Circuit Breaker Settings Monitoring (IEC)

Monitor the Protection Settings of the Electrical Installation

EcoStruxure Power Digital Application

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EcoStruxure™ Power

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Overview

Context of Application

An installation is designed with specific circuit breaker settings, calculated to optimize the protection of the installation. However, throughout the life cycle of the installation, these settings may not be applied correctly or may be modified (for example during maintenance, product replacement, or due to nuisance tripping).

An incorrect setting may lead to:

- Nuisance tripping if the threshold is too low
- The tripping of an upstream circuit breaker instead of the local circuit breaker if the selectivity is ineffective
- Device destruction, fire outbreak, and/or personal injury if the coordination between products is not correct

Problem to Solve

The facility manager needs to:

- Be confident that electrical protection devices are able to fulfill their function.
- Help prevent issues due to inappropriate or poorly coordinated circuit breaker settings.

Purpose of the Application

Manually or automatically generate a report summarizing settings of LV circuit breakers:

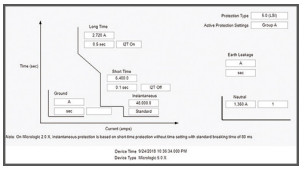
- Easily compare commissioned settings with designed settings to establish a validated baseline
- Compare actual circuit breaker settings with commissioned settings
- Periodically detect inappropriate setting modifications
- Provide information for capacity planning

This report helps to identify settings or coordination issues and to find the root cause of any settings or coordination problems.

Application Outcomes

Live Data Display

At any time, circuit breaker protection settings can be viewed in device diagrams.



Default trip curve diagram for MasterPacT MTZ In EcoStruxure Power Monitoring Expert.

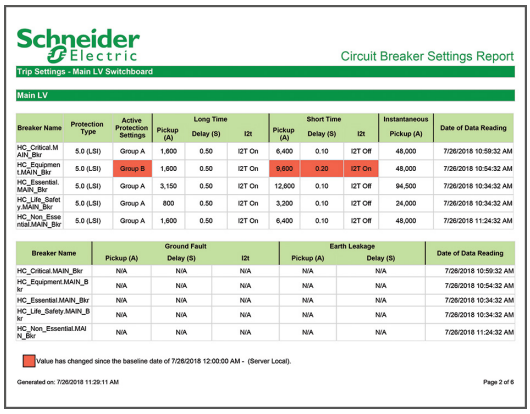
Events and Alarms

Alarms are generated when circuit breaker trip settings change.

Reports

For each protective device, the Circuit Breaker Settings report displays the name, type of protection, and related thresholds.

It also detects any changes made with respect to a baseline.



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Circuit Breaker Settings Report

Trip Settings - Main LV Switchboard

Main LV

Breaker Name	Protection Type	Active Protection Settings	Long Time			Short Time			Instantaneous	Date of Data Reading
			Pickup (A)	Delay (S)	I2t	Pickup (A)	Delay (S)	I2t	Pickup (A)	
HC_Critical.MAIN_Bkr	5.0 (LSI)	Group A	1,600	0.50	I2T On	6,400	0.10	I2T Off	48,000	7/26/2018 10:59:32 AM
HC_Equipment.MAIN_Bkr	5.0 (LSI)	Group B	1,600	0.50	I2T On	9,600	0.20	I2T On	48,000	7/26/2018 10:54:32 AM
HC_Essential.MAIN_Bkr	5.0 (LSI)	Group A	3,150	0.50	I2T On	12,600	0.10	I2T Off	94,500	7/26/2018 10:34:32 AM
HC_Life_Safety.MAIN_Bkr	5.0 (LSI)	Group A	800	0.50	I2T On	3,200	0.10	I2T Off	24,000	7/26/2018 10:34:32 AM
HC_Non_Essential.MAIN_Bkr	5.0 (LSI)	Group A	1,600	0.50	I2T On	6,400	0.10	I2T Off	48,000	7/26/2018 11:24:32 AM

Breaker Name	Ground Fault			Earth Leakage		Date of Data Reading
	Pickup (A)	Delay (S)	I2t	Pickup (A)	Delay (S)	
HC_Critical.MAIN_Bkr	N/A	N/A	N/A	N/A	N/A	7/26/2018 10:59:32 AM
HC_Equipment.MAIN_Bkr	N/A	N/A	N/A	N/A	N/A	7/26/2018 10:54:32 AM
HC_Essential.MAIN_Bkr	N/A	N/A	N/A	N/A	N/A	7/26/2018 10:34:32 AM
HC_Life_Safety.MAIN_Bkr	N/A	N/A	N/A	N/A	N/A	7/26/2018 10:34:32 AM
HC_Non_Essential.MAIN_Bkr	N/A	N/A	N/A	N/A	N/A	7/26/2018 11:24:32 AM

Value has changed since the baseline date of 7/26/2018 12:00:00 AM - (Server Local).

