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담 당	과 장	부 장

EN50160 Compliance Report - **FAIL**

2013-07-01 – 2013-07-31
"Characteristics of Voltage at a Network User's Supply Terminals: Limits and Values"

18 Floor, JoongAng Royal Officetel

18층
서초동 중앙로얄오피스텔 18층
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3-phase 4-wire Wye/Star
220.00V 60Hz

Summary of Results
EN50160 Compliance
2013-07-01 – 2013-07-31

EN50160 Pass-Fail Requirements Table

EN50160 Section	Power Quality Parameter	EN50160 Compliance	Remarks
4.2.1	Power Frequency	PASS	Coverage 100.00%
4.2.2	Supply Voltage Variations	PASS	Coverage 100.00%
4.2.3	Flicker Severity	PASS	
4.2.4	Voltage Unbalance	PASS	
4.2.5	Harmonic Voltages	FAIL	L1, L2, L3 Harmonics exceed limits

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 2013-07-01 – 2013-07-31 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® (www.PQube.com)
Manufacturer:	Power Standards Lab, U.S.A.
PQube ID:	18 Floor, JoongAng Royal Officetel
Location:	JSDATA_www.PQLooK.kr
Serial number:	P004505
Firmware revision:	2.1.0 2831
Calibration Certificate:	http://www.PowerStandards.com/CalibCerts/P004505.pdf
Report Software:	PQube Report Writer 2.1.11.2
Author of Report:	재신정보
Name:	한 정규(ceo@jsdata.co.kr)

Customer Information

Name:	18층
Company:	서초동 중앙로얄오피스텔 18층
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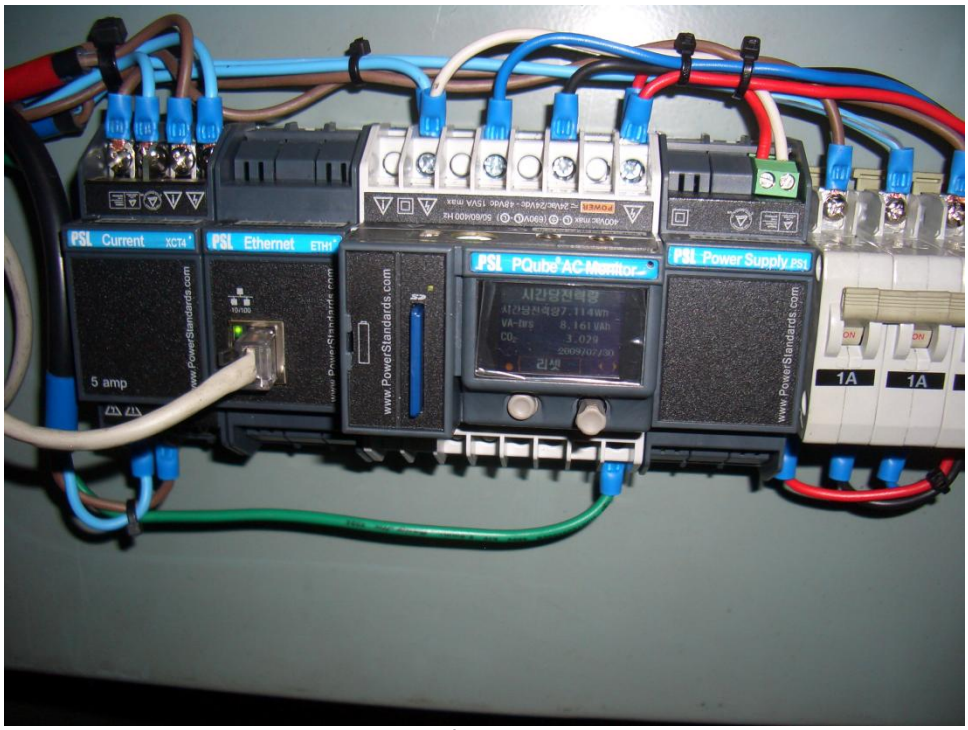


