Microgrids keep the power on when it matters



Microgrids are stand-alone electrical power systems that consist of two or more generating assets and dedicated loads that can operate autonomously or "islanded", from the utility grid. At the heart of such a system is an intelligent microgrid controller with standardized communications that enables easy system configuration, commissioning and future adaptability to changing system assets.

Eaton's solutions: The Power Xpert Microgrid Controllers (PXMC)

Our years of experience in automation and control for mission-critical microgrid applications molded the architecture for the Power Xpert™ Microgrid Controller—a controller built on utility-grade hardware that provides a reliable, intelligent, and scalable control platform. Deployable as grid connected or an isolated power system, large or small, the Power Xpert Microgrid Controller is up to the task.

The controller maintains overall system stability by regulating power flow and monitoring protection schemes in real-time; while dynamically managing generating assets and loads to meet user defined goals. Users can set control strategies to enhance resiliency, maximize renewables, reduce utility charges or combinations of prioritized strategies.

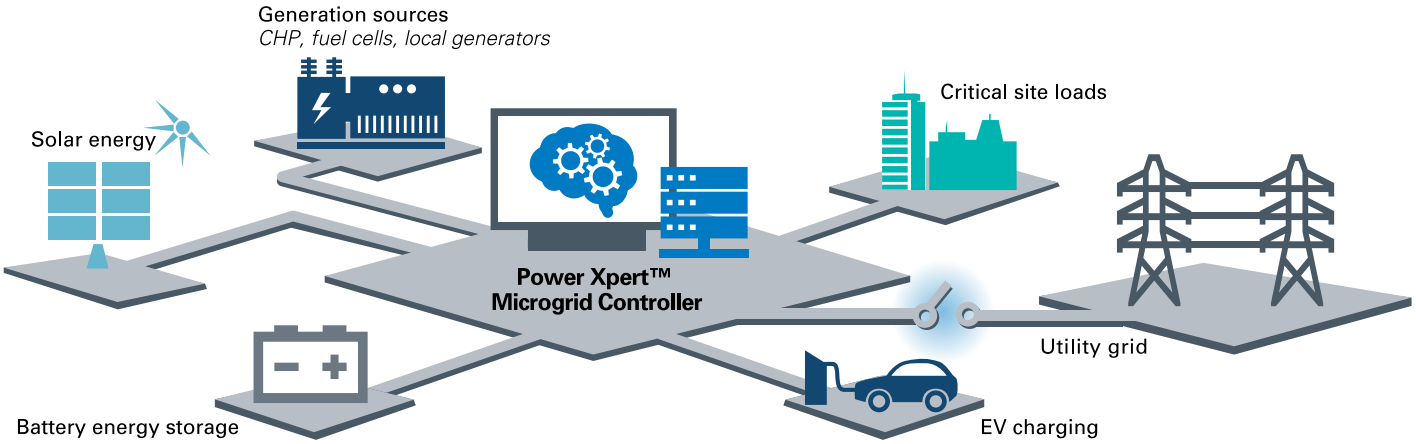
The Power Xpert Microgrid Controller's modular architecture allows it to easily scale to any application. Supporting more than 80 industrial communication protocols the controller can be configured to manage any generation, control, or measurement asset.

EATON
Powering Business Worldwide

EVERYTHING AS A GRID



Eaton's Power Xpert Microgrid Controllers is the brains of the microgrid



The details

Local and system controllers

An optimized combination of local and system control is used to integrate generating and load management assets. The local controller provides semi- autonomous and fast device control, maintains operation within connected equipment limits, provides local sequencing and alarm management and includes an integrated sequence of events recorder.

The Power Xpert Microgrid Controller can include local controllers for:

- Energy storage
- Photovoltaics
- Generators
- Load management
- Utility interconnection
- Fuel cells
- Other renewable generation resources

A system controller interfaces with upstream SCADA and optimizes the operation of power system assets (sources and loads) through the downstream local controllers. The system controller can support various system-wide applications such as optimal source dispatching, demand control, renewable firming and more.









Local HMI and historian

The Eaton Power Xpert Microgrid Controller's human-machine interface (HMI) provides system configuration, device monitoring and application control functionality. It's optional integrated historian continuously monitors system performance and collects detailed operational history.

While the server-based historian is a significant element of the control system, the balance of the control system can continue to operate independent of the server (during server upgrade, maintenance or outage).

Configured programming

Eaton's solution focuses on configured rather than custom programming and is built around the utility-proven SMP family of controllers, server and I/O modules coupled with Eaton's Yukon Visual T&D HMI products.

By design, the latest utility cybersecurity features and safeguards are embedded into each system device. For ease of configuration and maintenance, the Eaton Power Xpert Microgrid Controller is based on open standards including IEC 61850 communications.

Modular and scalable

A modular approach is used with each asset type configured to a standard template. Each tamplete includes the control functions, alarms, and measurement values for integration and implementation. This modular architecture allows the controller to be efficiently scaled for the application and adapted to changing generation assets and loads.

Scan or click here for our
Power Xpert Microgrid Controller product specification
Navigate to section 26-37-00

Control functions

Automated system sequencing and coordination: Coordinates sequencing for the system components in response to user commands, system status, limits or faults.

Common control strategies:

- Renewable Self-Consumption
- Renewable Maximization
- Renewable Curtailment
- Load Management - Priority based load shed / addPeak shaving
- Islanding
- Frequency regulation
- Energy Management - Time of Use
- Energy Management - Energy Rate Updates from SCADA
- Reactive Power Management
- Power Factor management
- Bus Voltage Regulation

Active control functions: Provides multiple modes of operation with well-defined transitions between modes.

Data logging: The data log is a true historian, providing a complete record of all system data, alarms, operator actions and events with millisecond time stamping.

