

On-Line Transformer Monitor Installation Guide - Model QGateway

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QGateway Installation Guide

Product Overview

The QGateway is used with remotely-deployed transformer monitors to transmit data wirelessly from the remote sensors to a central monitoring platform. The gateway is designed and constructed to operate in environmental conditions in Power Plants, Switchyards or Substations.

Data transmitted by the QGateway can be viewed in the QualConnex® web application to trend asset condition and provide user-defined caution and alarm notifications.

The QGateway is a battery powered, solar charged gateway that transmits encrypted raw signals via RF frequency to either another QGateway as a mesh networking node or to a cellular enabled QGateway for transmission of data through TCP/IP to the remote monitoring system.

QGateway Installation Guide

System Description

An overview of the technical specifications for the QGateway is provided below.



Characteristic	Value
NAM RF Centre Frequency	915 MHz
NAM Cellular	LTE 3G
Operating Mode	Continuous
Power Supply	Solar
Expected Availability	>90%
Ambient Temperature Range	-40°C to 50°C
Typical Range	600m to 1,500m

The system can be configured in to a mesh networking and end node configuration as demonstrated below where multiple sensors can send data to one QGateway and then QGateways can mesh network to a cellular equipped QGateway that transfers data to be analyzed in the QualConnex platform.



Warranty

Qualitrol warrants its Goods to be free from latent defects in materials or workmanship for **the duration of the monitoring contract** initiated at the date of shipment. Additional details on terms and conditions are provided in the signed agreement.

QGateway Installation Guide

Operating Environment

The QGateway is designed to operate within the following outdoor conditions:

- Altitude Range -2000 to 5,000 ft.
- Humidity Range 5% to 95%
- Ambient Temperature Range -40°C to +50°C

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Items Shipped

Upon receipt of your QGateway, it is important to verify the contents of the shipping carton with the packing list. After inspection of the contents, please notify Qualitrol directly if there are any signs of damage that may have occurred in transit. If possible, please retain the original shipping container and packing materials in the event that it becomes necessary to return the monitor.

Part Number	Description
GTW-RF-11310	Qualitrol QGateway, Wireless Sensor Transceiver for Mesh Network, RF to RF Communication, Battery Power Supply, Solar Power Harvesting 
GTW-RF-23310	Qualitrol QGateway, Wireless Sensor Transceiver for Mesh Network, RF to Cellular Communication, Battery Power Supply, Solar Power Harvesting 

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Monitor Installation

CAUTION: Do not attempt to install your DGA-LT1 On-Line Transformer Monitor until you have read and fully understand the procedures outlined in this document.

Installation of the DGA-LT1 consists of the following:

- Site Preparation
- Mounting the Gateway
- Configuration

Installing the Gateway

1. The QGateway is intended for installation on the south side of the transformer enclosure. The Gateway has adhesive pads which allow for installation without the need for fasteners although fasteners can be used if so desired. Place the QGateway as high as possible on the transformer South wall to maximize transmission distance. Alternatively, the QGateway can be mounted within 600m of the DGA-LT1 and still provide reliable data transmission from the sensor in the transformer enclosure.
 - a. Note that transmission distance is impacted by interference of buildings, wind turbine towers, terrain and so forth. Tests have provided communications distances between 300m and 1,500m in wind farm environments. The Gateway could also be mounted on top of the transformer instead of the side (as shown to the right with the original prototype) however possibilities of snow build up exist in some climates which would reduce the ability for the solar cell to charge the QGateway.
2. Once the gateway is mounted, the solar cell will begin to charge the battery in the gateway. The battery will require between 5 – 10 minutes of charge time in order to complete the system configuration once the monitor is installed.

