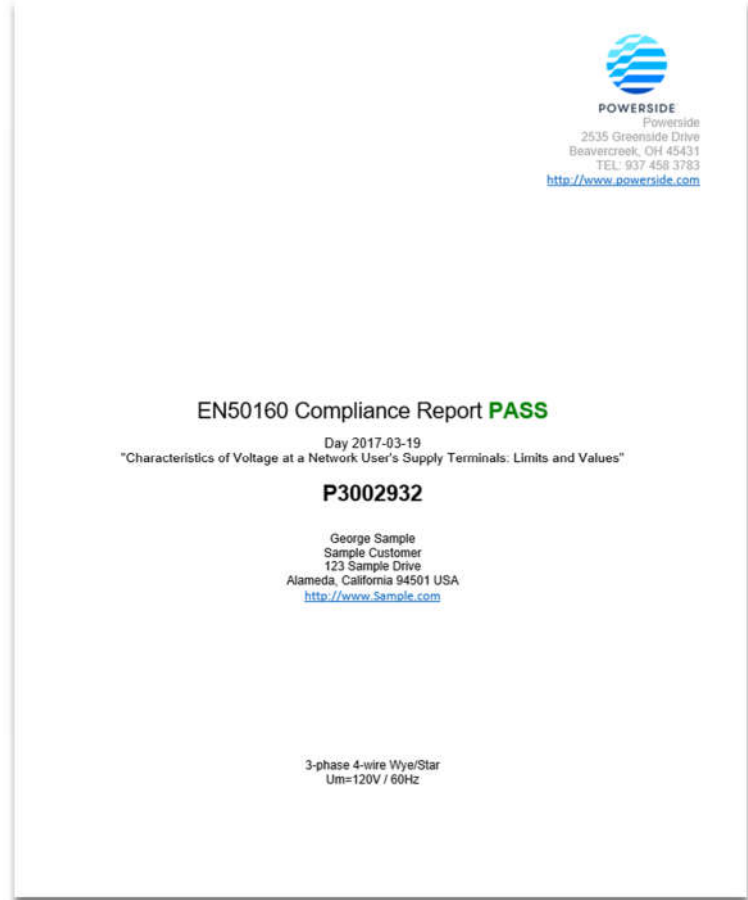# PQube® Report Writer 3.8.0

User's Guide

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If you find information in this manual that is incorrect, misleading, or incomplete, we would appreciate your comments and suggestions.

Please contact support@powerside.com for assistance or further information on our product.

Contents

1. Introduction to the PQube® Report Writer

- Create Standard-based and Custom Power Quality Reports.

  The PQube® Report Writer is a powerful tool that automates writing complete, ready-to-present Microsoft Word® reports based on the data and analysis generated from the Powerside PQube. The report organizes and formats the data collected and provides comparisons to international standards such as EN50160[1] documenting compliance. In addition to the library of standard reports, Report Writer can create custom reports based on user-selected thresholds, limits, coverage, etc.

  Report customization is made easy and repeatable using information captured in the main Report Writer window and inserted in the report, including photographs, as appropriate. Each report is complete and ready for delivery.

2. Available Report Types

- Standards-based reports, including EN50160

  The PQube® Report Writer comes with a library of international standards, including all six versions of EN50160. Choose a standard in the main Report Writer window to create a report based on that standard.

- Custom Reports, such as IEC 61000-3-2

  Create custom reports and add new standards to the library. Simply select NEW and create a report based on your unique criteria. Use this new standard for future reports. Note that any custom standards report must manually copied to the PQube Report Writer Standards folder with the installation of a new version of the Report Writer program.

- Energy, Harmonics, and PQube Trends

  Focused (limited) reports are available for energy usage, power readings or harmonic compliance.

3. Installing the Report Writer program

- System Requirements

  To install the PQube® Report Writer program, you will need the following:

  - Microsoft® Word 2007 or later. Open Office version of Word will not work.
  - At least 1 GB of free RAM.
  - ADMIN privileges if installing in the C:\Program Files directory.

- Installing the Report Writer program

  It is a compressed (zipped) file so you will first need to extract (unzip) it to run the executable. A file called "Install PQube Report Writer.exe" will be created. Double click on this to install the program. You will get the PQube® Report Writer Setup screen.
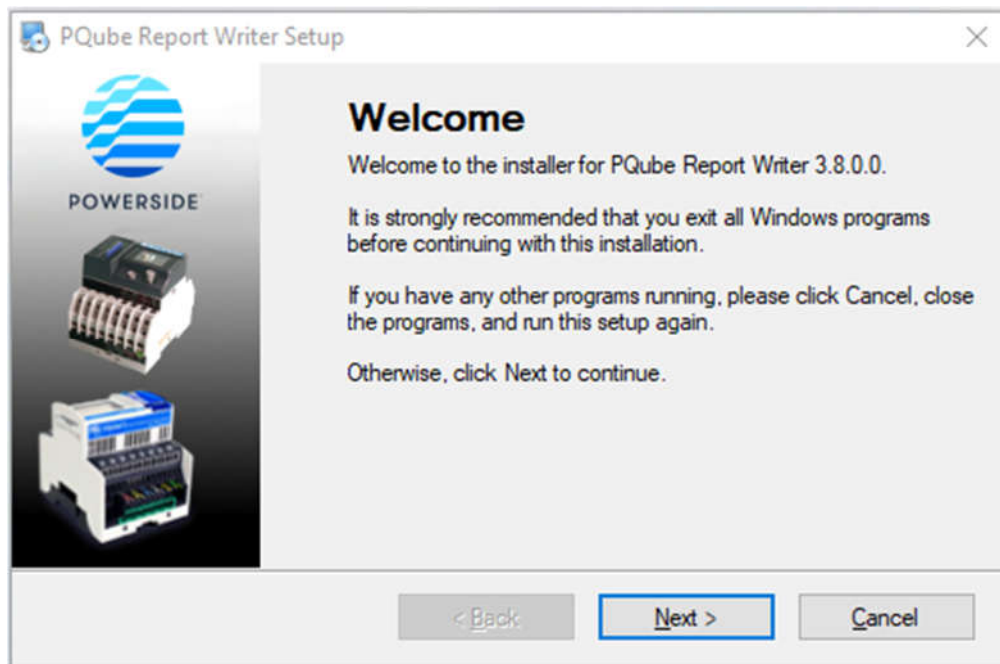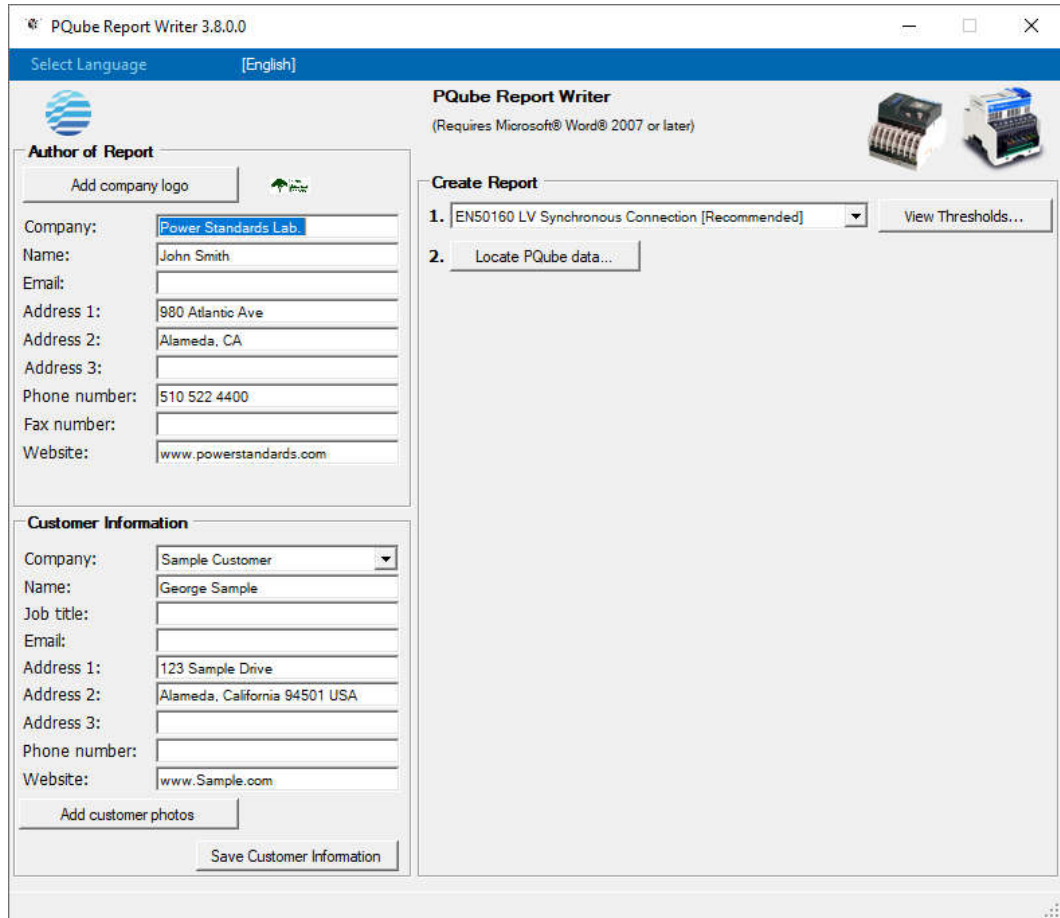
PQube Report Writer is now ready for use.

