



735 SW Coast Avenue
Depoe Bay, Oregon
97341
360.521.9756

LANGENBURG POWER GENERATION

TECHNOLOGY TEST

INTRODUCTION

On July 23rd and July 25th tests were conducted on the Langenburg power generating system. The place of testing was at the Langenburg Technology site in Eugene, Oregon.

This final report is a summary of the testing results.

SYSTEM TESTED

The Langenburg portable water processing and electrical generating system was tested. Photographs of the testing are shown in Attachment A. The Langenburg system is shown in A-1 through A-3, and is claimed capable of purifying 250,000 gallons of water per day and generating 1.1 mega-Watts of electrical power from water.

Refer to A-4. The Langenburg process comprises:

1. Taking as input a volume of water, which may be polluted.
2. Converting a portion of the water into syn-gas (primarily hydrogen).
3. Powering a turbine-generator with the syn-gas to produce electricity, while providing energy to drive the syn-gas production process.
4. Utilizing some of the energy from syn-gas process to purify the remaining water (approximately 97% of water remaining.)

A-7 shows the Langenburg turbine powered by syn-gas produced from water input. The turbine provides motive power to a generator (not shown), with water (steam) exhausting through a stack also shown in A-7,



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The Langenburg water processing portion of the technology was tested earlier and is not included in this report.

TEST OBJECTIVES

The objectives of these tests were:

1. Determine the electric generating capacity of the Langenburg system shown in A-1 through A-3.
2. Ascertain the ability of the system to respond to electrical demand within the range of capabilities claimed for the system.
3. Validate the claim that the only input to the system is water.

TEST EQUIPMENT

These tests required a "load-bank." A load bank is a device which creates an electrical load, applies the load to an electrical power source and converts or dissipates the resultant power output of the source.

The purpose of a load bank is to accurately simulate the operational or "real" load that a power source will see in actual application. However, unlike the "real" load, which is likely to be dispersed, unpredictable and random in value, a load bank provides a contained, organized and fully controllable load.

The three most common types of load banks are resistive, inductive, and capacitive. Both inductive and capacitive loads create what is known as reactance in an AC circuit. Reactance is a circuit element's opposition to an alternating current, caused by the buildup of electric or magnetic fields in the



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element due to the current and is the "imaginary" component of impedance, or the resistance to AC signals at a certain frequency. Inductive reactance resists the change to current, causing the circuit current to lag voltage. Capacitive reactance resists the change to voltage, causing the circuit current to lead voltage.

Test equipment included a load-bank provided under contract from ComRent of Kent, Washington. (For more information on ComRent refer to C-1 through C-3- mainly marketing materials. Also see www.ComRent.com) The ComRent load-bank is shown in A-5 through A-7, and in A-7 is shown electrically connected to the Langenburg generator.

As part of the contract ComRent provided a test engineer and monitoring device for recording and reporting tests of the generator using the load-bank.

The ComRent load-bank was equipped with a display for showing interactions between the load-bank and generator. However, the display was not capable of data capture.

Test data was captured by a "Cx monitor", provided by ComRent. The Cx monitor captures all data related to demands imposed by the load-bank and responses to demands by the generator.

The Cx monitor is connected directly to the load-bank and is shown in A-7. Specifications for the Cx monitor are found in C-3.

In addition a laptop computer was connected to the Cx monitor for the purpose of viewing in real-time load-bank/generator interactions. The



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laptop was not permitted to store data, but was allowed periodic "snapshots" of the interactions.

After tests were completed the Cx monitor was sealed by ComRent and transported to Atlanta for the purpose of creating detailed reports that are returned to the test sponsor.

DATA CAPTURED AND REPORTS

The Cx monitor captures interactions between the load-bank and generator in terms of load-steps (demands by the load-bank) and responses by the electrical generating system.

These reports include details of the electrical waveforms output from the generator and include voltage and amperage for three electrical power phases, and other information second-by-second as the generator responds to demands by the load-bank.

TEST SPONSOR

The test sponsor is Harris Thermal Transfer of Newburg, Oregon. See www.HarrisThermal.com.

TEST MONITORS AND OBSERVERS

Test monitors certify the reports produced by ComRent from the Cx monitor. The test monitors were:

- Greg Fuchs, MSEE- representing Harris Thermal. Greg Fuchs may be reached through Arnold Fuchs, CEO Harris Thermal by first coordinating with the author of this report.



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- Lee Davis, System Engineer- resides in Washington state and is independent of Harris Thermal and Langenburg Research.

Test observers provided further input and evaluation to the Test Monitors. All test observers are independent of Langenburg Research and Harris Thermal. They are:

- Linda Tiokasin- Lakota Pride LLC (a Native American company)- An environmental scientist and potential user of the Langenburg system
- Jeff Wingad- Former Cray Research engineer and entrepreneur with interests in applying the Langenburg system
- Michael Gottchick- A Canadian citizen interested in the technology

Test monitors and observers certify the results of this preliminary report and may be contacted by request made to the author of this report.

LANGENBURG INVOLVEMENT IN TEST

Langenburg engineers assisted in the connection of the load-bank and the generating system, and initialized the generating system. From that point forward the test was controlled by the ComRent test engineer- Barry Carlson following test protocols.

TEST PROTOCOL

Test protocols were specified by Harris Thermal. Each protocol comprised a test script used by the ComRent test engineer to control the load-bank. A test script was (essentially) varying electrical demand up and down between 250 kilo-Watts and 1 mega-Watt. The actual script followed



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can be determined by an examination of the reports produced by the Cx monitor.

A starting electrical load (beginning "load-step") was imposed on the generator by the load-bank and after a period of time was changed to a different value. Load-steps were imposed by the load-bank until the test script was completed.

EXAMINATION OF SYSTEM

Prior to testing, the Langenburg system was examined for fuel or auxiliary power sources, including batteries, inductive coupling mechanisms, hidden power cables, etc. None was found in the compact space of the mobile system. Even grounding cables (installed because of the rain) were removed. Furthermore a simple calculation shows a lithium-ion battery bank for generating power according to the test scripts would require more than 400 cubic feet of space- a cube seven feet on a side, which could not be hidden.

TESTING

The ComRent load-bank and ComRent personnel (Jay Cutlip and Barry Carlson) arrived early afternoon on Tuesday July 22. Langenburg and ComRent engineers connected the Langenburg generator and the load-bank within a few hours after ComRent arrival.

The test was scheduled to begin at 1:30 PM on Wednesday July 23rd. Rain started early Wednesday morning before the installation of the Cx monitor.



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At approximately 1:40 PM the test was begun by imposing a load of 250 kilo-Watts. Immediately, an odor was detected and it was eventually determined a cable in the Cx monitor had shorted in the rain. The display on the load-bank and the laptop showed the Langenburg system had responded appropriately but complete real-time data capture of tests results was impossible. The test was postponed until a replacement Cx monitor cable could be sent from Atlanta.

On the morning of Friday July 25th a replacement cable arrived and was installed. At 1:00 PM the test resumed.

Testing was performed in two stages. In the first stage the load-bank imposed resistive loads and in the second stage imposed reactive loads (resistive, inductive and capacitive loading.)

In both phases, the ComRent engineer followed the Harris script, which was:

1. Impose a 250 kilo-Watt load
2. Wait several minutes (wait time determined by ComRent engineer)
3. Add an additional 250 kilo-Watt load (load now 500 kilo-Watts)
4. Wait several minutes (wait time determined by ComRent engineer)
5. Add an additional 250 kilo-Watt load (load now 750 kilo-Watts)
6. Wait several minutes (wait time determined by ComRent engineer.)
7. Add an additional 250 kilo-Watts (load now 1 mega-Watt)
8. Wait several minutes (wait time determined by ComRent engineer)

In both phases of the test, and for all load-steps the Langenburg system responded immediately. At the higher loads (900 kilo-Watts and



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above) the load-bank's power absorption and feedback to the Langenburg generator oscillated- caused by the load-bank operating at a different frequency from the Langenburg system (60 Hz for the load-bank and 50 Hz for the Langenburg system.) The 50 Hz operation had been requested, but in the haste of locating and transporting the load-bank, the setting of the proper operating frequency was overlooked.

A-9 is taken from the test and shows the test monitors and test engineer conducting the tests; **A-10** through **A-12** shows screen snapshots taken from the laptop connected to the Cx monitor. These screen shots will be replaced by screen shots from the Cx monitor and by detailed reports produced by ComRent in Atlanta.



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SUMMARY AND CONCLUSIONS

ComRent test engineer Carlson and test monitors Davis and Fuchs certified the Langenburg system performed as claimed for each load-step.

The test monitors and test observers also verify the claim by Langenburg that the only input was water. It appeared to the test monitors and observers that the only output was electricity and water. There was no evidence of combustion in any form, visual or odor.

A-13 shows signatures of the test engineer, test monitors and test observers.

David E. Orr PhD



A-1



Langenburg portable water-power system with syn-gas generator



A-2



Inside water-power system



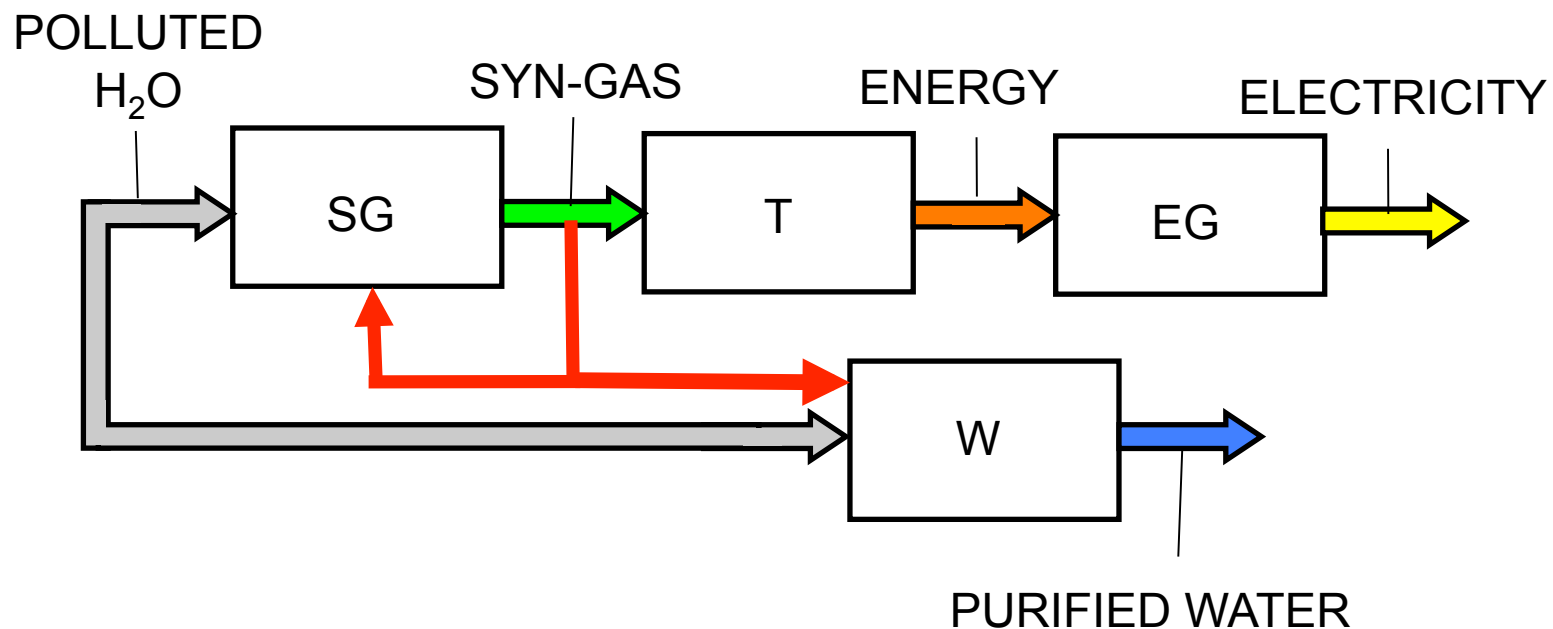
A-3



Inside water-power system



A-4



SG SYN-GAS GENERATION
T TURBINE
EG ELECTRICITY GENERATION
W WATER PURIFICATION

Note: this diagram is conceptual only for the purpose of illustrating the purpose of this test and was created by the author of this report



A-5



ComRent load-bank



A-6



ComRent load-bank



A-7



Cx monitor prior to
connecting to load-bank

Connecting load-bank to syn-gas powered generator



A-8



Syn-gas turbine and exhaust stack for expelling steam formed from syn-gas burn

A-9



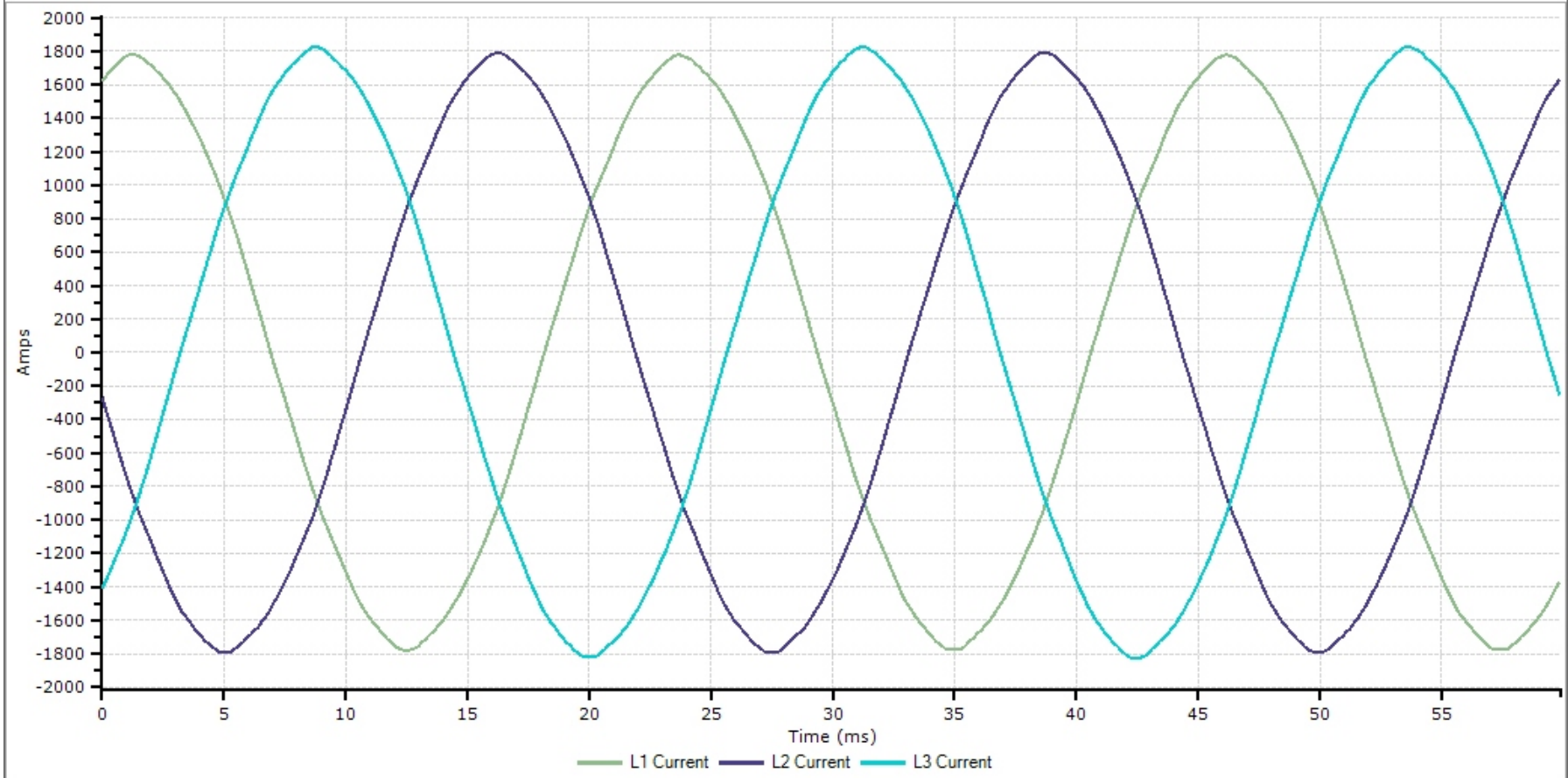
A- COMRENT ENGINEER CARLSON; B: TEST MONITOR DAVIS;
C: TEST MONITOR FUCHS; D LANGENBURG ENGINEER



A-10

Event ID: 9432
Jul 25, 14 13:49:38

Snapshot





A-11

Meter

Volts	L1-G	L2-G	L3-G	L1-L2	L2-L3	L3-L1	N-G
RMS	226	233	250	385	426	417	1.3
Min	0.1	0.1	0.1	0.1	0.1	0.1	0.06
Max	332	333	332	576	580	578	203
%THD	12.0	11.3	18.6	7.1	17.0	16.7	
Max	73.5	73.3	73.3	72.7	72.8	72.2	
AC Freq							
Min	44.873	44.865	44.873				
Max	64.403	64.403	64.403				

Current	L1	L2	L3	NEU	GND
RMS	1169	1294	1293	0.3	0.01
Min	0.3	0.3	0.7	0.2	0.01
Max	1498	1537	1549	0.3	0.01
%THD	7.5	17.7	15.5		
Max	124.2	203.0	135.3		

Power	L1	L2	L3	TOTAL
KVA	268	299	321	888
KW	189	226	252	667
KVAR	190	196	198	584
PA	45.2	40.8	38.2	
PF	0.705	0.756	0.786	0.752
DPF	0.705	0.756	0.786	0.752

