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PSL Demonstration Unit - Calendar Week 43-2011



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EN50160 Compliance Report - **PASS**

2011 Calendar Week 43 - 10/24/2011 – 10/30/2011

"Characteristics of Voltage at a Network User's Supply Terminals: Limits and Values"

PSL Demonstration Unit

George Sample
Sample Customer
123 Sample Drive
Alameda, California 94501 USA
www.Sample.com

3-phase 4-wire Wye/Star
277.00V 60Hz

www.IER.com

Summary of Results
EN50160 Compliance
10/24/2011 – 10/30/2011

EN50160 Pass-Fail Requirements Table

EN50160 Section	Power Quality Parameter	EN50160 Compliance	Remarks
4.2.1	Power Frequency	PASS	Coverage 99.90%
4.2.2	Supply Voltage Variations	PASS	Coverage 99.90%
4.2.3	Flicker Severity	PASS	
4.2.4	Voltage Unbalance	PASS	
4.2.5	Harmonic Voltages	PASS	

EN50160 Additional Information Table

EN50160 Section	Power Quality Parameter	Remarks
4.2.6	Interharmonic Voltages	Data only
4.2.7	Mains Signaling	Not measured
4.3.1	Interruptions	
4.3.2	Dips	
4.3.3	Swells	
4.3.4	Transient overvoltages	

Note 1: During 10/24/2011 – 10/30/2011 measurements were made 99.90% 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® (www.PQube.com)
Manufacturer: Power Standards Lab, U.S.A.
PQube ID: PSL Demonstration Unit
Location: Main Breaker in Office
Serial number: P004424
Firmware revision: 2.0.0 2756
Calibration Certificate: <http://www.PowerStandards.com/CalibCerts/P004424.pdf>
Report Software: PQube Report Writer 2.1
Author of Report: Intratech Electrical Reports
Name: George Smith

Customer Information

Name: George Sample
Company: Sample Customer
Address 1: 123 Sample Drive
Address 2: Alameda, California 94501 USA
Address 3:
Website: www.Sample.com