4. Using Report Writer

- You must have Microsoft® Word® 2007 or later

  The PQube® Report Writer Program generates reports in Microsoft® Word®. To use this program, you *must* have Microsoft Word 2007 or later. Note that Open Office version of Word will not work.

- Configuring your PQube's Setup.ini for an EN50160 report

  To include EN50160 requirements such as **harmonics, flicker, voltage unbalance, voltage THD**, **10-sec frequency** in your EN50160 report, it is important to properly configure your PQube's Setup.ini parameters *prior* to measuring and recording data. Below are the parameters which need to be enabled in your Setup.ini file.

  PQube 3: Record voltage unbalance, Record 10 second frequency, Record 10 min harmonics and parameter, Record Flicker, Record THD, Record TDD. Note that if "Record 10 second frequency" is enabled in your PQube 3's Setup.ini, only averages for frequency will be reported.

  PQube Classic: Trend Harmonics (10 or 15 min. intervals), Voltage THD, Voltage Unbalance, Flicker

Or click on the "EN50160 Settings" button in your PQube Configurator program and it will automatically enable these settings for you.

Very important. Use either a comma (,) or semicolon (;) as your CSV separator for the PQube trends output formatting in the Setup.ini file (default is set to comma). *Do not use [tab]*. The Report Writer program does not recognize the use of the [tab] separator and will generate an error message.

- PQube-recorded data

    To create a report, import the recordings from your PQube. We recommend that you copy ALL the data from your PQube to your computer. Or simply generate your report directly from your USB Drive or SD card! If you don't have physical access to the PQube, you can download the files via FTP. The Report Writer program uses the Daily/Weekly/Monthly Trends data which can be found in the \<year>\<month>\<day> folders. When downloading the files remotely to your computer, it is important to maintain the same file directory structure found on your PQube.

- Company Information

    Enter information about your company in the main Report Writer window. The PQube® Report Writer uses this information to prepare a Microsoft® Word® report that is correctly formatted with your company as the preparer of the report. The PQube® Report Writer automatically remembers all your company's data, so you only need to enter it once.

    Company's Logo

    If you want your company's logo to appear on every report, click on **Add Company Logo** and select a file that contains a picture of your logo in JPG, PNG, or GIF format. Don't worry about the size of the picture—the PQube® Report Writer will automatically resize it to fit.

    Company's Contact information

    Fill in your company's contact information. The PQube® Report Writer will automatically put it in the correct locations in your report.

    Company's Website

    Add your company's website. It will appear on every page of the report. Your customer will know exactly who prepared the report!

- Customer Information

    Enter information about your customer right below your company's information. This information will change based on the specific customer for whom the report was generated. Click the **Save Customer Information** button to save the customer information for future use.

    Once a customer profile has been saved, this customer's information will be automatically available on the customer drop-down list.

To enter a new customer, choose **New** from the Customer drop-down list, choose a new name for this customer, and enter the data for this customer.

<u>Customer name, address and website</u>

The PQube® Report Writer will automatically insert the customer's name, address and website at the correct locations in your report.

<u>Customer photographs</u>

Photographs can also be imported into Report Writer. Click on **Add customer photos** to add photos and captions for the photos.

The photo files can be multiple formats with JPG being standard. The photos must be in the correct orientation—the PQube® Report Writer will not rotate them. Report Writer will automatically resize the photos to fit the report.

- Standards-Based Reports

    The PQube® Report Writer prepares a report based on your PQube's recorded data and the requirements of an international standard or your custom limits/threshold settings.

    Choose a standard from the drop-down list on the right side of the Report Writer window.

- Custom Reports

    Create custom reports based on new standards or your unique requirements. From the Standard drop-down list, choose **New**, and name the new standard. Thresholds, comments, and all the parameters of the new standard can now be edited and saved for future use.

- Standard Reports English, French or German

    PQube® Report Writer comes ready to write reports in English, French and German.

- Other Languages

    Add any language is as easy as updating a text file. Copy and rename a text file (in the "Languages" folder) and translate the phrases in the text file. The new language will be available in the Languages menu of your PQube® Report Writer.

5. Write the report

Once the data has been loaded and prepared, click on the **Create Report** button, and the PQube®
Report Writer will automatically launch Microsoft® Word® and start writing the report!
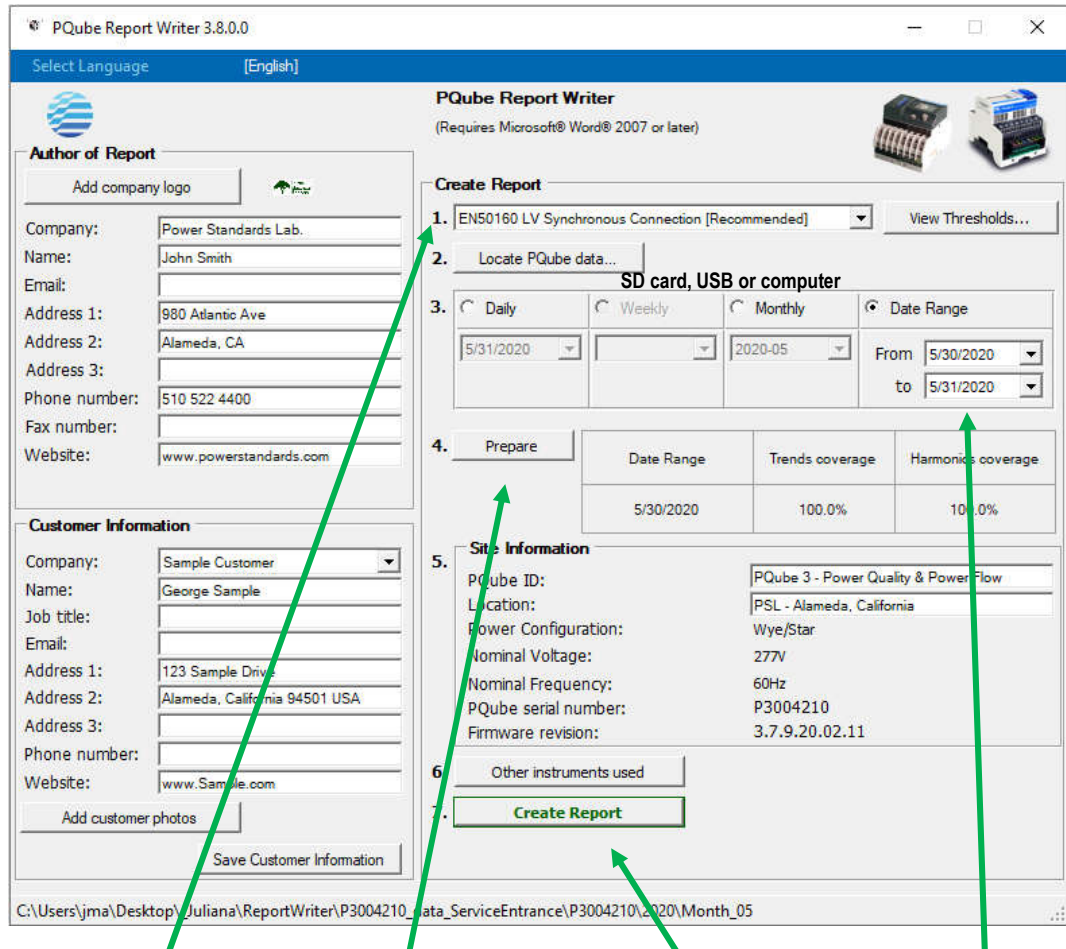
Choose an EN50160 standard or create your own!
You can customize your report by clicking on the
Edit Thresholds button. Note that you can only View
Thresholds for EN50160 reports.

**Click Prepare to calculate
your Trends and Harmonics
coverage for your report.**

**Click Create Report to start
writing the report in MS
Word.**

**Choose Daily, Weekly,
Monthly or Date Range
for your report.**

6. How to choose a pre-defined standard

- Choose an EN50160 standard

There are six versions of the EN50160 standard built into the Report Writer program: Low Voltage,
Medium Voltage, High Voltage, and, each in a—Synchronous Connection (interconnected grid i.e.,
European grid, western U.S. grid, etc.)

—Non-synchronous Connection mode (islanded grid i.e., Azores Islands, Hawaii, Puerto Rico grid, etc.).
You have the option of excluding or including flagged data² in your EN50160 report by clicking on the
"View Thresholds…" button.

|	
☑ Exclude flagged data	**This is the default setting**. Dips, swells, interruptions will be "flagged," excluded in the report and not calculated in the measurement period. However, if there was a continuous event and 100% of your data are flagged or your frequency was flagged more than 20% of the measurement period, the result will be INCOMPLETE.
☐ Exclude flagged data	Dips, swells, interruptions will NOT be "flagged" and included in the report. By doing so, your results may yield as FAILED if the flagged data measurements fall outside of the EN50160 limits and thresholds for frequency, voltage, flicker, unbalance, THD.