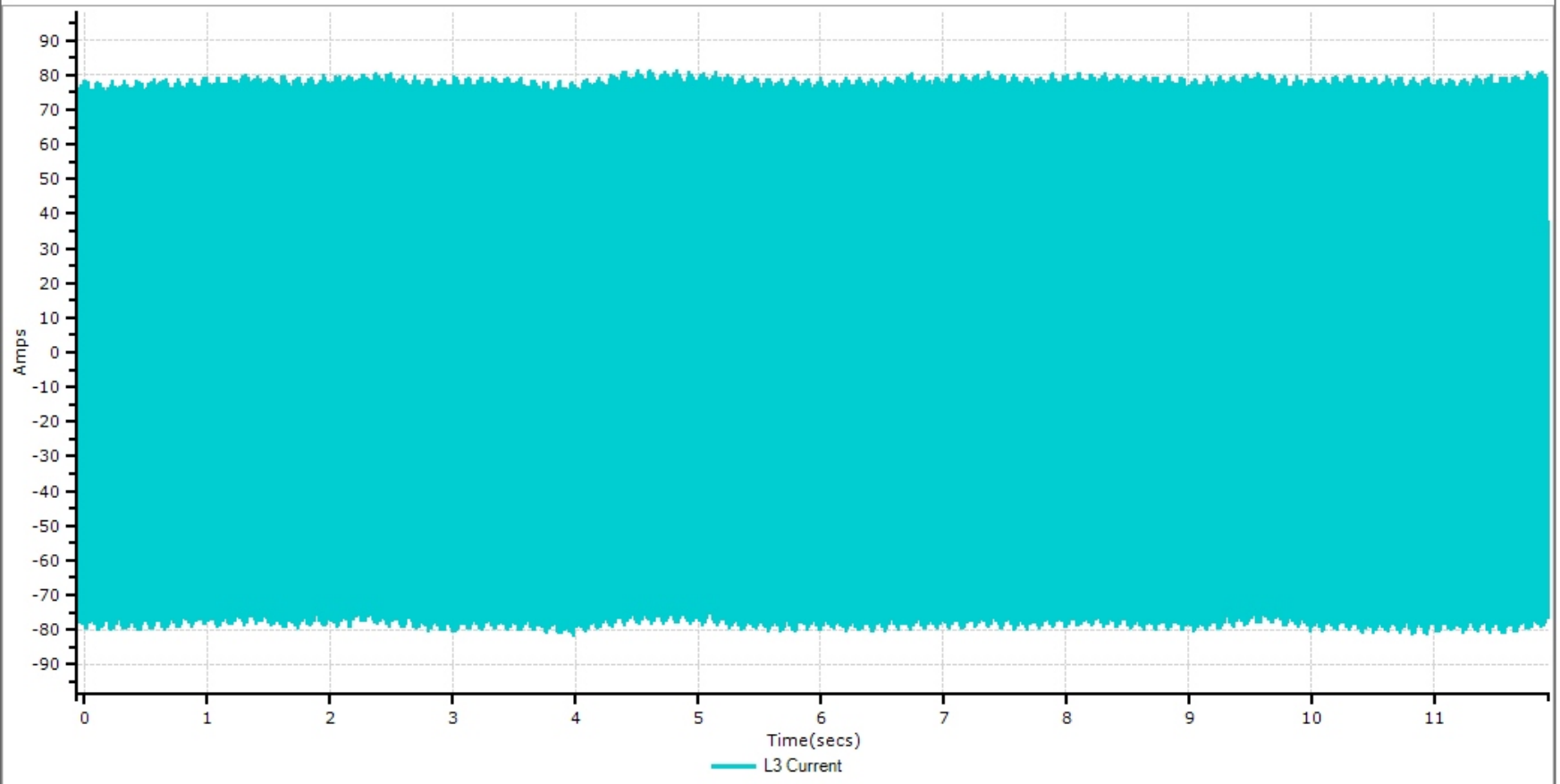
Serial #	Note	Type	Reading
1		T/H	0.0/0.0



A-12

Event ID: 9569
Jul 25, 14 13:52:13.891

Waveform Capture





A-13

TESTERS

COMRENT

[Signature]

MONITORS

Greg Fuchs

Lee Davis

OBSERVERS

[Signature]

Jim Wiggan, Trustee
MAGWERKS TRUST



RxMS Tech Notes

7/30/2014

Site Certified ®

Customer Information

Jay Cutlip
ComRent International
848 3rd Ave S
Kent, WA 98032, US

Site Information

David Orr
Langenburg Water
1704 West 2nd Ave.
Eugene, OR 97402, US
360-326-4038

Rx Site #: 24134
Monitor S/N:

Client Site Code: Harris Thermal
Site Equipment: Generator
Monitor Location: Output of custom generator

Comments:

Attached is the report for Langenburg Research R+D mobile generator. No testing data was supplied, so the report is based on best guess needs. The frequency varied heavily during load steps, view the Waveform Capture section to see the frequency shifts.

This power quality survey was conducted by an independent power and environmental consulting firm, Rx Monitoring Services, Inc. (RxMS). The equipment used to perform the survey was provided by RxMS and calibrated prior to shipment and again upon return according to our internal procedures and national standards.

The client is only responsible for the installation of the equipment and has either no or limited access to the data. The data gathered at the site is compared to the original equipment's site specification guideline (supplied at the initial installation) and used to provide the recommendations found in the report. For technical assistance please contact, at no extra charge, Rx Tech Support at 1-603-666-6606. RxMS is not affiliated with any power conditioning manufacturer or distributor but will refer solutions for your convenience if no local source is available.

Rx Monitoring Services, Inc.

**22A Eastman Ave.
Bedford, NH. 03110**

**www.rxms.com
1-888-329-2321**



18-Jul-14

Site Registration #: 24134

[illegible]

Telephone: (603) 666-6606 - Tech Support: Ext. 2 - Web: www.rxms.com



Site Information

18-Jul-14

Please call us at (603) 666-6606 x204
before installing the power monitor
and reference the following Site Registration #

Site Registration #: 24134

Please return all equipment by: 7/25/2014

Your Information

Name/Company: *LANGENBURG RESEARCH*

Phone #: *541-687-0130*

Email: *SALES@LANGENBURGWATER.COM*

Additional Emails:

Site Contact Information

Name/Company (If Different): *DAVID ORR*

Phone #: *360-521-9756*

Email: *DAVIDEORR@GMAIL.COM*

Equipment Information

Cust Code/Eq. Serial #:

Type of Eq.: *MOBILE GENERATOR*

Date/Time of Monitor Installation: *7/23/2014*

System Voltage:

What Leads Were Plugged Into the Monitor?:

☐ L1

☐ L2

☐ L3

☐ Neutral

☐ Ground

Where was the Monitor connected?:

☐ Input/Wall Connection

☐ OR

☐ Output of Power Protection

Power Protection Brand/Model If Used:

Reason for Monitoring (New Install / Outstanding Issues - Please Describe):

R&D POWER TEST

Please use the Detailed Site Log to track any System
Errors, Resets, Site Issues, etc.

Load Bank Test Log:

To use the load bank test sheet fill out all information during testing.



monitoring services

Load Bank Test Log

RxSiteID: _____

Customer: _____
UPS #: _____
Make: _____
Model: _____
S/N: _____
KW Rating: _____

Your Name: DAVID ORR
Your Email: DavidEOrri@gmail.com
W/O: _____

Load Bank Info: _____

Load Step Test

Test #	Time	Load %
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		

Other Tests

Test #	Time	Test Type
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		

Please fill this form out as fully as possible. Any other notes can be added to the *Detailed Site log* provided in the power monitor kit.

Reminder: Voltage & Current probes must be connected properly for complete report.

Generator Test Log:

Because generator testing can require different information we provide the following



monitoring services

Generator Load Bank Test Log

RxSiteID: _____

Customer: _____

Generator #: _____

Make: _____

Model: _____

S/N: _____

KW Rating: _____

Your Name: DAVID ORR

Your Email: DAVIDEORR@gmail.com

W/O: _____

Load Bank Info: _____

Test #	Time	Load %	Speed RPM	Oil Press	Water Temp	Amb. Temp	Exhaust Temp.	Charge Amps	Eng Hours
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									

Please fill this form out as fully as possible. Any other notes can be added to the *Detailed Site log* provided in the power monitor kit.

Reminder: Voltage & Current probes must be connected properly for complete report.

Report Information Form

The following information is required for a report to be generated. Please be as detailed as possible.

Facility Name: LANGENBURG RESEARCH

Facility St. Address: 1704 W. 2ND AVENUE

City: EUGENE State: OREGON Zip: 97402

Name of on site testing agent: DE ORR

Phone#: 360-521-9756 Email: DAVIDEORR@GMAIL.COM

Model Number of Equipment under test: LT 1.1 MW

Make of Equipment under test: _____

Serial Number: _____ KW Rating: 1,100 KW

Load Bank Sizing and information: _____

Tests Performed and times

Test requirements (Needs to pass ITIC, Manufacturers specifications, or custom)

CUSTOM

See attached Load Bank Test Log or Generator Load Bank Test Log

Additional Documentation Needed

Test Scripts

For Temperature/Humidity provide a diagram of the equipment layout (Rack Address and Serial Numbers)

Equipment Specifications

Bill Of Materials for Equipment

Commissioning Requirements

Confidential Information

Waveform Capture



0-200kW

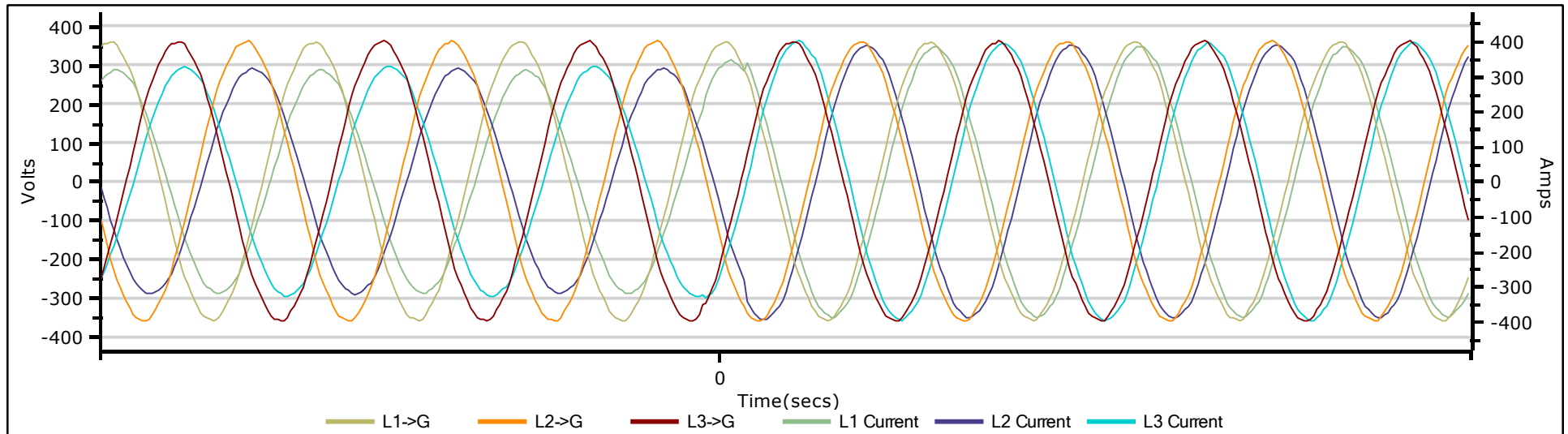
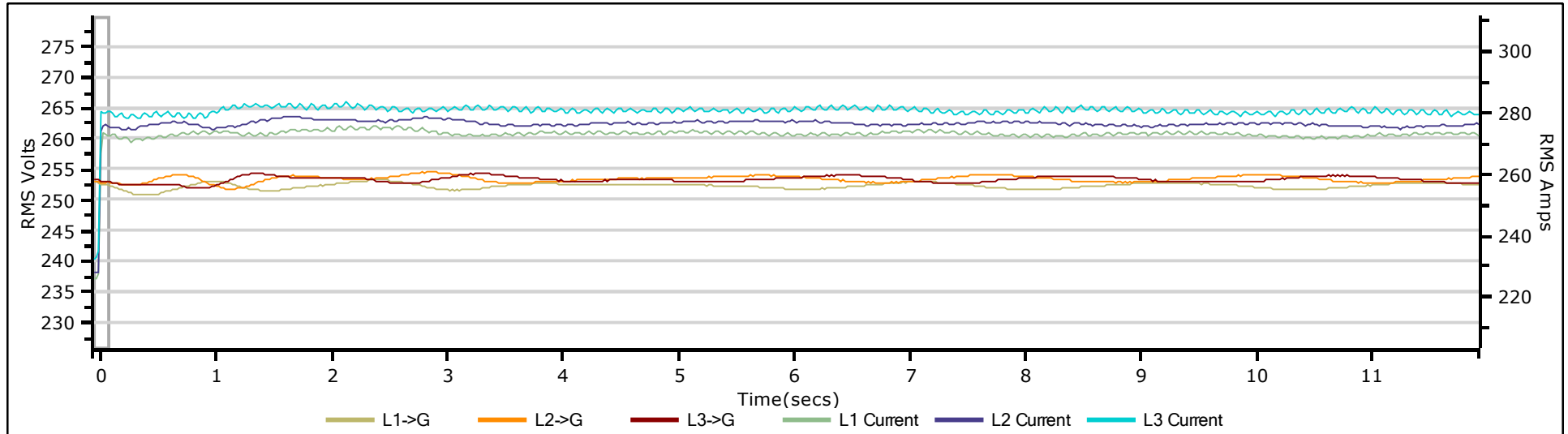


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 6000 - Friday, Jul 25, 2014 12:46:53

Volts Angle: -120.4
Phase Seq: CCW(CBA)



Comments:

175-200kW

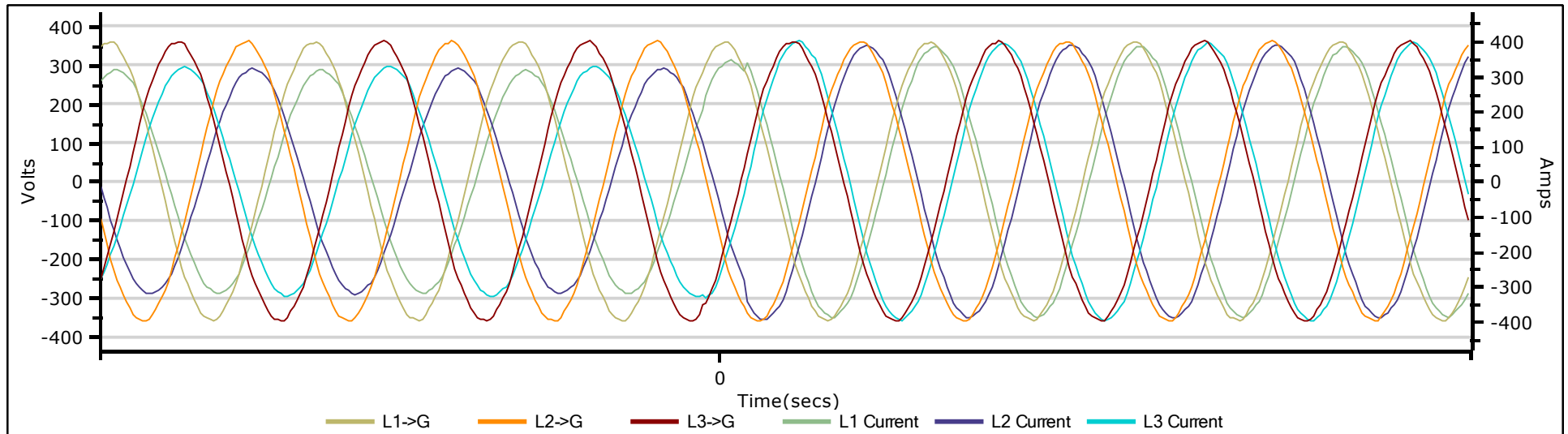
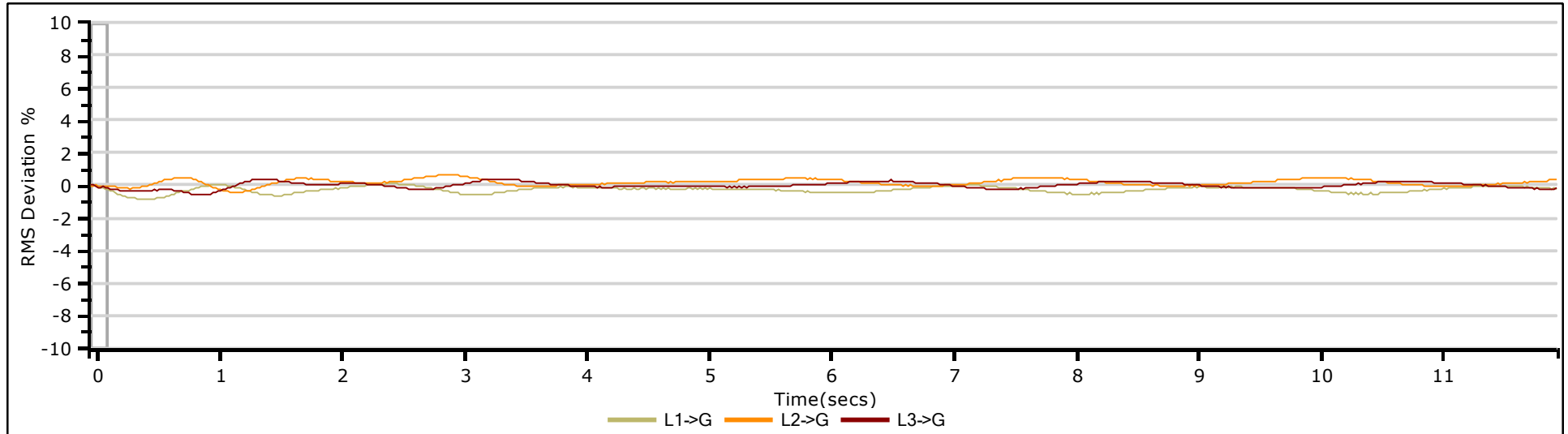