Photo 1 - Sample Caption - Power lines near sample customer



Photo 2 - Sample Caption - PQube installation at sample customer

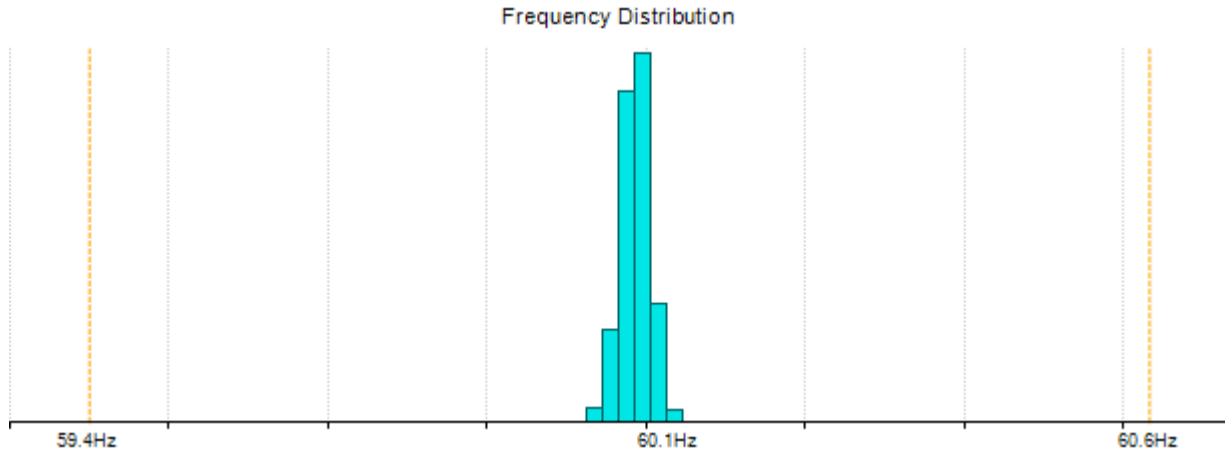
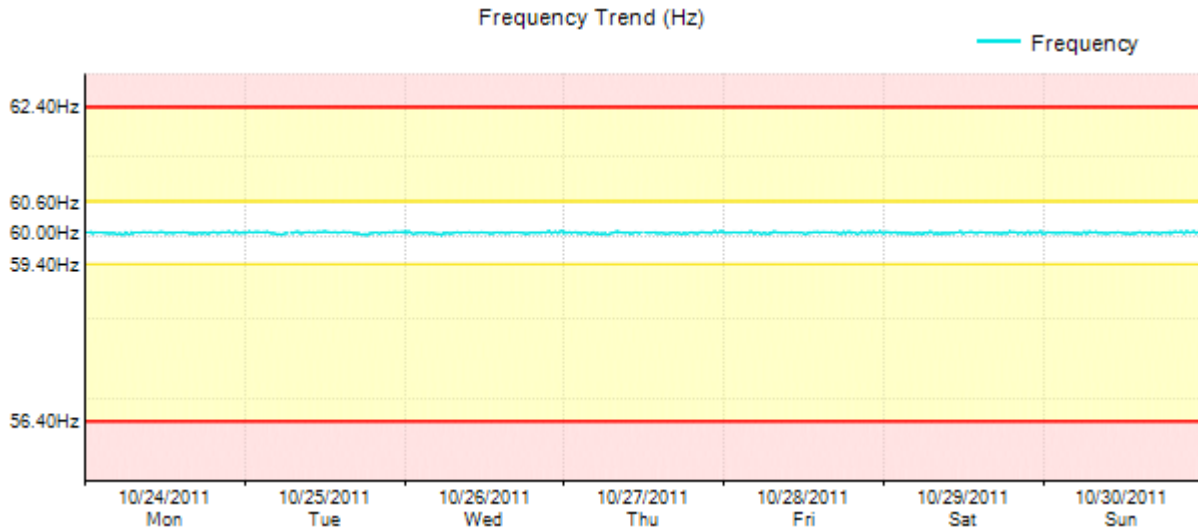
EN50160 4.2.1: Power Frequency

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

EN50160 Requirement	Measured frequency	Result
99.5% of week: 59.40 Hz - 60.60 Hz	59.96 Hz~60.03 Hz	PASS
100% of week: 56.40 Hz - 62.40 Hz	59.95 Hz~60.04 Hz	PASS