²Flagged data is defined as IEC 61000-4-30 events such as voltage sags, swells, interruptions.

The description of the EN50160 standard is based on the characteristics of voltage at a network user's supply terminals: Limits and Values

- EN50160 LV Synchronous Connection
  Low Voltage Systems (<1 kV) limits

- EN50160 LV Non-Synchronous Connection (Island)
  Low Voltage Systems (<1 kV) limits

- EN50160 MV Synchronous Connection
  Medium Voltage Systems (1 kV —- 36 kV) limits

- EN50160 MV Non-Synchronous Connection (Island)
  Medium Voltage Systems (1 kV —- 36 kV) limits

- EN50160 HV Synchronous Connection
  High-Voltage Systems (36 kV —- 150 kV) limits

- EN50160 HV Non-Synchronous Connection (Island)
  High-Voltage Systems (36 kV —- 150 kV) limits

Click on the drop-down list to select from one of the EN50160 standards.

Thresholds, limits, parameters are pre-defined and cannot be edited (grayed out). To view the thresholds, click on the **View Thresholds** button.
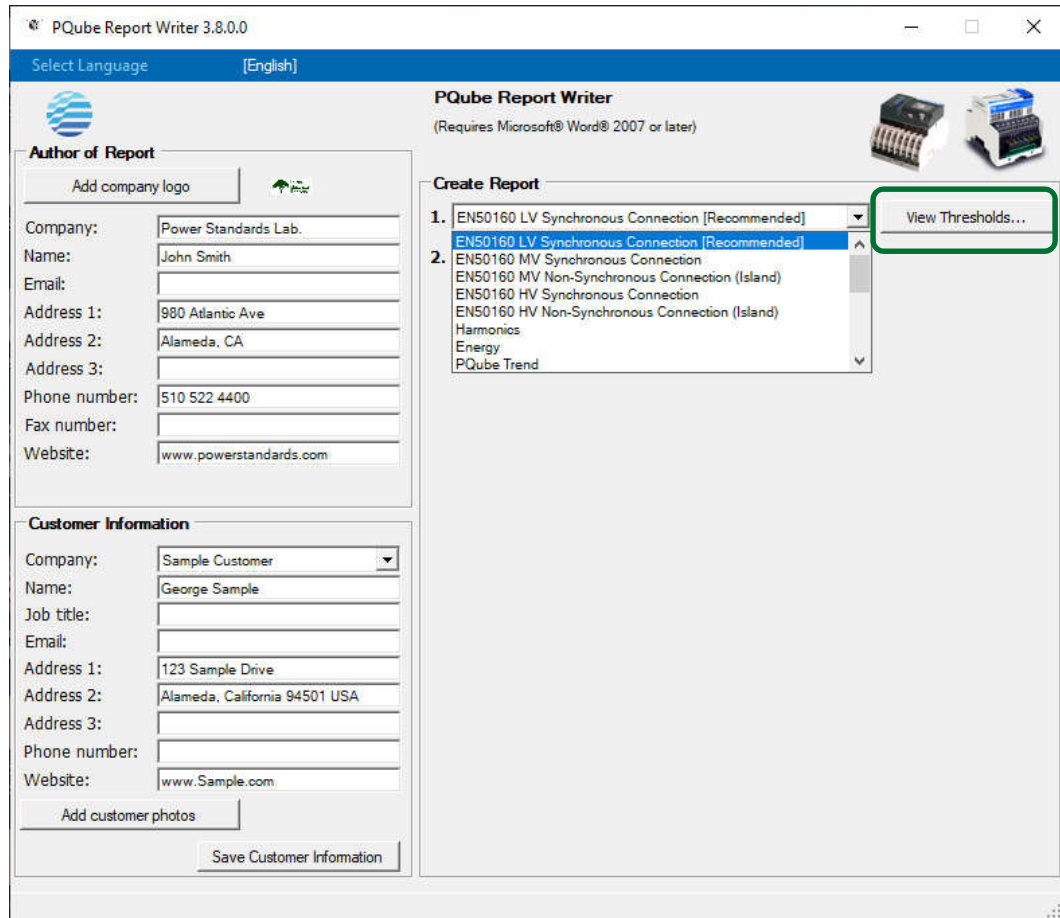
The first screen that appears is your "General" settings for the **EN50160 standard**. Here you'll select what parameters are included in your report. To get more details, click on each tab to display the EN50160 defined limits and thresholds for each individual parameter. Note that the limits and thresholds are pre-defined per EN50160 standards and cannot be edited.

You have the option to EXCLUDE or INCLUDE flagged data² in your report.

- Exclude flagged data may lower the coverage and result in INCOMPLETE. Check the box.
- Include flagged data may result in FAILED when there are many events. Uncheck the box.

7. Choose a non-EN50160 standard

In addition to EN50160 compliance report, the PQube® Report Writer program comes preloaded with other types of reports to help you understand and analyze your power.

Unlike the EN50160 reports which have fixed pre-defined parameters and limits, you can choose which parameters to include/exclude in your report and whether to use thresholds by clicking on the "Edit Thresholds…" button. Graphs are optional.

Use Thresholds ☐	To generate a DATA only report without a PASS/FAIL result, uncheck the "Use Thresholds" box for each parameter included in your report.
Use Thresholds ☑	To generate a PASS/FAIL compliance report *and* customize your limits and threshold settings, check the "Use Thresholds" box for each parameter included in your report. By default, you will also get min., avg., and max. values.

- Energy

    This report has preselected parameters for Power and Energy.

- Energy Billing

    In this report, you can load account-specific tariff rates, edit an existing tariff, and select a currency.

    Note: The power_energy.CSV files needed for the Energy Billing report are generated in the Daily trends only. Therefore, you can only run the report by selecting "Daily" or "Date range."

    "Record energy metering" must be enabled in your PQube's Setup.ini prior to recording data.

8. Important information for all Harmonics and IEEE 519 reports

- Harmonic recording must be enabled in the PQube's Setup.ini prior to recording data.

Record 10 min harmonics and param. (parameter) = ON (for PQube 3)—CLASS A Compliant
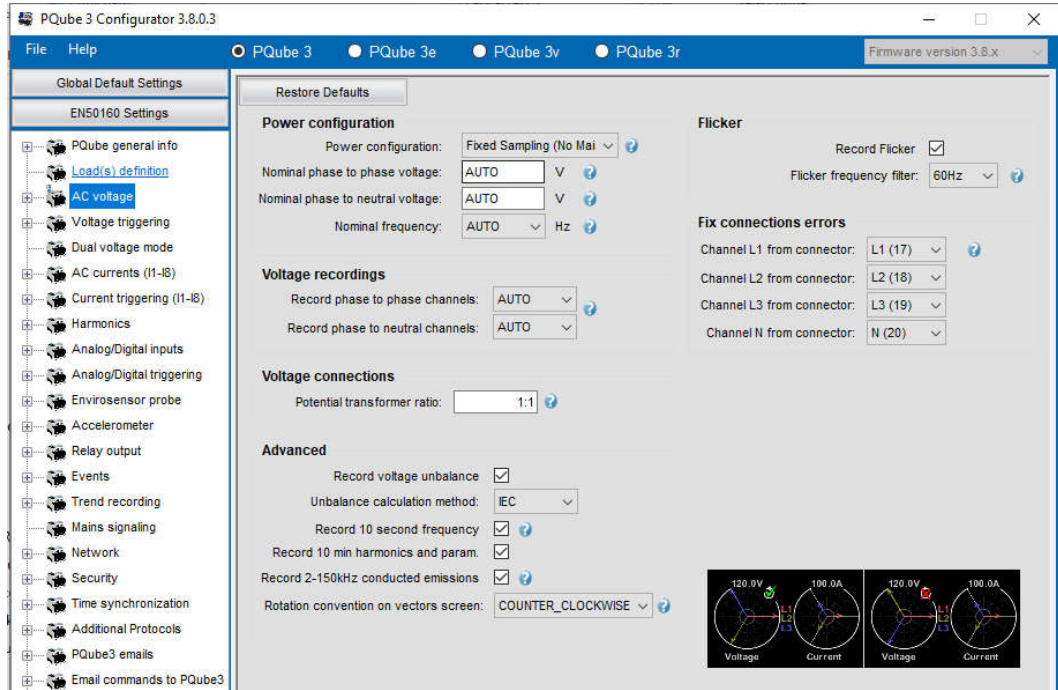
Trend Harmonic Interval in Minutes = 10 or 15 (for PQube Classic)—NOT CLASS A Compliant
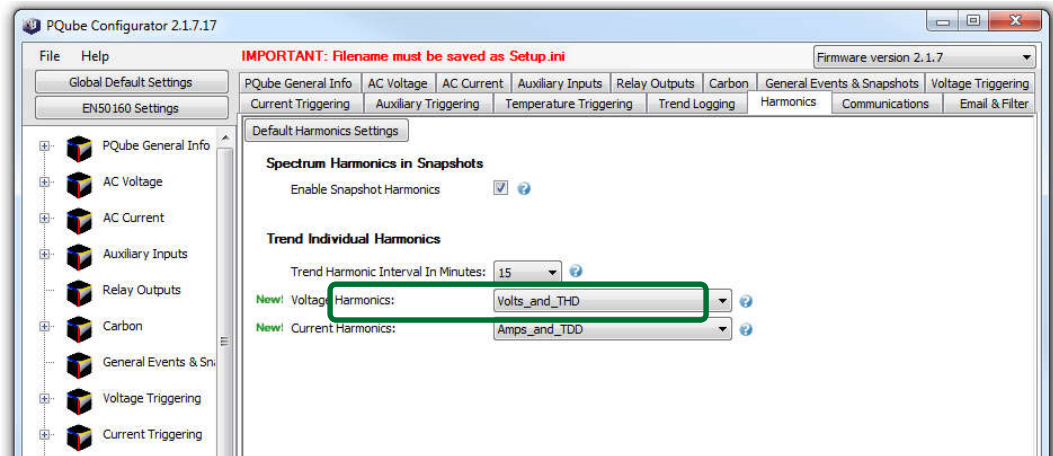
- 10 Min Class A CSV