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 6000 - Friday, Jul 25, 2014 12:46:53

Volts Angle: -120.4
Phase Seq: CCW(CBA)



Comments:

175-200kW

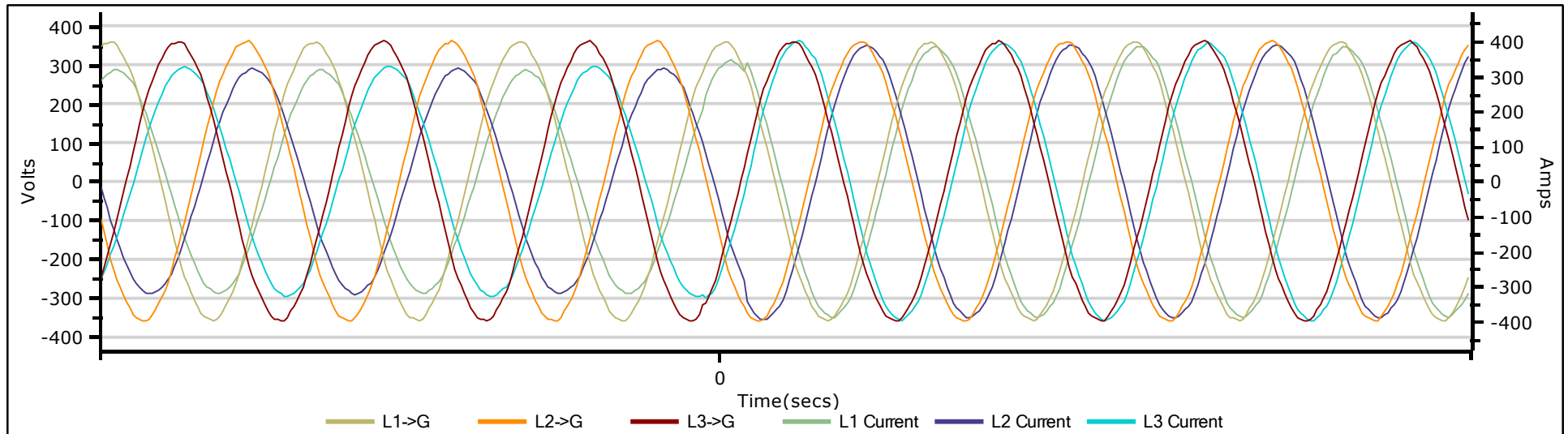
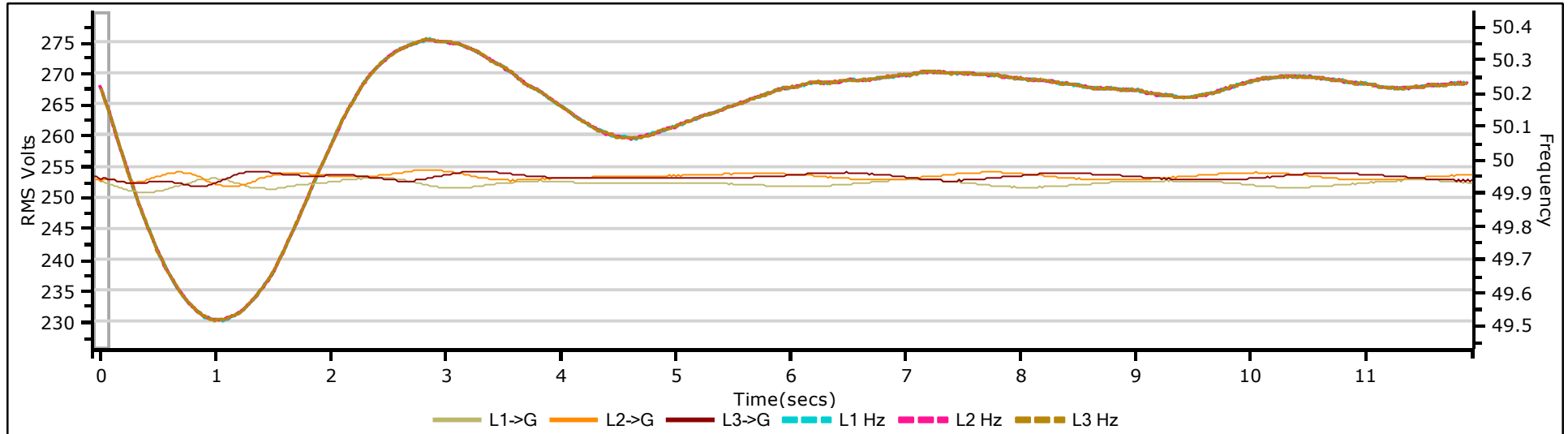


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 6000 - Friday, Jul 25, 2014 12:46:53

Volts Angle: -120.4
Phase Seq: CCW(CBA)



Comments:

175-200kW

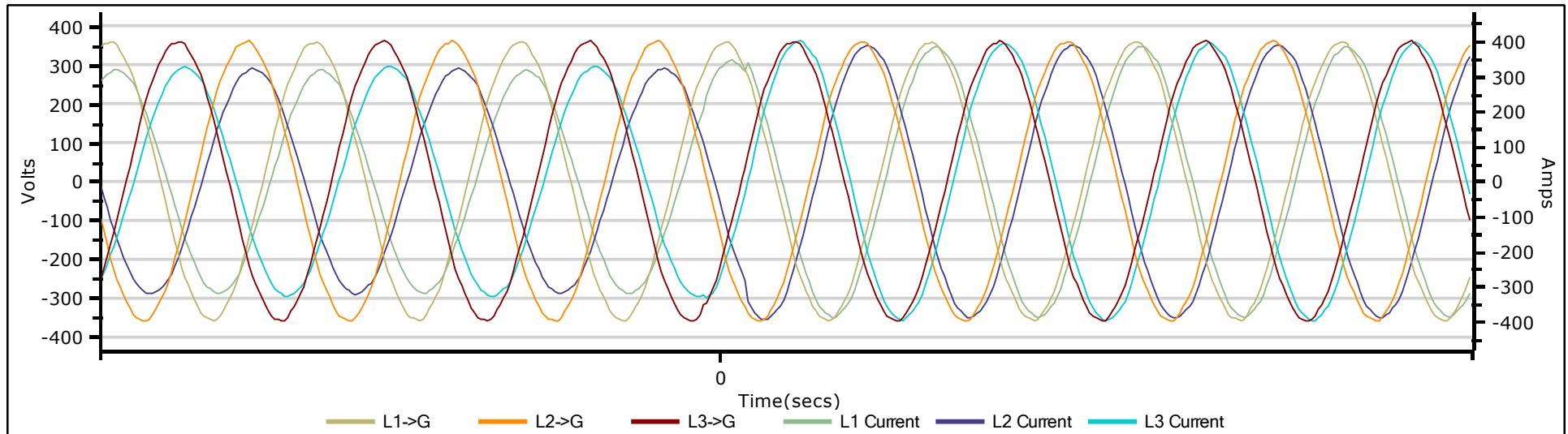
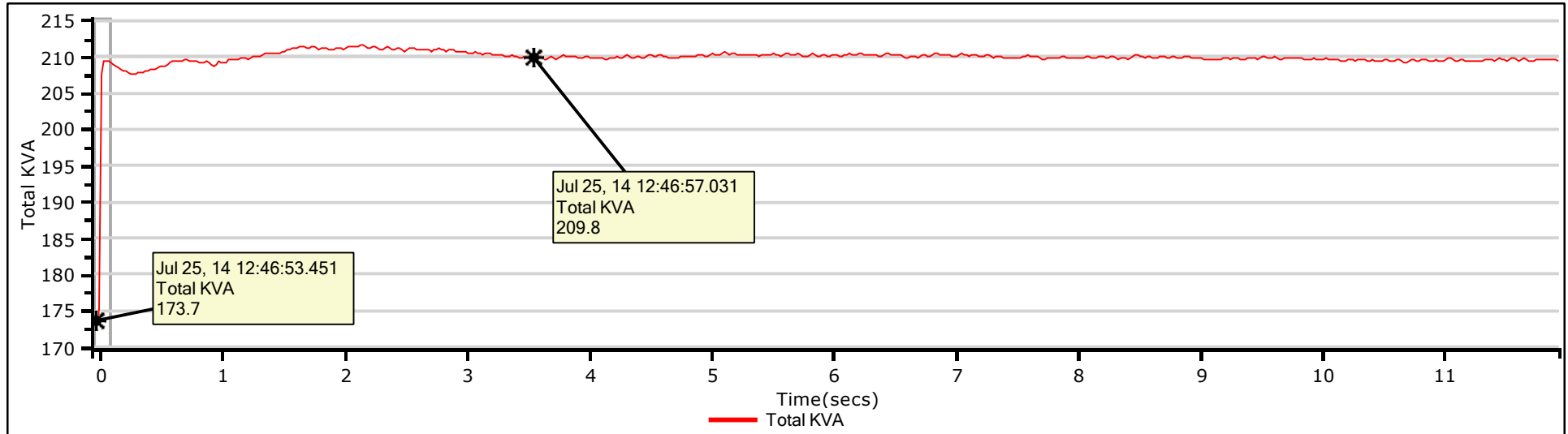


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 6000 - Friday, Jul 25, 2014 12:46:53

Volts Angle: -120.4
Phase Seq: CCW(CBA)



Comments:

175-200kW

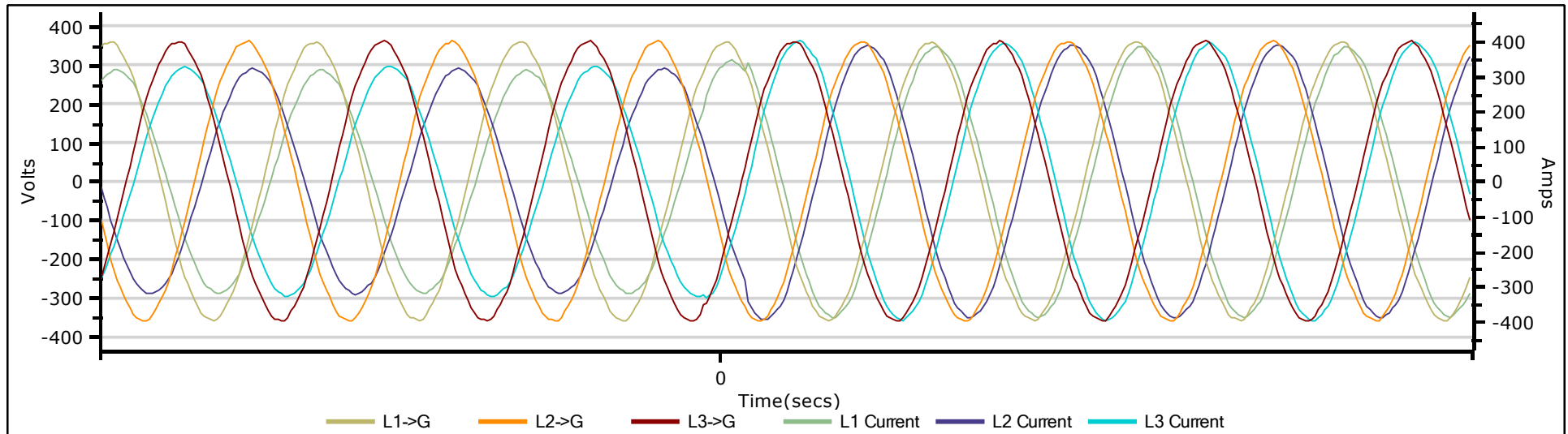
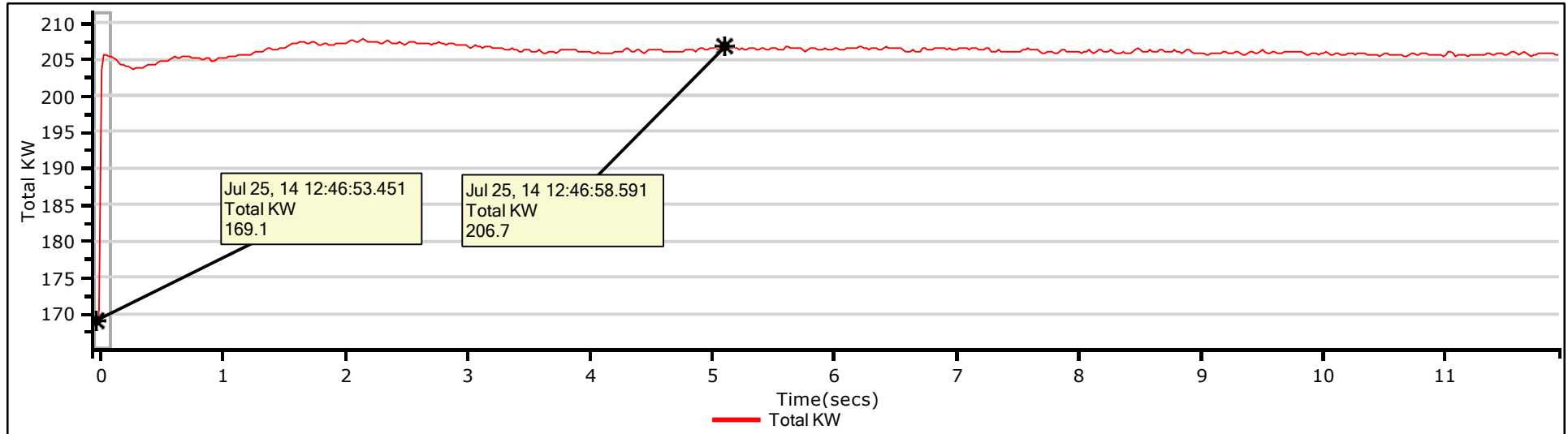


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 6000 - Friday, Jul 25, 2014 12:46:53

Volts Angle: -120.4
Phase Seq: CCW(CBA)



Comments:

175-200kW



200-500kW

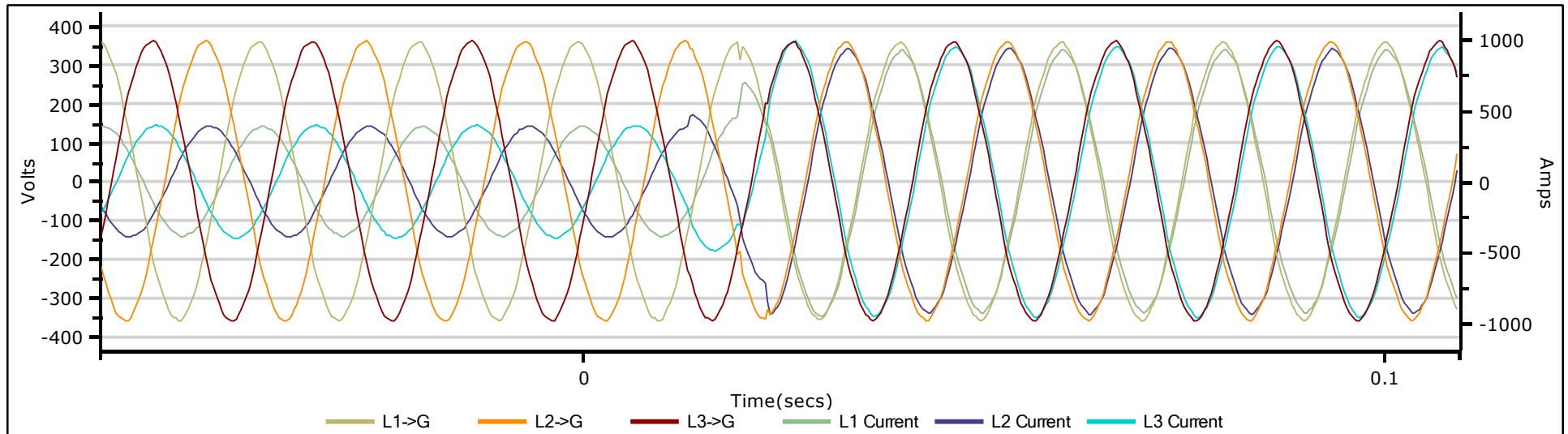
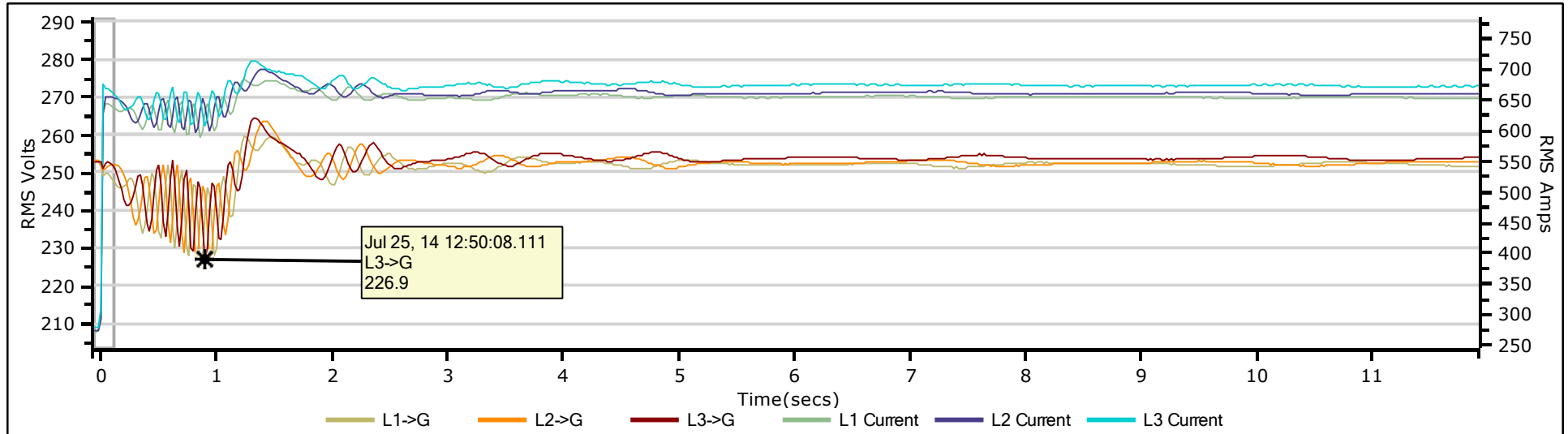