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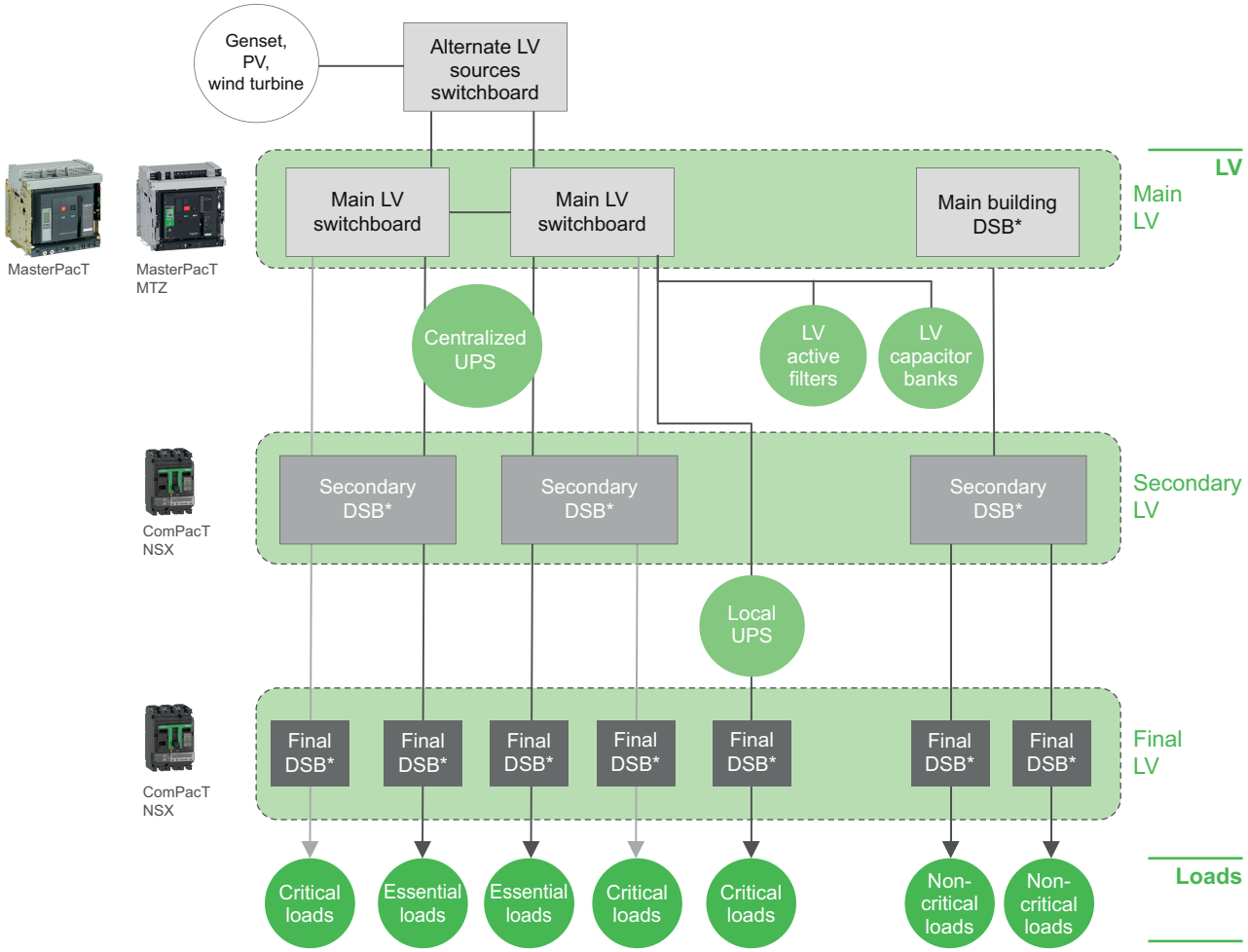
Circuit Breaker Settings Report

Notifications

SMS and/or email notifications can be sent upon settings changes to help detect potential loss of selectivity.

Electrical Architecture

The following diagram details the areas of the architecture where the connected products should be installed in order to implement the Circuit Breaker Settings Monitoring application:

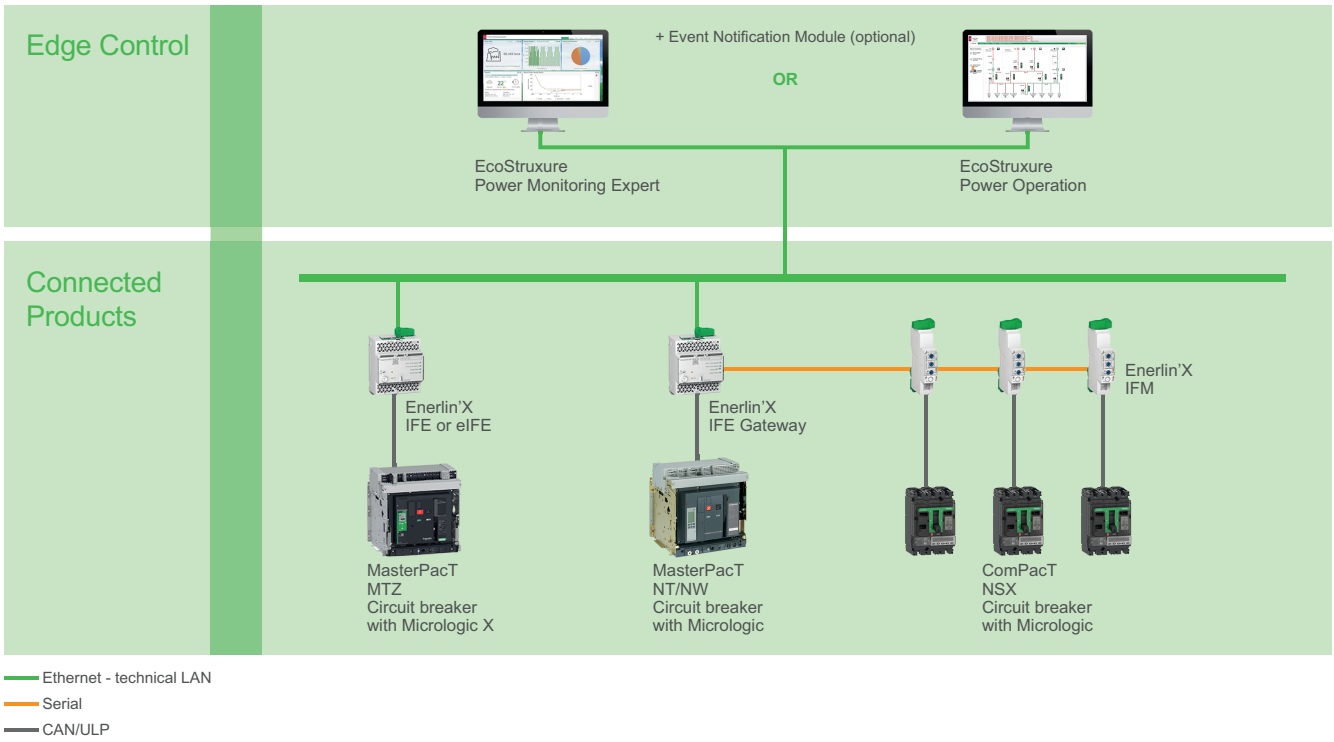


* DSB = Distribution Switchboard

Digital Architecture

The digital architecture of the Circuit Breaker Settings Monitoring application depicts the collection of the protection settings of different circuit breakers via gateways (Enerlin'X IFE, eIFE, or IFM). These data are then recorded and processed by the Edge Control software (EcoStruxure Power Monitoring Expert or Power Operation) for on-premise visualization, analysis, and reporting.

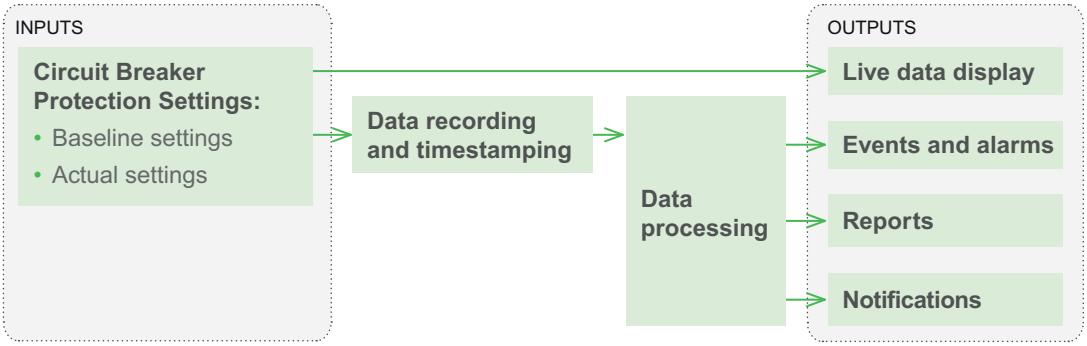
The recommended digital architecture for the application is shown below:



System Description

Data Flow

The Circuit Breaker Settings Monitoring application can be broken down as follows:



Inputs

The following data is required:

Circuit Breaker Protection Settings

Circuit breaker protection settings are obtained from communicating circuit breaker trip units. These protection settings are typically based on an electrical system coordination study performed by an expert. These settings are designed to minimize the impact of disturbances. Any changes in protection settings must consider the overall system coordination of the facility.

