt; 5 min</td>
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<tr>
<td>Maximum capacitive compensation range: $1 , 300 , \mu F \text{ at } 100 , Hz$</td>
<td>$1 , 600 , \mu F \text{ at } 100 , Hz$</td>
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<tr>
<td>Weight: 68 kg / 150 lbs</td>
<td>103 kg / 227 lbs</td>
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</tbody>
</table>
| Temperature<br>Operating: $-10 \, ^{\circ}C \ldots +55 \, ^{\circ}C / +14 \, ^{\circ}F \ldots +131 \, ^{\circ}F$
<br>Storage: $-20 \, ^{\circ}C \ldots +70 \, ^{\circ}C / -4 \, ^{\circ}F \ldots +158 \, ^{\circ}F$ | Operating: $-10 \, ^{\circ}C \ldots +55 \, ^{\circ}C / +14 \, ^{\circ}F \ldots +131 \, ^{\circ}F$
<br>Storage: $-20 \, ^{\circ}C \ldots +70 \, ^{\circ}C / -4 \, ^{\circ}F \ldots +158 \, ^{\circ}F$ |
| Humidity range: 5 % ... 95 % relative humidity, non-condensing | 5 % ... 95 % relative humidity, non-condensing |

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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. VEHZ0760)

Hardware
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 mm²)
2 × CP RC Y cable 4 m / 13.1 ft red (16 mm²)
1 × CP RC cable 1 m / 3.3 ft (16 mm²)
1 × Booster connection cable 6 m / 19.7 ft (3 × 1.5 mm²)
3 × Grounding cable (green/yellow) 6 m / 19.7 ft (6 mm²)
1 × Current transformer KSO104
1 × Terminal adapters
2 × Transport case
1 × CP RC1 user manual

CP RC2 resonance circuit (order no. VEHZ0770)

Hardware
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 mm²)
2 × CP RC Y cable 4 m / 13.1 ft red (16 mm²)
1 × CP RC cable 1 m / 3.3 ft (16 mm²)
1 × Booster connection cable 6 m / 19.7 ft (3 × 1.5 mm²)
5 × Grounding cable (green/yellow) 6 m / 19.7 ft (6 mm²)
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

1The 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 serving the electrical power industry with innovative testing and diagnostic solutions. The application of OMICRON products allows users to assess the condition of the primary and secondary equipment on their systems with complete confidence. Services offered in the area of consulting, commissioning, testing, diagnosis and training make the product range complete.

Customers in more than 140 countries rely on the company’s ability to supply leading-edge technology of excellent quality. Service centers on all continents provide a broad base of knowledge and extraordinary customer support. All of this together with our strong network of sales partners is what has made our company a market leader in the electrical power industry.

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.