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 6037 - Friday, Jul 25, 2014 12:50:07

Volts Angle: -120.5
Phase Seq: CCW(CBA)



Comments:

200-500kW

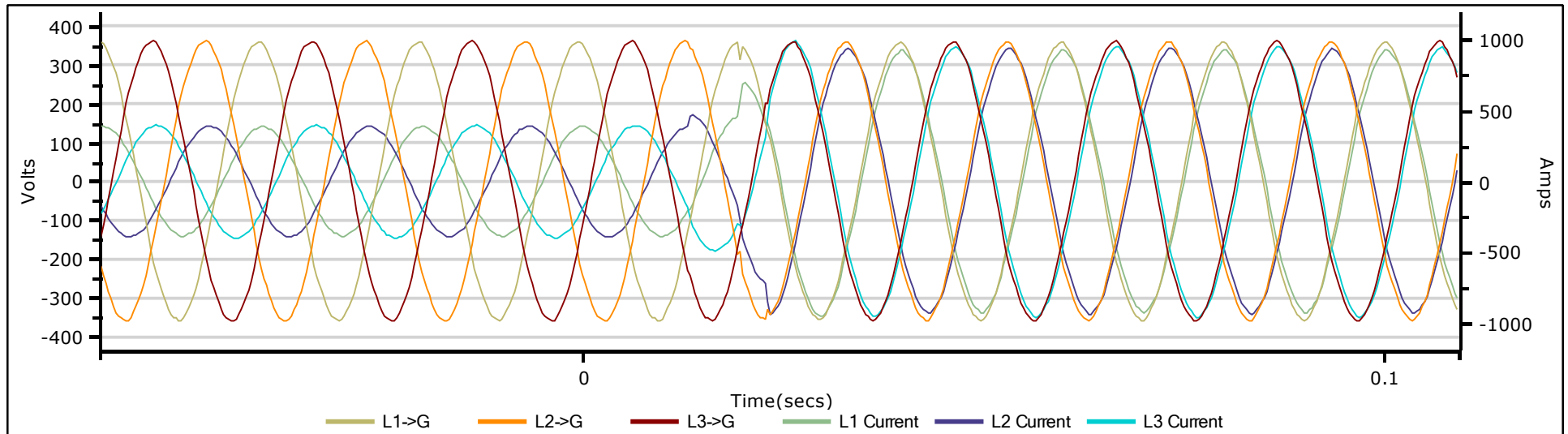
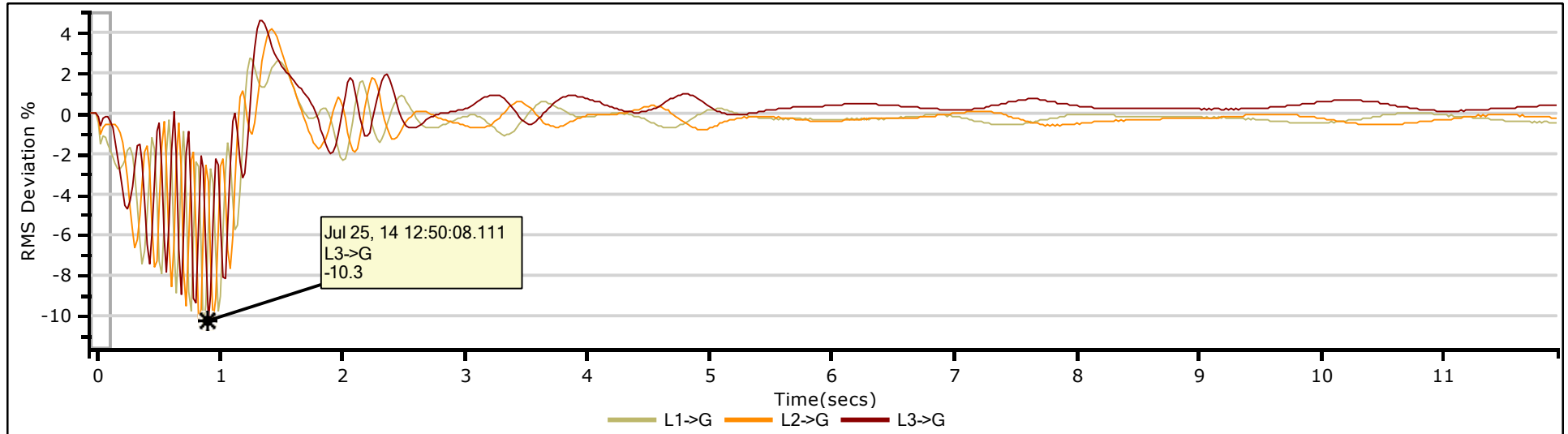


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 6037 - Friday, Jul 25, 2014 12:50:07

Volts Angle: -120.5
Phase Seq: CCW(CBA)



Comments:

200-500kW

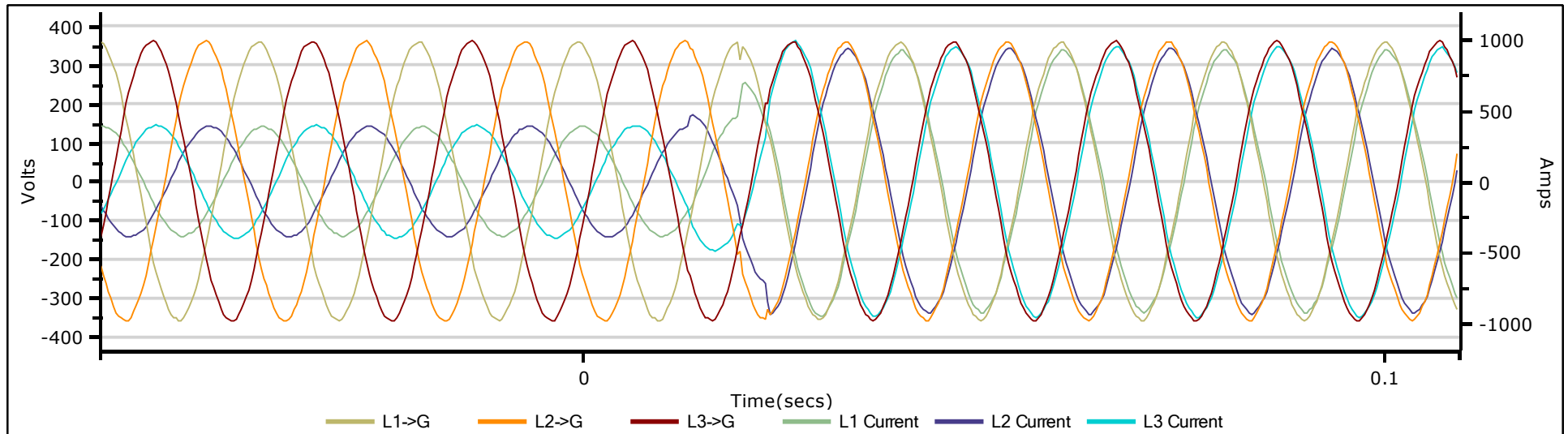
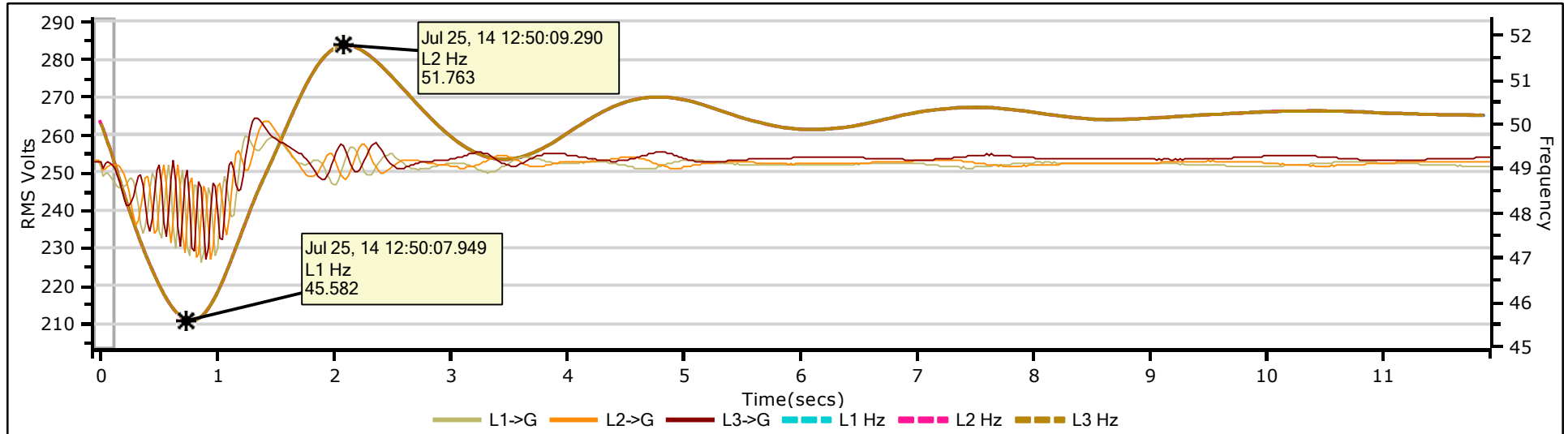


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 6037 - Friday, Jul 25, 2014 12:50:07

Volts Angle: -120.5
Phase Seq: CCW(CBA)



Comments:

200-500kW

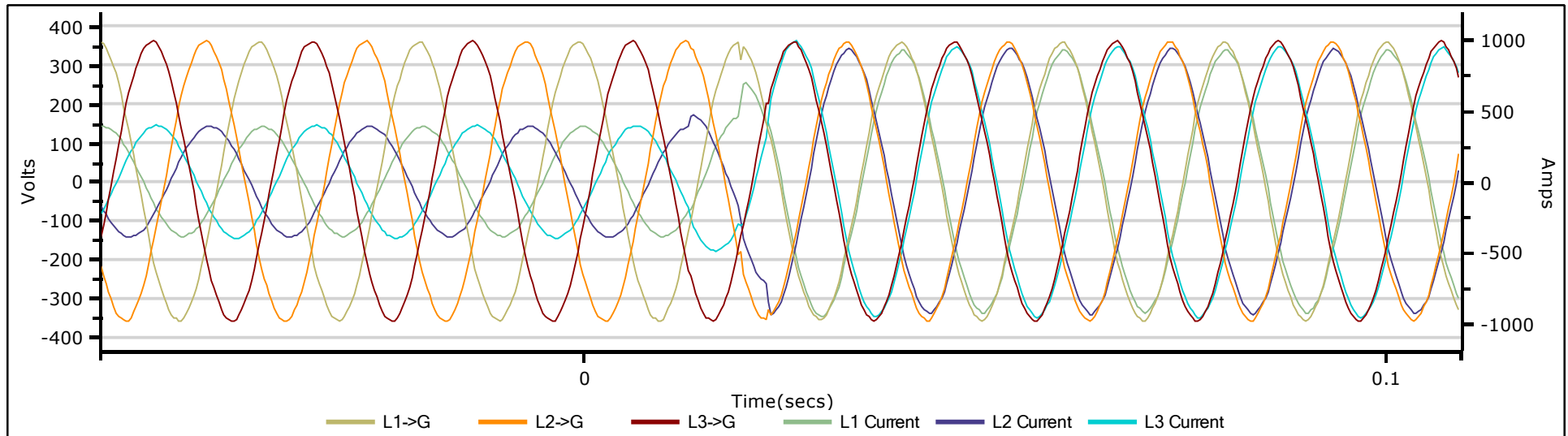
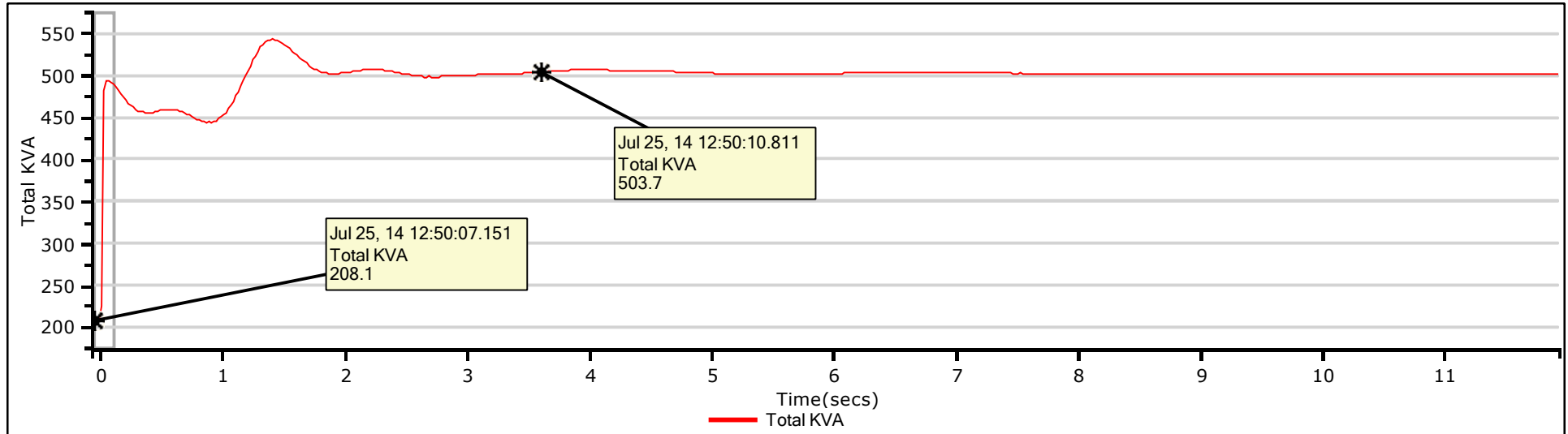


Waveform Capture

7/30/2014

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ComRent International Langenburg Water
Event 6037 - Friday, Jul 25, 2014 12:50:07

Volts Angle: -120.5
Phase Seq: CCW(CBA)



Comments:

200-500kW

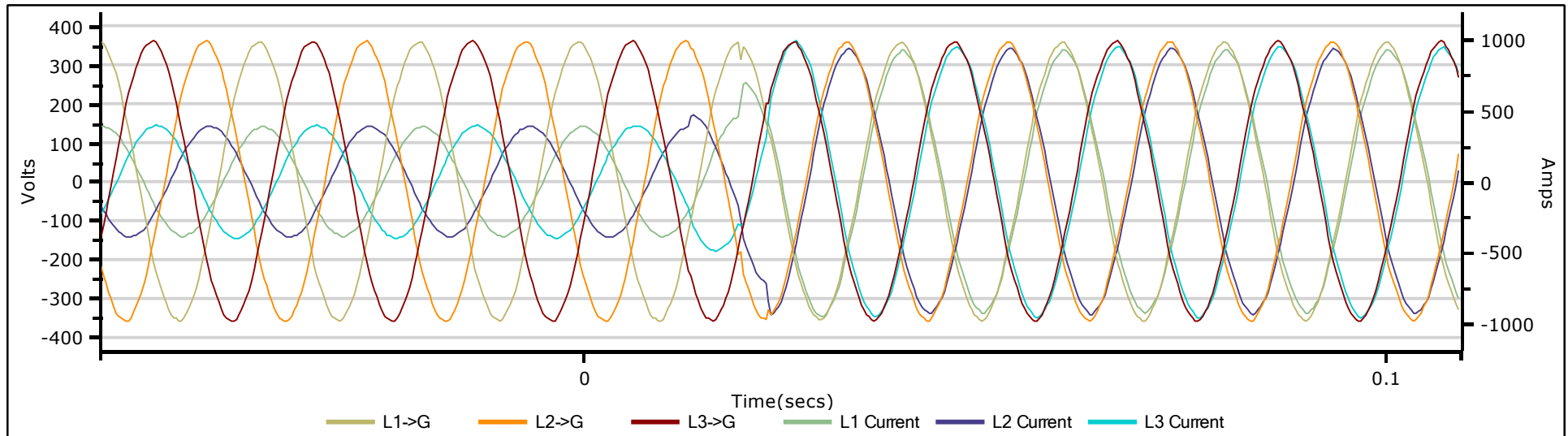
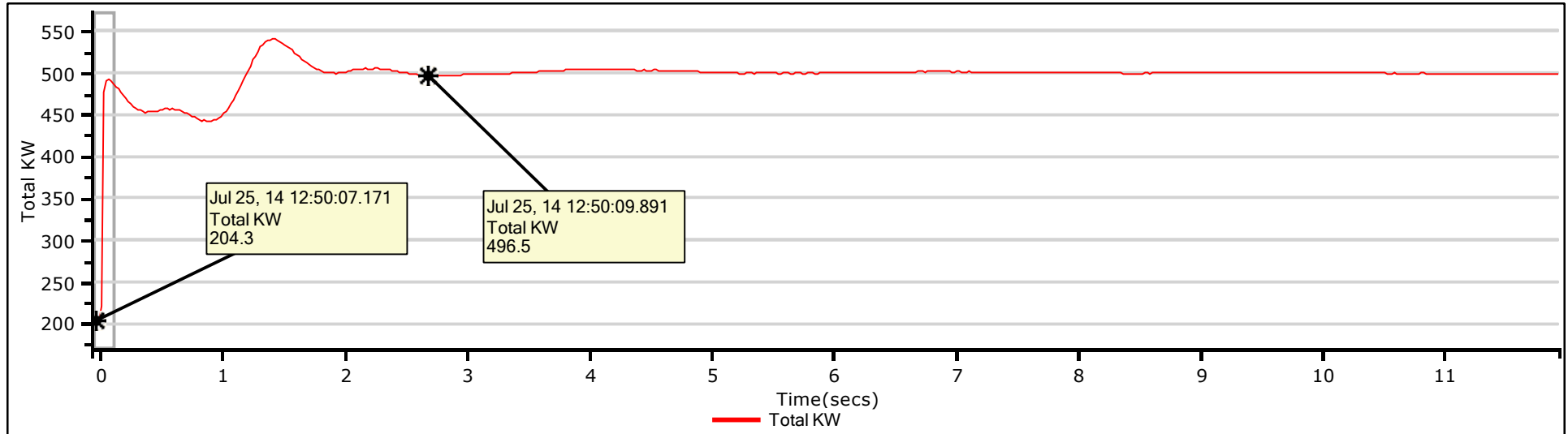


