

# VOLT/VAR CONTROL SOLUTIONS

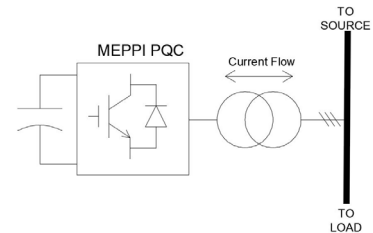


## VVC Solutions applies a power quality compensator to monitor the grid and provide application targeted support

Mitsubishi Electric's Power Quality Compensator (PQC) is a power electronic-based Volt/Var Control product for electric distribution market customers requiring improved voltage stability and autonomous real or reactive power control. By advancing the technology beyond the traditional D-STATCOM, and thru the addition of advanced features, Mitsubishi Electric will engineer a solution to fit your grid application with a single device.

Offered as a response to distributed energy resource (DER) penetration on the distribution grid, as well as market segments not traditionally targeted by centralized transmission level solutions, Mitsubishi Electric Power Product's distribution Power Quality Compensator (PQC) is a customized solution to meet utility and industrial power quality requirements. The PQC is comprised of an compact, advanced power converter to control and regulate bi-directional power flow, and an advanced application level controller capable of interfacing with a utility's SCADA and feedback devices.

By regulating the output voltage of the Power Quality Compensator, the converter can source or absorb vars with respect to the connected power system based on the required application. Utilizing a proven power converter technology, the PQC is able to respond to rapidly changing grid conditions and offer increased dynamic reactive compensation compared to traditional solutions such as shunt



### Power Quality Compensator (PQC)

- ◆ Replaces unloaded synchronous machines to control reactive power and provide virtual inertia
- ◆ Faster response time than a SVC, capacitors, reactor banks, or load tap changers
- ◆ Dynamic reactive power response with output characteristic shaping and programmable droop controls
- ◆ Standard software package and parameterized controls for applications
- ◆ Application specific mapping and sequencing
- ◆ Interfacing with existing capacitor and reactor banks for improved feeder reactive power coverage

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reactors, capacitors, and load tap changers. Using this technology and designed with these applications in mind, the PQC is superior to other “smart” inverters that have been re-purposed as reactive devices with limited flexibility and redundancy, and also the inability to manage unbalanced loads.

### Capabilities

- ◆ Volt-Var Optimization (VVO)
- ◆ Conservation Voltage Reduction (CVR)
- ◆ Current Phase Balancing
- ◆ Harmonic Mitigation
- ◆ Var Regulation
- ◆ Power Factor Correction
- ◆ Voltage Stability
- ◆ Transient Over/Under Voltage
- ◆ Frequency Regulation

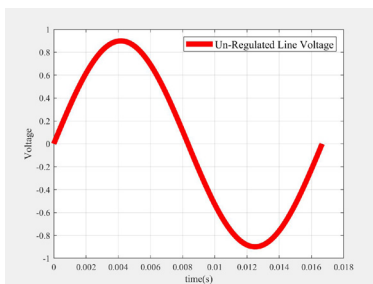
### Applications

- ◆ Distributed Generation Integration
- ◆ Voltage Imbalance Situations
- ◆ IEEE 519 Compliance (Harmonics)
- ◆ Peak Demand Shaving
- ◆ Power Quality Requirements
- ◆ Asset Life Maximization
- ◆ Industrial Load Compensation
- ◆ Grid Bridging

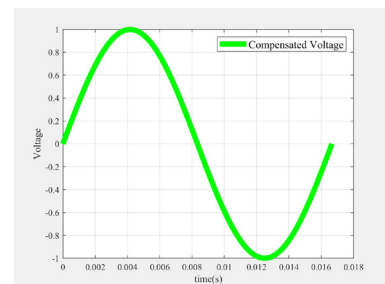
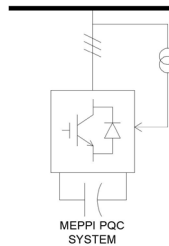
### Customized solutions to the application:

By tailoring each system to solving the utility’s specific needs, a VVC Solutions PQC is able to maximize the utility’s investment by supplying only the features and capability required. Integrating a Power Quality Compensator with Mitsubishi Electric’s internally developed software makes long term reliability and resilience part of every installation.

#### Example: 2-Quadrant Operations

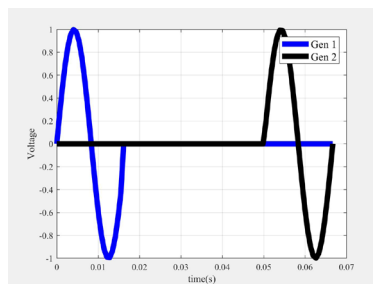


#### Voltage Regulation

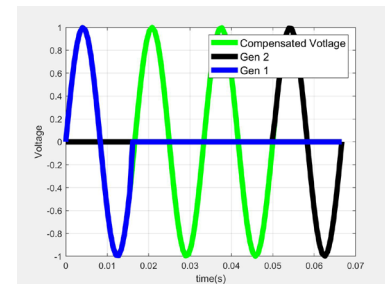
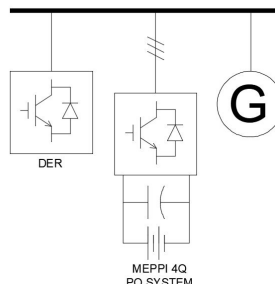


Mitigates voltage variation by VAR injection

#### Example: 4-Quadrant Operations



#### Grid Bridging



Watt injection and interim cycle replacement during generation loss

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