  The Report Writer uses the 10-Min Class A.CSV files for all Harmonics and IEEE 519 report. These files are generated as part of the daily trends (not weekly or monthly). However, you can still run a Weekly and Monthly report that will include your harmonics data. To do so, when clicking on "Locate PQube data…" button, select the <year> folder.
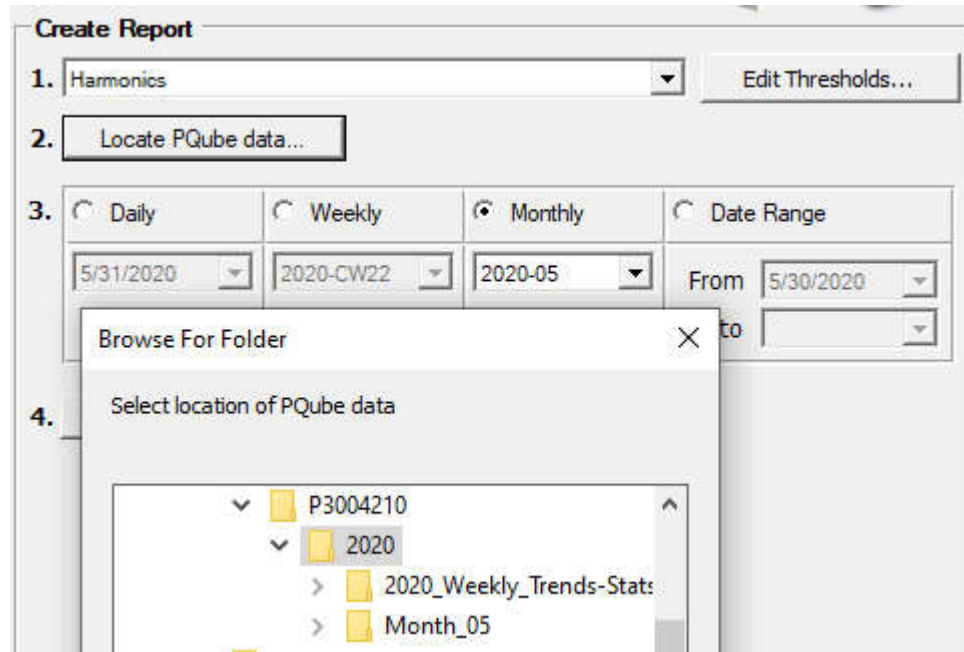
- Harmonics

  This report includes THD, TDD and all individual harmonic measurements based on user-defined harmonic limits.

- IEEE 519 THD_1.5% High Voltage

  IEEE Recommended Practice and Requirements for Harmonic Control in Electric Power Systems.
  Bus voltage V at PCC (point of common coupling): 161 kV <V.

- IEEE 519 THD_2.5% Medium Voltage

  IEEE Recommended Practice and Requirements for Harmonic Control in Electric Power Systems.
  Bus voltage V at PCC: 69 kV <V ≤ 161 kV

- IEEE519 THD_5% Low Voltage

  IEEE Recommended Practice and Requirements for Harmonic Control in Electric Power Systems.
  Bus voltage V at PCC: 1 kV <V ≤ 69 kV

- IEEE519 THD_8% Low Voltage

  IEEE Recommended Practice and Requirements for Harmonic Control in Electric Power Systems.
  Bus voltage V at PCC: V ≤ 1 kV

- PQube Trend

  This report takes all the parameters and combines it into one convenient report!

- EIFS 2013—LV

  Swedish standard: voltage systems (<36 kV) limits

- EIFS 2013—MV

  Swedish standard: voltage systems (> 36 kV) limits

- IEC 61000-2-2

  Electromagnetic compatibility (EMC)

- Costa Rica—LV Synchronous Connection

  Low Voltage Systems (<1 kV) limits were used

- PRODIST – 1 kV

  Baixa tensão (<1 kV) limites usados

9. How to create a new standard

Report Writer allows for the creation of a new report. Customization includes everything from defining your own limits, percent coverage, choosing which power parameters to include/exclude in your report and choose whether to "Use Thresholds."

Click on the drop-down list, select **NEW,** and choose from one of the following options:

- "Create a brand-new report."
- "Create a report from an existing one."
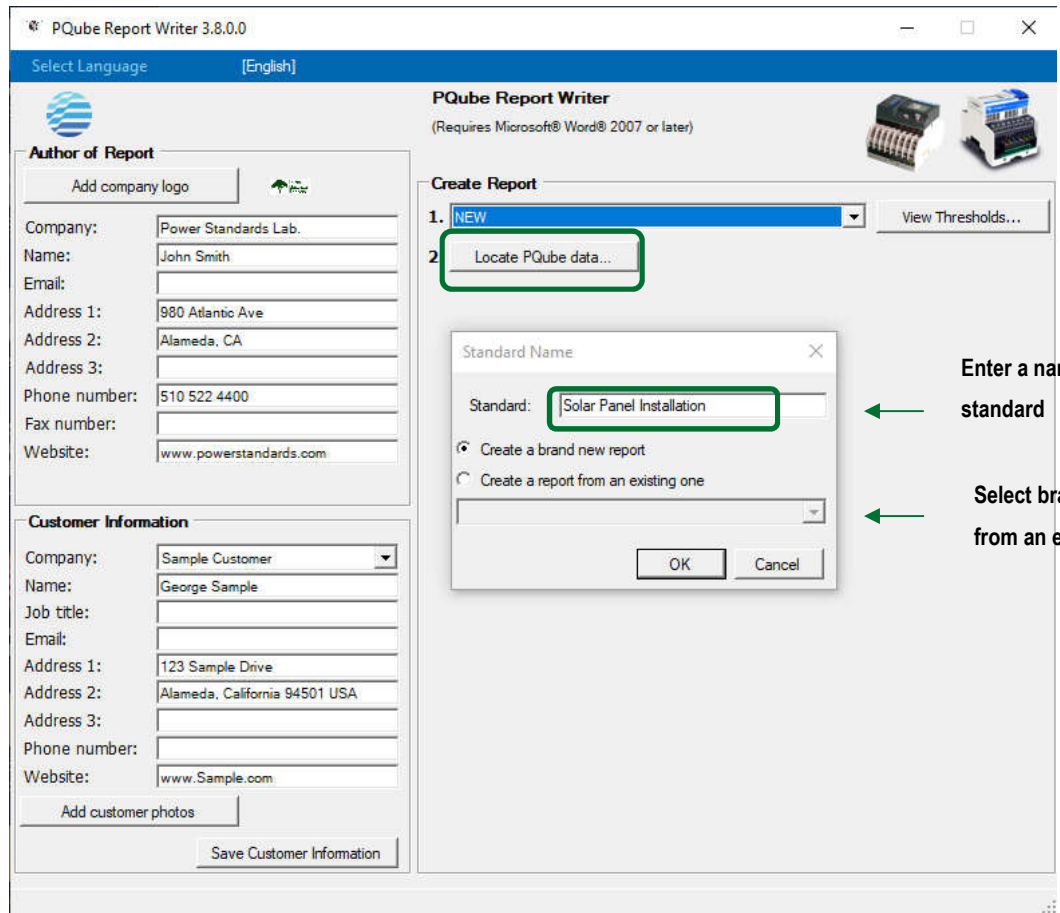
10. Sample EN50160 Report

EN50160 Compliance Report **PASS**

Day 5/31/2020
"Characteristics of Voltage at a Network User's Supply Terminals: Limits and Values"

PQube 3—Power Quality & Power Flow

Sample Customer

3-phase 4-wire Wye/Star
Um=277V/60 Hz

Summary of Results
EN50160
5/31/2020 00:00—5/31/2020 23:59

EN50160 Pass-Fail Requirements Table

EN50160 Section	Power Quality Parameter	EN50160 Compliance	Remarks
4.2.1	Power Frequency	PASS	
4.2.2	Supply Voltage Variations	PASS	
4.2.3	Flicker Severity	PASS	
4.2.4	Voltage Unbalance	PASS	
4.2.5	Voltage THD	PASS	
4.2.5	Voltage Harmonics	PASS	

EN50160 Additional Information Table

EN50160 Section	Power Quality Parameter	Remarks
4.2.6	Voltage Interharmonics	Limits thresholds not set
4.3.1	Interruptions	
4.3.2	Dips	
4.3.3	Swells	
4.3.6	Rapid Voltage Changes	
4.3.4	Transient Overvoltages	
4.3.5	Waveshape Changes	

Note 1: During 5/31/2020 measurements were made 100.00% of the time
Note 2: Low Voltage Systems (<1 kV) limits were used.
Note 3: Flagged data was excluded from this report.

