Power Quality Correction (IEC)

Help Protect Sensitive Equipment and Business Operations from Power Quality Issues

EcoStruxure Power Digital Application

ESXP2GE017EN-05 11/2023

Eco**G**truxure[®] Power





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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

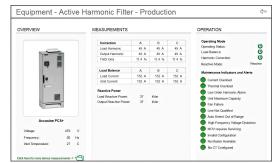
Live Data Display

VERVIEW		MEASUREMENT	s			ALARMS
		Power	Mains 1	Mains 2	Output	UPS Status
		kW Total			10 kW	Load Protected
		KVA Total			11 kVA	 UPS in Backup
		PF Total			95.00	Emergency Stop
		Frequency	50 Hz	0 Hz	50 Hz	-
						Battery Information
MARCONCE MARCONCE		Voltage	Mains 1	Mains 2	Output	 Battery Low Warning
		VLL AB	479 V	0 V	479 V	End of Life Status
COLUMN DISCOUT		VLL BC	479 V	0 V	479 V	Test Running
No. of Concession, Name		VLL CA	479 V	0 V	479 V	Battery Test Result
The second se		VLN A			277 V	Battery Temp. Within Threshold
		VLN B			277 V	Battery temp. within Threshold
		VLN C			277 V	Warnings and Alarms
Galaxy 5000 Series		Current	Mairs 1	Mairs 2	Output	General Alarm Status
Galaxy biob beints		LA	13 A	0 A	13 A	Major UPS Fault Status
Time Remaining 60	min	18	13 A	0.0	13 A	Charger General Fault Status
Battery Voltage: 431	Vd:	10	13 A	0 A	13 A	Output Overload
Loading 95	¥0:	10	13 8			-

UPS equipment status panel diagram

UPS Equipment Status Panel 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

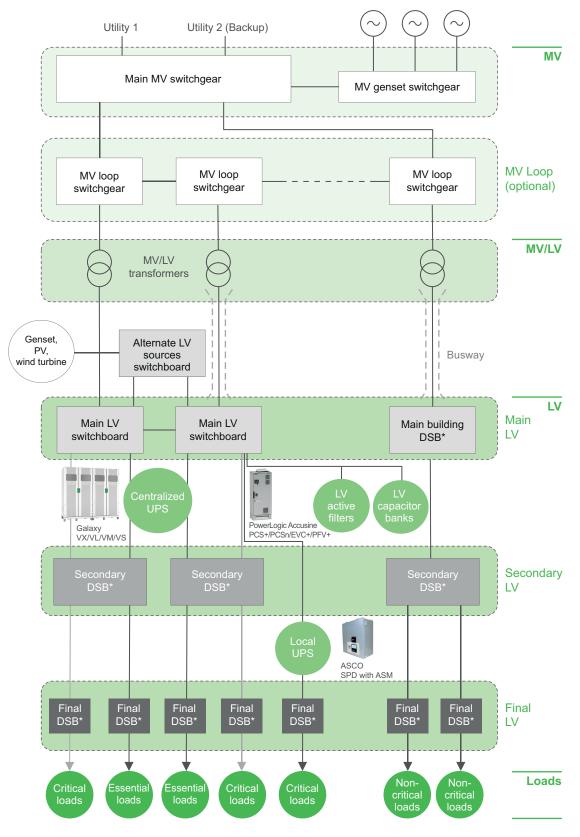
As an option, EcoStruxure Service Plan powered by EcoStruxure Power Advisor provides power quality analytics with recommendations from our Schneider Electric service experts.



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:



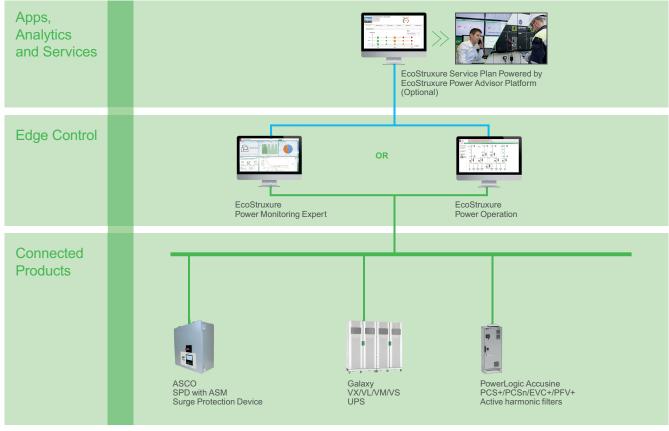
* DSB = Distribution Switchboard

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:



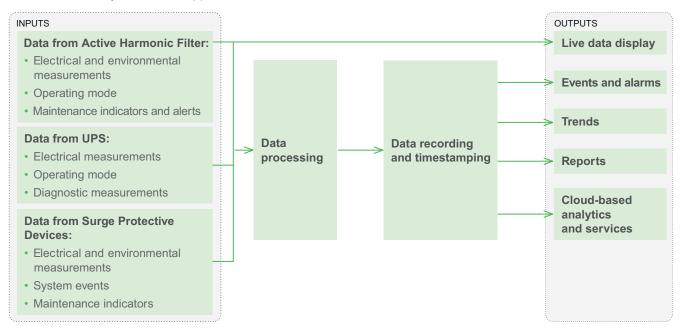
Ethernet - public LAN/WAN Ethernet - technical LAN

Serial

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



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



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



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.

OVERVIEW		MEASUREMENT	s	ALARMS		
		Power	Mains 1	Mairs 2	Output	UPS Status
		kiV Total			10 kW	Load Protected
		KNN Total			11 8505	UPS in Backup
THE R. L.		PF Total			95.00	Errergency Stop
		Frequency	60 Hz	0 Hz	50 Hz	•
						Battery Information
STATE STATE		Voltage	Mains 1	Mains 2	Output	 Battery Low Warning
States States		VLL AB	479 V	0 V	479 😪	End of Life Status
Canal Street		VLL BC	479 V	0 V	479 V	Test Russing
The second division in which the second division is not the second division of the second d		VLL GA	479 V	0 V	479 V	Battery Test Result
and the second se		VUNA			277 V	Battery Temp, Within Threshold
		VUN B			277 V	Cancey lemp. Within Intested
		VLN C			277 V	Warnings and Alarms
						General Alarm Status
Galaxy 5000 Series		Current	Mains 1	Mains 2	Output	Major UPS Fault Status
		1A.	13 A	0 A	13 A	Charger General Fault Status
Time Remaining: 60	rein	10	13 A	A 0	13 A	
Battery Voltage: 431	Vok	10	13 A	0 A 0	13 A	 Output Overload
Loading 95	25					



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

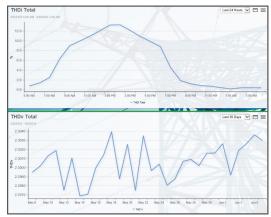
All analog values stored as historical data can be displayed as trends to monitor their evolution over time.

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)



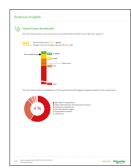
Active Harmonic Filter THDi and THDv Dashboards

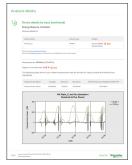
Cloud-Based Analytics and Services

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



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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