

Power Source and Load Control (NEMA)

Remotely Control and Visualize Automated Electrical Control Schemes

EcoStruxure Power Digital Application

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EcoStruxure™ Power



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Overview

Context of Application

Facility managers of large and critical buildings expect a reliable power network to maximize uptime for their business. However, a number of factors make this more complex. Growing grid instability due to increasing power demand and unpredictable, powerful storms are impacting continuous power availability.

To maximize availability and reliability of their power networks, they require smart and cost-effective remote control, automatic transfer systems, and load management.

Problem to Solve

The facility manager needs to:

- Remotely control electrical loads from a SCADA system.
- Automate transfer schemes, load shifting, or simple load shedding operations.
- Visualize and audit sequences of operations.

Purpose of the Application

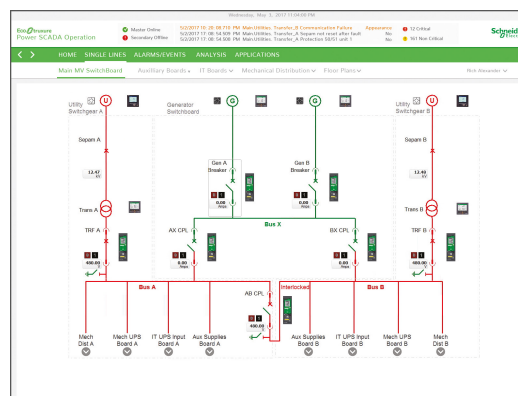
Remotely control, visualize, and supervise automatic transfer schemes

A combination of connected hardware and Edge Control software allows for remote controls or monitoring of automated controls.

Application Outcomes

Live Data Display

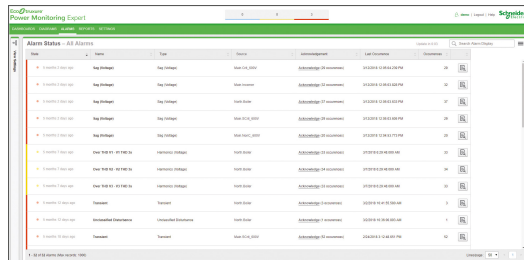
- Animated Single-Line Diagrams (SLDs) display the status of the system.
- If ASCO CPMA (Critical Power Management Appliance) is deployed, animated electrical single-line diagrams, floor plans, or facility risers can visually replay power control events.



Animated Single-Line Diagram

Events and Alarms

- All remote control actions performed are logged and available for auditing and tracking.
- Alarms on operating status of automated systems (Loop configuration, Automatic Transfer Switch, etc.) enable preventive intervention if any abnormal conditions arise in the electrical network reconfiguration system.



Alarm and Event Log Viewer in EcoStruxure Power Operation

If ASCO CPMA (Critical Power Management Appliance) is deployed, events and alarms can be displayed locally for associated backup power devices.