Instrument used: PQube 3® (www.powerside.com)
Manufacturer: Powerside
PQube ID: PQube 3—Power Quality & Power Flow
Location: PSL— Alameda, California
Serial number: P3004210
Firmware revision: 3.7.9.20.02.11
Report Software: PQube Report Writer 3.8.0.0
Author of Report:
Name:

Customer Information
Name:
Company: Sample Customer
Address 1:
Address 2:
Address 3:
Phone:
Website:

Equipment Settings (Event thresholds)

Dips	90.00%
Swells	105%
Interruptions	10.00%
RVC	6%
Transients	300V

Section 4.2.1: Power Frequency

Nominal Frequency:	**60.00Hz**
Parameter definition:	Mean value of the fundamental frequency measured over 10 seconds
Limitation:	For systems with a synchronous connection to an interconnected system
	Measured values based on coverage

Requirement	Measured Frequency	Result
99.5% of day: 59.40Hz ~ 60.60Hz	**59.96Hz~60.04Hz**	**PASS**
100% of day: 56.40Hz ~ 62.40Hz	**59.96Hz~60.05Hz**	**PASS**

Frequency

Frequency Distribution
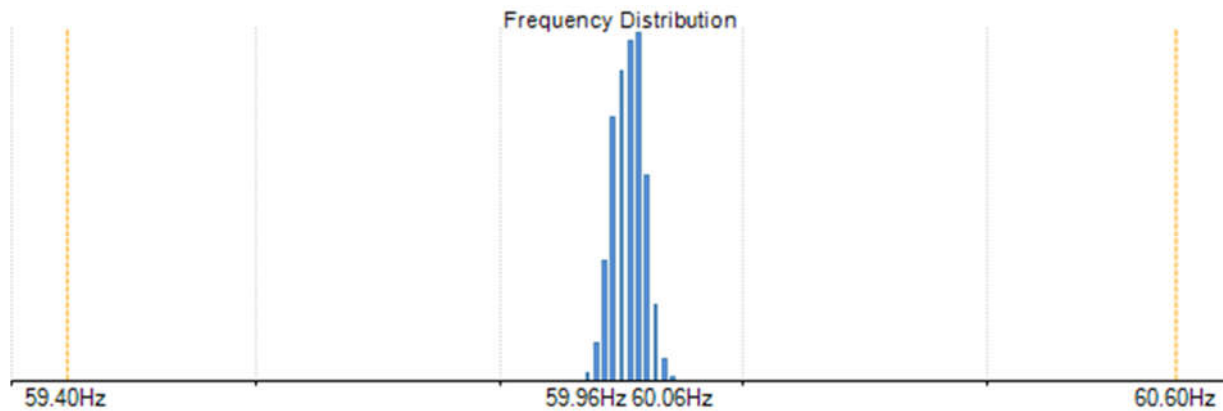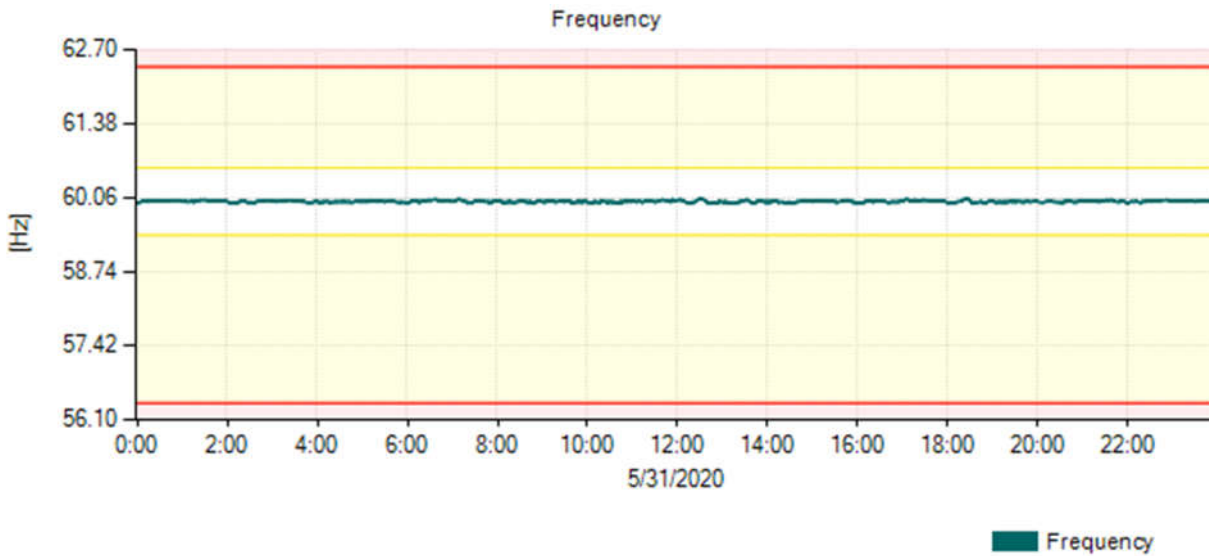
Section 4.2.2: Supply Voltage Variations

Nominal Voltage L-N: **277.00V L-N**
Parameter definition: 10 minute mean RMS value of the supply voltage (Avg)
Limitation: For systems with a synchronous connection to an interconnected system
       Measured values based on coverage

Requirement	Measured L1 Voltage	Measured L2 Voltage	Measured L3 Voltage	Result
95% of day: 249.3V ~ 304.7V	281.60V ~ 284.66V	280.63V ~ 283.35V	281.76V ~ 284.69V	PASS
100% of day: 235.45V ~ 304.7V	281.22V ~ 285.19V	280.07V ~ 283.92V	281.26V ~ 285.22V	PASS

Voltage L-N

Voltage Distribution L-N
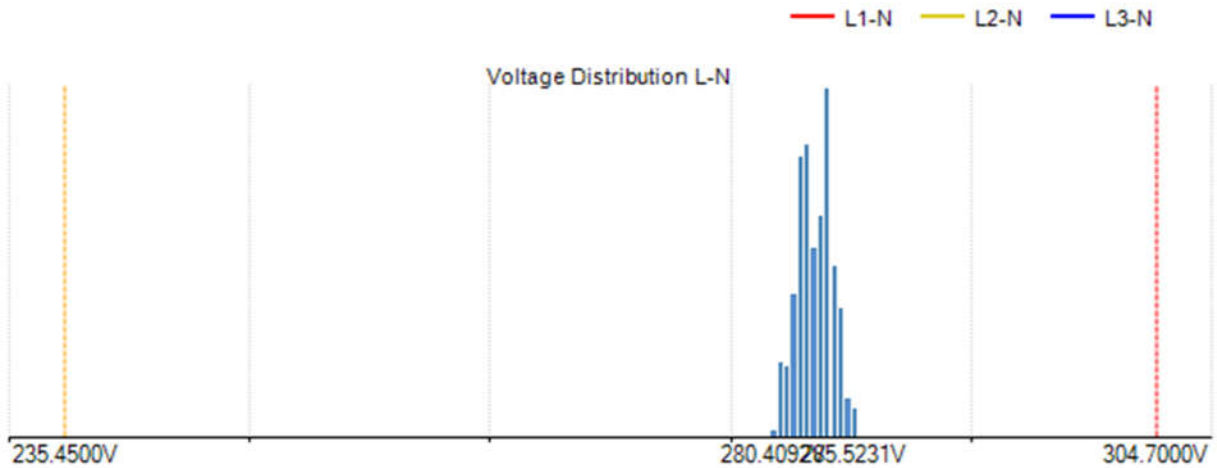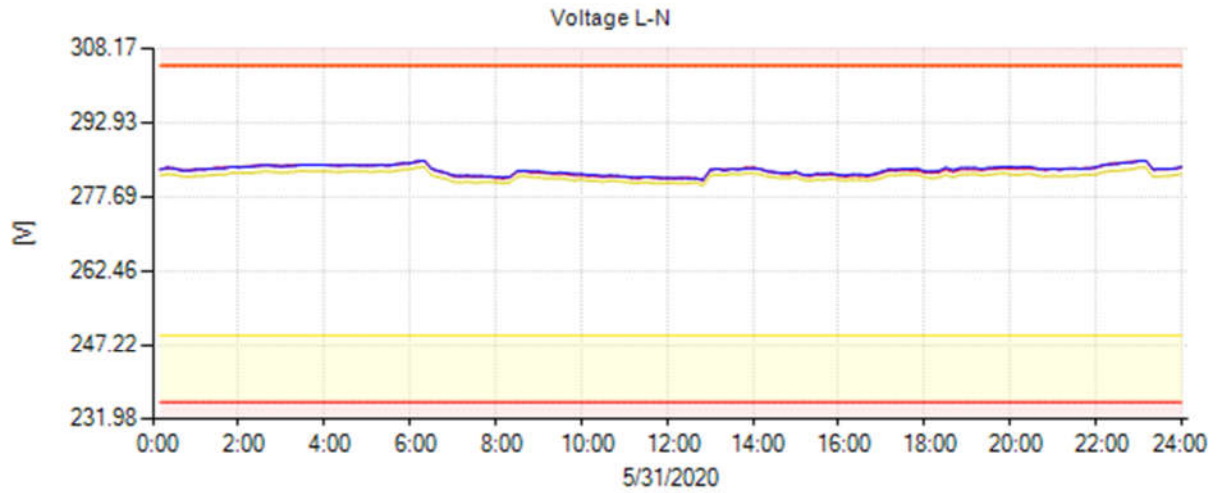
Section 4.2.3: Flicker Severity