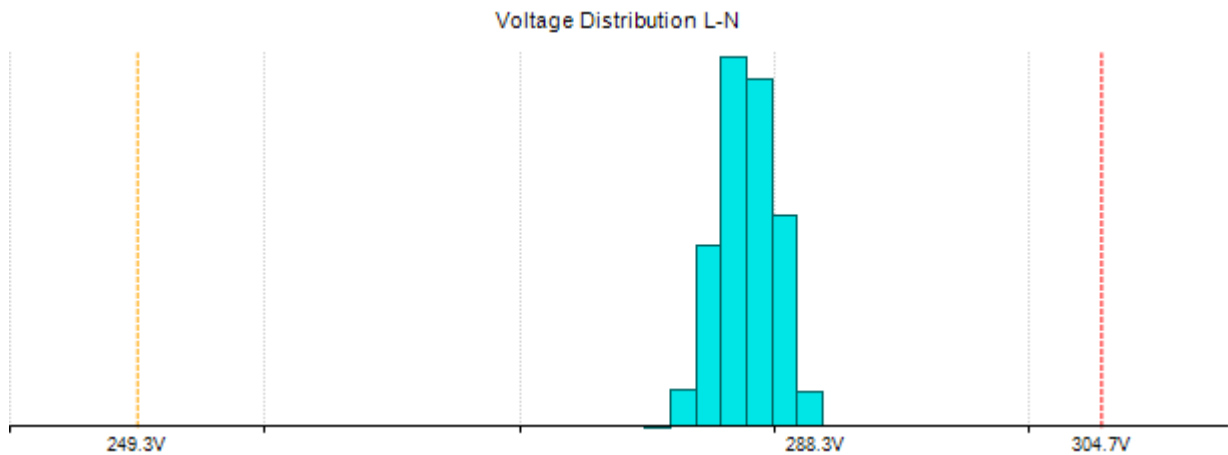
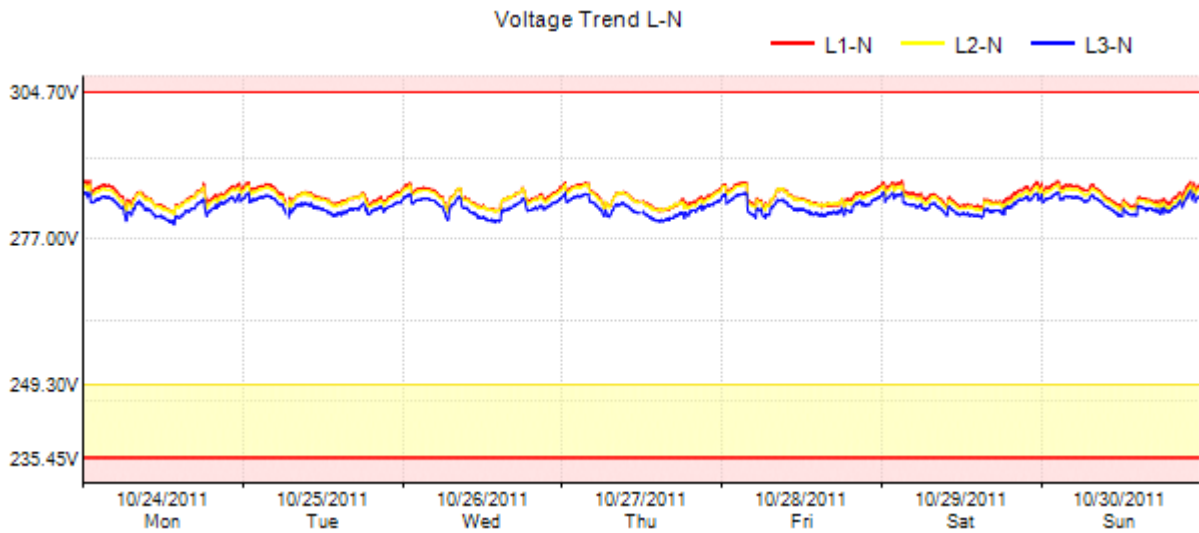
EN50160 4.2.2: Supply Voltage Variations