Notifications

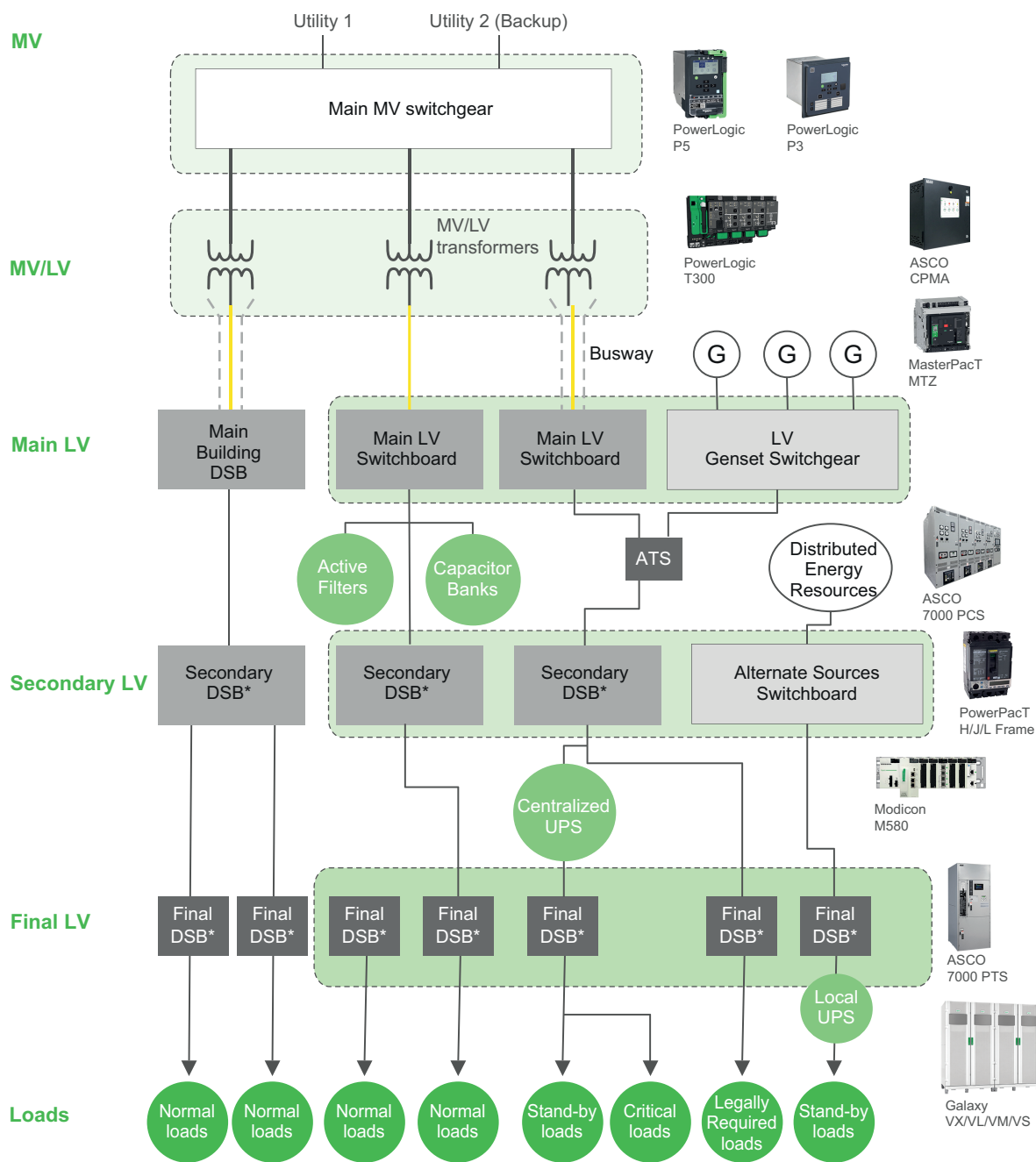
- SMS and/or email notifications can be sent for fast analysis and action.
- Email notifications are also available to send reports and non-critical information.

Remote Control

- Select-before-operate commands are available from EcoStruxure Power Operation or via circuit breaker mobile apps.
- Automatic transfer schemes help ensure seamless transition from utility sources to backup systems.
- Simple load control is available to manage demand, helping prevent overloads or utility surcharges.
- If ASCO CPMA (Critical Power Management Appliance) is deployed, remote controls are available for associated ATS.

Electrical Architecture

The following diagram details the areas of the architecture where the connected products should be installed in order to implement the Power Source and Load Control application:



* DSB = Distribution Switchboard

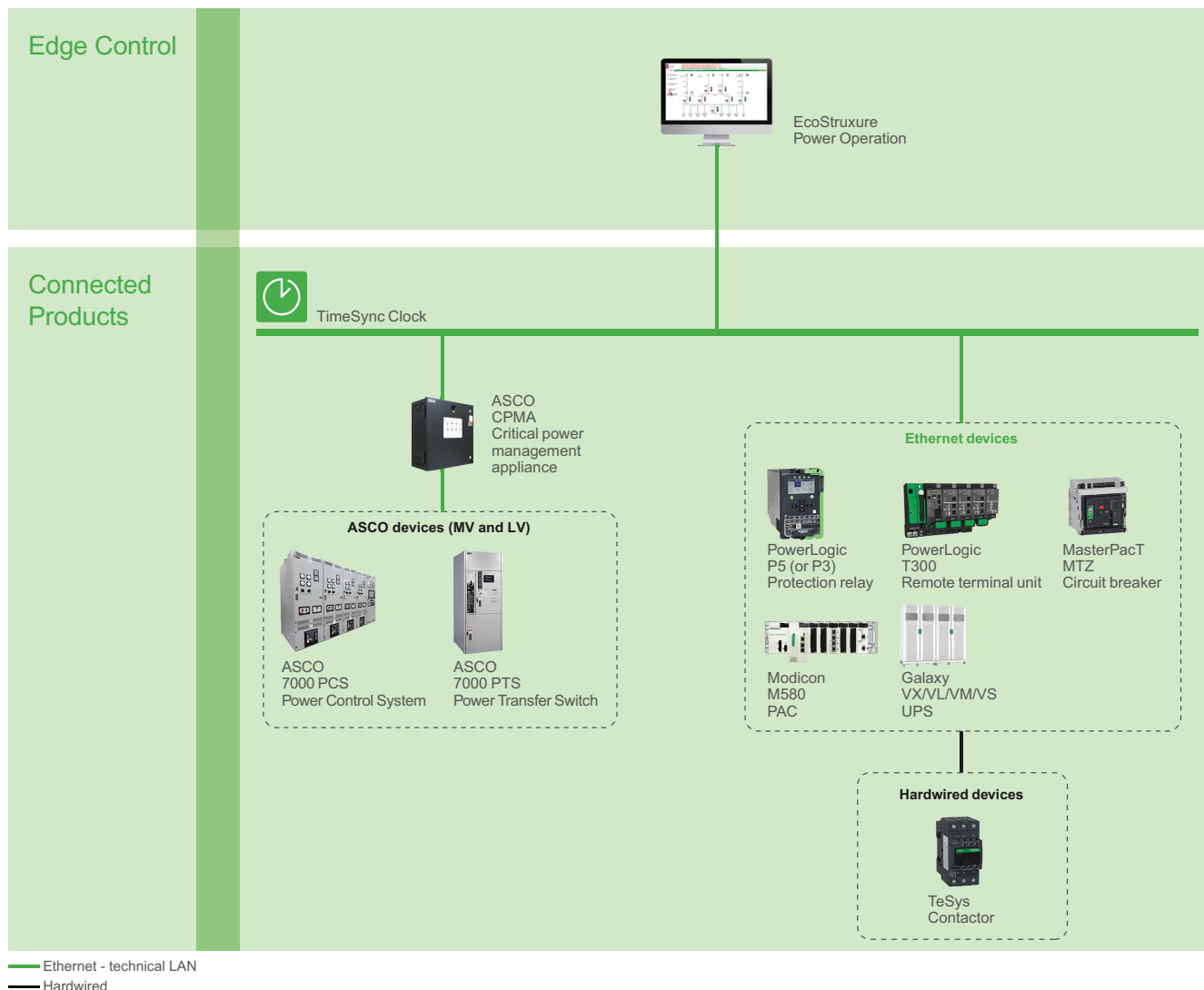
Digital Architecture

In this architecture, the data is collected from connected products either directly over Ethernet, via gateways (such as the EcoStruxure Panel Server), or by the ASCO CPMA. This data is then recorded and processed by the Edge Control software (EcoStruxure Power Operation) for on-premise visualization, analysis, and reporting.

Ethernet-based communication is preferred for fast acquisition of source and network reconfiguration conditions as well as fast action of automatic systems.

In addition, Ethernet-based communication architectures offer a faster response time for user controls. Legacy connected products can be accessed through protocols such as Serial Modbus but will exhibit slower performance.