Photo 1 -

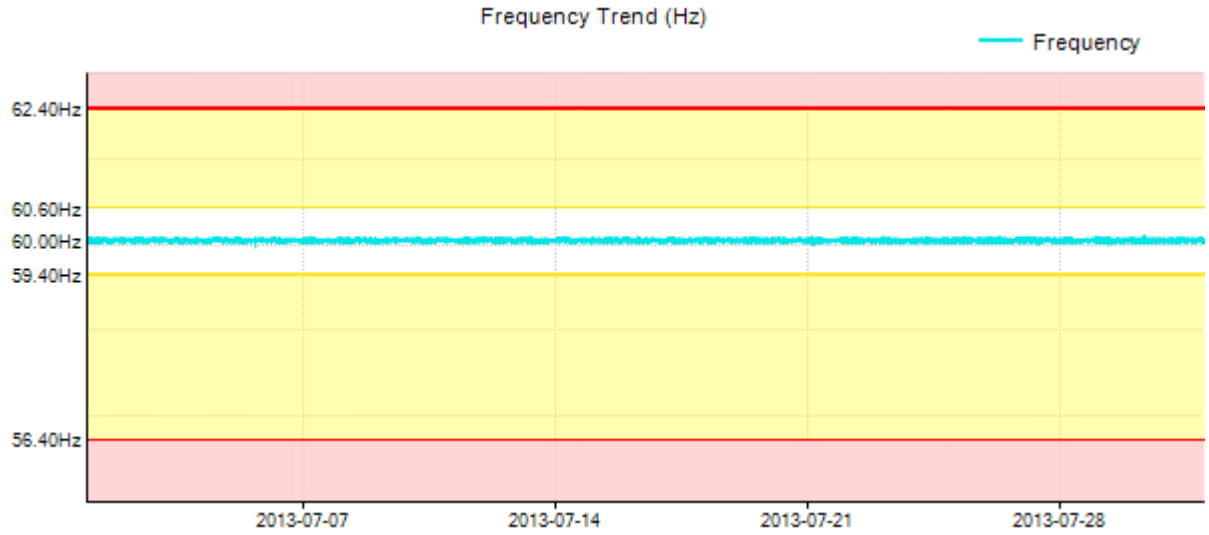
Photo 2 -

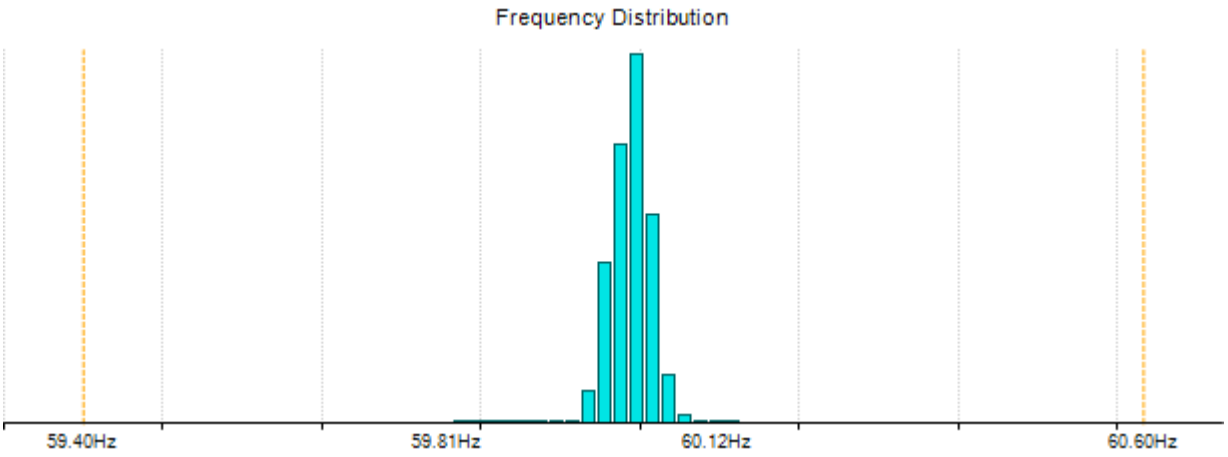
EN50160 4.2.1: Power Frequency

Nominal Frequency: **60.00Hz**

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

EN50160 Requirement	**Measured Frequency**	**Result**
99.5% of the time: 59.40Hz - 60.60Hz	**59.97Hz~60.04Hz**	**PASS**
100% of the time: 56.40Hz - 62.40Hz	**59.96Hz~60.06Hz**	**PASS**



