Power Quality Correction (IEC)

Help Protect Sensitive Equipment and Business Operations from Power Quality Issues

EcoStruxure Power Digital Application

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EcoStruxure™ Power

Schneider Electric

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Overview

Context of Application

In order to optimize business continuity, critical facilities such as hospitals, data centers, industrial plants, and other infrastructure must avoid damage to sensitive equipment and unexpected disruptions. In these facilities, non-linear loads such as variable speed drives and other electronic equipment with switching power supplies can cause power quality issues. In addition, utilities can feed poor power quality to the facility. As a result, during the design or operations phase of a building, the proper compensation must be implemented to mitigate these effects and deliver clean power to sensitive processes.

Problem to Solve

The facility manager needs to:

- Help protect sensitive equipment and processes against power quality issues such as nuisance tripping, overheating, and malfunction of sensitive equipment.
- Help ensure continuity of business operations.
- Comply with power quality standards such as IEEE 519 for harmonics.

Purpose of the Application

Power Quality Correction addresses common power quality issues such as harmonics, load unbalance, and short interruptions.

Mitigate harmonic effects

Harmonic disturbances typically occur in facilities with sizable non-linear loads such as variable speed drives (VSD), arc furnaces, electronic equipment with switch-mode power supplies, LED lighting, electronic ballasts, battery chargers, etc.

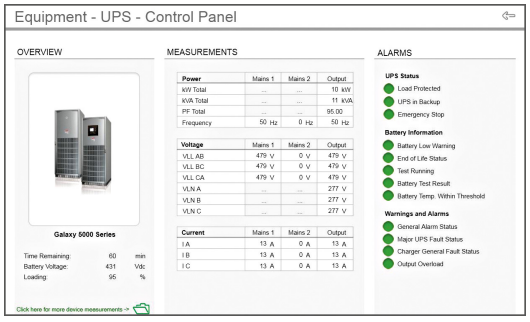
Cure power quality problems due to load current fluctuations

Typically needed to help protect sensitive loads from interruptions, voltage sags and swells, flicker, etc.

Application Outcomes

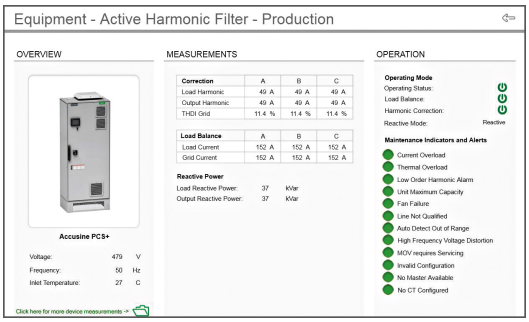
Live Data Display

- UPS equipment status panel diagram



UPS Equipment Status Panel Diagram

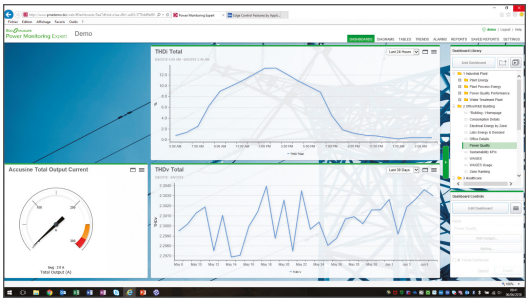
- Active harmonic filtering device diagram



Active Harmonic Filtering Device Diagram

Dashboards

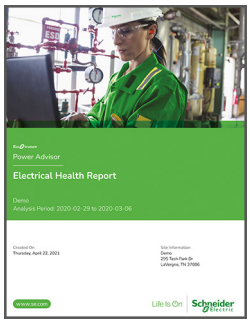
- Power quality dashboard including current, voltage, power factor, reactive power and energy, and current and voltage harmonic distortions