Nominal Voltage: 277.00V L-N / 480.00V L-L

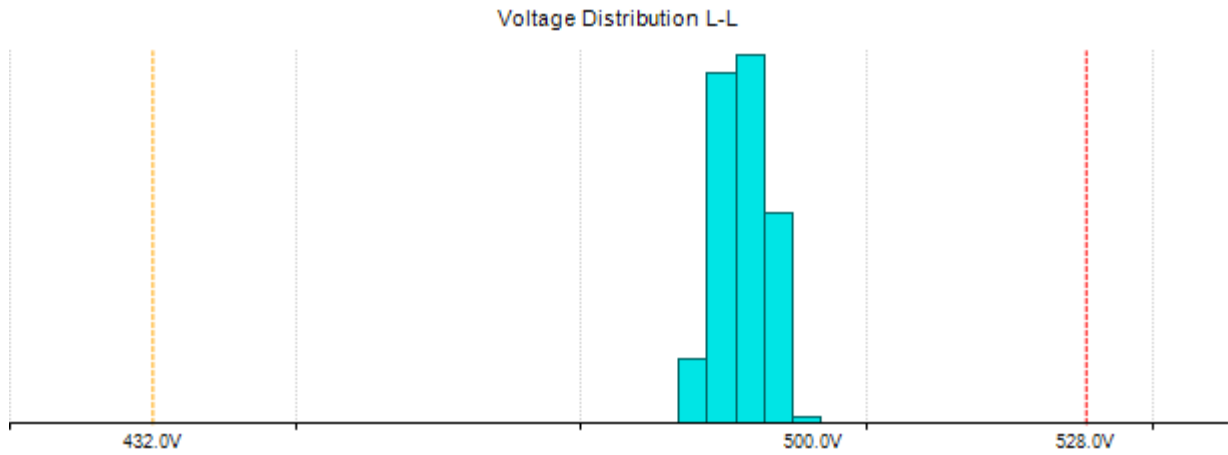
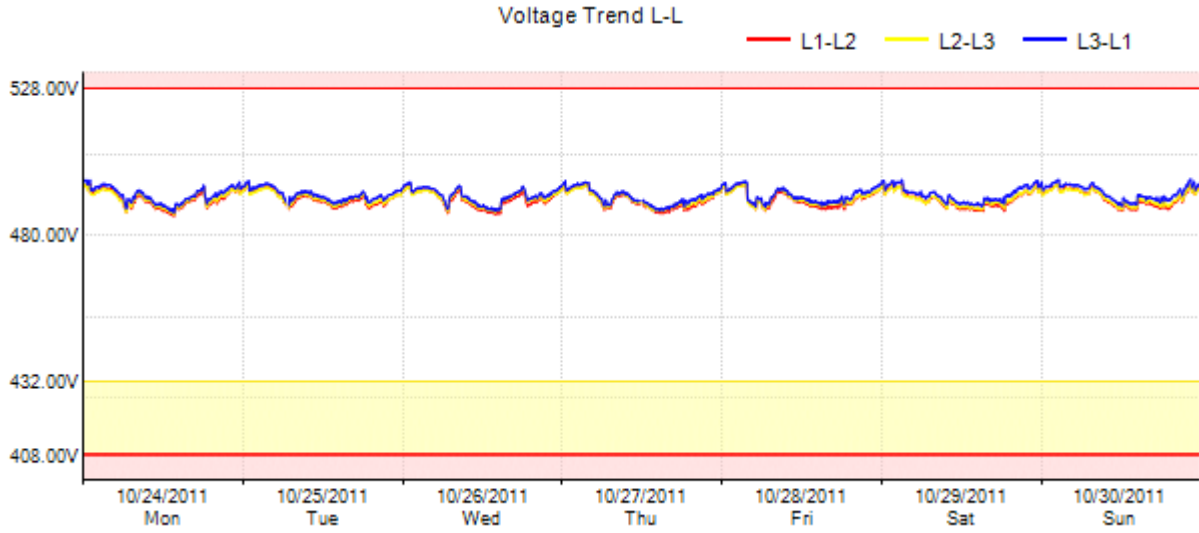
Parameter definition: 10 minute mean RMS value of the supply voltage

Limitation: For systems with a synchronous connection to an interconnected system

EN50160 Requirement	Measured L1 Voltage	Measured L2 Voltage	Measured L3 Voltage	Result
95% of week: 249.30V - 304.70V	282.90V~287.25V	282.60V~286.70V	280.90V~285.20V	PASS
100% of week: 235.45V - 304.70V	281.85V~287.85V	281.60V~287.25V	279.65V~285.70V	PASS