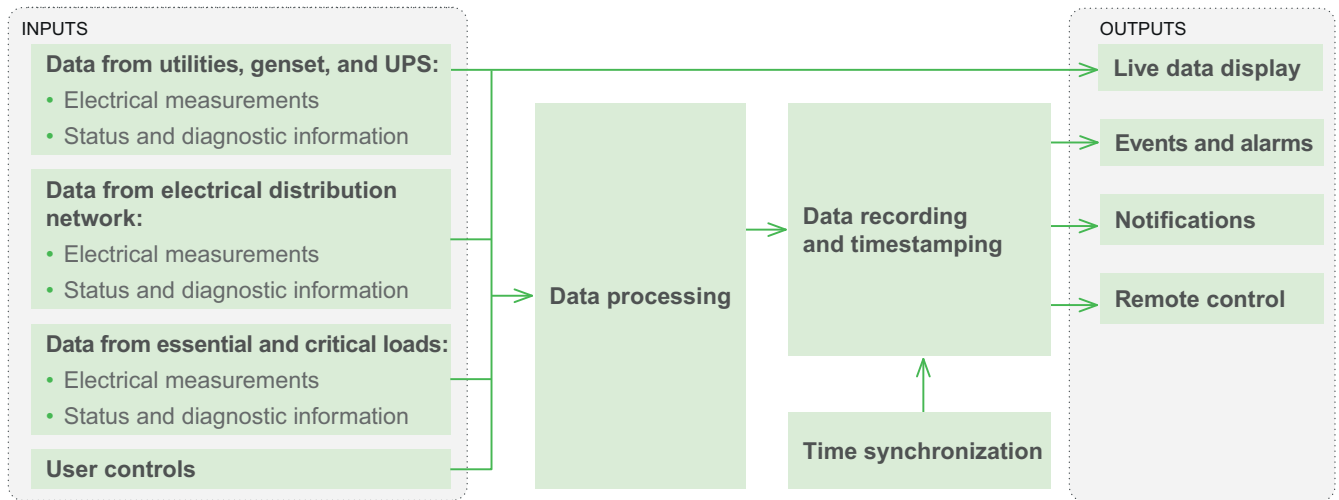
The recommended digital architecture for the application is shown below:



System Description

Data Flow

The Power Source and Load Control application can be broken down as follows:



Inputs

Data from Utilities, Genset, and UPS¹

The following data is required:

- **Electrical measurements:** power sources are monitored to launch automatic reconfigurations or to help operators decide on relevant actions to restore power.
- **Status and diagnostic information:** if any source or load control operations involve the utility incomers, the genset(s), or UPS(s) in the facility, it is key to understand their status and access diagnostic information to run proper automatic or manual reconfiguration sequences.

For the utility incomer and genset, these measurements are collected by protection relays such as the PowerLogic P5/P3 or directly from the genset controller. For UPSs, the measurements can be performed by Galaxy VX/VL/VM/VS.



PowerLogic
P5



PowerLogic
P3



Galaxy
VX/VL/VM/VS

Data from Electrical Distribution Network

The following data is acquired to help automatic systems or operators decide on the best supply path through the electrical distribution network:

- **Electrical measurements:** electrical system loading and parameters such as voltage, current, power, etc.

1. UPS: Uninterruptible Power Supply

- **Status and diagnostic information:**

- Status, diagnostics, and associated status changes from contactors, switches, circuit breakers, Automatic Transfer Switches / Power Transfer Switches (ATS/PTS), etc.
- Trip context from circuit breakers.
- Status of automatic reconfiguration devices.

This information can be gathered from:

- Protection relays with embedded metering (PowerLogic P5/P3, MasterPacT MTZ, or PowerPacT H/J/L)



PowerLogic
P5



PowerLogic
P3



MasterPacT
MTZ



PowerPacT
H/J/L

- Automation controllers (ASCO 7000 Series PCS, PowerLogic T300, Modicon M340 or M580 PAC)



ASCO
7000 Series
PCS



PowerLogic
T300



Modicon
M340



Modicon
M580

- The controllers of the ATS/PTS (ASCO 7000 Series PTS)



ASCO
7000 Series
PTS

Data from Essential and Critical Loads

In critical facilities, the preservation of essential loads such as motors, machines, or other equipment is of utmost importance. Therefore, the following data is key:

- Electrical measurements.
- Status and diagnostic information: it is necessary to understand the status and diagnostic information of these essential loads prior to stopping or re-starting them.

This data can be collected from final distribution devices (for example, TeSys contactors) or through digital and analog inputs of controllers (Modicon M340 or M580 PAC).



TeSys



Modicon
M340



Modicon
M580

User Controls

In the event the automation system halts (due to improper operating conditions) or for the purpose of maintenance, the user is able to issue external control actions (both from EcoStruxure Power Operation or on the device front panel), such as resetting of alarms or open/close orders.



EcoStruxure
Power Operation

Data Processing

For the Power Source and Load Control application, most data processing occurs before data recording and timestamping since power control relies on automation and mostly occurs without user intervention.

These automated actions are monitored and recorded with timestamps in the Edge Control software (EcoStruxure Power Operation or ASCO CPMA in the case of ASCO architectures) for a better understanding of reconfiguration sequences and potential system issues due to improper operating conditions (for example, device in local mode, tripped circuit breaker, etc.).