The following LV circuit breakers can be monitored by this application:

- **MasterPacT:**
  - MicroLogic 2 A/E
  - MicroLogic 5 A/E/P/H
  - MicroLogic 6 A/E/P/H
  - MicroLogic 7 A/P/H

MicroLogic for MasterPacT

- **PowerPacT (China) / ComPacT NSX:**
  - MicroLogic 5.2/5.3 A/E
  - MicroLogic 6.2/6.3 A/E

MicroLogic for ComPacT NSX

- **MasterPacT MTZ:**
  - MicroLogic 2 X, Xi
  - MicroLogic 5 X, Xi
  - MicroLogic 6 X, Xi
  - MicroLogic 7 X, Xi

MicroLogic X for MasterPacT MTZ

Baseline settings

To capture the original coordination settings, a snapshot is recorded for future reference as a baseline. This baseline is referred to in the Circuit Breaker Protection Settings Report.

Actual settings

Actual protection settings are monitored and recorded either periodically or on value-change notification from connected products.

Data Recording and Timestamping

Circuit breaker protection settings data is recorded and timestamped by the Edge Control software (EcoStruxure Power Monitoring Expert or Power Operation). Therefore, no specific device for time synchronization is necessary.

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

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Power Monitoring Expert

EcoStruxure
Power Operation

Data Processing

Baseline Comparison[1]

A circuit breaker protection setting baseline is used by the Edge Control software (EcoStruxure Power Monitoring Expert or Power Operation Module) to compare the actual state of the circuit breaker settings to a baseline point in time.

If a change is detected between the state of the settings today and the state of the settings on the baseline date, the change will be timestamped, an event will be generated, and the change will be noted in the reporting.

EcoStruxure
Power Monitoring Expert

EcoStruxure
Power Operation

Outputs

Outputs are displayed by the Edge Control software (EcoStruxure Power Monitoring Expert or EcoStruxure Power Operation).

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Power Monitoring Expert

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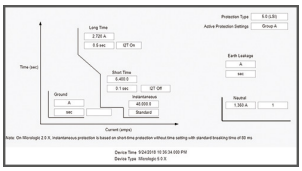
Power Operation

Live Data Display

The protection settings (default trip curve) for a supported circuit breaker can be displayed in the default device diagrams of the Edge Control software.



Default trip curve diagram for MasterPacT MTZ In EcoStruxure Power Monitoring Expert.

Events and Alarms[1]

Any potential changes to the designed protection settings for a circuit breaker can be raised as an event or alarm in the Edge Control software's native alarm interface.

By default, alarms are generated in case of any changes to the following settings:

1. The Breaker Performance module of EcoStruxure Power Monitoring Expert or Power Operation must be deployed to benefit from these features.

- Type of Protection
- Long Time Overcurrent Protection Enabled
- Long Time Overcurrent Pickup Threshold / Time Delay
- Long Time Overcurrent Curve
- Short Time Overcurrent Protection Enabled
- Short Time Overcurrent Pickup Threshold / Time Delay
- Short Time Overcurrent Curve
- Instantaneous Overcurrent Protection Enabled
- Instantaneous Overcurrent Pickup Threshold
- Ground Fault Overcurrent Protection Enabled
- Ground Fault Overcurrent Pickup Threshold / Time Delay
- Ground Fault Overcurrent Curve
- Earth Leakage Protection Enabled
- Earth Leakage Protection Pickup Threshold / Time Delay

Reports[2]

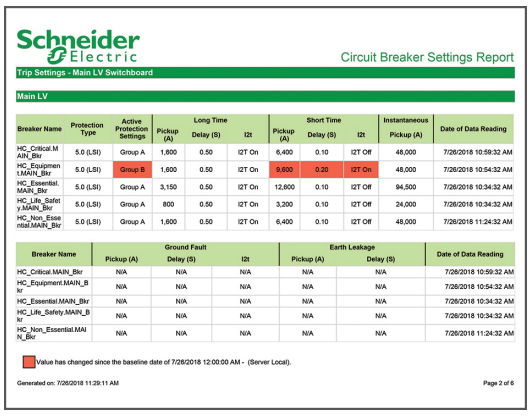
Reports can be configured to be generated upon detection of a circuit breaker settings change.

Circuit Breaker Settings Report

Monitors and reports on the configuration settings of the circuit breakers in your electrical system. The report highlights changes between the baseline and the last known values.

The contents of the report can be summarized as follows:

- Circuit breaker name
- Protection settings, protection modes, maintenance status
- Value (actual and baseline)
- Date/time of change detection
- Date/time of last settings verification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Circuit Breaker Settings Report

Notifications

Notifications of events and alarms can be sent by EcoStruxure Power Monitoring Expert or Power Operation using the Event Notification Module.

2. The Breaker Performance module of EcoStruxure Power Monitoring Expert or Power Operation must be deployed to benefit from these features.

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