Standard Dashboard for Power Quality Correction

Cloud-Based Analytics and Services

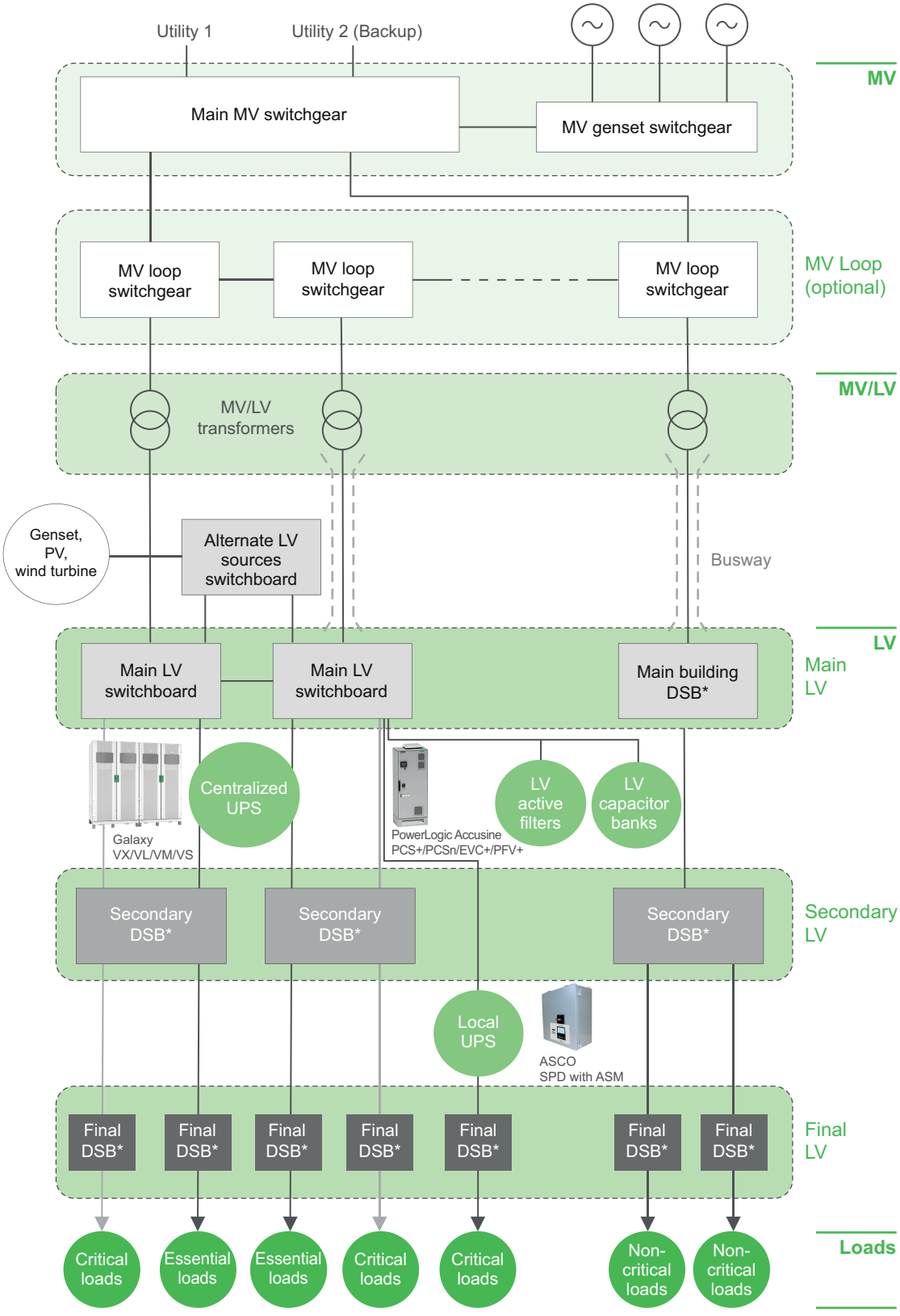
As an option, EcoStruxure Service Plan powered by EcoStruxure Power Advisor provides power quality analytics with recommendations from our Schneider Electric service experts.