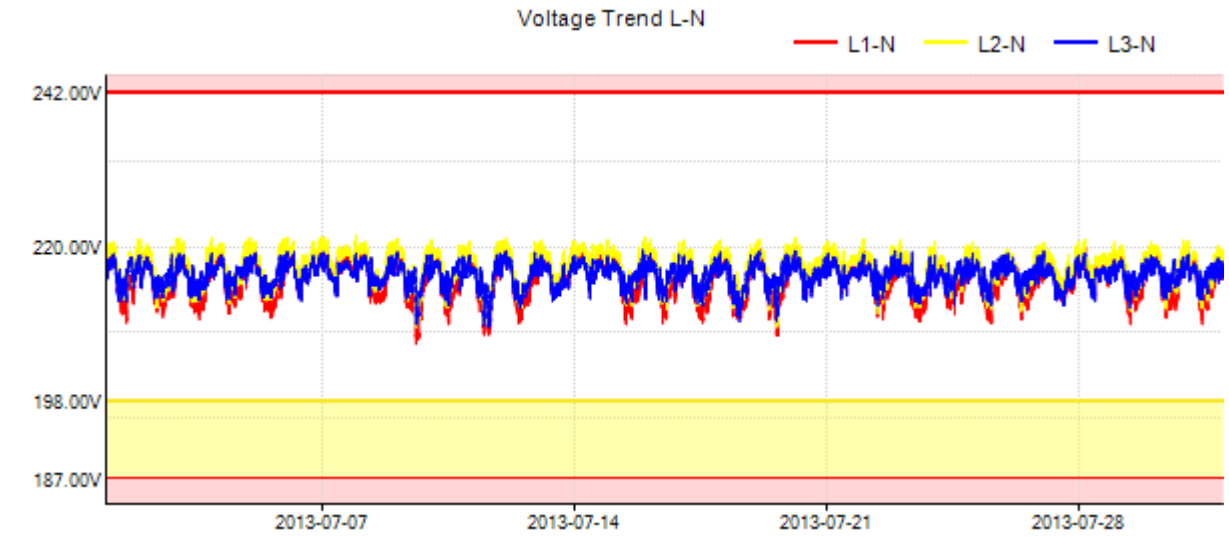


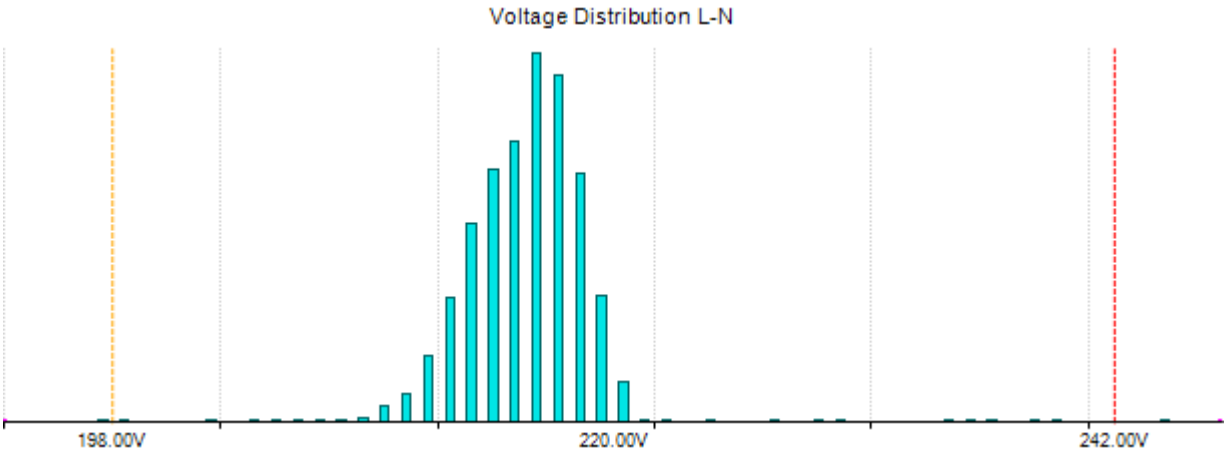
EN50160 4.2.2: Supply Voltage Variations

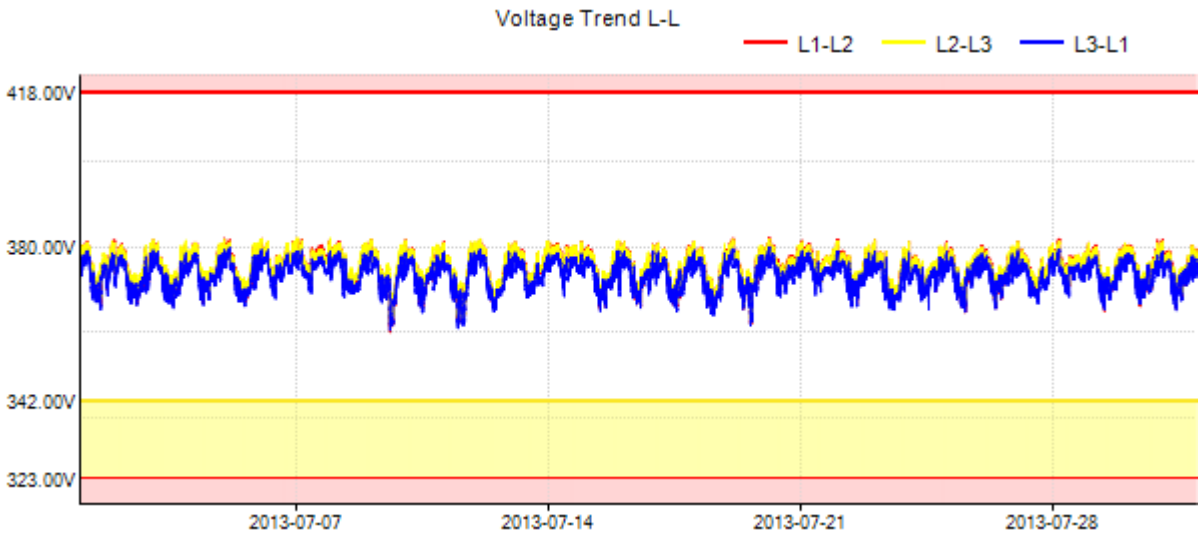
Nominal Voltage: **220.00V L-N / 380.00V L-L**

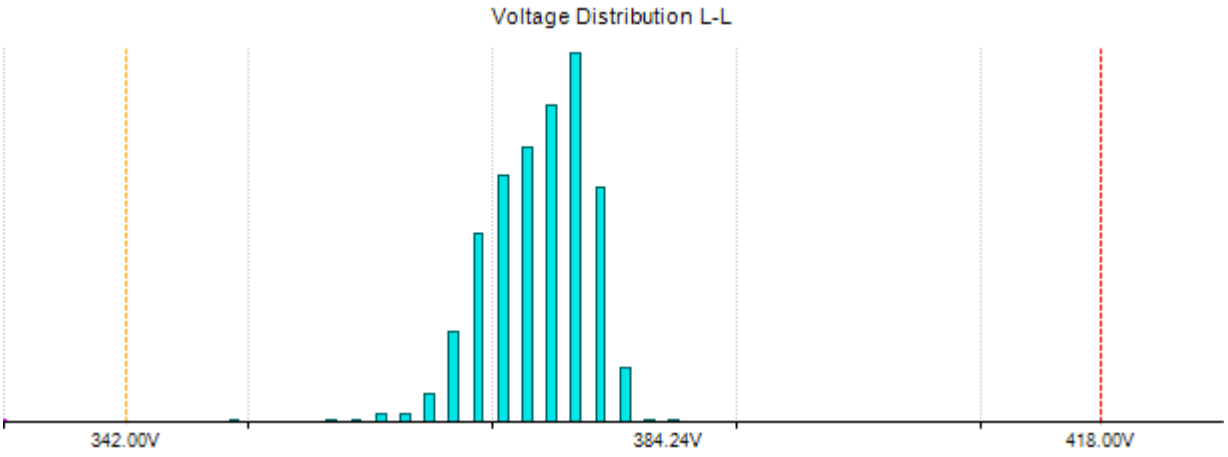
Limitation: For systems with a synchronous connection to an interconnected system

EN50160 Requirement	**Measured L1 Voltage**	**Measured L2 Voltage**	**Measured L3 Voltage**	**Result**
95% of the time: 198.00V - 242.00V	**211.31V~218.48V**	**213.00V~219.99V**	**213.18V~218.02V**	**PASS**
100% of the time: 187.00V - 242.00V	**207.04V~219.52V**	**209.26V~221.07V**	**209.03V~219.03V**	**PASS**