Parameter definition: Long term flicker severity Plt (2 hour intervals) (Avg)
Limitation: Under normal operating conditions
        Measured values based on coverage

Requirement	Measured L1 Plt	Measured L2 Plt	Measured L3 Plt	Result
95% of day: Plt ≤ 1	0.09	0.10	0.09	PASS

Flicker

Flicker Distribution
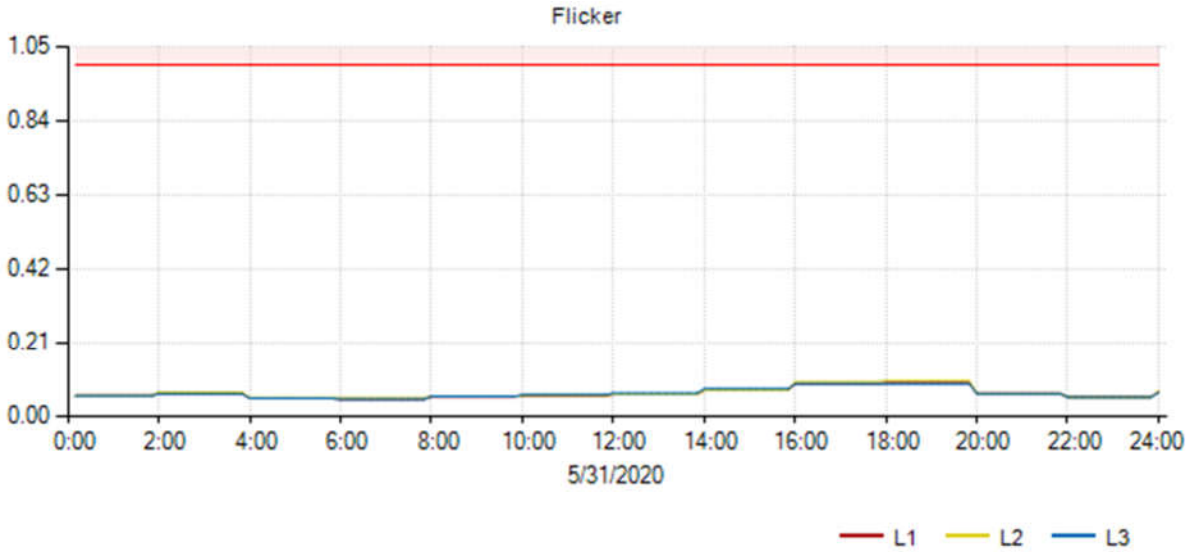
Section 4.2.4: Voltage Unbalance

Parameter definition:	10 minute mean RMS values of the negative sequence ratio u2 (Avg)
Limitation:	Under normal operating conditions
	Measured values based on coverage

Requirement	Measured Unbalance u2	Result
95% of day: 0% ~ 2%	**0.38%**	**PASS**

Voltage Unbalance

Unbalance Distribution

All our energy, in your power
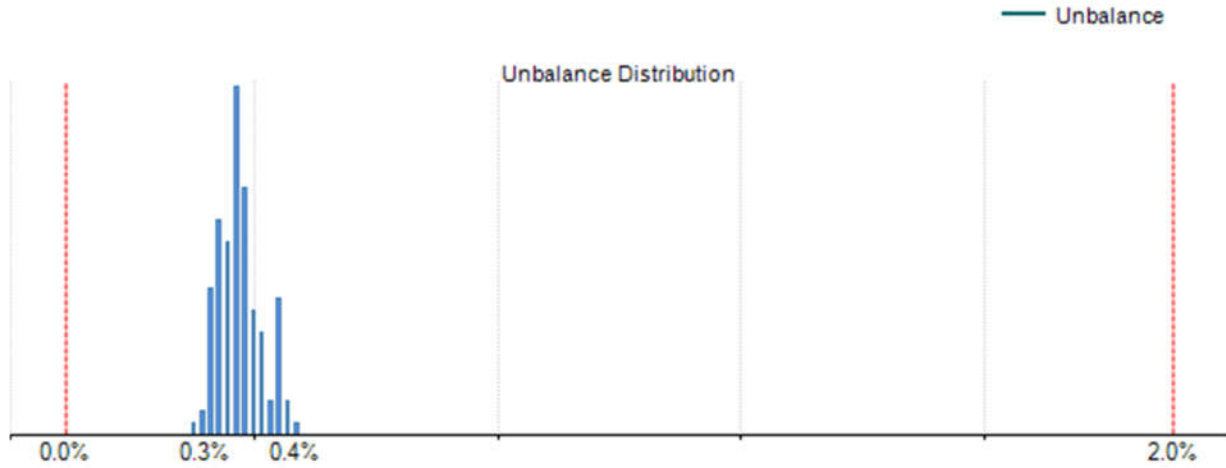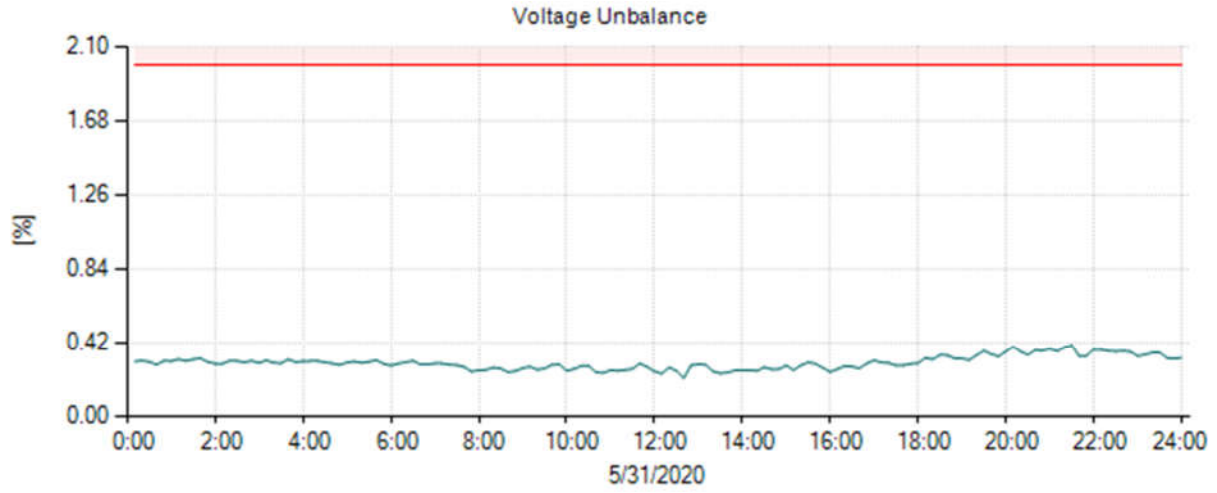
Section 4.2.5: Voltage THD

Parameter definition: 10 minute mean RMS value of THD. (Avg)
Limitation: Under normal operating conditions
                                         Measured values based on coverage