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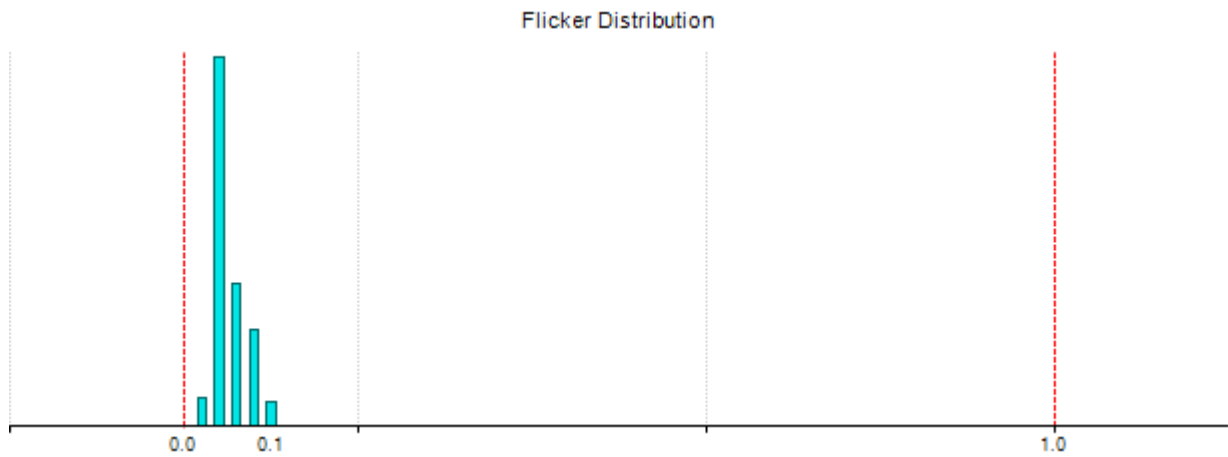
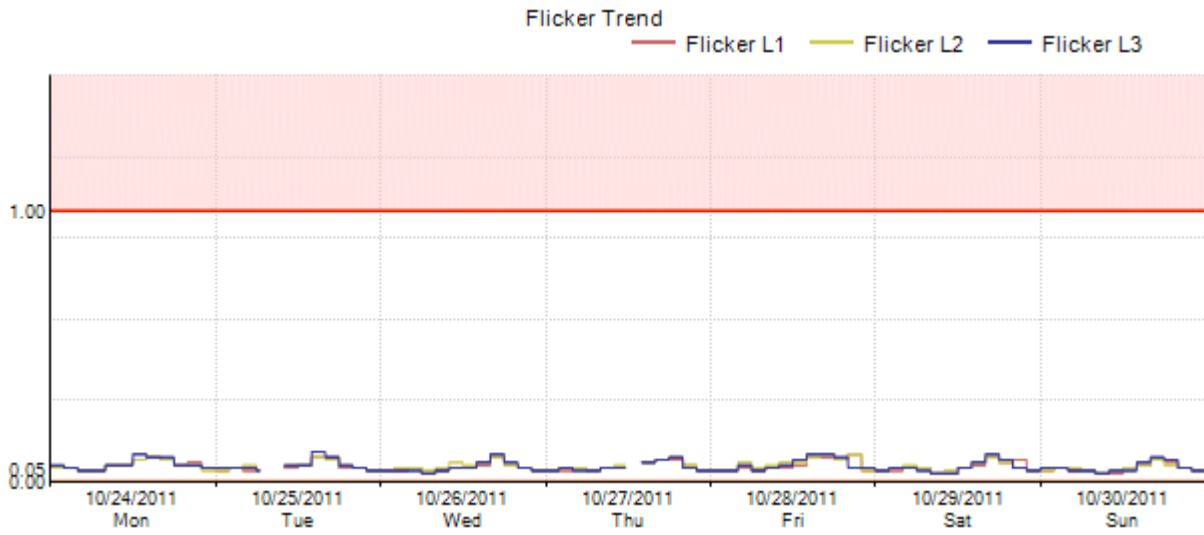


EN50160 4.2.3: Flicker Severity

Parameter definition: Long term flicker severity Plt (2 hour intervals)

Limitation: Under normal operating conditions

EN50160 Requirement	Measured L1 Plt	Measured L2 Plt	Measured L3 Plt	Result
95% of week: $Plt \leq 1$	0.09	0.09	0.10	PASS