Voltage Trend L-L
L1-L2
L2-L3
L3-L1
418.00V
380.00V
342.00V
323.00V
2013-07-07
2013-07-14
2013-07-21
2013-07-28

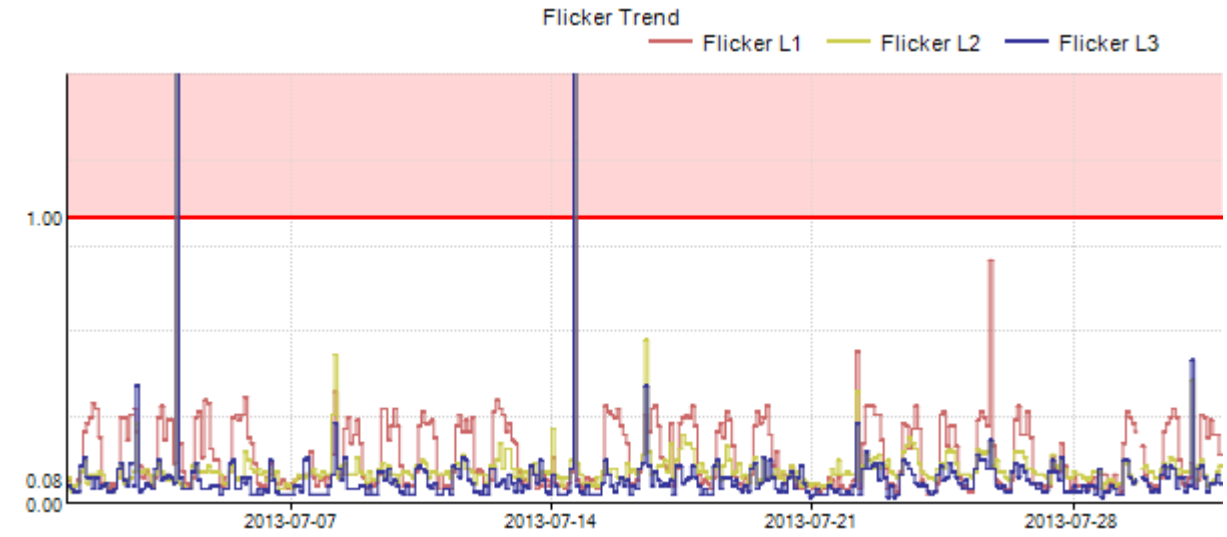

Voltage Distribution L-L
342.00V
384.24V
418.00V

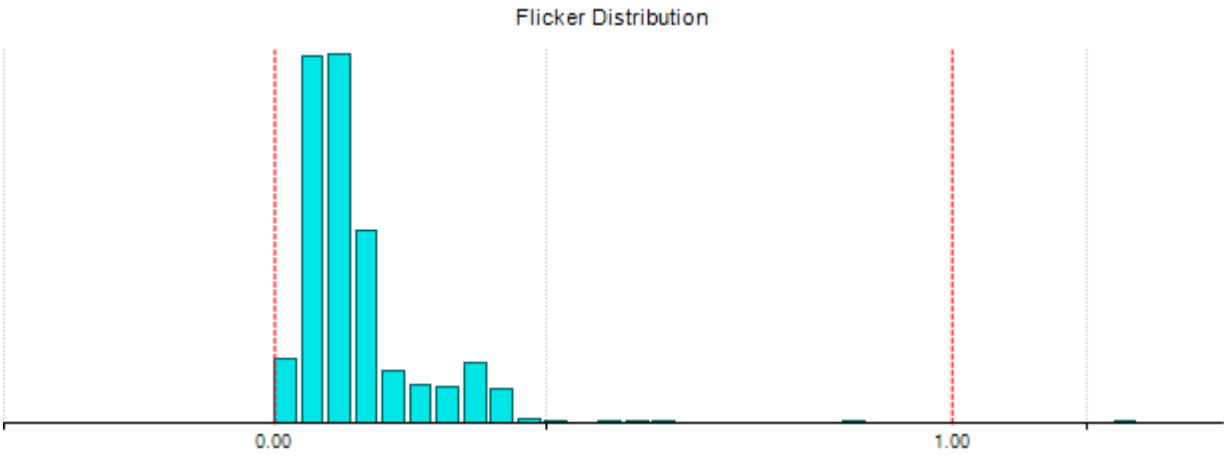
EN50160 4.2.3: Flicker Severity

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 the time: Plt ≤ 1	**0.34**	**0.20**	**0.15**	**PASS**