Requirement	Measured L1 THD	Measured L2 THD	Measured L3 THD	Result
95% of day: THD ≤ 8%	1.17% ~ 1.29%	1.06% ~ 1.16%	1.01% ~ 1.19%	PASS
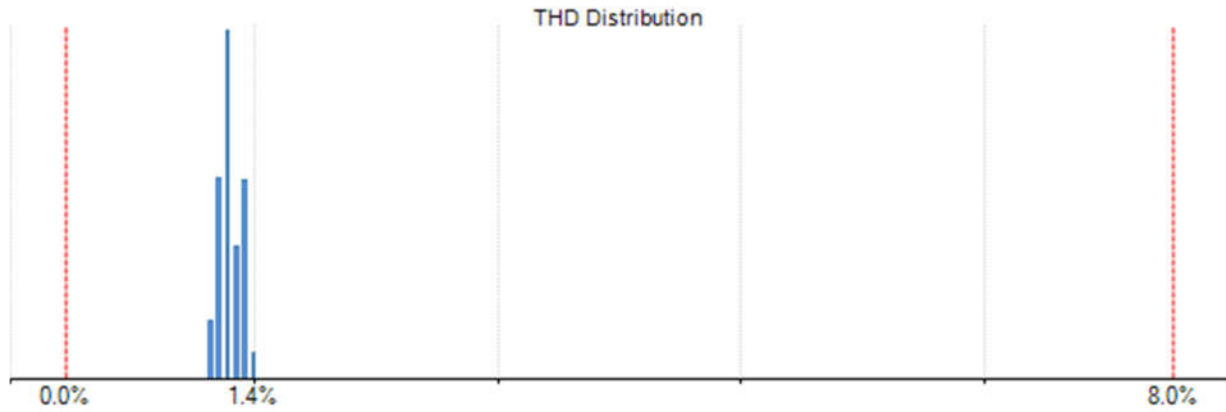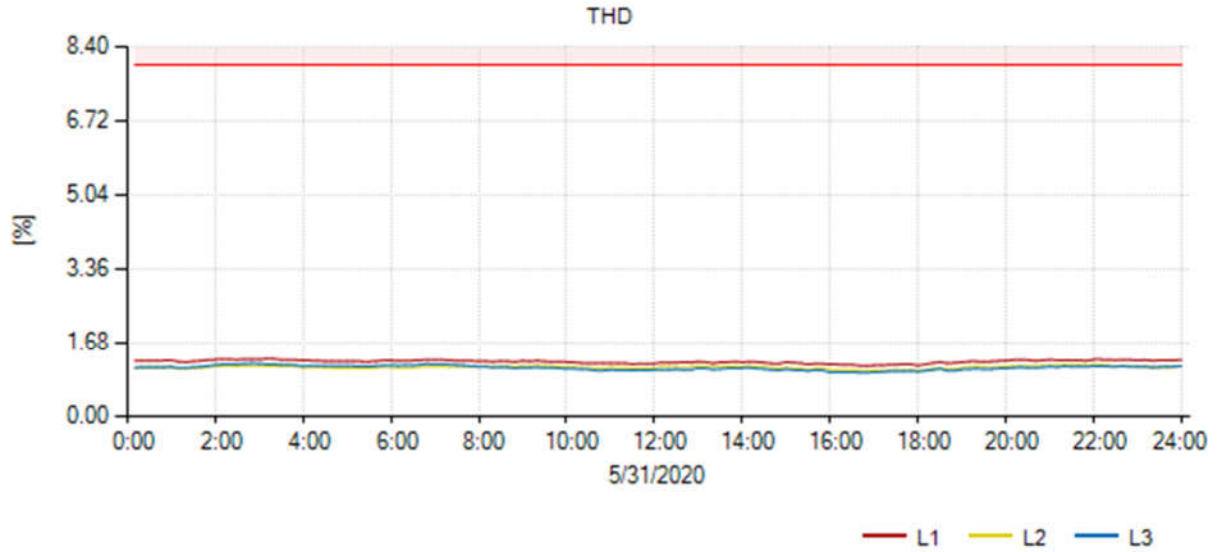
Section 4.2.5: Voltage Harmonics

Parameter definition: 10 minute mean RMS values of each individual harmonic voltage.
Limitation: Under normal operating conditions
        Measured values based on coverage

L1-N Harmonics Table

| Odd Harmonics | | | | | | | | Even Harmonics | | | |
| Not multiples of 3 | | | | Multiples of 3 | | | | | | | |
Order h	EN50160 limit	95% value	Result	Order h	EN50160 limit	95% value	Result	Order h	EN50160 limit	95% value	Result
H5	6.0%	0.608%	PASS	H3	5.0%	0.380%	PASS	H2	2.0%	0.008%	PASS
H7	5.0%	1.120%	PASS	H9	1.5%	0.114%	PASS	H4	1.0%	0.058%	PASS
H11	3.5%	0.391%	PASS	H15	0.5%	0.067%	PASS	H6	0.5%	0.052%	PASS
H13	3.0%	0.113%	PASS	H21	0.5%	0.010%	PASS	H8	0.5%	0.038%	PASS
H17	2.0%	0.119%	PASS	H27	None	0.025%		H10	0.5%	0.015%	PASS
H19	1.5%	0.046%	PASS	H33	None	0.015%		H12	0.5%	0.016%	PASS
H23	1.5%	0.024%	PASS	H39	None	0.012%		H14	0.5%	0.018%	PASS
H25	1.5%	0.031%	PASS					H16	0.5%	0.005%	PASS
H29	None	0.028%						H18	0.5%	0.003%	PASS
H31	None	0.016%						H20	0.5%	0.006%	PASS
H35	None	0.012%						H22	0.5%	0.004%	PASS
H37	None	0.017%						H24	0.5%	0.002%	PASS
								H26	None	0.003%	
								H28	None	0.002%	
								H30	None	0.002%	
								H32	None	0.002%	
								H34	None	0.002%	
								H36	None	0.002%	
								H38	None	0.002%	
								H40	None	0.002%	

L2-N Harmonics Table

| Odd Harmonics | | | | | | | | Even Harmonics | | | |
| Not multiples of 3 | | | | Multiples of 3 | | | | | | | |
Order h	EN50160 limit	95% value	Result	Order h	EN50160 limit	95% value	Result	Order h	EN50160 limit	95% value	Result
H5	6.0%	0.741%	PASS	H3	5.0%	0.217%	PASS	H2	2.0%	0.017%	PASS
H7	5.0%	0.837%	PASS	H9	1.5%	0.139%	PASS	H4	1.0%	0.049%	PASS
H11	3.5%	0.447%	PASS	H15	0.5%	0.100%	PASS	H6	0.5%	0.118%	PASS
H13	3.0%	0.168%	PASS	H21	0.5%	0.016%	PASS	H8	0.5%	0.042%	PASS
H17	2.0%	0.109%	PASS	H27	None	0.011%		H10	0.5%	0.013%	PASS
H19	1.5%	0.037%	PASS	H33	None	0.007%		H12	0.5%	0.031%	PASS
H23	1.5%	0.021%	PASS	H39	None	0.008%		H14	0.5%	0.021%	PASS
H25	1.5%	0.022%	PASS					H16	0.5%	0.006%	PASS
H29	None	0.016%						H18	0.5%	0.005%	PASS
H31	None	0.004%						H20	0.5%	0.004%	PASS
H35	None	0.009%						H22	0.5%	0.002%	PASS
H37	None	0.008%						H24	0.5%	0.002%	PASS
								H26	None	0.002%	
								H28	None	0.002%	
								H30	None	0.002%	
								H32	None	0.002%	
								H34	None	0.002%	
								H36	None	0.002%	
								H38	None	0.003%	
								H40	None	0.002%	

L3-N Harmonics Table

Odd Harmonics								Even Harmonics			
Not multiples of 3				Multiples of 3							
Order h	EN50160 limit	95% value	Result	Order h	EN50160 limit	95% value	Result	Order h	EN50160 limit	95% value	Result
H5	6.0%	0.633%	PASS	H3	5.0%	0.234%	PASS	H2	2.0%	0.013%	PASS
H7	5.0%	1.020%	PASS	H9	1.5%	0.118%	PASS	H4	1.0%	0.046%	PASS
H11	3.5%	0.350%	PASS	H15	0.5%	0.044%	PASS	H6	0.5%	0.067%	PASS
H13	3.0%	0.115%	PASS	H21	0.5%	0.009%	PASS	H8	0.5%	0.046%	PASS
H17	2.0%	0.105%	PASS	H27	None	0.010%		H10	0.5%	0.013%	PASS
H19	1.5%	0.062%	PASS	H33	None	0.012%		H12	0.5%	0.017%	PASS
H23	1.5%	0.017%	PASS	H39	None	0.006%		H14	0.5%	0.015%	PASS
H25	1.5%	0.030%	PASS					H16	0.5%	0.005%	PASS
H29	None	0.010%						H18	0.5%	0.003%	PASS
H31	None	0.013%						H20	0.5%	0.005%	PASS
H35	None	0.008%						H22	0.5%	0.002%	PASS
H37	None	0.008%						H24	0.5%	0.002%	PASS
								H26	None	0.002%	
								H28	None	0.002%	
								H30	None	0.002%	
								H32	None	0.002%	
								H34	None	0.001%	
								H36	None	0.002%	
								H38	None	0.002%	
								H40	None	0.002%	

Section 4.2.6: Voltage Interharmonics

Parameter definition: The level of interharmonics is increasing due to the development of frequency converters and similar control equipment.