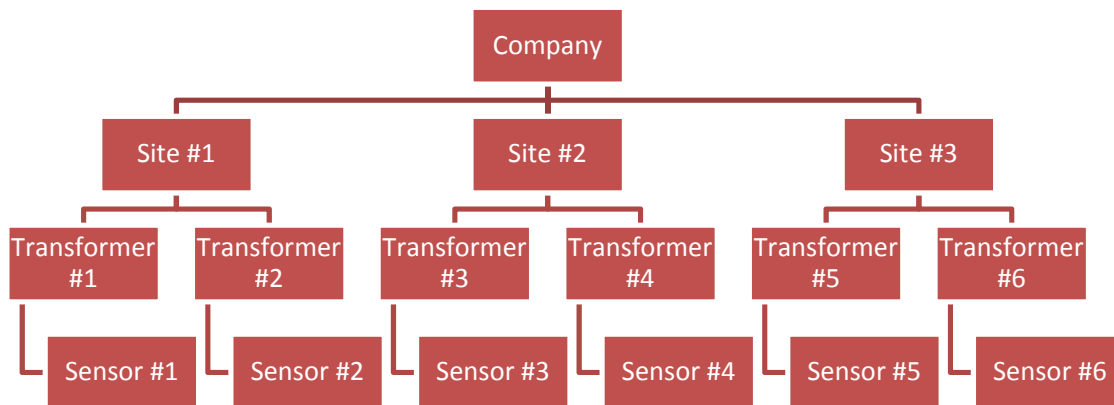


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Commissioning

Introduction

Assets are organized hierarchically, with companies managing a set of sites, and each site containing a set of transformers. Each transformer is associated with a single sensor, which monitors its temperature, humidity and hydrogen levels



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Sites

Viewing and Editing Sites

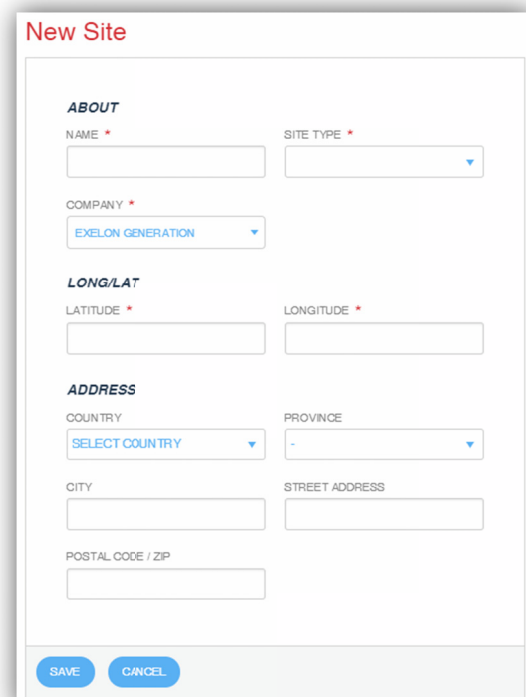
- Select **Asset Management** -> **Sites** from the navigation menu
- Click on the site to view or edit it

Adding a Site

- Click the **Add a Site** button located above or below the sites listing table.

Special Fields

- The **Company** field is used to associate the site with a company.
- **Latitude** and **Longitude** control where the site will appear on the various maps throughout the site.



The 'New Site' form is a web-based interface for adding a new site. It is titled 'New Site' in red text at the top left. The form is organized into sections: 'ABOUT', 'LONG/LAT', and 'ADDRESS'. The 'ABOUT' section contains 'NAME *' (text input) and 'SITE TYPE *' (dropdown menu). The 'LONG/LAT' section contains 'LATITUDE *' (text input) and 'LONGITUDE *' (text input). The 'ADDRESS' section contains 'COUNTRY' (dropdown menu with 'SELECT COUNTRY' text), 'PROVINCE' (dropdown menu with '-' text), 'CITY' (text input), 'STREET ADDRESS' (text input), and 'POSTAL CODE / ZIP' (text input). At the bottom of the form are two buttons: 'SAVE' and 'CANCEL'.

ABOUT

NAME * SITE TYPE *

COMPANY *

EXELON GENERATION

LONG/LAT

LATITUDE * LONGITUDE *

ADDRESS

COUNTRY PROVINCE

SELECT COUNTRY -

CITY STREET ADDRESS

POSTAL CODE / ZIP

SAVE CANCEL

Transformers

Viewing and Editing Transformers

- Select **Asset Management** -> **Transformers** from the navigation menu
- Click on a transformer to view or edit it

Adding a Transformer

- Click the **Add a Transformer** button located above or below the transformers listing table.

Special Fields

- The **Company** and **Site** fields are used to associate the transformer to a site. They are connected, meaning selecting a company will filter the list of available sites.
- **Latitude** and **Longitude** control where the transformer will appear on the various maps throughout the site.