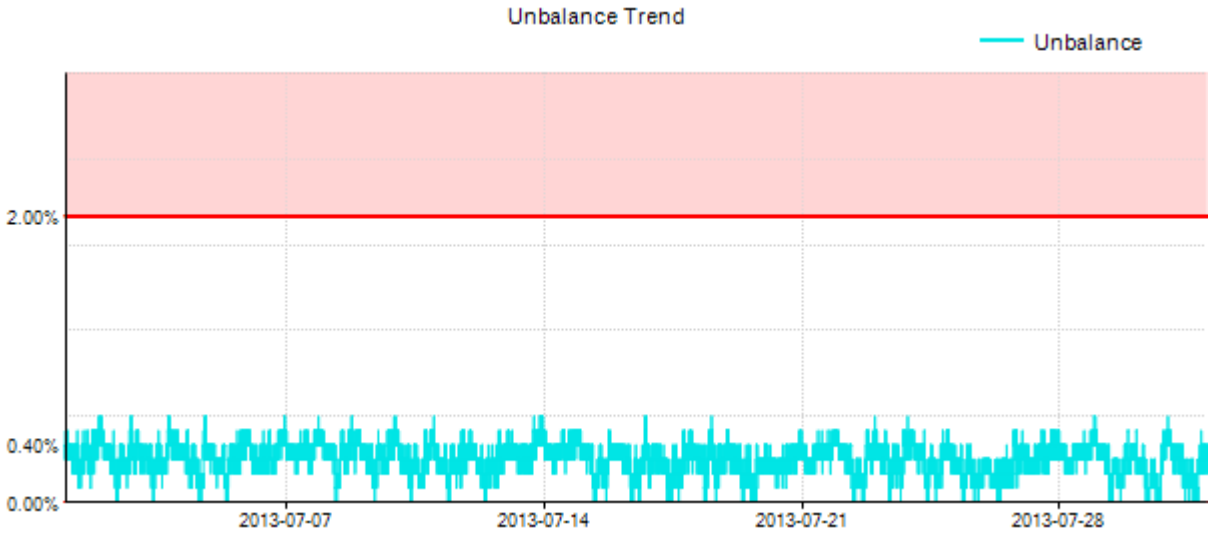


EN50160 4.2.4: Voltage Unbalance

Parameter definition: 10 minute mean RMS values of the negative sequence ratio u2

Limitation: Under normal operating conditions

EN50160 Requirement	**Measured Unbalance u2**	**Result**
95% of the time: 0% ~ 2% u2	**0.45%**	**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%	2.181%	PASS	H3	5.0%	3.683%	PASS	H2	2.0%	0.046%	PASS
H7	5.0%	1.183%	PASS	H9	1.5%	1.360%	PASS	H4	1.0%	0.036%	PASS
H11	3.5%	1.858%	PASS	H15	0.5%	0.997%	FAIL	H6	0.5%	0.030%	PASS
H13	3.0%	1.673%	PASS	H21	0.5%	0.483%	PASS	H8	0.5%	0.029%	PASS
H17	2.0%	0.727%	PASS					H10	0.5%	0.032%	PASS
H19	1.5%	0.554%	PASS					H12	0.5%	0.034%	PASS
H23	1.5%	0.143%	PASS					H14	0.5%	0.036%	PASS
H25	1.5%	0.165%	PASS					H16	0.5%	0.031%	PASS
								H18	0.5%	0.027%	PASS
								H20	0.5%	0.026%	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%	1.767%	PASS	H3	5.0%	2.832%	PASS	H2	2.0%	0.032%	PASS
H7	5.0%	1.552%	PASS	H9	1.5%	1.069%	PASS	H4	1.0%	0.032%	PASS
H11	3.5%	1.651%	PASS	H15	0.5%	1.212%	FAIL	H6	0.5%	0.029%	PASS
H13	3.0%	1.099%	PASS	H21	0.5%	0.649%	FAIL	H8	0.5%	0.029%	PASS
H17	2.0%	0.889%	PASS					H10	0.5%	0.028%	PASS
H19	1.5%	0.977%	PASS					H12	0.5%	0.029%	PASS
H23	1.5%	0.188%	PASS					H14	0.5%	0.031%	PASS
H25	1.5%	0.162%	PASS					H16	0.5%	0.034%	PASS
								H18	0.5%	0.032%	PASS
								H20	0.5%	0.027%	PASS
								H22	0.5%	0.026%	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%	1.533%	PASS	H3	5.0%	2.627%	PASS	H2	2.0%	0.052%	PASS
H7	5.0%	1.228%	PASS	H9	1.5%	1.042%	PASS	H4	1.0%	0.036%	PASS
H11	3.5%	1.724%	PASS	H15	0.5%	1.035%	FAIL	H6	0.5%	0.033%	PASS
H13	3.0%	0.802%	PASS	H21	0.5%	0.473%	PASS	H8	0.5%	0.029%	PASS
H17	2.0%	0.860%	PASS					H10	0.5%	0.035%	PASS
H19	1.5%	0.655%	PASS					H12	0.5%	0.035%	PASS
H23	1.5%	0.135%	PASS					H14	0.5%	0.030%	PASS
H25	1.5%	0.209%	PASS					H16	0.5%	0.032%	PASS
								H18	0.5%	0.029%	PASS
								H20	0.5%	0.026%	PASS
								H22	0.5%	0.025%	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	**0.030%**	**0.046%**	**0.101%**	*IH3*	**0.032%**	**0.051%**	**0.123%**	*IH2*	**0.031%**	**0.045%**	**0.092%**
IH7	**0.031%**	**0.046%**	**0.108%**	*IH9*	**0.030%**	**0.044%**	**0.141%**	*IH4*	**0.031%**	**0.048%**	**0.093%**
IH11	**0.031%**	**0.044%**	**0.172%**	*IH15*	**0.035%**	**0.050%**	**0.230%**	*IH6*	**0.030%**	**0.045%**	**0.091%**
IH13	**0.033%**	**0.045%**	**0.289%**	*IH21*	**0.032%**	**0.045%**	**0.069%**	*IH8*	**0.030%**	**0.046%**	**0.106%**
IH17	**0.031%**	**0.044%**	**0.113%**					*IH10*	**0.030%**	**0.042%**	**0.133%**
IH19	**0.029%**	**0.040%**	**0.078%**					*IH12*	**0.032%**	**0.046%**	**0.128%**
IH23	**0.036%**	**0.054%**	**0.077%**					*IH14*	**0.031%**	**0.043%**	**0.142%**
								IH16	**0.030%**	**0.042%**	**0.116%**
								IH18	**0.029%**	**0.040%**	**0.086%**
								IH20	**0.029%**	**0.039%**	**0.087%**
								IH22	**0.029%**	**0.038%**	**0.063%**