EcoStruxure Power Advisor Electrical Health Report

Electrical Architecture

The following diagram details the areas of the architecture where the connected products should be installed in order to implement the Power Quality Correction application:



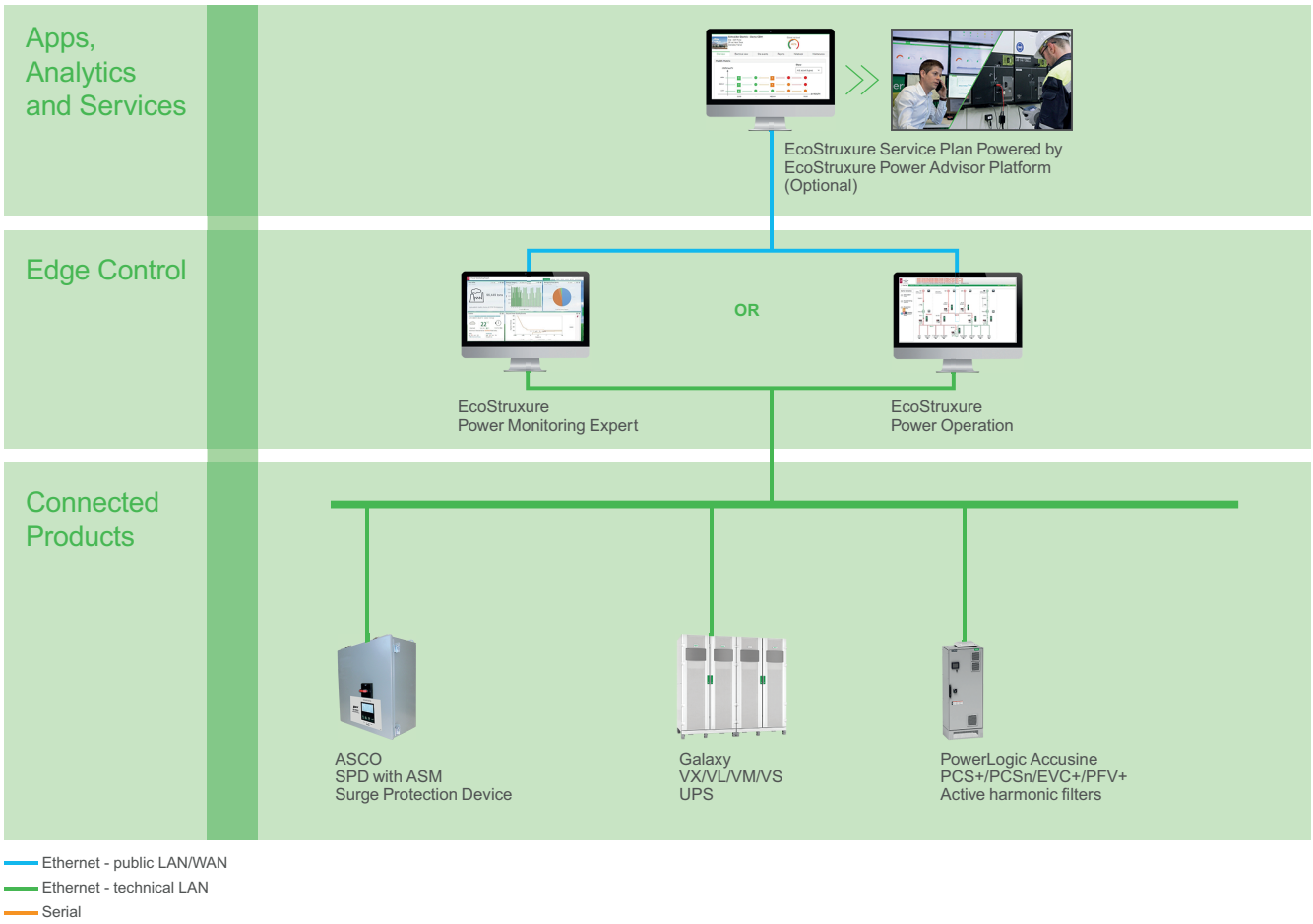
* DSB = Distribution Switchboard

Digital Architecture

Data collected by both PowerLogic AccuSine PCS+/PCSn/EVC+/PFV+ power correction devices and Galaxy VX/VL/VM/VS UPSs is passed on to the Edge Control software (EcoStruxure Power Monitoring Expert or Power Operation) using a direct Ethernet connection.

As an option, data from EcoStruxure Power Monitoring Expert or Power Operation can be passed on to the EcoStruxure Power Advisor platform and interpreted by experts as part of the EcoStruxure Service Plan.