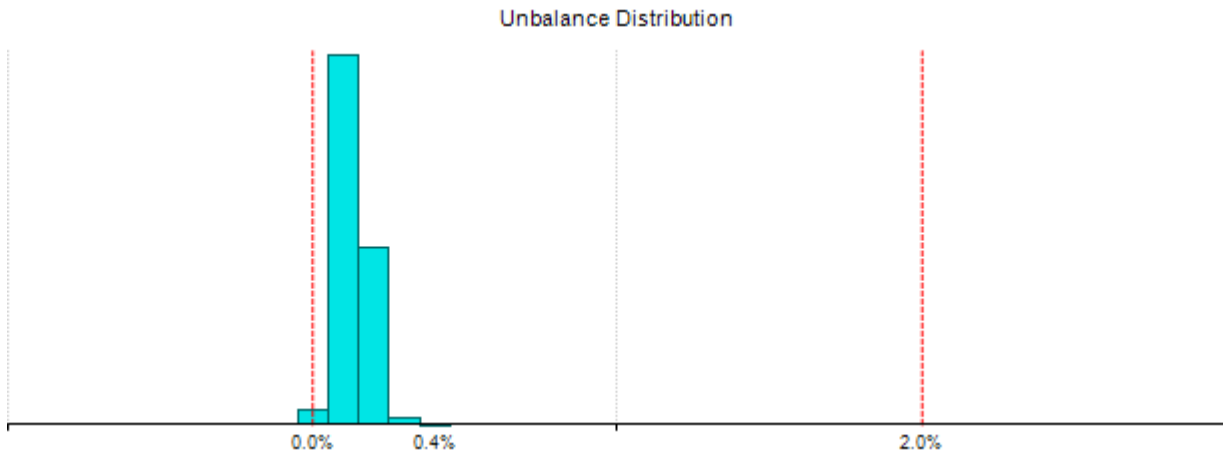
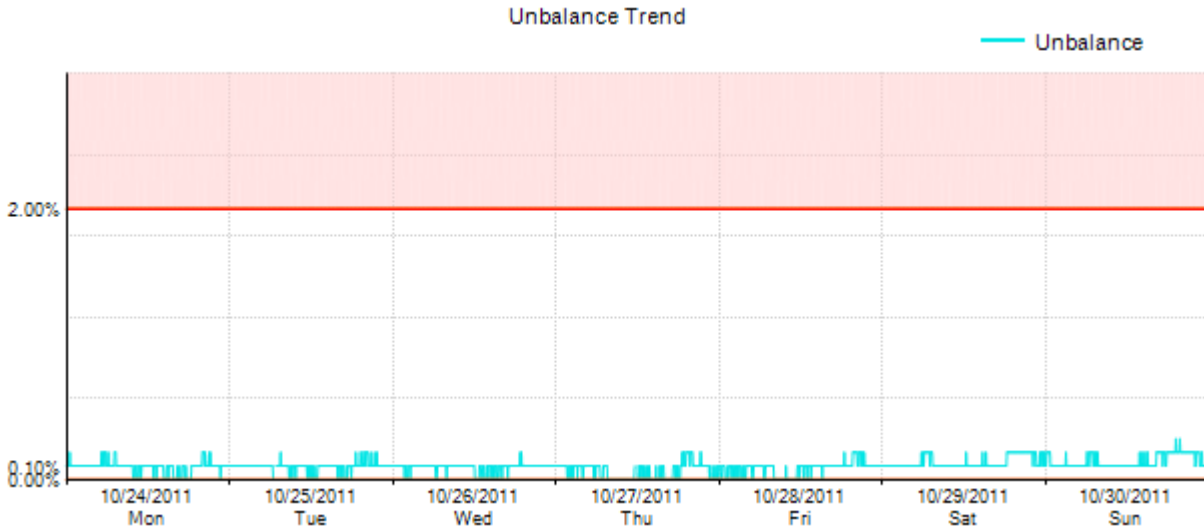


EN50160 4.2.4: Voltage Unbalance

Parameter definition: 10 minute mean RMS values of the negative sequence ratio u_2

Limitation: Under normal operating conditions

<i>EN50160 Requirement</i>	Measured Unbalance u_2	Result
<i>95% of week: 0% ~ 2% u_2</i>	0.20%	PASS



EN50160 4.2.5: Harmonic Voltages

Parameter definition: 10 minute mean RMS values of each individual harmonic voltage

Limitation: Under normal operating conditions

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%	0.974%	PASS	H3	5.0%	0.478%	PASS	H2	2.0%	0.031%	PASS
H7	5.0%	0.961%	PASS	H9	1.5%	0.115%	PASS	H4	1.0%	0.034%	PASS
H11	3.5%	0.444%	PASS	H15	0.5%	0.094%	PASS	H6	0.5%	0.038%	PASS
H13	3.0%	0.276%	PASS	H21	0.5%	0.029%	PASS	H8	0.5%	0.033%	PASS
H17	2.0%	0.183%	PASS					H10	0.5%	0.026%	PASS
H19	1.5%	0.059%	PASS					H12	0.5%	0.027%	PASS
H23	1.5%	0.043%	PASS					H14	0.5%	0.029%	PASS
H25	1.5%	0.041%	PASS					H16	0.5%	0.026%	PASS
								H18	0.5%	0.026%	PASS
								H20	0.5%	0.027%	PASS
								H22	0.5%	0.026%	PASS