User intervention (user controls) may be necessary in the event of halted automation, manual load control, or maintenance activities. In this case, data processing consists of logging all user actions with the date and time as well as their user ID for traceability purposes.



EcoStruxure
Power Operation



ASCO
CPMA

Data Recording and Timestamping

All Power Source and Load Control activities are recorded and timestamped for postmortem analysis, traceability, and auditing.

For critical applications, a timestamp accuracy of ± 10 milliseconds is recommended.

To achieve this, the measurements and events are recorded and timestamped onboard smart equipment such as PowerLogic P5/P3, Modicon M580 and M340, etc.

For less critical applications, ± 100 milliseconds may be adequate.

For a comprehensive overview of device recording and timestamping capabilities, refer to Data Recording and Time Synchronization Capabilities of EcoStruxure Power Connected Products.

PowerLogic
P5PowerLogic
P3Modicon
M580Modicon
M340

Time Synchronization

For a consistent chronological view of all events that take place throughout the facility, the date and time should be accurately distributed to connected products and other management systems.

Time synchronization can be performed through various technologies (PTP, NTP, SNTP, etc.). An external master clock may be required and can be connected to a GPS antenna to reach the expected time precision.



TimeSync Clock

Outputs

Outputs are displayed remotely by EcoStruxure Power Operation or by ASCO CPMA (Critical Power Management Appliance).

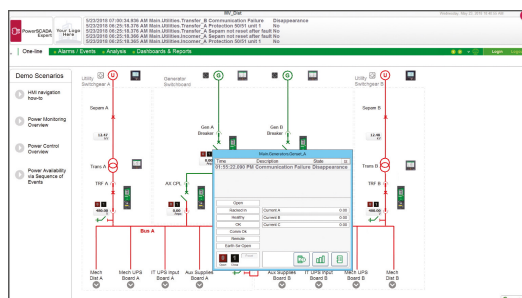
EcoStruxure
Power OperationASCO
CPMA

Live Data Display

Data is displayed in animated single-line diagrams with embedded graphic objects with relevant electrical measurements for sources, distribution network, and loads.

Detailed equipment views with diagnostic information help users to understand the status of each piece of equipment.

If ASCO CPMA is deployed, animated electrical single-line diagrams, floor plans, or facility risers can visually replay power control events.

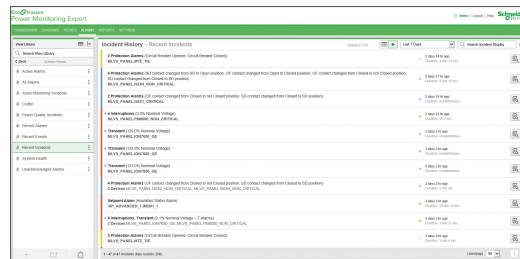


Live Data Display in EcoStruxure Power Operation.

Events and Alarms

Events and alarms are uploaded from connected products or generated by the Edge Control software (EcoStruxure Power Operation) and displayed in native event and alarm viewers. Chronological views include:

- All alarms and events, acknowledged or unacknowledged alarms, summary alarms, or incidents
- High speed and high precision sequence of events to quickly locate the source of a power outage
- Traceability of user control actions with operator name and timestamp



Events and Alarms Log viewer in EcoStruxure Power Operation.

If ASCO CPMA (Critical Power Management Appliance) is deployed, events and alarms can be displayed locally for associated backup power devices such as ATS or genset.

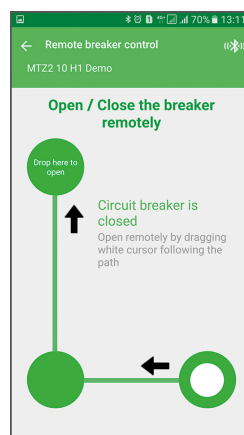
Notifications

Notifications can be sent by EcoStruxure Power Operation with the optional Event Notification module.

Remote Control

EcoStruxure Power Operation enables select-before-operate commands.

Devices such as the MasterPacT MTZ or PowerLogic P5/P3 can be manually controlled from the EcoStruxure Power Device App.



Remote Circuit Breaker Control Interface in EcoStruxure Power Device .



EcoStruxure Power Operation

If ASCO CPMA (Critical Power Management Appliance) is deployed, remote controls are available for associated ATS.

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