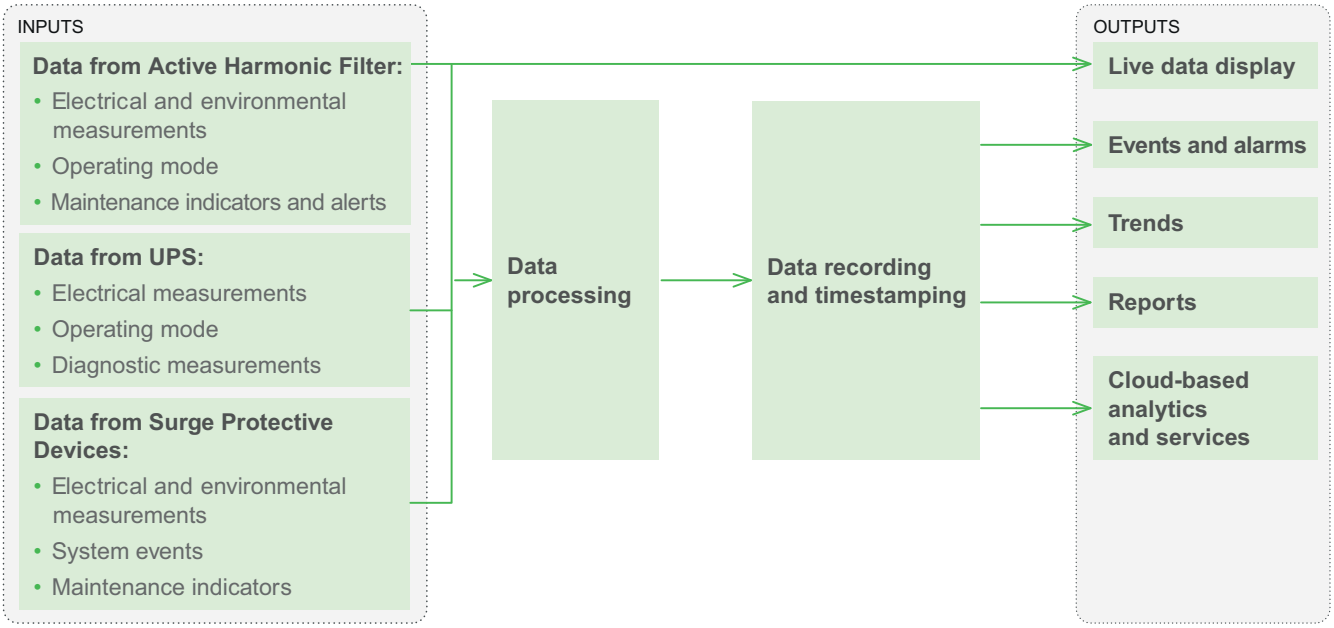
The recommended digital architecture for the application is shown below:



System Description

Data Flow

The Power Quality Correction application can be broken down as follows:



Inputs

The following data is required:

Data from Active Harmonic Filters (PowerLogic AccuSine PCS +/PCSn/EVC+/PFV+)

Electrical and environmental measurements

- Voltage, current, frequency
- Load harmonics, output harmonics
- Load reactive power, output reactive power
- Ambient temperature
- Total harmonic distortion (THD), individual harmonics

Operating mode

- Operating status, load balance, harmonic correction
- Reactive, auto start, auto detect modes

Maintenance indicators and alerts

For example: overloads, capacity alarms, required servicing alarm, etc.

PowerLogic
AccuSine PCS+/PCSn/EVC+/PFV+

Data from UPS (Galaxy VX/VL/VM/VS)

Electrical measurements

- Input and output voltages, currents, and frequencies
- UPS active and apparent power

Operating mode

- Load protected mode
- Bypass enabled mode
- Charging mode
- Test mode
- UPS in backup mode

Diagnostics measurements

- Load capacity percentage, output overload
- Remaining backup time (minutes)
- Battery temperature, charge level, low battery status, end of life

Galaxy
VX/VL/VM/VS

Data from Surge Protective Devices (ASCO SPD with ASM)[1]

Electrical and environmental measurements

- Voltage
- Frequency
- Harmonics

System events

- Surge count
- Voltage sag/swell count

Maintenance indicators

- MOV (Metal Oxide Varistor) health
- SPD health

ASCO
SPD with ASM

Data Processing

Data processing is done through the Edge Control's data acquisition engine to create events and alarms from status and diagnostic information (with EcoStruxure Power Monitoring Expert or Power Operation).