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	**8.861%**	**0.044%**	**349.500**	*IH3*	**1.605%**	**0.042%**	**67.000%**	*IH2*	**6.673%**	**0.040%**	**355.400**
IH7	**7.404%**	**0.044%**	**288.000**	*IH9*	**3.908%**	**0.042%**	**181.500**	*IH4*	**3.318%**	**0.039%**	**155.900**
IH11	**0.969%**	**0.043%**	**51.500%**	*IH15*	**3.713%**	**0.050%**	**160.700**	*IH6*	**7.141%**	**0.041%**	**292.600**
IH13	**6.297%**	**0.043%**	**307.500**	*IH21*	**6.257%**	**0.044%**	**320.300**	*IH8*	**1.589%**	**0.041%**	**68.100%**
IH17	**7.573%**	**0.052%**	**312.400**					*IH10*	**6.456%**	**0.042%**	**351.000**
IH19	**5.878%**	**0.043%**	**265.900**					*IH12*	**2.724%**	**0.045%**	**133.200**
IH23	**6.001%**	**0.066%**	**273.600**					*IH14*	**5.683%**	**0.053%**	**309.600**
								IH16	**1.836%**	**0.048%**	**95.000%**
								IH18	**6.005%**	**0.041%**	**327.000**
								IH20	**4.516%**	**0.039%**	**175.200**
								IH22	**5.143%**	**0.038%**	**235.500**

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	**0.029%**	**0.038%**	**0.128%**	*IH3*	**0.029%**	**0.038%**	**0.123%**	*IH2*	**0.029%**	**0.038%**	**0.089%**
IH7	**0.029%**	**0.037%**	**0.092%**	*IH9*	**0.029%**	**0.038%**	**0.082%**	*IH4*	**0.029%**	**0.038%**	**0.094%**
IH11	**0.029%**	**0.037%**	**0.096%**	*IH15*	**0.032%**	**0.041%**	**0.155%**	*IH6*	**0.028%**	**0.037%**	**0.083%**
IH13	**0.030%**	**0.040%**	**0.119%**	*IH21*	**0.031%**	**0.042%**	**0.082%**	*IH8*	**0.028%**	**0.036%**	**0.077%**
IH17	**0.033%**	**0.044%**	**0.170%**					*IH10*	**0.029%**	**0.037%**	**0.082%**
IH19	**0.029%**	**0.039%**	**0.112%**					*IH12*	**0.030%**	**0.039%**	**0.094%**
IH23	**0.036%**	**0.054%**	**0.077%**					*IH14*	**0.030%**	**0.039%**	**0.094%**
								IH16	**0.030%**	**0.040%**	**0.114%**
								IH18	**0.029%**	**0.038%**	**0.087%**
								IH20	**0.029%**	**0.037%**	**0.065%**
								IH22	**0.028%**	**0.036%**	**0.051%**

EN50160 4.3.1: 순간정전 (Interruptions)

Parameter definition: According to IEC 61000-4-30 Section 5.5.2

On single-phase systems, a voltage interruption begins when the Urms voltage falls below the voltage interruption threshold and ends when the Urms value is equal to, or greater than, the voltage interruption threshold plus the hysteresis. On polyphase systems, a voltage interruption begins when the Urms voltage of all channels fall below the voltage interruption threshold and ends when the Urms voltage on any one channel is equal to, or greater than, the voltage interruption threshold plus the hysteresis.

Date	Time	Duration in seconds	다운된 장비 (추가가능)
2013/07/03	T 20:55:08.508 KST	1.275	A01, B01, D01 등등

EN50160 4.3.2: 순간전압강하 (Dips)

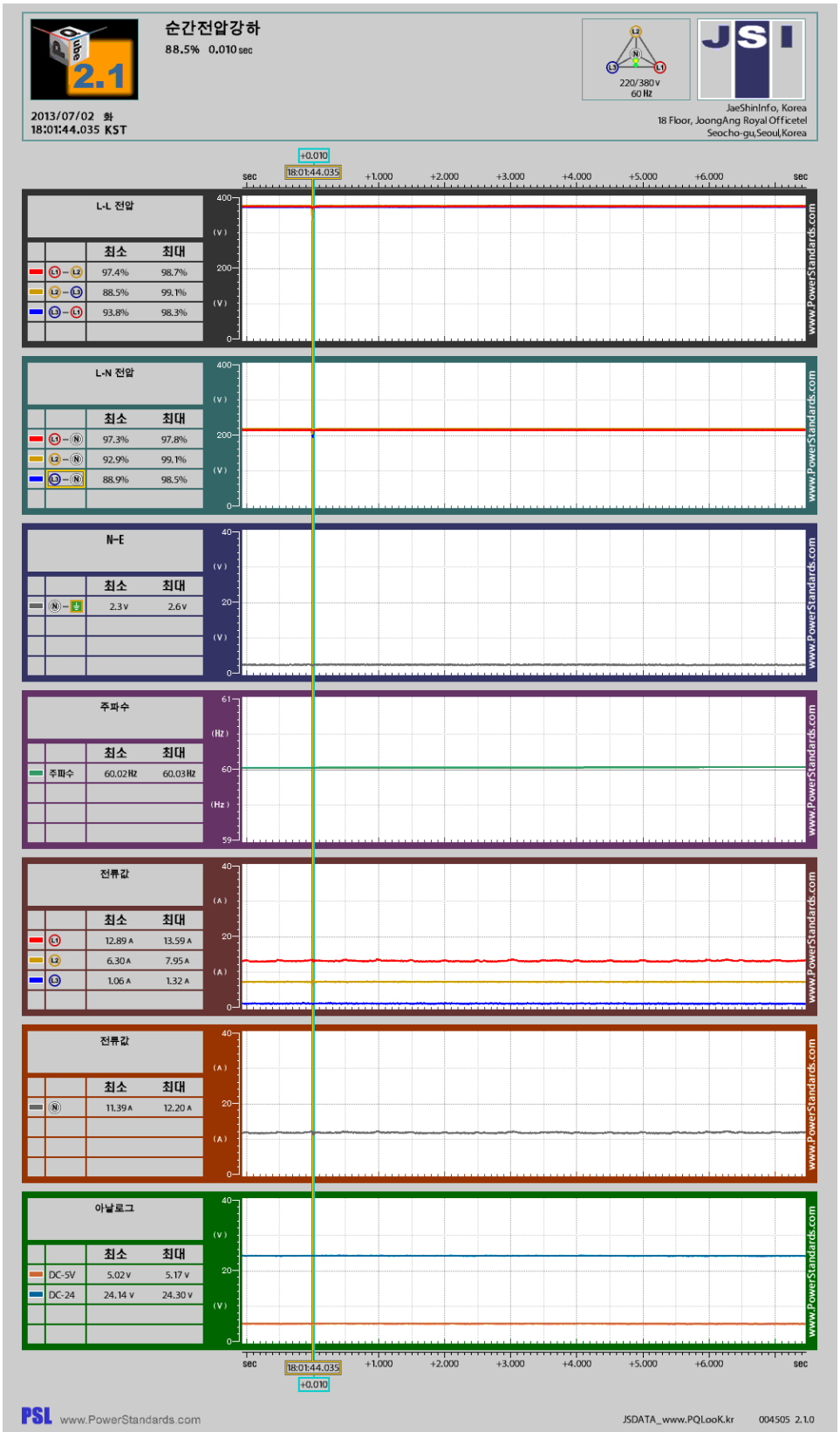
Parameter definition: According to IEC 61000-4-30 Section 5.4.2.1