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%	1.061%	PASS	H3	5.0%	0.246%	PASS	H2	2.0%	0.030%	PASS
H7	5.0%	0.686%	PASS	H9	1.5%	0.160%	PASS	H4	1.0%	0.035%	PASS
H11	3.5%	0.545%	PASS	H15	0.5%	0.158%	PASS	H6	0.5%	0.032%	PASS
H13	3.0%	0.289%	PASS	H21	0.5%	0.034%	PASS	H8	0.5%	0.033%	PASS
H17	2.0%	0.184%	PASS					H10	0.5%	0.028%	PASS
H19	1.5%	0.051%	PASS					H12	0.5%	0.029%	PASS
H23	1.5%	0.055%	PASS					H14	0.5%	0.029%	PASS
H25	1.5%	0.036%	PASS					H16	0.5%	0.028%	PASS
								H18	0.5%	0.027%	PASS
								H20	0.5%	0.027%	PASS
								H22	0.5%	0.027%	PASS

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%	0.863%	PASS	H3	5.0%	0.275%	PASS	H2	2.0%	0.029%	PASS
H7	5.0%	0.913%	PASS	H9	1.5%	0.103%	PASS	H4	1.0%	0.028%	PASS
H11	3.5%	0.483%	PASS	H15	0.5%	0.067%	PASS	H6	0.5%	0.032%	PASS
H13	3.0%	0.193%	PASS	H21	0.5%	0.028%	PASS	H8	0.5%	0.029%	PASS
H17	2.0%	0.175%	PASS					H10	0.5%	0.026%	PASS
H19	1.5%	0.054%	PASS					H12	0.5%	0.026%	PASS
H23	1.5%	0.050%	PASS					H14	0.5%	0.028%	PASS
H25	1.5%	0.044%	PASS					H16	0.5%	0.027%	PASS
								H18	0.5%	0.026%	PASS
								H20	0.5%	0.026%	PASS
								H22	0.5%	0.026%	PASS

EN50160 4.2.6: Interharmonic Voltages

Parameter definition: 10 minute mean RMS values of each interharmonic voltage group.

Limitation: Levels are under consideration in EN50160, but there are no limits at present.

L1-N Interharmonics Table

Odd Interharmonics								Even Interharmonics			
Not multiples of 3				Multiples of 3							
Order h	Average value	95% value	Max value	Order h	Average value	95% value	Max value	Order h	Average value	95% value	Max value
IH5	0.033%	0.046%	0.073%	IH3	0.032%	0.043%	0.056%	IH2	0.031%	0.041%	0.064%
IH7	0.030%	0.040%	0.055%	IH9	0.030%	0.039%	0.066%	IH4	0.032%	0.044%	0.054%
IH11	0.030%	0.040%	0.062%	IH15	0.031%	0.040%	0.062%	IH6	0.032%	0.046%	0.065%
IH13	0.031%	0.042%	0.059%	IH21	0.030%	0.039%	0.057%	IH8	0.030%	0.039%	0.053%
IH17	0.031%	0.040%	0.055%					IH10	0.030%	0.039%	0.055%
IH19	0.031%	0.040%	0.059%					IH12	0.032%	0.041%	0.058%
IH23	0.030%	0.040%	0.048%					IH14	0.031%	0.040%	0.061%
								IH16	0.032%	0.041%	0.070%
								IH18	0.031%	0.040%	0.057%
								IH20	0.031%	0.040%	0.063%
								IH22	0.031%	0.039%	0.060%