Limitation: Levels are under consideration in EN50160, but there are no limits at present. Measured values based on coverage

L1-N Interharmonics Table

Odd Interharmonics								Even Interharmonics			
Not multiples of 3				Multiples of 3							
Order h	Min value	Average value	Max value	Order h	Min value	Average value	Max value	Order h	Min value	Average value	Max value
IH5	0.004%	0.005%	0.005%	IH3	0.004%	0.005%	0.006%	IH2	0.005%	0.006%	0.006%
IH7	0.004%	0.005%	0.006%	IH9	0.003%	0.003%	0.004%	IH4	0.005%	0.005%	0.006%
IH11	0.005%	0.006%	0.007%	IH15	0.007%	0.008%	0.010%	IH6	0.004%	0.005%	0.006%
IH13	0.009%	0.011%	0.013%	IH21	0.002%	0.002%	0.002%	IH8	0.003%	0.004%	0.005%
IH17	0.003%	0.004%	0.004%					IH10	0.004%	0.005%	0.006%
IH19	0.002%	0.002%	0.002%					IH12	0.007%	0.009%	0.010%
IH23	0.001%	0.002%	0.002%					IH14	0.009%	0.010%	0.013%
IH25	0.001%	0.002%	0.003%					IH16	0.005%	0.006%	0.007%
								IH18	0.003%	0.004%	0.004%
								IH20	0.002%	0.002%	0.003%
								IH22	0.003%	0.006%	0.011%
								IH24	0.002%	0.010%	0.020%

L2-N Interharmonics Table

Odd Interharmonics								Even Interharmonics			
Not multiples of 3				Multiples of 3							
Order h	Min value	Average value	Max value	Order h	Min value	Average value	Max value	Order h	Min value	Average value	Max value
IH5	0.004%	0.005%	0.005%	IH3	0.004%	0.005%	0.006%	IH2	0.005%	0.005%	0.006%
IH7	0.005%	0.006%	0.006%	IH9	0.003%	0.004%	0.004%	IH4	0.004%	0.005%	0.006%
IH11	0.005%	0.006%	0.007%	IH15	0.008%	0.009%	0.011%	IH6	0.005%	0.006%	0.007%
IH13	0.010%	0.012%	0.015%	IH21	0.001%	0.002%	0.002%	IH8	0.004%	0.005%	0.006%
IH17	0.003%	0.004%	0.004%					IH10	0.005%	0.005%	0.006%
IH19	0.002%	0.002%	0.002%					IH12	0.008%	0.009%	0.011%
IH23	0.001%	0.002%	0.003%					IH14	0.010%	0.012%	0.015%
IH25	0.001%	0.002%	0.003%					IH16	0.005%	0.006%	0.008%
								IH18	0.003%	0.003%	0.004%
								IH20	0.002%	0.002%	0.003%
								IH22	0.003%	0.005%	0.009%
								IH24	0.002%	0.010%	0.018%

L3-N Interharmonics Table

| Odd Interharmonics								Even Interharmonics			
Not multiples of 3				Multiples of 3							
Order h	Min value	Average value	Max value	Order h	Min value	Average value	Max value	Order h	Min value	Average value	Max value
IH5	0.004%	0.005%	0.005%	IH3	0.004%	0.005%	0.006%	IH2	0.005%	0.005%	0.006%
IH7	0.004%	0.005%	0.006%	IH9	0.003%	0.003%	0.004%	IH4	0.004%	0.005%	0.006%
IH11	0.004%	0.005%	0.006%	IH15	0.007%	0.008%	0.010%	IH6	0.005%	0.006%	0.007%
IH13	0.009%	0.011%	0.013%	IH21	0.002%	0.002%	0.002%	IH8	0.004%	0.005%	0.006%
IH17	0.003%	0.003%	0.004%					IH10	0.004%	0.005%	0.006%
IH19	0.002%	0.002%	0.002%					IH12	0.007%	0.008%	0.009%
IH23	0.001%	0.002%	0.002%					IH14	0.009%	0.011%	0.013%
IH25	0.001%	0.002%	0.002%					IH16	0.005%	0.006%	0.007%
								IH18	0.003%	0.003%	0.004%
								IH20	0.002%	0.002%	0.003%
								IH22	0.004%	0.007%	0.010%
								IH24	0.002%	0.010%	0.019%

Section 4.3.1: Interruptions

No interruptions during 5/31/2020 00:00—5/31/2020 23:59

Section 4.3.2: Dips

No dips during 5/31/2020 00:00—5/31/2020 23:59

Section 4.3.3: Swells

No swells during 5/31/2020 00:00—5/31/2020 23:59

ITIC Curve
Interruptions, Dips, Swells
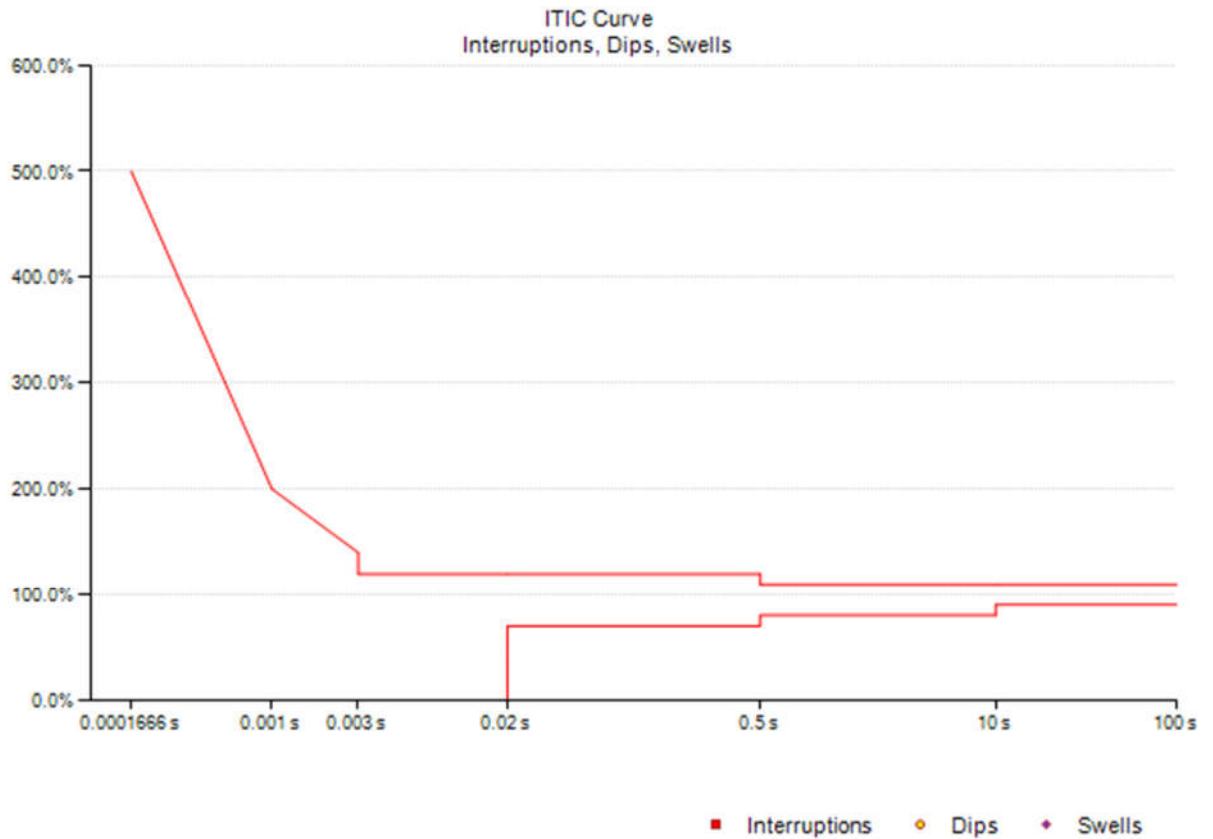
Section 4.3.4: Transient Overvoltages

No transients during 5/31/2020 00:00—5/31/2020 23:59

Section 4.3.5: Waveshape Changes

No waveshape changes during 5/31/2020 00:00—5/31/2020 23:59

Section 4.3.6: Rapid Voltage Changes

No rapid voltage changes during 5/31/2020 00:00—5/31/2020 23:59

Conclusions
EN50160
5/31/2020 00:00 – 5/31/2020 23:59

EN50160 Pass-Fail Requirements Table

EN50160 Section	Power Quality Parameter	EN50160 Compliance	Remarks
4.2.1	Power Frequency	**PASS**	
4.2.2	Supply Voltage Variations	**PASS**	
4.2.3	Flicker Severity	**PASS**	
4.2.4	Voltage Unbalance	**PASS**	
4.2.5	Voltage THD	**PASS**	
4.2.5	Voltage Harmonics	**PASS**	

EN50160 Additional Information Table

EN50160 Section	Power Quality Parameter	Remarks
4.2.6	Voltage Interharmonics	Limits thresholds not set
4.3.1	Interruptions	
4.3.2	Dips	
4.3.3	Swells	
4.3.6	Rapid Voltage Changes	
4.3.4	Transient Overvoltages	
4.3.5	Waveshape Changes	

Note 1: During 5/31/2020 measurements were made 100.00% of the time
Note 2: Low Voltage Systems (<1 kV) limits were used.
Note 3: Flagged data was excluded from this report.

Instrument used:	[PQube 3® (www.powerside.com)](www.powerside.com)
Manufacturer:	Powerside
PQube ID:	PQube 3—Power Quality & Power Flow
Location:	PSL— Alameda, California
Serial number:	P3004210
Firmware revision:	3.7.9.20.02.11
Report Software:	PQube Report Writer 3.8.0.0
Author of Report:	
Name:	

Customer Information

Name:	
Company:	Sample Customer
Address 1:	
Address 2:	
Address 3:	
Phone:	
Website:	

Equipment Settings (Event thresholds)

Dips	90.00%
Swells	105%
Interruptions	10.00%
RVC	6%
Transients	300V