On single-phase systems, a voltage dip begins when the Urms voltage falls below the dip threshold and ends when the Urms voltage is equal to, or above the dip threshold plus the hysteresis voltage. On polyphase systems, a dip begins when the Urms voltage of one or more channels is below the dip threshold and ends when the Urms voltage on all measured channels is equal to, or above the dip threshold plus the hysteresis voltage. The Depth is the difference between the reference voltage and the residual voltage. It generally expressed in percentage of the reference voltage.

Date	Time	Depth	Duration in seconds	다운된 장비(추가가능)
2013/07/02	T 18:01:44.035 KST	88.50%	0.010	
2013/07/03	T 20:50:42.328 KST	0.11%	360.963	
2013/07/03	T 20:56:43.598 KST	76.06%	0.031	
2013/07/03	T 20:56:43.904 KST	15.18%	0.108	A02, C03
2013/07/03	T 20:56:44.054 KST	11.04%	0.108	
2013/07/03	T 20:56:44.187 KST	86.32%	0.017	
2013/07/03	T 20:56:44.220 KST	74.16%	0.042	
2013/07/03	T 20:56:45.204 KST	53.70%	0.075	
2013/07/03	T 20:56:45.320 KST	57.43%	0.050	K01, L01,
2013/07/03	T 20:56:45.681 KST	51.10%	0.081	
2013/07/03	T 20:56:45.923 KST	66.73%	0.039	
2013/07/03	T 20:56:46.370 KST	62.23%	0.058	
2013/07/03	T 20:56:47.595 KST	3.98%	0.125	
2013/07/03	T 20:56:47.854 KST	88.36%	0.033	
2013/07/14	T 13:34:41.316 KST	52.27%	0.118	P01,U03
2013/07/16	T 10:10:03.711 KST	88.20%	0.051	
2013/07/25	T 16:41:06.185 KST	76.55%	0.025	

Limit Voltage u[%]	Duration t[ms]						
	10≤t≤200	200<t≤500	500<t≤1000	1000<t≤5000	5000<t≤60000	t>60000	N/A
90>u≥80	4	-	-	-	-	-	
80>u≥70	3	-	-	-	-	-	
70>u≥40	6	-	-	-	-	-	
40>u≥5	2	-	-	-	-	-	
5>u	1	-	-	-	-	1	
N/A	-	-	-	-	-	-	

Typical Disturbance during 2013-07-01 – 2013-07-31



EN50160 4.3.3: 순간과전압 (Swells)