L2-N Interharmonics Table

Odd Interharmonics								Even Interharmonics			
Not multiples of 3				Multiples of 3							
Order h	Average value	95% value	Max value	Order h	Average value	95% value	Max value	Order h	Average value	95% value	Max value
IH5	0.034%	0.047%	0.068%	IH3	0.033%	0.045%	0.060%	IH2	0.032%	0.044%	0.062%
IH7	0.032%	0.043%	0.058%	IH9	0.031%	0.041%	0.061%	IH4	0.033%	0.044%	0.061%
IH11	0.032%	0.044%	0.063%	IH15	0.032%	0.043%	0.065%	IH6	0.033%	0.046%	0.062%
IH13	0.033%	0.044%	0.066%	IH21	0.031%	0.041%	0.062%	IH8	0.031%	0.040%	0.059%
IH17	0.032%	0.042%	0.059%					IH10	0.032%	0.042%	0.061%
IH19	0.032%	0.041%	0.056%					IH12	0.034%	0.043%	0.066%
IH23	0.031%	0.041%	0.054%					IH14	0.033%	0.042%	0.066%
								IH16	0.034%	0.045%	0.065%
								IH18	0.032%	0.042%	0.062%
								IH20	0.032%	0.043%	0.059%
								IH22	0.032%	0.041%	0.056%

L3-N Interharmonics Table

Odd Interharmonics								Even Interharmonics			
Not multiples of 3				Multiples of 3							
Order h	Average value	95% value	Max value	Order h	Average value	95% value	Max value	Order h	Average value	95% value	Max value
IH5	0.031%	0.040%	0.050%	IH3	0.031%	0.041%	0.057%	IH2	0.030%	0.039%	0.056%
IH7	0.030%	0.039%	0.050%	IH9	0.030%	0.038%	0.048%	IH4	0.031%	0.040%	0.049%
IH11	0.030%	0.039%	0.049%	IH15	0.031%	0.040%	0.054%	IH6	0.031%	0.042%	0.060%
IH13	0.031%	0.041%	0.058%	IH21	0.030%	0.039%	0.054%	IH8	0.030%	0.039%	0.054%
IH17	0.030%	0.039%	0.052%					IH10	0.030%	0.038%	0.053%
IH19	0.030%	0.039%	0.051%					IH12	0.032%	0.041%	0.053%
IH23	0.030%	0.039%	0.052%					IH14	0.031%	0.039%	0.056%
								IH16	0.032%	0.041%	0.055%
								IH18	0.030%	0.039%	0.053%
								IH20	0.030%	0.038%	0.054%
								IH22	0.030%	0.039%	0.049%

EN50160 4.3.1: Interruptions

No interruptions during 10/24/2011 – 10/30/2011

EN50160 4.3.2: Dips

No dips during 10/24/2011 – 10/30/2011

EN50160 4.3.3: Swells

No swells during 10/24/2011 – 10/30/2011

EN50160 4.3.4: Transient overvoltages

No transients during 10/24/2011 – 10/30/2011

Conclusions
EN50160 Compliance
10/24/2011 – 10/30/2011

EN50160 Pass-Fail Requirements Table

EN50160 Section	Power Quality Parameter	EN50160 Compliance	Remarks
4.2.1	Power Frequency	PASS	Coverage 99.90%
4.2.2	Supply Voltage Variations	PASS	Coverage 99.90%
4.2.3	Flicker Severity	PASS	
4.2.4	Voltage Unbalance	PASS	
4.2.5	Harmonic Voltages	PASS	

EN50160 Additional Information Table

EN50160 Section	Power Quality Parameter	Remarks
4.2.6	Interharmonic Voltages	Data only
4.2.7	Mains Signaling	Not measured
4.3.1	Interruptions	
4.3.2	Dips	
4.3.3	Swells	
4.3.4	Transient overvoltages	

Note 1: During 10/24/2011 – 10/30/2011 measurements were made 99.90% 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® (www.PQube.com)
Manufacturer: Power Standards Lab, U.S.A.
PQube ID: PSL Demonstration Unit
Location: Main Breaker in Office
Serial number: P004424
Firmware revision: 2.0.0 2756
Calibration Certificate: <http://www.PowerStandards.com/CalibCerts/P004424.pdf>
Report Software: PQube Report Writer 2.1
Author of Report: Intratech Electrical Reports
Name: George Smith

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Website: www.Sample.com