New Transformer

ABOUT

NAME *

COMPANY * SITE *

DESCRIPTION *

LONG/LAT

LATITUDE * LONGITUDE *

ADDRESS

COUNTRY PROVINCE

SELECT COUNTRY

CITY STREET ADDRESS

POSTAL CODE / ZIP

TECHNICAL SPECIFICATIONS

MANUFACTURER SERIAL NUMBER

MODEL NUMBER RATED KVA

PHASE FREQUENCY

VECTOR HV AMPERES

LV AMPERES OIL TYPE

OIL VOLUME TOP OIL RISE

WINDING TEMP RISE LOW VOLTAGE NO LOAD

HIGH VOLTAGE NO LOAD MINIMUM PRESSURE

MAXIMUM PRESSURE

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Sensors

Viewing and Editing Sensors

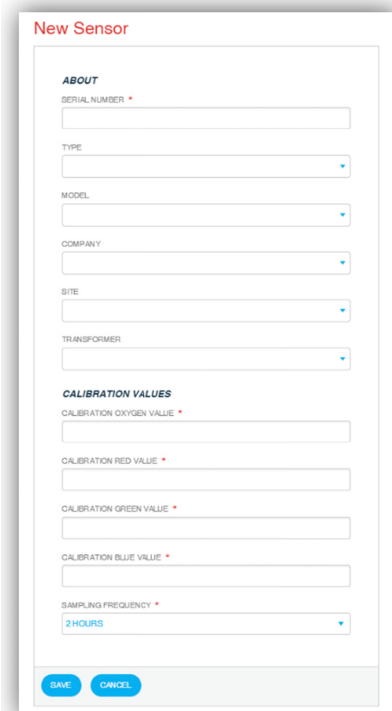
- Select **Asset Management** -> **Sensors** from the navigation menu.

Adding a Sensor

- Click the **Add a Sensor** button located above or below the sensors listing table.
- On save a **Unique ID** (UUID) will be generated that will need to be sent back with any data from the sensor, which will allow the match up of sensor data and sensor. The **Unique ID** is viewable on the sensor listing and when editing a sensor. It cannot be modified.

Special Fields

- The **Company, Site, and Transformer** fields are used to associate the sensor to a transformer. They are connected, meaning selecting a company will filter the list of available sites, and then selecting a site will filter the list of available transformers.
- **Calibration values** are used to calibrate any data sent by the sensor. They are not retroactive, meaning any changes will not affect already calibrated data.
- **Sampling frequency** controls how often data is sent by the sensor (not yet implemented).



The screenshot shows a 'New Sensor' form with the following fields:

- ABOUT**
 - SERIAL NUMBER *
 - TYPE *
 - MODEL *
 - COMPANY *
 - SITE *
 - TRANSFORMER *
- CALIBRATION VALUES**
 - CALIBRATION OXYGEN VALUE *
 - CALIBRATION RED VALUE *
 - CALIBRATION GREEN VALUE *
 - CALIBRATION BLUE VALUE *
 - SAMPLING FREQUENCY *

At the bottom, there are 'SAVE' and 'CANCEL' buttons. The 'SAMPLING FREQUENCY' is currently set to '2 HOURS'.

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Alert Threshold Profiles

Alert Threshold Profiles enable you to set the limits for a sensor's temperature, humidity and hydrogen rating. If a sensor reports readings that exceed its Alert Threshold Profile limits, an alert will be triggered.

Once created, an Alert Threshold Profile can be applied to one or more transformers.

Viewing and Editing Alert Threshold Profiles

- Select **Asset Management -> Alert Threshold Profiles** from the navigation menu.
- Click on the Alert Threshold Profile to view or edit it

Adding an Alert Threshold Profile

- Click the Add an Alert Threshold Profile button located above or below the sites listing table.
- Fill out an identifying name for the profile and select a company.
- Each row corresponds to a particular metric with an input to enter a threshold and contains a toggle to enable / disable each metric / threshold individually.
- When complete, click the Save button at the bottom of the form.