1. Surge protective device with active surge monitor

EcoStruxure
Power Monitoring Expert

EcoStruxure
Power Operation

Data Recording and Timestamping

Data recording is done by EcoStruxure Power Monitoring Expert or Power Operation based on real-time values acquired by the driver.

Timestamping is performed by the PC and recorded in the database, available to the HMI. Therefore, no specific device for time synchronization is necessary.

EcoStruxure
Power Monitoring Expert

EcoStruxure
Power Operation

Outputs

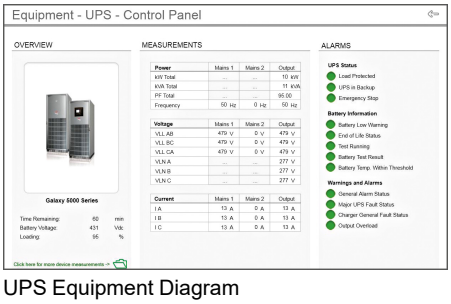
Live data, events, alarms, trends, and dashboards are available by default in EcoStruxure Power Monitoring Expert and Power Operation.

Live Data Display

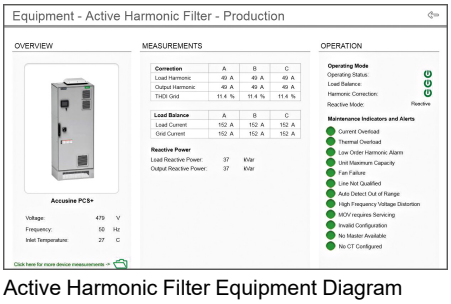
Live data acquired by the software driver can be displayed through equipment diagrams and animated single-line diagrams in EcoStruxure Power Monitoring Expert or Power Operation.

One-page summary diagrams give quick access to the most useful real-time data including electrical measurements, operating modes and statuses, and maintenance indicators.

When required, other measurements and status information can be investigated through more detailed diagrams.



UPS Equipment Diagram



Active Harmonic Filter Equipment Diagram

Events and Alarms

Events and alarms are generated by the Edge Control software upon change of the statuses. The events are timestamped by the PC then recorded and displayed in the software's default alarm interface as diagnostic alarms.

Trends

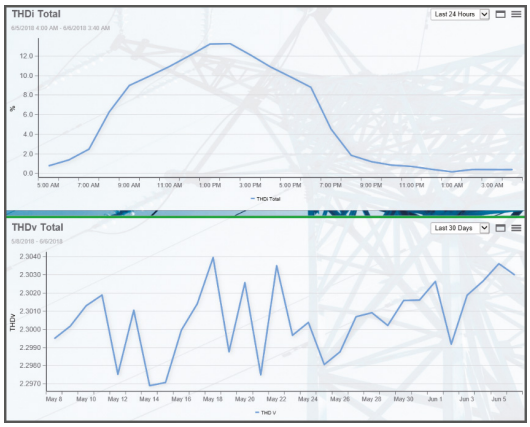
All analog values stored as historical data can be displayed as trends to monitor their evolution over time.

Dashboards

Electrical measurements acquired from correction equipment (PowerLogic AccuSine PCS+/PCSn/EVC+/PFV+, Galaxy VX/VL/VM/VS) can be displayed as historical data in dashboards.

Some examples of these dashboards include:

- Active Harmonic Filter output
- Active Harmonic Filter THDi and THDv total (input or load)



Active Harmonic Filter THDi and THDv Dashboards

Cloud-Based Analytics and Services

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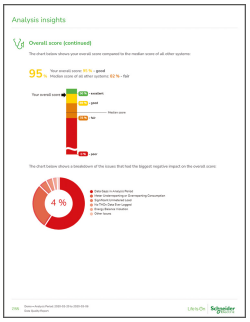
EcoStruxure
Service Plan powered by EcoStruxure Power Advisor Platform



EcoStruxure
Power Advisor Electrical Health Report - Overall Score

EcoStruxure
Power Advisor Electrical Health Report - Device Details by Issue

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