Momentary Voltage Dip Multiple Power Compensator (MPC)

At TMEIC, we provide high-reliability power quality solutions. Sometimes, even the most reliable power delivery system can experience faults, momentary voltage dips, and power outages. TMEIC offers a unique voltage dip multiple power compensator for medium voltage industrial applications.

The MPC is a bidirectional converter that uses an energy storage element (such as a battery or capacitor) and a high speed switch (HSS) to eliminate voltage dips experienced by a facility. The MPC is an optional standby energy source.

### Design Feature

<table>
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<tr>
<th>Design Feature</th>
<th>Customer Benefit</th>
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<tbody>
<tr>
<td>High Speed transfer</td>
<td>Power source change-over of less than 1/4-cycle (4.2 msec) at the time of blackout eliminates service dis-continuity ensuring 100% power availability.</td>
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<td>High efficiency</td>
<td>With proven efficiency of 99%, the MPC far exceeds the efficiency of UPS systems by at least 7%, reducing the total cost of ownership (TCO).</td>
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<td>Converter redundancy (option)</td>
<td>By using the module-type converter and making redundancy configuration by taking advantage of parallel operation, momentary voltage dip compensation can be performed even if one unit is out of service or faulted.</td>
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<td>Multi-MVA power ratings</td>
<td>Single bank configurations of up to 12 MVA and even higher with paralleling can provide momentary power for entire plants in the semiconductor, mining, automotive, food and beverage and other demanding industries.</td>
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<tr>
<td>Long term power supply under blackout</td>
<td>By using a battery system and isolating the facility from line-side power, the MPC can be used not just for voltage dip compensations, but also as a UPS system. Conventional voltage dip compensation methods such as statcoms and static VAR compensators do not provide this functionality.</td>
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### MPC energy storage options

- **Battery** (long term supply from 10 sec to a few minutes)
- **Electric double-layer capacitor** (short term from 1 sec to a few seconds)

### MPC High-Speed Switch options

- **Mechanical-type high speed switch** (4 msec transfer)
- **Semiconductor-type high speed switch** (1 msec transfer)
Multiple Power Compensator Technical Overview

**Transfer Time**
- At blackout or momentary voltage dip*1: 1 msec (semiconductor-type switch), 4 msec (mechanical-type switch)
- At recovery: No interruption

**Output Power**
- # of phases/wires: 3 Phase / 3 Wires
- Rated voltage: 6,600V or 3,300V ±5% or less
- Rated load power factor: 0.8 lag
- Load factor range: 0.7 lag – 1.0
- Voltage THD*3: 3% or less (at 100% linear load)
- Voltage unbalanced rate*4: ±5% or less (at load unbalance rate of ≤ 30%)
- Transient recovery: 50 msec or less

**Input Power**
- **AC Input**
  - Number of phases/wires: 3 Phase / 3 Wires
  - Rated Voltage: 6,600V or 3,300V ±10%
  - Rated frequency: 50/60 Hz ±5%
- **DC Input**
  - Voltage range: 500–745V

**Environmental**
- Cooling: Forced air
- Operating temperature*2: 0~40°C, (average 25°C for energy storage device)
- Relative humidity: 30~90% (non condensing)
- Altitude: 1000m or less
- Location: Indoor (free from corrosive gas and dust)

**MPC General Arrangement (Typical)**

**MPC Electrical one-line Illustration (Typical)**
- Input/output panel
- Maintenance bypass supply
- High Speed Switch panel
- Bidirectional converter
- Battery or EDLC panel
- Converter panel
- Medium-voltage transformer panel

**Bidirectional converter functions**
- Charging the energy storage device
- Converting the energy from the energy storage device into an alternating current.

**HSS functions**
- Opens the circuit at a high speed
- MPC 2000 uses a mechanical switch
- MPC 1000/3000 uses a semiconductor switch

**Notes:**
1) W1 and W2 dimensions depend on the output capacity of the MPC
2) Additional clearance space required: Top: 400mm (18 in.), Back: 1400mm (51 in.), Front: 2000mm (79 in.)

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* THD = \( \sqrt{\sum (\text{Root mean square value of each harmonic})^2} \)

* Voltage unbalanced rate = \( \frac{\text{Output line-to-line voltage} - \text{Output voltage arithmetic mean value}}{\text{Output voltage arithmetic mean value}} \)

* Load unbalanced rate = \( \frac{\text{Maximum load current} - \text{Minimum load current}}{\text{Load current arithmetic mean value}} \)