The screenshot shows a web form titled "Alert Threshold Profile". At the top, there are two input fields: "NAME" and "COMPANY". Below these are two buttons: "ENABLE ALL" (blue) and "DISABLE ALL" (red). The main part of the form is a table with three sections: "HYDROGEN", "HUMIDITY", and "TEMPERATURE". Each section has a row of input fields for thresholds and a row of toggle switches. The columns for thresholds are: "NO DATA ALERT (DAYS)", "ABSOLUTE LIMIT", and "INCREASE LIMIT" (which is further divided into "1 DAY", "7 DAY", "30 DAY", "90 DAY", "180 DAY", and "365 DAY"). Each input field contains the number "0". Each toggle switch is currently in the "off" position (blue square). At the bottom of the form are two buttons: "SAVE" (blue) and "CANCEL" (blue).

	NO DATA ALERT (DAYS)	ABSOLUTE LIMIT	INCREASE LIMIT					
			1 DAY	7 DAY	30 DAY	90 DAY	180 DAY	365 DAY
HYDROGEN	0	0	0	0	0	0	0	0
	☐	☐	☐	☐	☐	☐	☐	☐
HUMIDITY	0	0	0	0	0	0	0	0
	☐	☐	☐	☐	☐	☐	☐	☐
TEMPERATURE	0	0	0	0	0	0	0	0
	☐	☐	☐	☐	☐	☐	☐	☐

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Assigning an Alert Threshold Profile

- Select **Asset Management** -> **Transformers** from the navigation menu.
- Select a transformer for edit.
- Select the Alert Profile tab.
- From here you can select a profile, edit the assigned profile, create a new profile, or remove the profile from the transformer.
- All available thresholds are selectable from the list. When chosen, a preview will be shown.
- When ready, click the **Save** button at the bottom of the form.

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Managing Alerts and Reports Emails

Your **Profile Page**, which you can access via a link in the top right of the navigation, gives you the option to opt in or out of alert and report emails.

Signing up for Alerts

- Select **My Profile** from top right of the window.
- Check the box Receive Alert Emails.
- Click the **Save Changes** button at the bottom of the form.

Signing up for Reports

- Select **My Profile** from top right of the window.
- Check the box Receive Report Emails.
- Click the **Save Changes** button at the bottom of the form.

The screenshot shows the 'MY PROFILE' form with the following fields and annotations:

- E-MAIL ADDRESS ***: Text input field.
- FIRST NAME ***: Text input field.
- LAST NAME ***: Text input field with a red '2' icon.
- COMPANY ***: Dropdown menu showing 'COMPANY'.
- ACTIVE ***: Dropdown menu showing 'ACTIVE'. A red arrow points to this field.
- ROLE ***: Dropdown menu showing 'COMPANY ADMINISTRATOR'. A red arrow points to this field.
- RECEIVE ALERT EMAILS**: Checkbox, currently unchecked.
- RECEIVE REPORT EMAILS**: Checkbox, currently checked.
- TIMEZONE ***: Dropdown menu showing '(GMT-04:00) AMERICA, TORONTO'.
- Password**: Text input field with a red '2' icon. Below it are three bullet points: 'must be at least 8 characters long', 'must contain at least 1 uppercase letter, 1 lowercase letter, and 1 number', and 'can contain special characters'.
- PASSWORD (LEAVE BLANK TO KEEP CURRENT PASSWORD)**: Text input field with a red '2' icon.
- PASSWORD CONFIRMATION**: Text input field.
- Buttons**: 'SAVE CHANGES' and 'CANCEL' buttons at the bottom.

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Canadian Compliance Statement

This device contains license-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada license-exempt RSS(s). Operation is subject to the following two conditions:

- (1) This device may not cause interference.
- (2) This device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

- (1) L'appareil ne doit pas produire de brouillage;
- (2) L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

NOTE: Afin d'assurer la conformité aux exigences de la FCC en matière d'exposition aux radiofréquences, aucune modification de l'antenne ou de l'appareil n'est autorisée. Toute modification de l'antenne ou de l'appareil pourrait avoir pour conséquence que l'appareil dépasse les exigences en matière d'exposition aux radiofréquences et annule le droit de l'utilisateur de faire fonctionner l'appareil

FCC Compliance Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause interference
- (2) This device must accept interference, including interference that may cause undesired operation of the device.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These Limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the users is encouraged to try to correct the interference by one or more of the following measures.

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and the receiver
- Consult Qualitrol for assistance

Any changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This equipment complies with the FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator and all persons. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.