Alarm and event management and processing: Provides alarms at both the system and local levels, with access to alarm-eventmanagement. Alarms and events can be viewed through the HMI or remotely via a web browser. Customized notifications for significant alarms and events are also available.

Graphical system display and control: Interactive diagrams to monitor status and operate the system

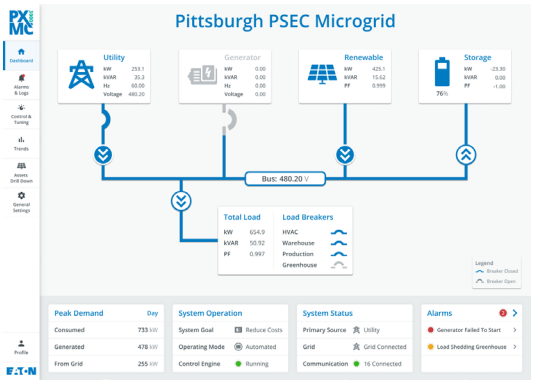
Optional features:

The Power Xpert Microgrid Controller provides additional significant functionality:

- Automatic retrieval and processing of event files from digital fault recorders and relays
- Integration and secure configuration management of all intelligent connected devices
- Enhanced secure pass-through access to connected devices through server; adds session logging, automatic password login and role-based access
- Secure Authentication V5 between system controller and upstream SCADA

Power Xpert Microgrid Controller (PXMC) target applications

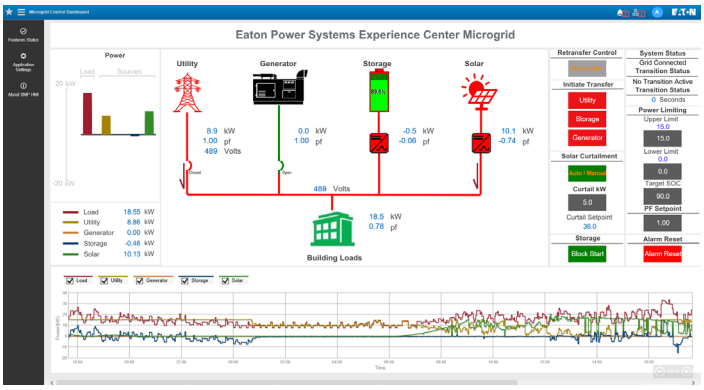
Configurable solution: PXMC 3000



Target applications

Single building/single electrical bus applications where system components are selected from a defined pre-tested device list (DERs, metering, etc.)

Customized solution: PXMC 5000



Target applications

Large buildings or campuses with DER integration at multiple electrical buses, or with varying system voltages, or where existing assets require integration to the microgrid.

	Points of Differentiation	PXMC 3000	PXMC 5000
Topology	Single voltage and electricle bus	●	●
	Multiple voltages and electrical bus		●
	Integrated Vendor List (IVL)	●	●
DERs	BESS and Standby generator grid-forming sources and PV grid-following source (islanded/ off-grid)	●	●
	PV, BESS, Standby generator (Parallel operation)	●	●
	Fuel cell	Future	●
	Wind, Co-generation, geothermal & more		●
Islanding	Open transitions	●	●
	Closed transitions	● (1)	●
	Unplanned, closed transitions (2)		●
Deployment	Partial customization (non-standard, historian, etc.)	Optional	●
	Fully customized-to-order		●
	Total cost of deployment	$$$	$$$$

(1) Dependent on BESS features available, assumes that the BESS has a Droop/Auto Grid-Forming mode available. Meaning that the BESS inverter can switch from grid following to grid forming without requiring a shutdown in between modes. For islanded to grid, an auto synchronization feature is required at the grid-forming asset.

(2) The BESS vendor must support virtual synchronous generator mode or seamless islanding mode. Special protective functions will be required by the utility protective relay.



EVERYTHING AS A GRID

Everything as a Grid is our approach to helping partners across the world embrace energy transition, on their terms. Today, energy flows through the grid in more directions and through more devices than ever before. And although that decentralization creates more complexities and challenges, it also creates new potential. By viewing Everything as a Grid, we're simplifying those complexities, meeting those challenges and reinventing the ways power is distributed, stored and consumed. The future is one of low-carbon, renewable power. The future is Everything as a Grid.

Why Eaton?

Over the last decade, Eaton has successfully applied its power systems and automation expertise to design, implement, and control microgrid systems from highly complex to more basic applications. With experience spanning a wide range of industries we understand the inherent electrical operation and control challenges of microgrids and can work with you to design a system to meet your needs. Our power system experts have developed unique optimization strategies for microgrids that maximize resiliency, efficiency, and sustainability.

Turnkey electrical solutions

With complete end-to-end service capability and application expertise, Eaton's team of project engineers can design and manage your microgrid project from initial concept and design to a completed turnkey project including ongoing operations and maintenance.

Studies and modeling

Our experienced power systems engineers produce a suite of studies and models for building the most capable microgrid and efficient power management system. System studies range from DER sizing and site resiliency to techno-economic analysis.

Cybersecurity features

Eaton's Power Xpert Microgrid Controller leverages our proven utility-grade, substation automation hardware with integral advanced cybersecurity features that keep your microgrid protected from evolving threats.

Integrated Microgrid Switchboard

Factory installation and testing of the microgrid controller into Eaton's Pow-R-Line switchboard as an integrated solution ensures interoperability and expedited on-site commissioning.

Field services

Eaton has one of the largest and most experienced teams of power system engineers, field technicians and customer support engineers in the industry—strategically positioned across North America for rapid, dedicated local support to keep you up and running





EVERYTHING™ AS A GRID

For more information, visit
Eaton.com/microgrids

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Printed in USA
Publication No. BR027059EN
June 2025

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