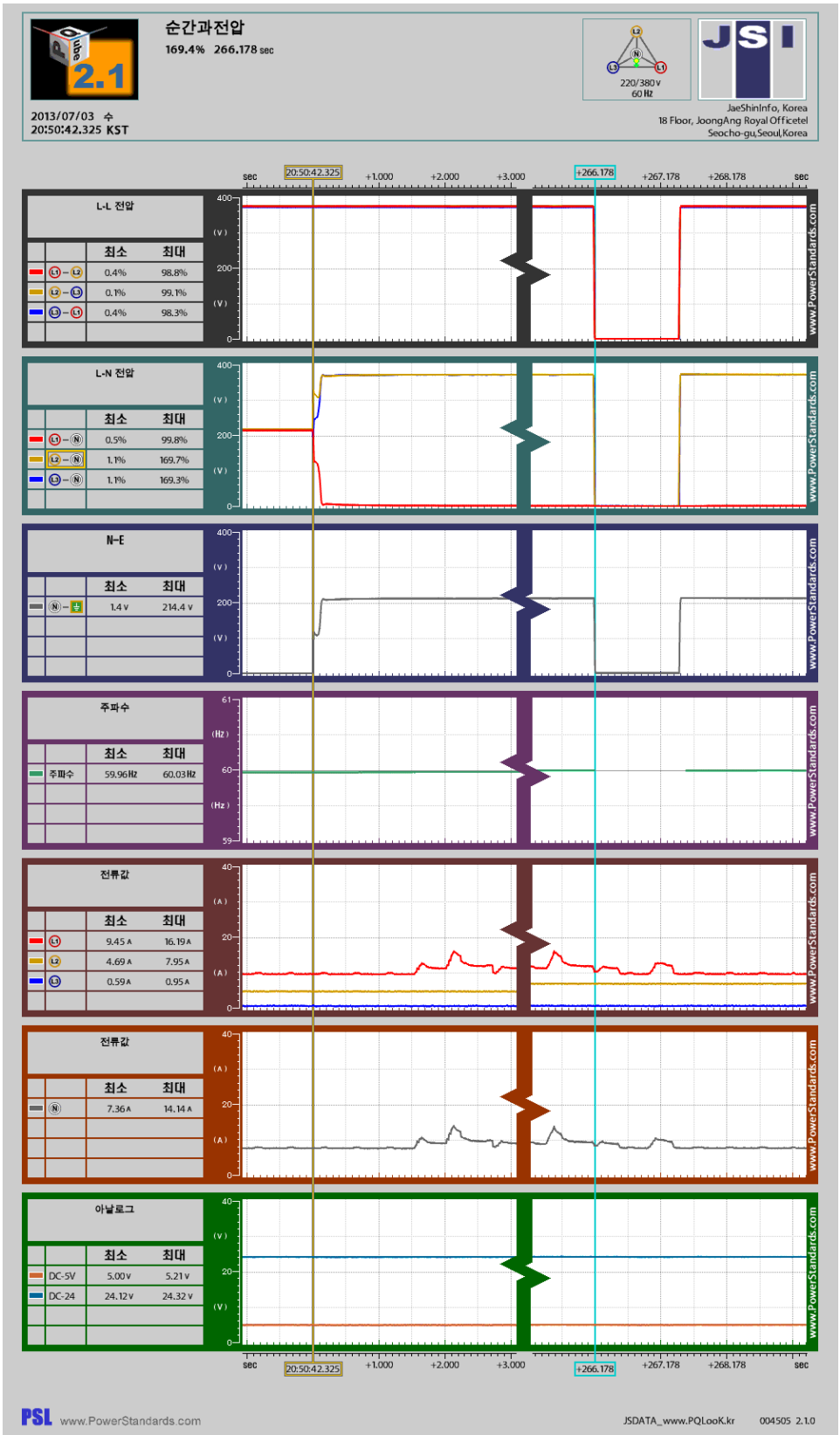
Parameter definition: According to IEC 61000-4-30 Section 5.4.3.1

On single-phase systems, a voltage swell begins when the Urms voltage rises above the swell threshold and ends when the Urms voltage is equal to, or below the swell threshold minus the hysteresis voltage. On polyphase systems, a swell begins when the Urms voltage of one or more channels is above the swell threshold and ends when the Urms voltage on all measured channels is equal to, or below the swell threshold minus the hysteresis voltage.

Date	Time	Depth	Duration in seconds	다운된 장비(추가가능)
2013/07/03	T 20:50:42.325 KST	169.43%	266.178	G02.
2013/07/03	T 20:55:09.789 KST	169.73%	93.507	
2013/07/03	T 20:56:43.409 KST	111.58%	0.008	
2013/07/03	T 20:56:43.601 KST	142.50%	0.025	
2013/07/03	T 20:56:43.901 KST	161.34%	0.114	U72
2013/07/03	T 20:56:44.051 KST	164.39%	0.108	B02
2013/07/03	T 20:56:44.193 KST	123.20%	0.017	
2013/07/03	T 20:56:44.217 KST	143.30%	0.042	
2013/07/03	T 20:56:45.193 KST	145.55%	0.083	H01
2013/07/03	T 20:56:45.317 KST	144.17%	0.050	M02
2013/07/03	T 20:56:45.393 KST	112.05%	0.008	
2013/07/03	T 20:56:45.684 KST	143.63%	0.075	
2013/07/03	T 20:56:45.918 KST	137.68%	0.042	
2013/07/03	T 20:56:46.367 KST	141.78%	0.033	
2013/07/03	T 20:56:46.409 KST	116.97%	0.017	
2013/07/03	T 20:56:47.593 KST	167.95%	0.131	L01
2013/07/03	T 20:56:47.851 KST	121.04%	0.033	

Limit Voltage u[%]	Duration t[ms]			
	10≤t≤500	500<t≤5000	5000<t≤60000	N/A
u≥120	12	-	-	2
120>u>110	1	-	-	-
N/A	-	-	-	-

Typical Disturbance during 2013-07-01 – 2013-07-31



EN50160 4.3.4: Transient overvoltages

Parameter definition:
Impulse on L1-E, L2-E, L3-E exceeds a ±450V peak between 1-µsec and 100-µsec.

Date	Time
2013/07/03	T 20:56:47.715 KST

Conclusions
EN50160 Compliance
2013-07-01 – 2013-07-31

EN50160 Pass-Fail Requirements Table

EN50160 Section	Power Quality Parameter	EN50160 Compliance	Remarks
4.2.1	Power Frequency	PASS	Coverage 100.00%
4.2.2	Supply Voltage Variations	PASS	Coverage 100.00%
4.2.3	Flicker Severity	PASS	
4.2.4	Voltage Unbalance	PASS	
4.2.5	Harmonic Voltages	FAIL	L1, L2, L3 Harmonics exceed limits

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 2013-07-01 – 2013-07-31 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® (www.PQube.com)
Manufacturer:	Power Standards Lab, U.S.A.
PQube ID:	18 Floor, JoongAng Royal Officetel
Location:	JSDATA_www.PQLooK.kr
Serial number:	P004505
Firmware revision:	2.1.0 2831
Calibration Certificate:	http://www.PowerStandards.com/CalibCerts/P004505.pdf
Report Software:	PQube Report Writer 2.1.11.2
Author of Report:	재신정보
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