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 6037 - Friday, Jul 25, 2014 12:50:07

Volts Angle: -120.5
Phase Seq: CCW(CBA)



Comments:

200-500kW



640-715kW

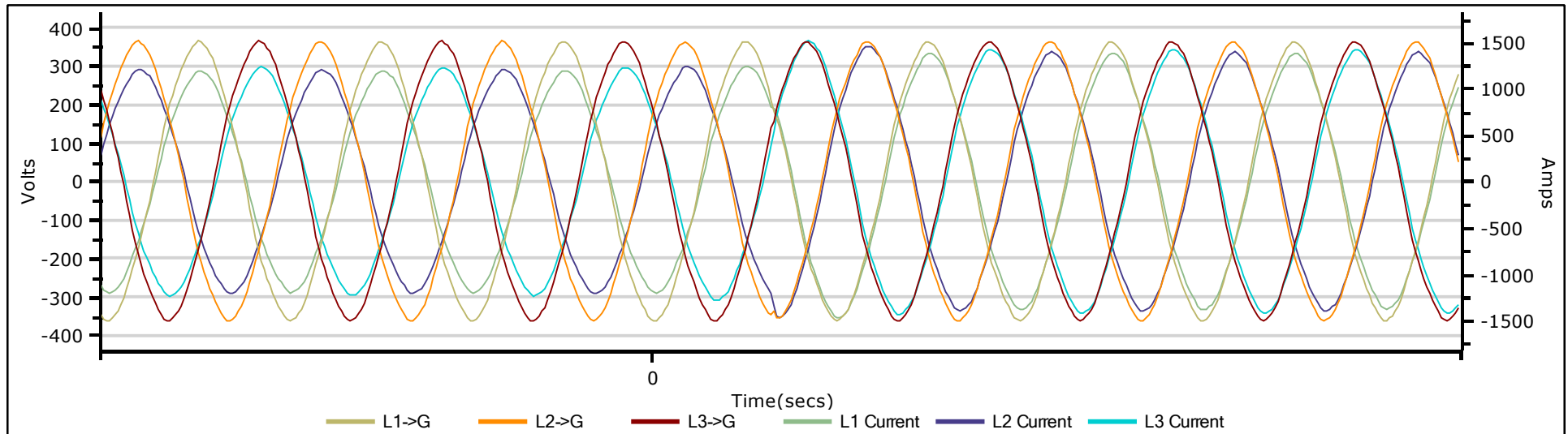
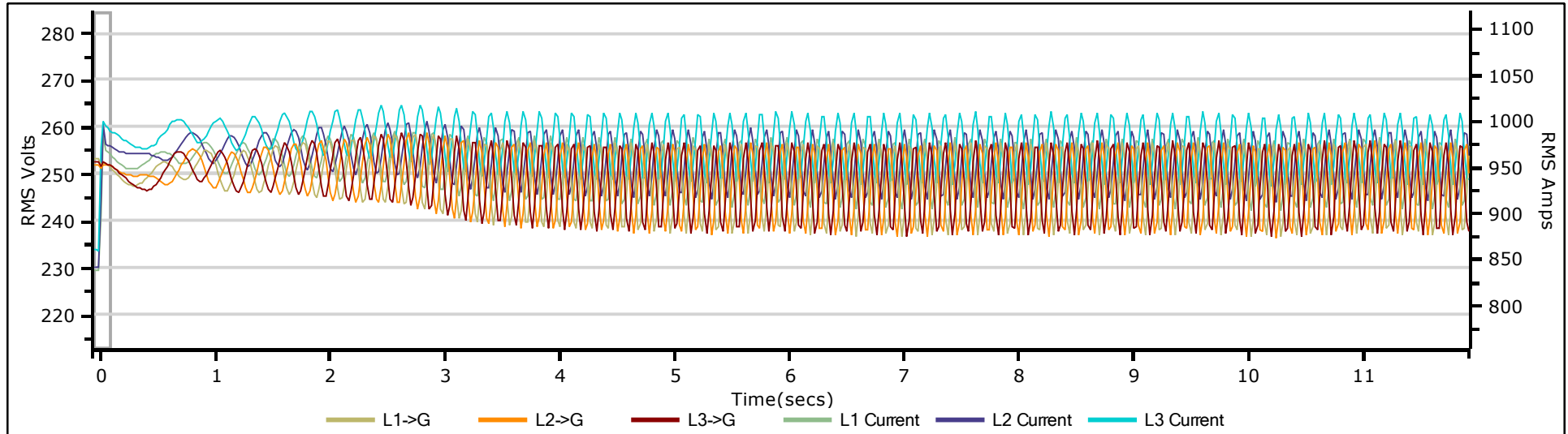


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 6234 - Friday, Jul 25, 2014 12:54:56

Volts Angle: -120.4
Phase Seq: CCW(CBA)



Comments:

640-715kW

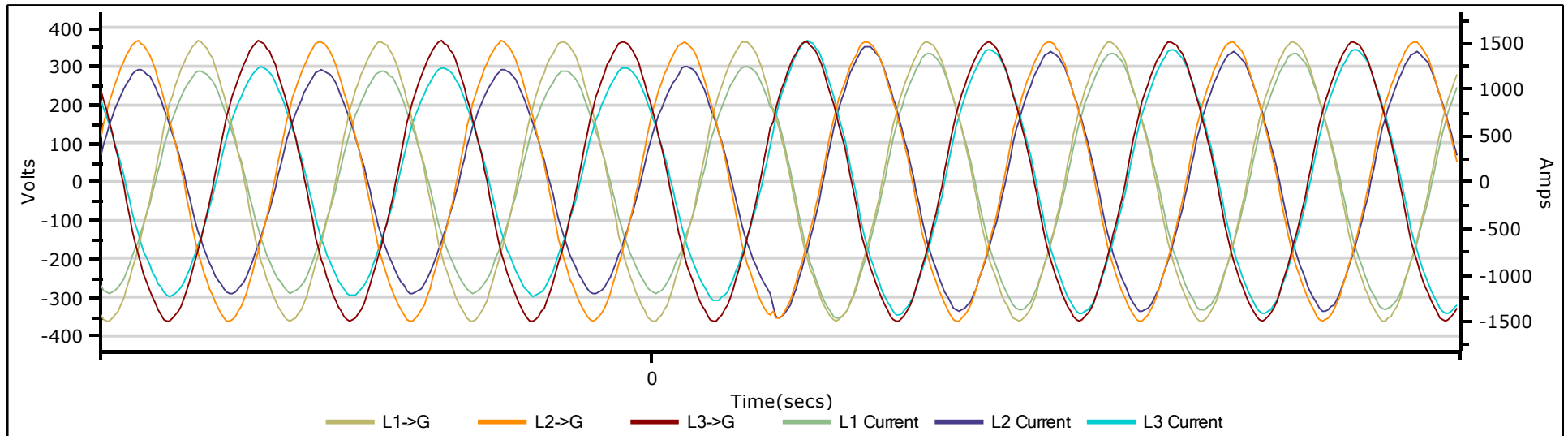
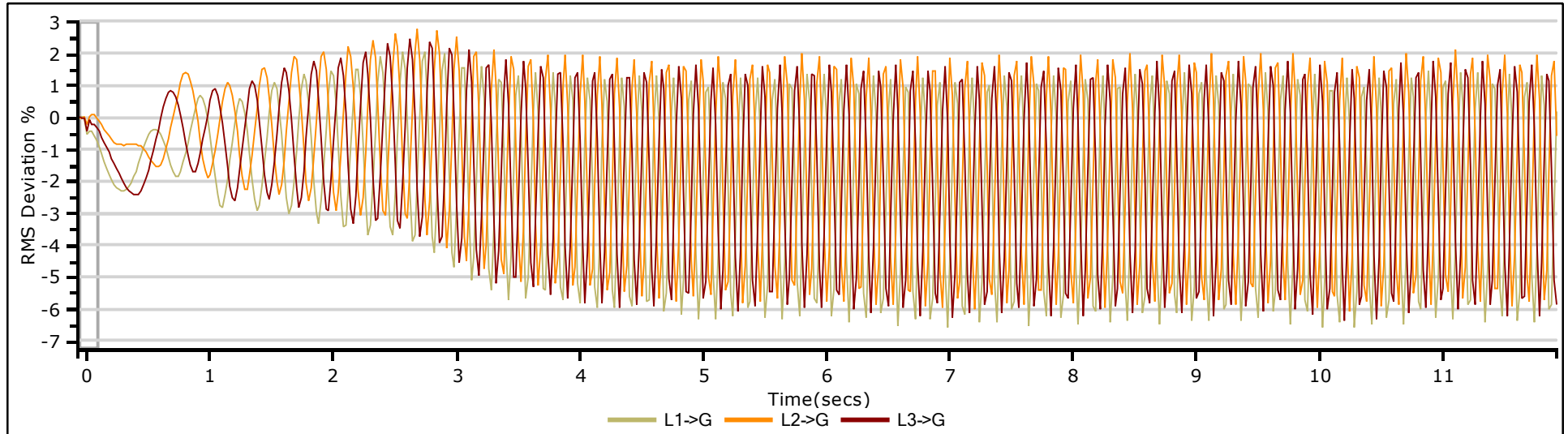


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 6234 - Friday, Jul 25, 2014 12:54:56

Volts Angle: -120.4
Phase Seq: CCW(CBA)



Comments:

640-715kW

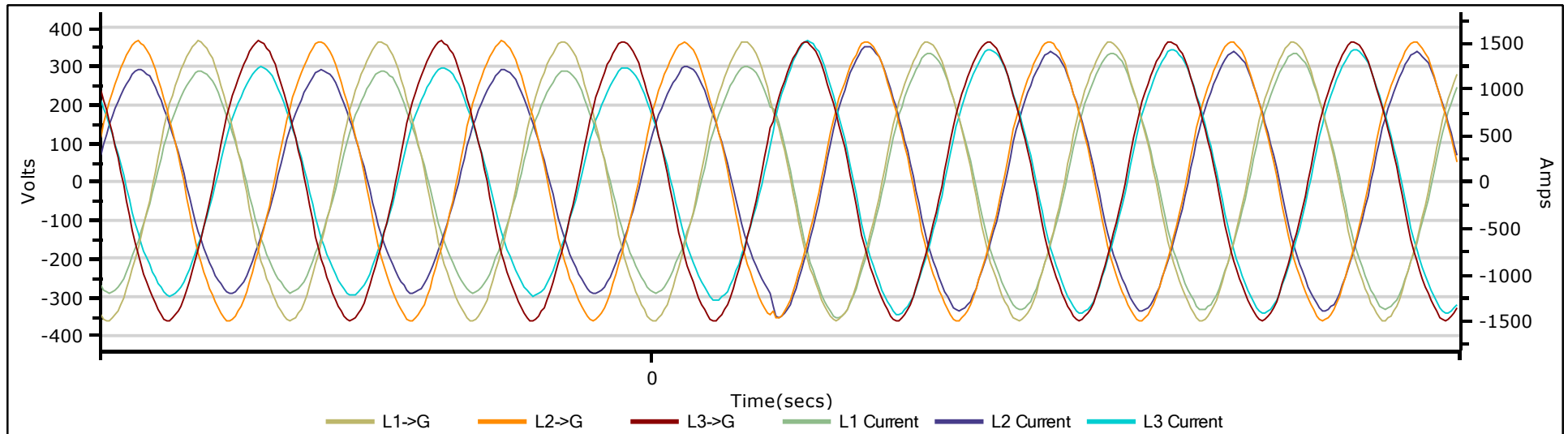
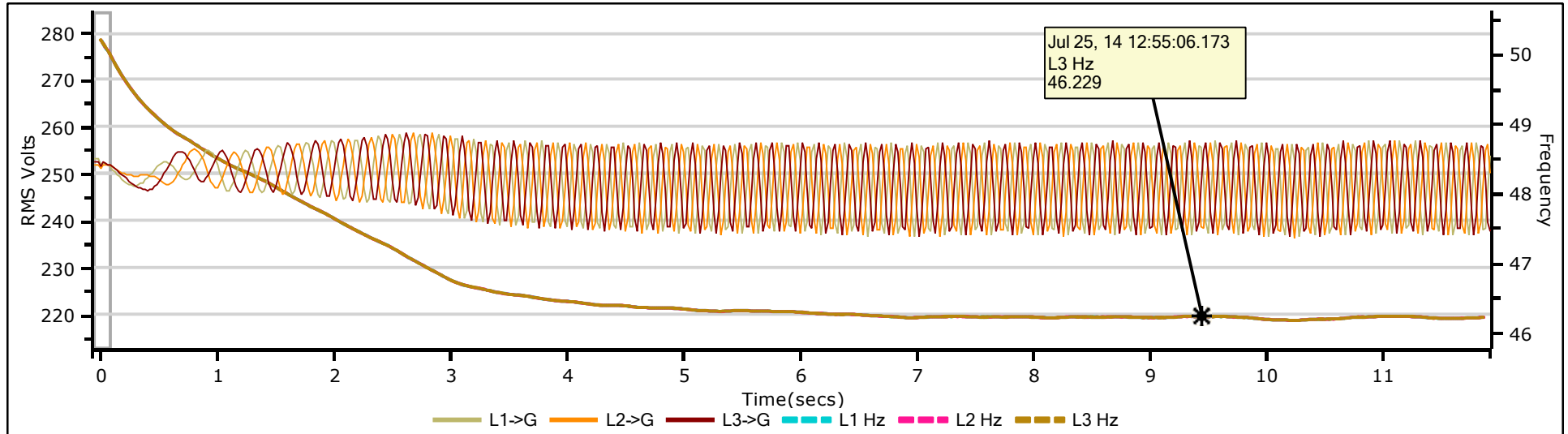


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 6234 - Friday, Jul 25, 2014 12:54:56

Volts Angle: -120.4
Phase Seq: CCW(CBA)



Comments:

640-715kW

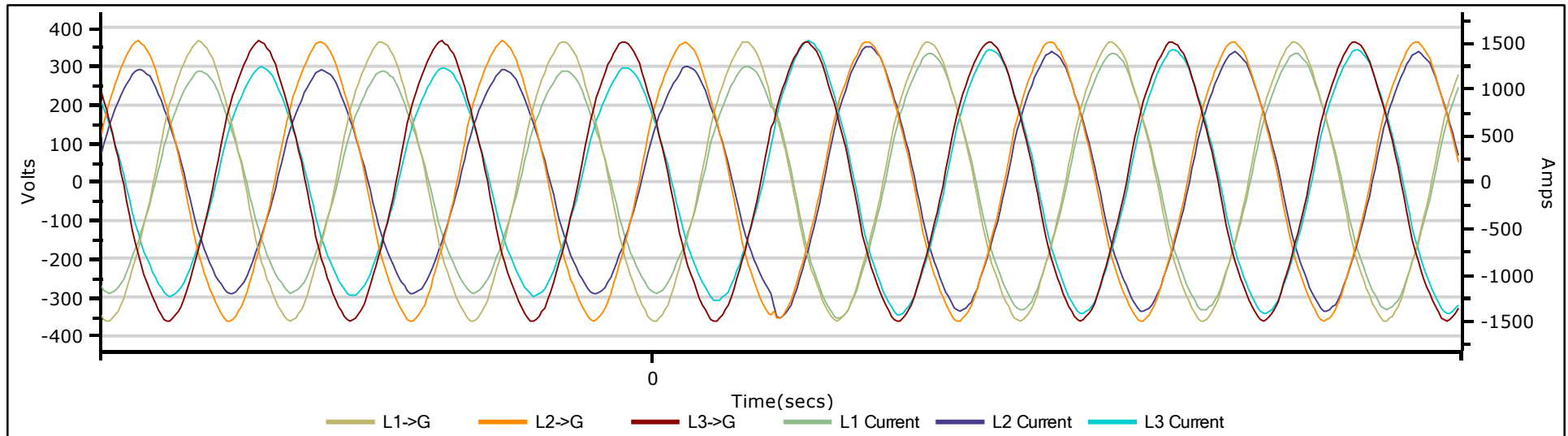
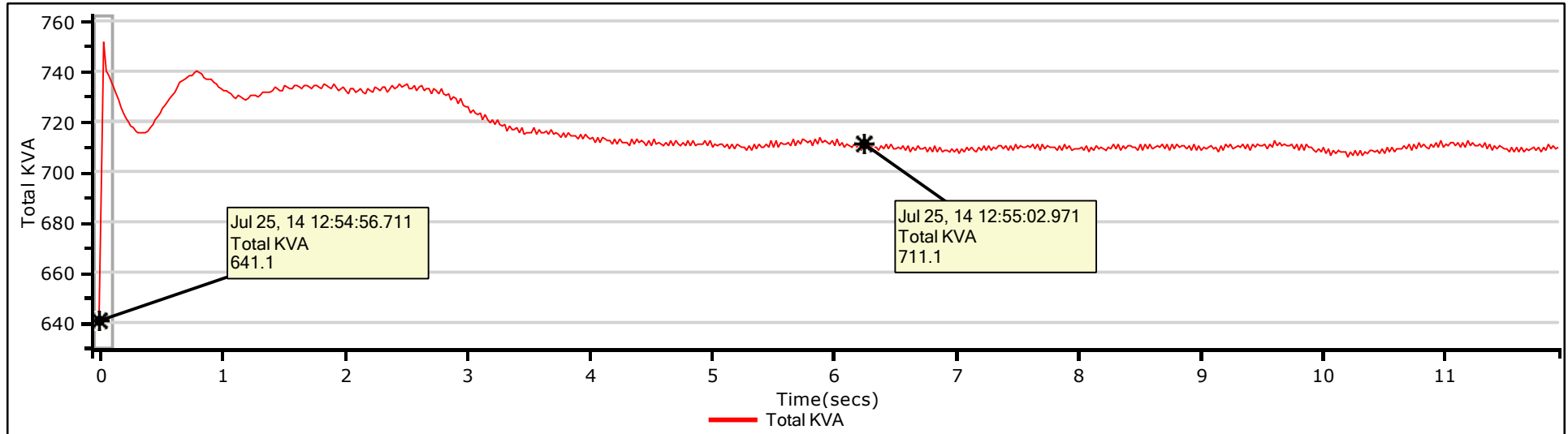


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 6234 - Friday, Jul 25, 2014 12:54:56

Volts Angle: -120.4
Phase Seq: CCW(CBA)



Comments:

640-715kW

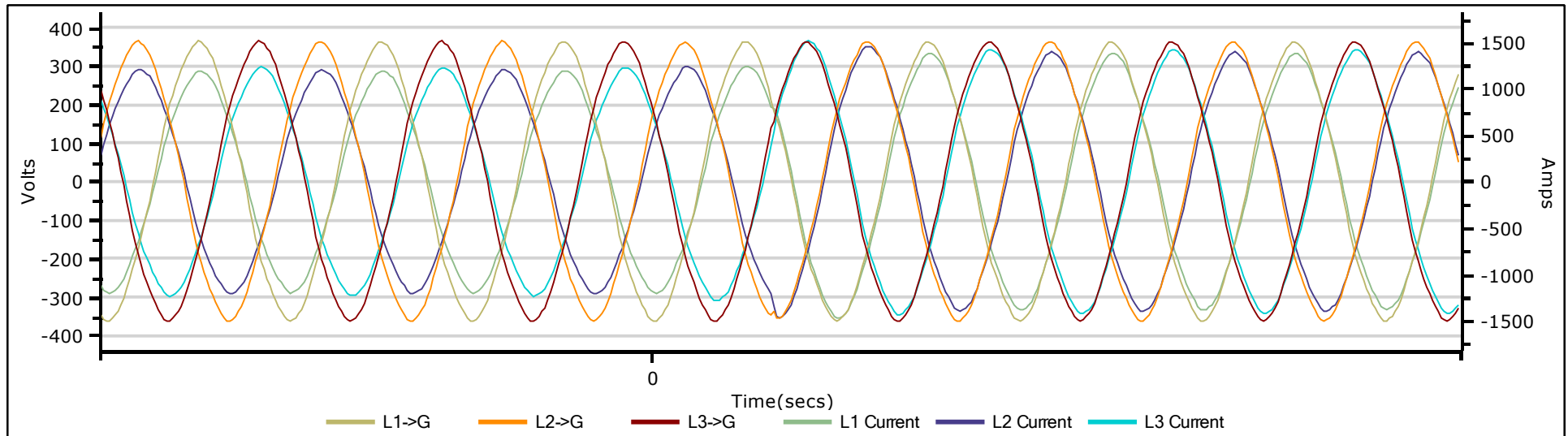
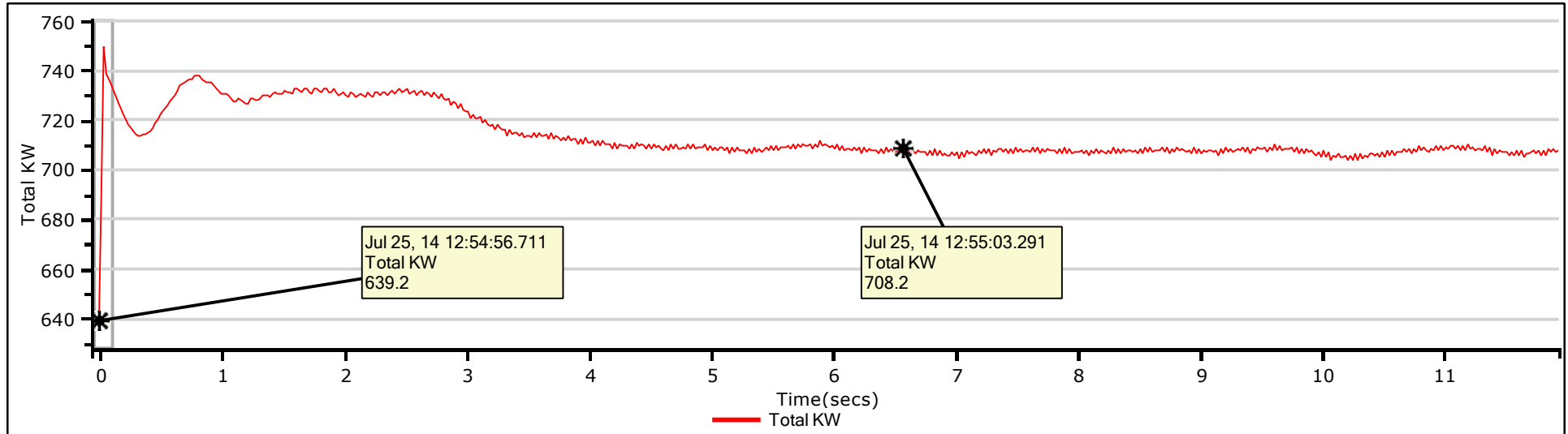


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 6234 - Friday, Jul 25, 2014 12:54:56

Volts Angle: -120.4
Phase Seq: CCW(CBA)



Comments:

640-715kW



715-0kW

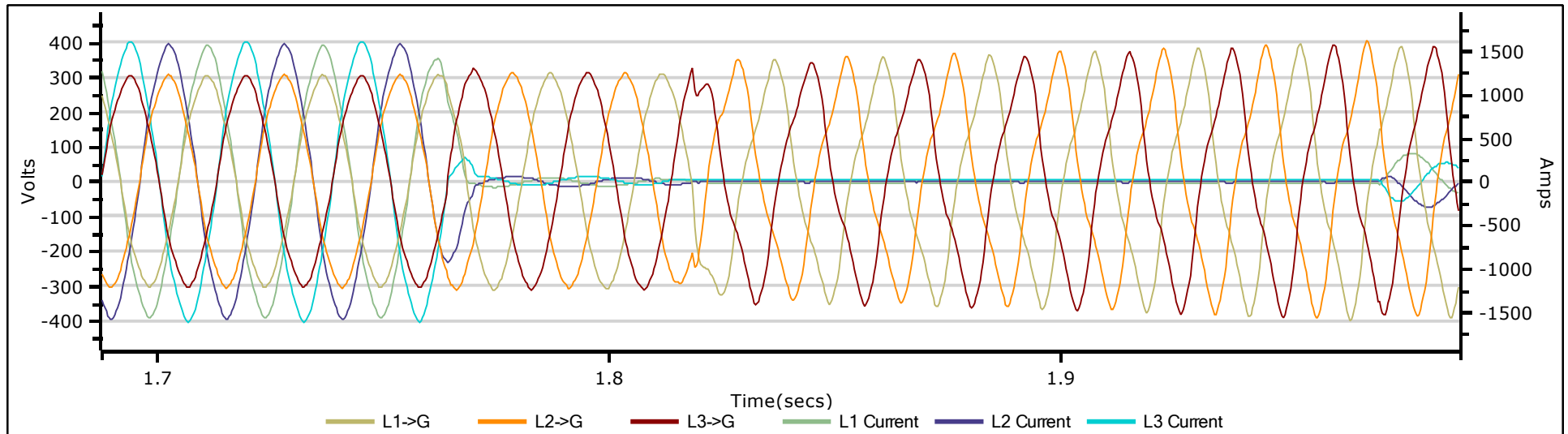
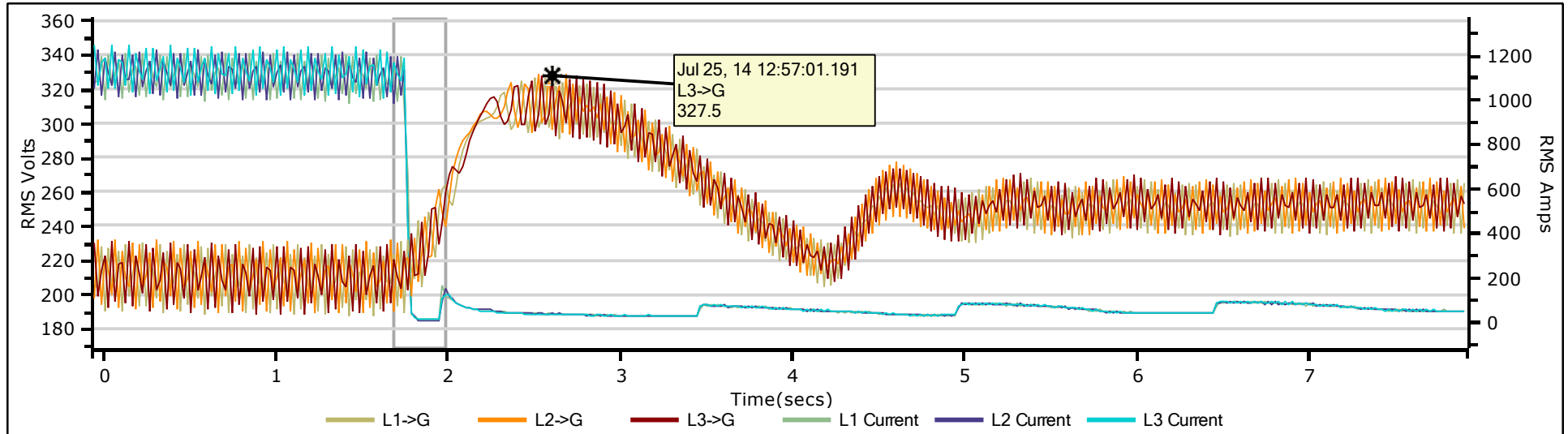


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 7735 - Friday, Jul 25, 2014 12:56:58

Volts Angle: -109.1
Phase Seq: CCW(CBA)



Comments:

700-0kW

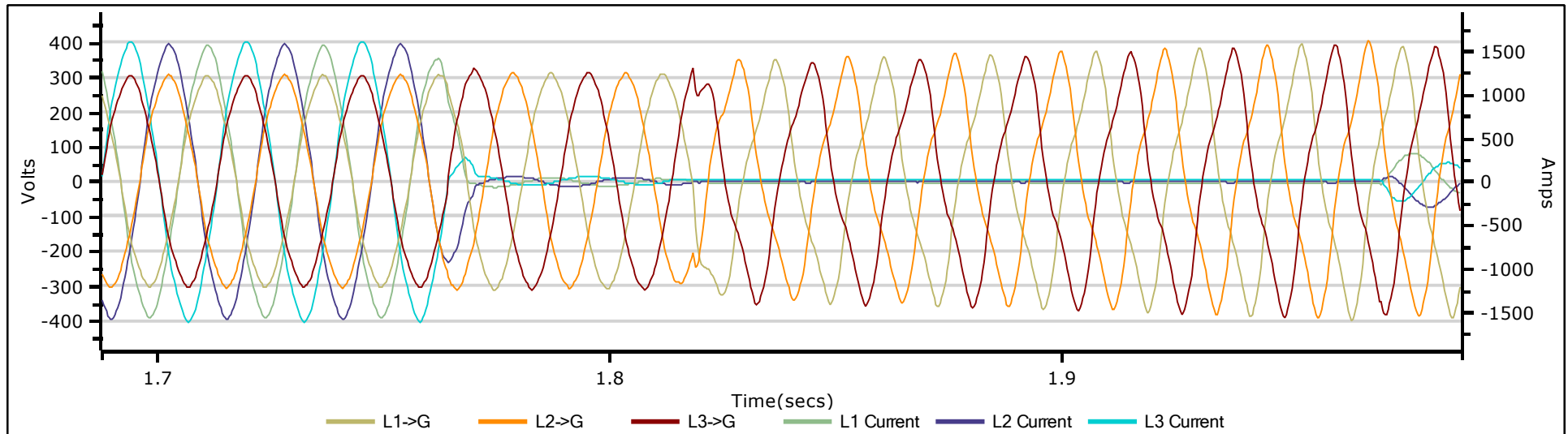
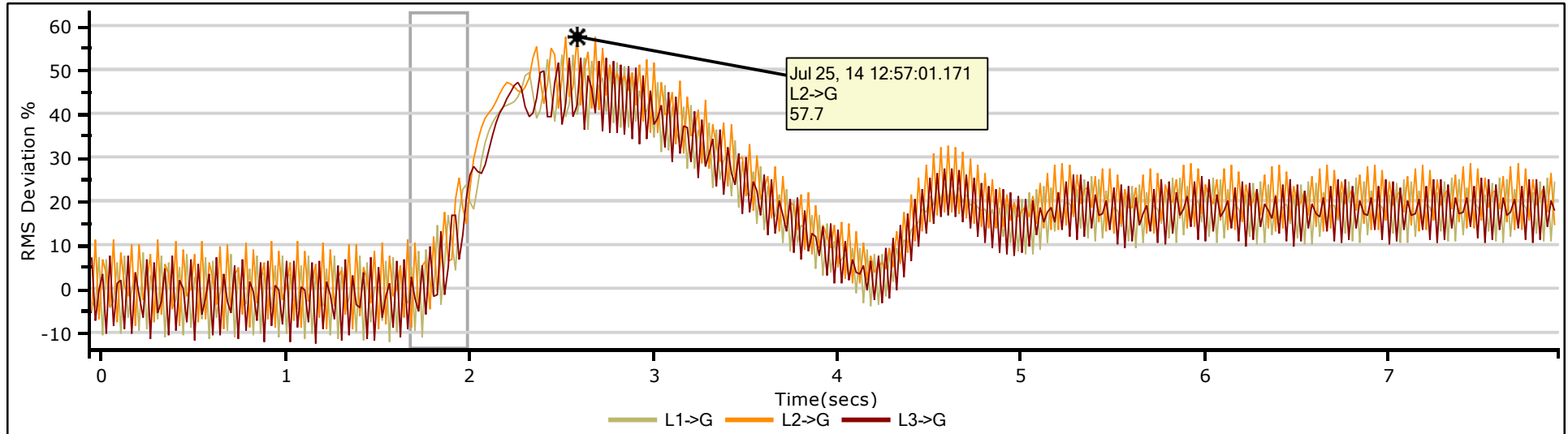


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 7735 - Friday, Jul 25, 2014 12:56:58

Volts Angle: -109.1
Phase Seq: CCW(CBA)



Comments:

700-0kW

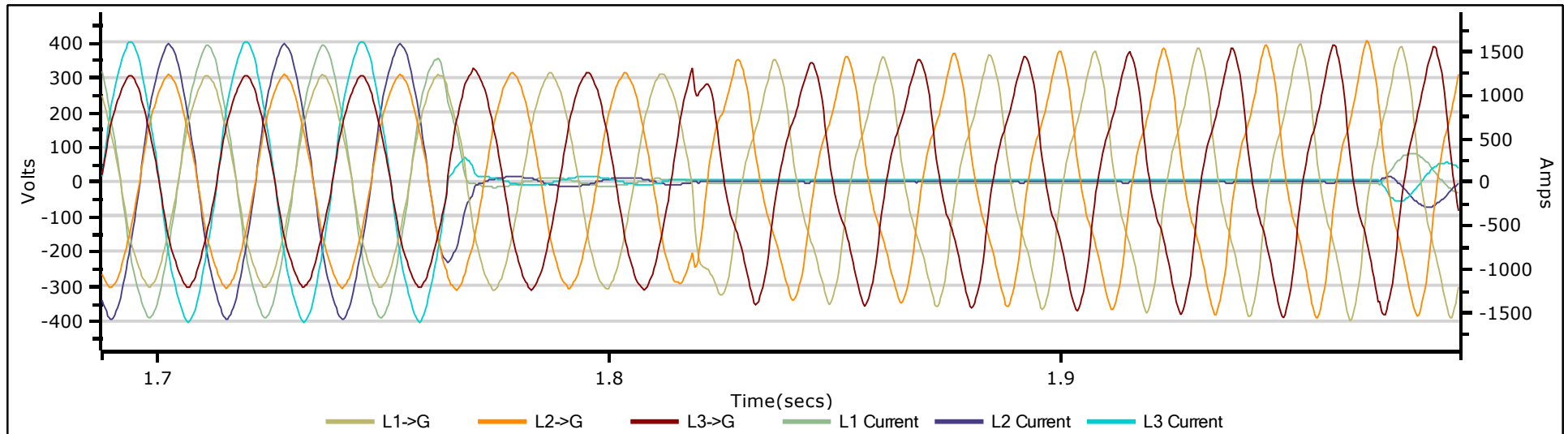
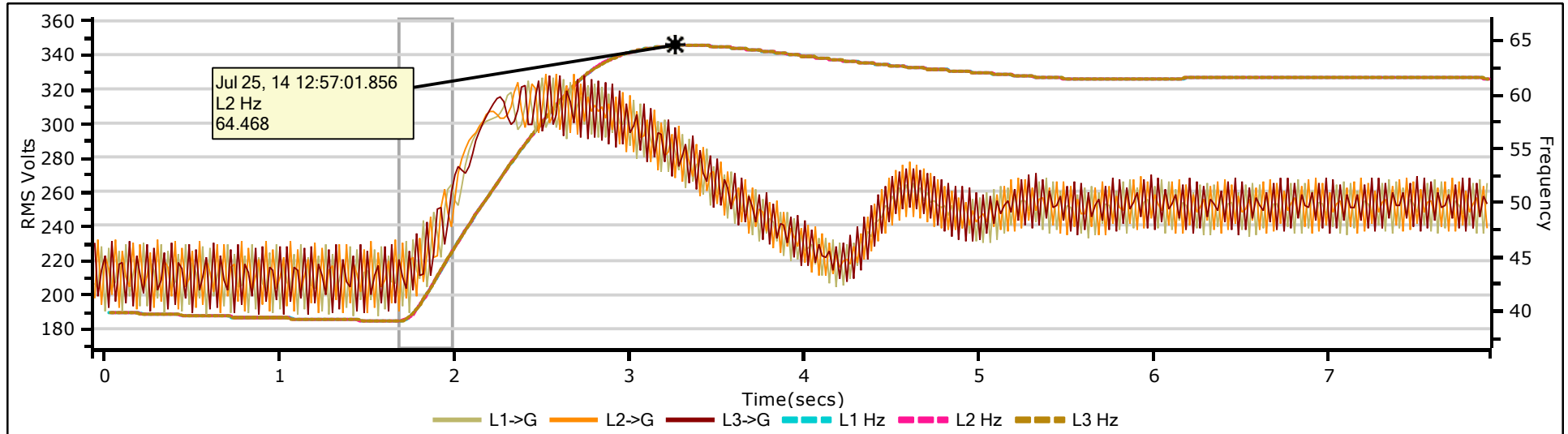


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 7735 - Friday, Jul 25, 2014 12:56:58

Volts Angle: -109.1
Phase Seq: CCW(CBA)



Comments:

700-0kW

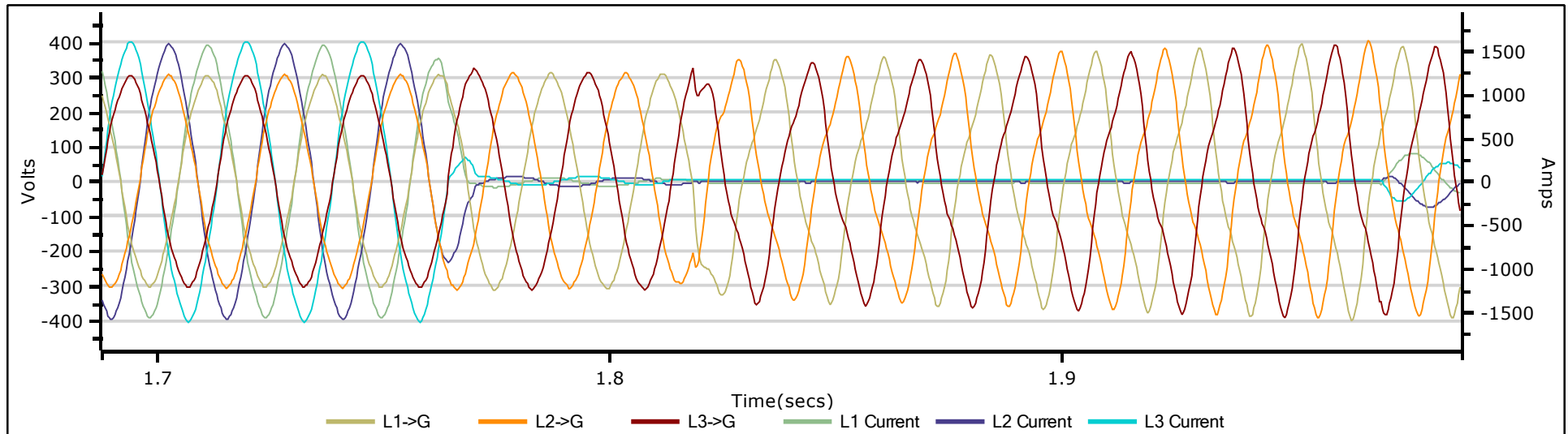
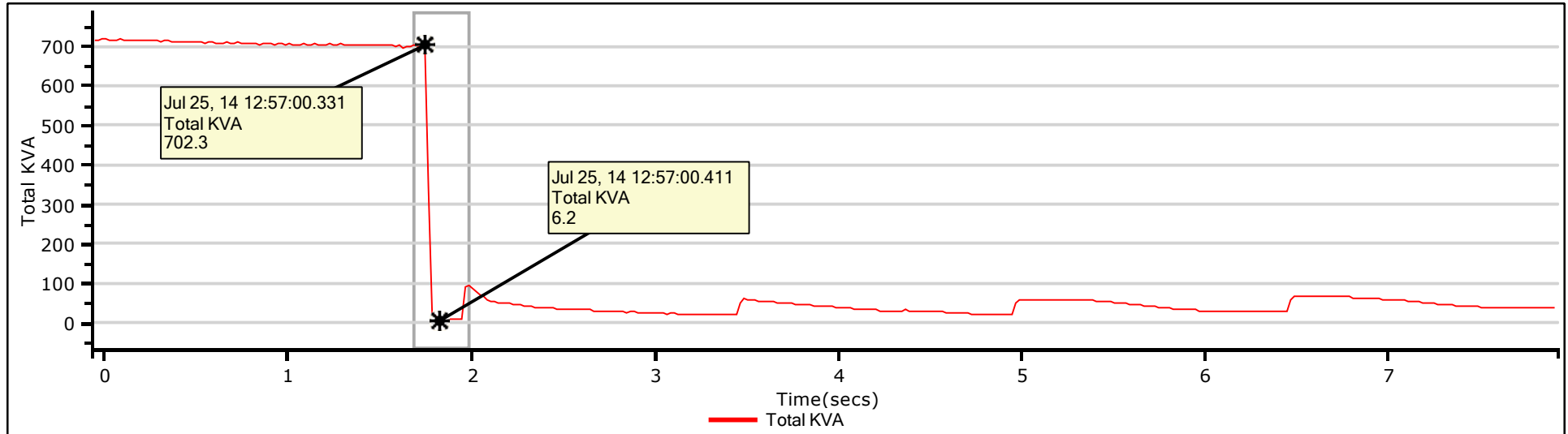


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 7735 - Friday, Jul 25, 2014 12:56:58

Volts Angle: -109.1
Phase Seq: CCW(CBA)



Comments:

700-0kW

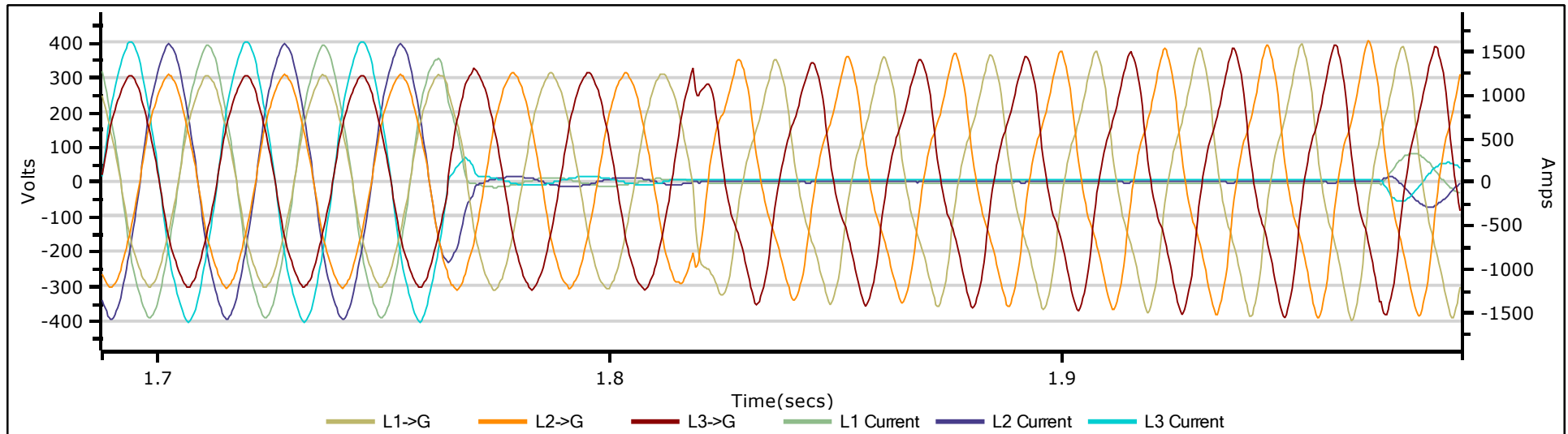
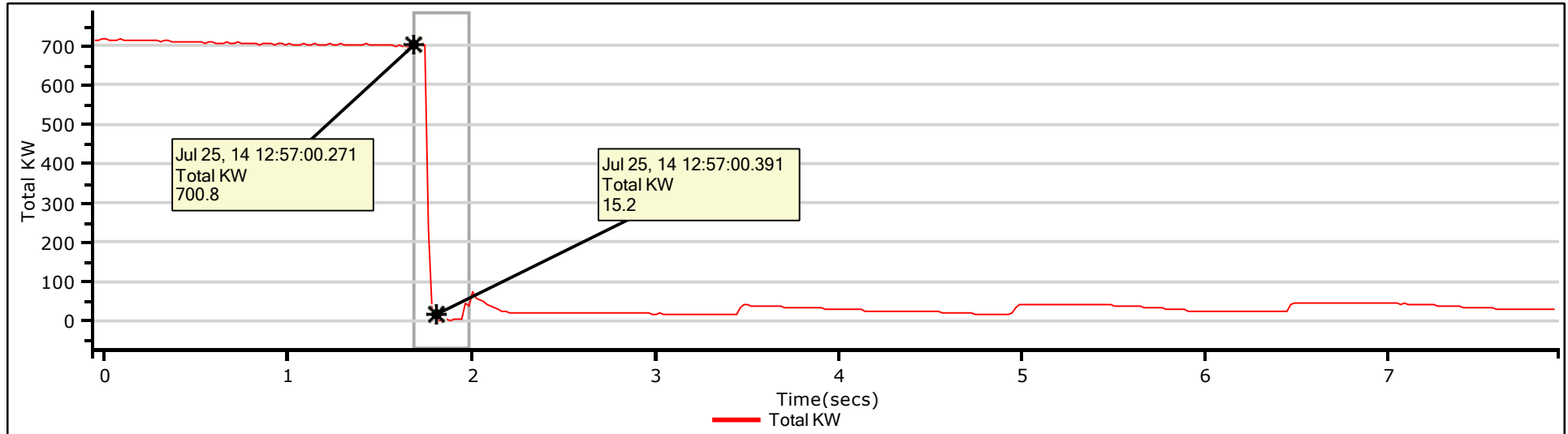


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 7735 - Friday, Jul 25, 2014 12:56:58

Volts Angle: -109.1
Phase Seq: CCW(CBA)



Comments:

700-0kW



0-700kW

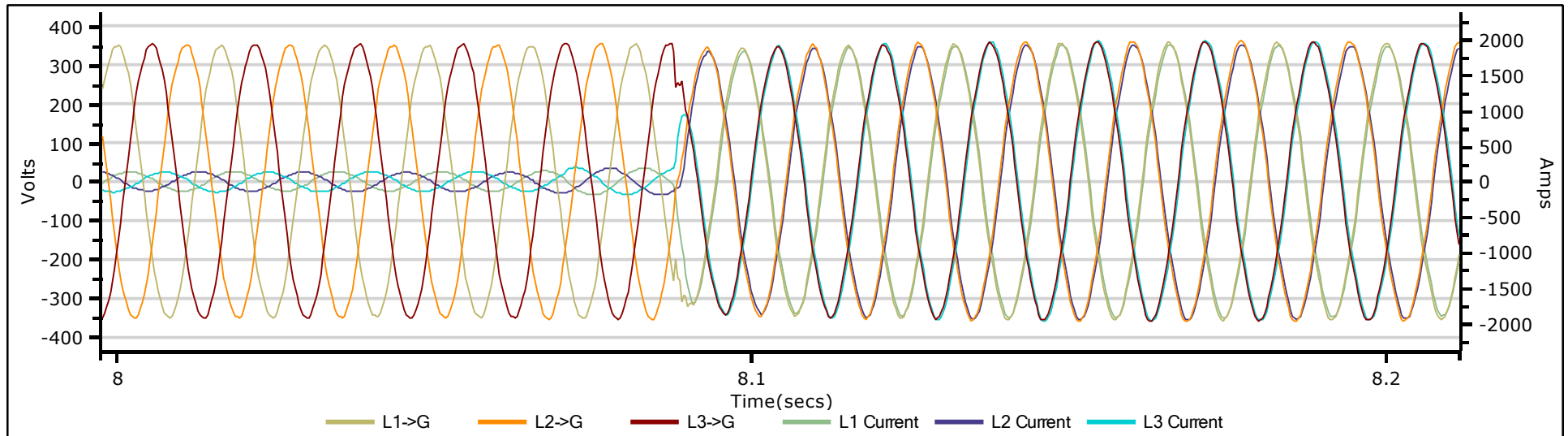
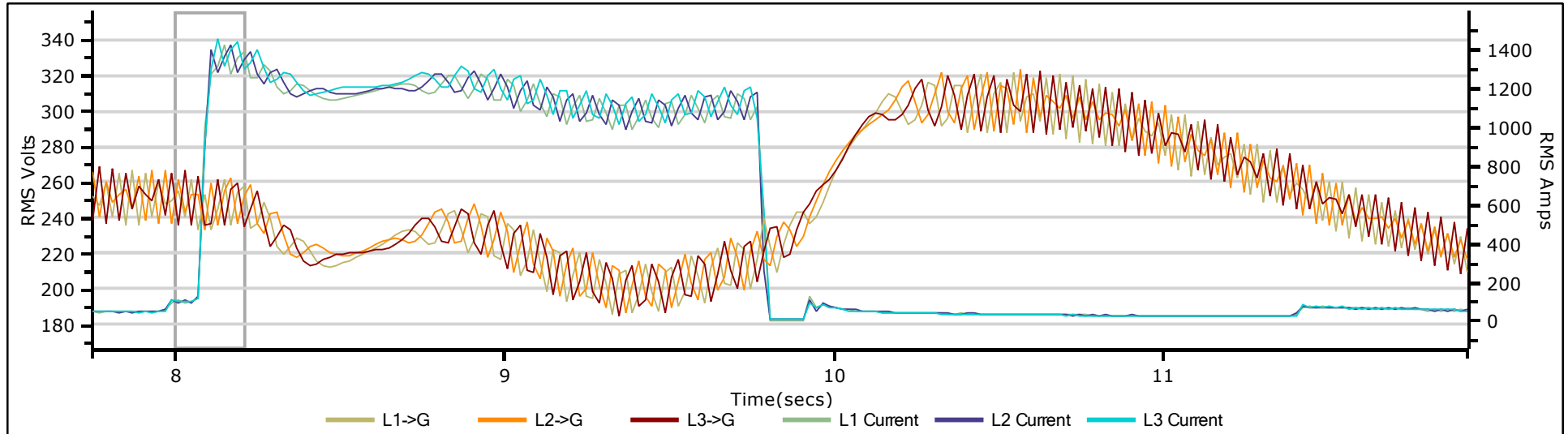


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 7735 - Friday, Jul 25, 2014 12:56:58

Volts Angle: -109.1
Phase Seq: CCW(CBA)



Comments:

0-700kW

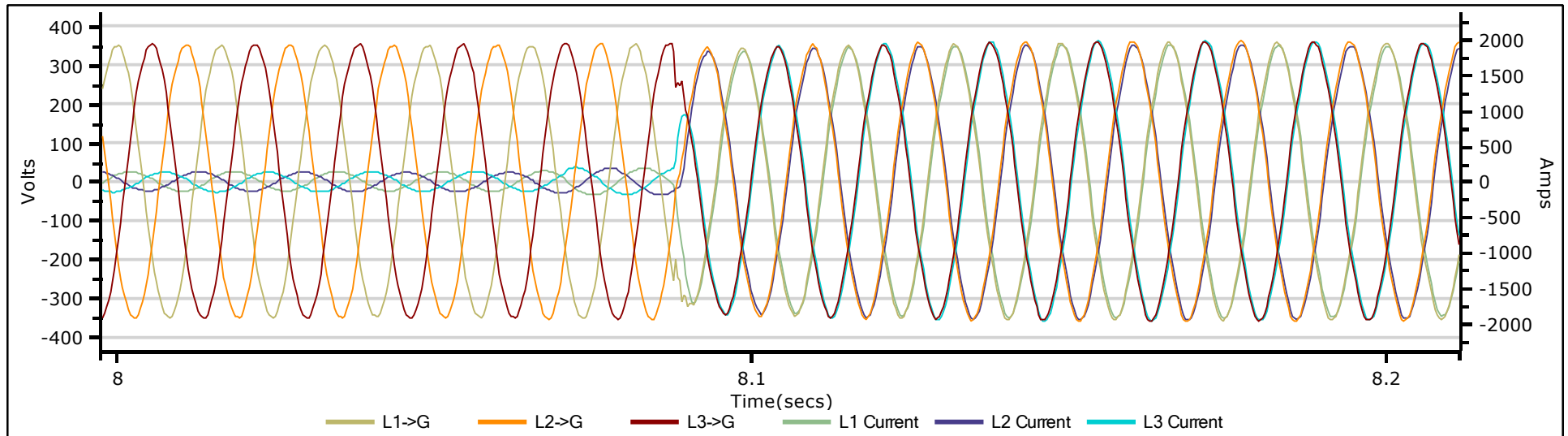
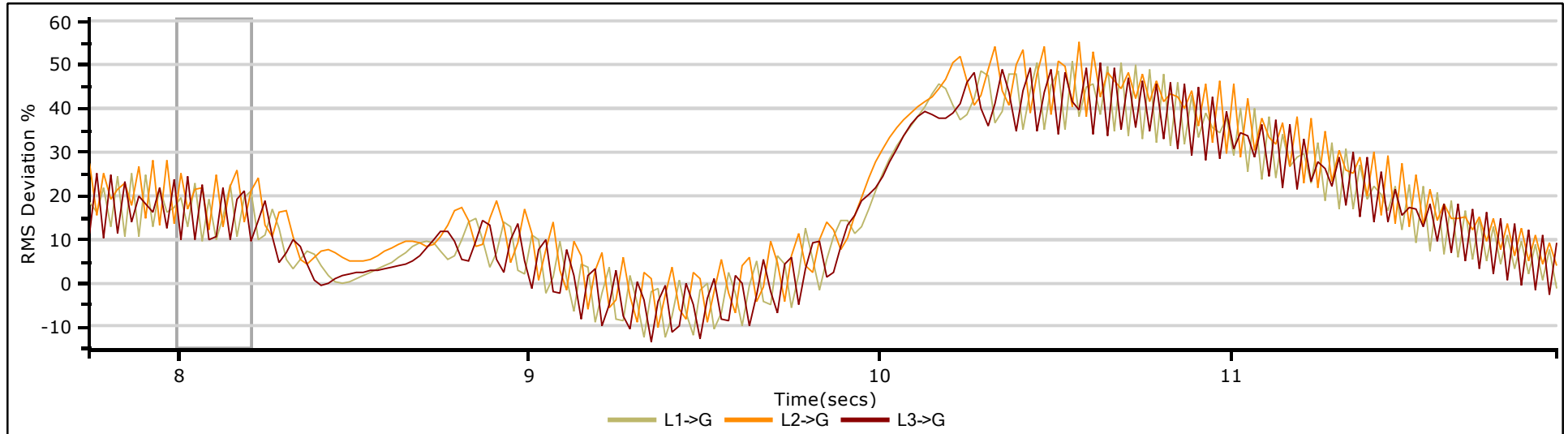


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 7735 - Friday, Jul 25, 2014 12:56:58

Volts Angle: -109.1
Phase Seq: CCW(CBA)



Comments:

0-700kW

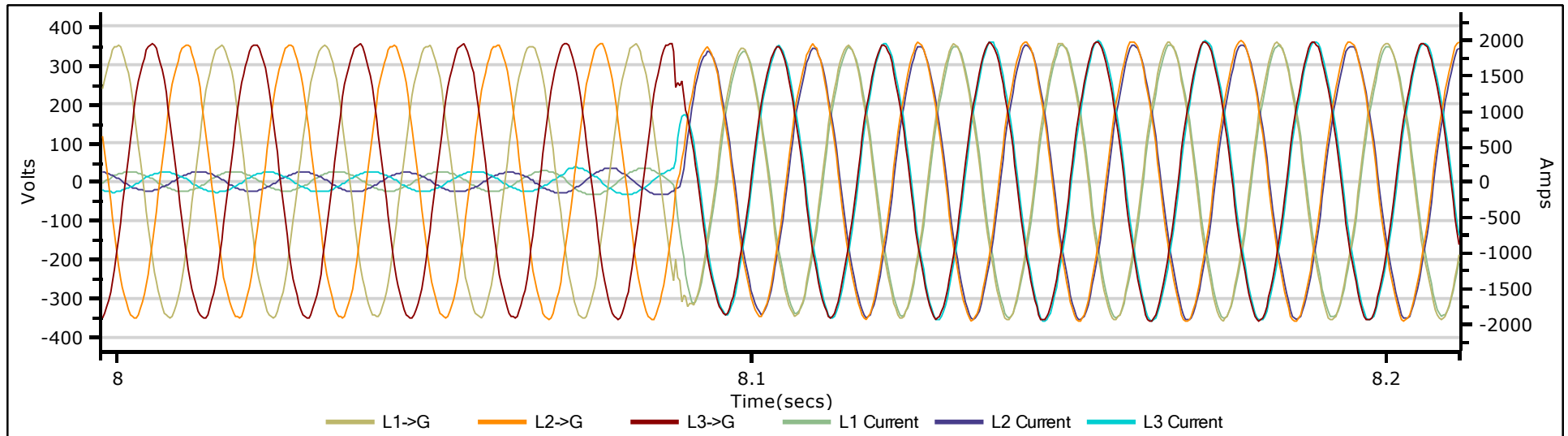
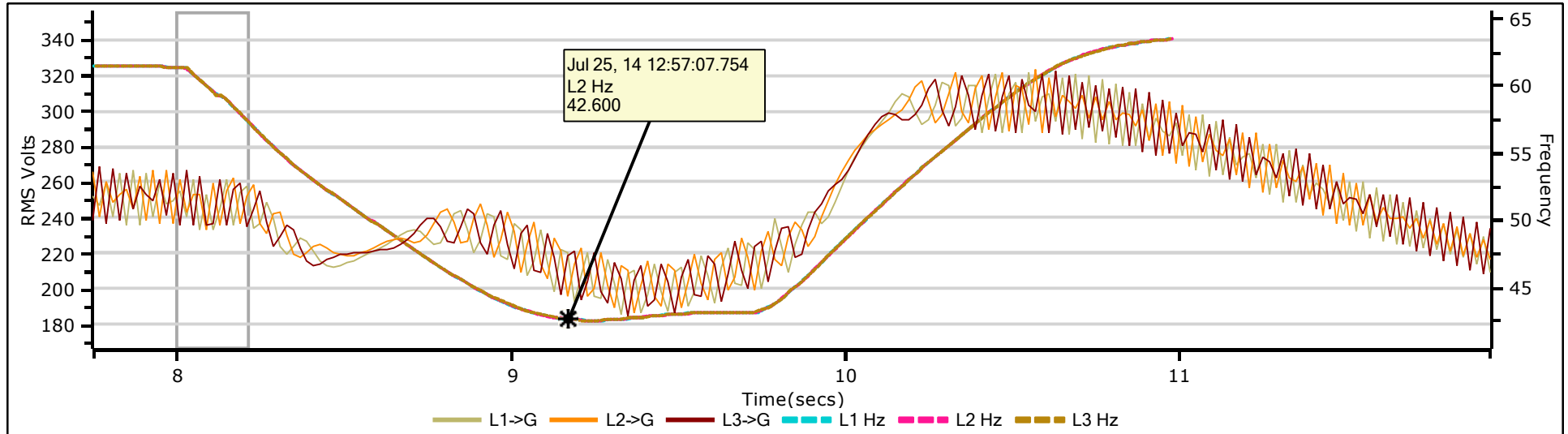


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 7735 - Friday, Jul 25, 2014 12:56:58

Volts Angle: -109.1
Phase Seq: CCW(CBA)



Comments:

0-700kW

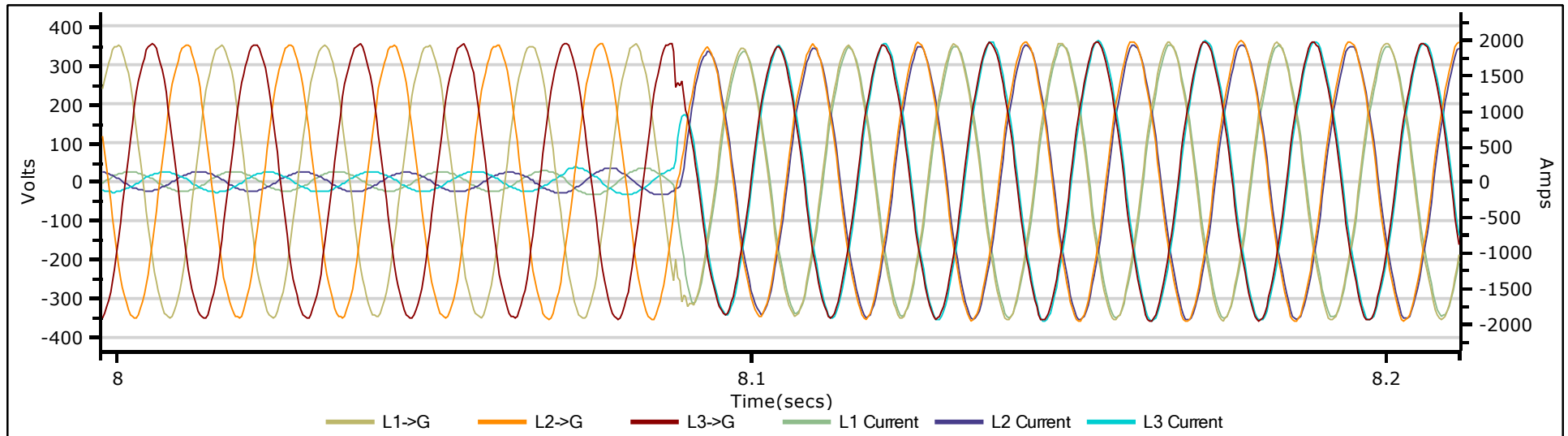
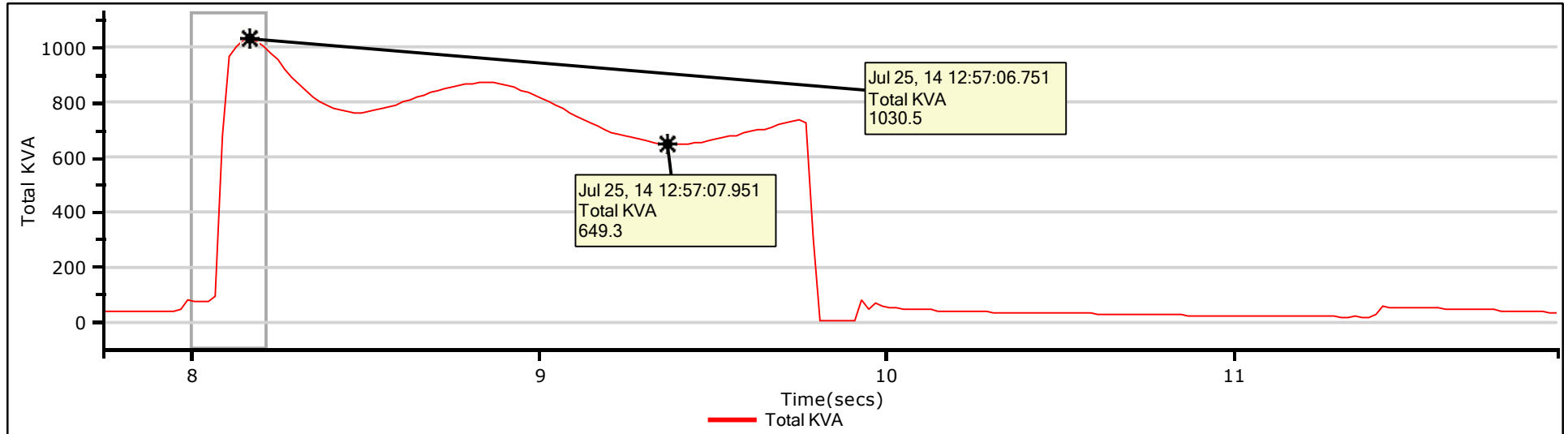


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 7735 - Friday, Jul 25, 2014 12:56:58

Volts Angle: -109.1
Phase Seq: CCW(CBA)



Comments:

0-700kW

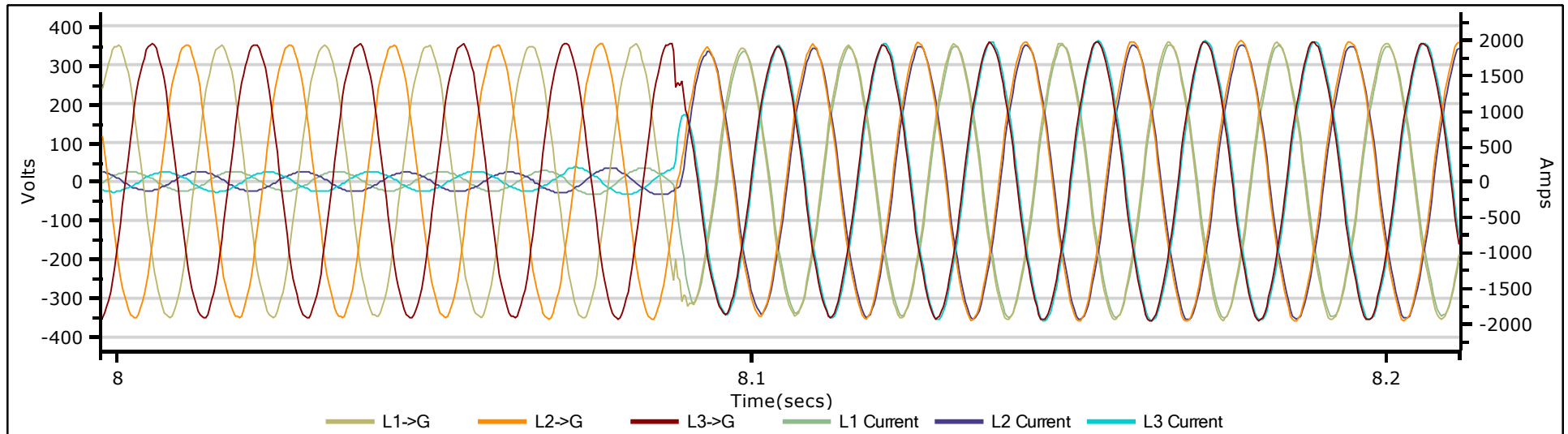
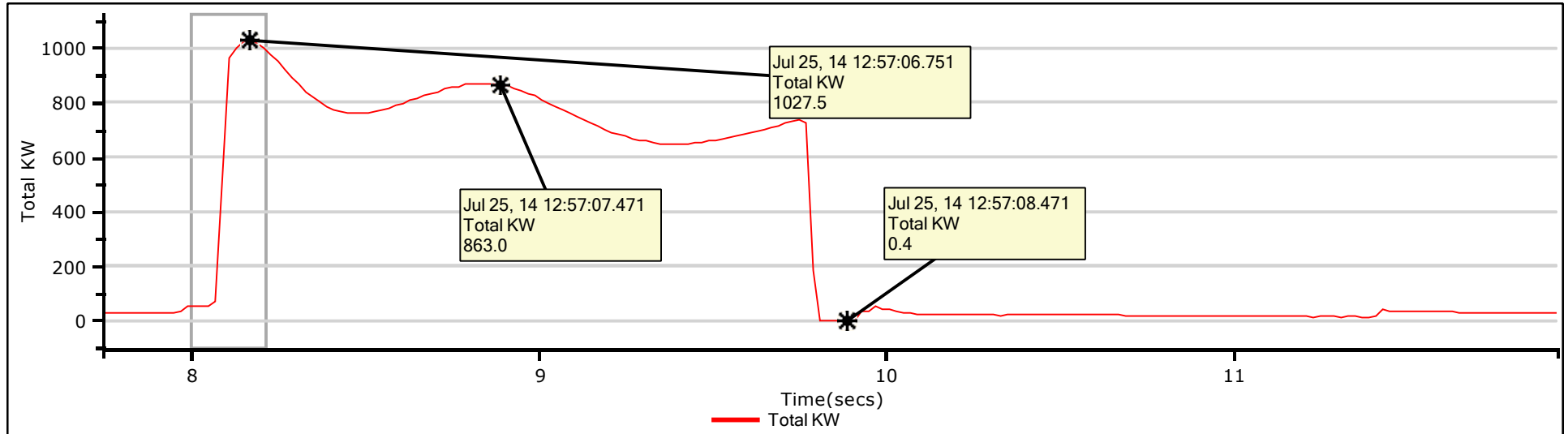


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 7735 - Friday, Jul 25, 2014 12:56:58

Volts Angle: -109.1
Phase Seq: CCW(CBA)



Comments:

0-700kW

0-700-0kW

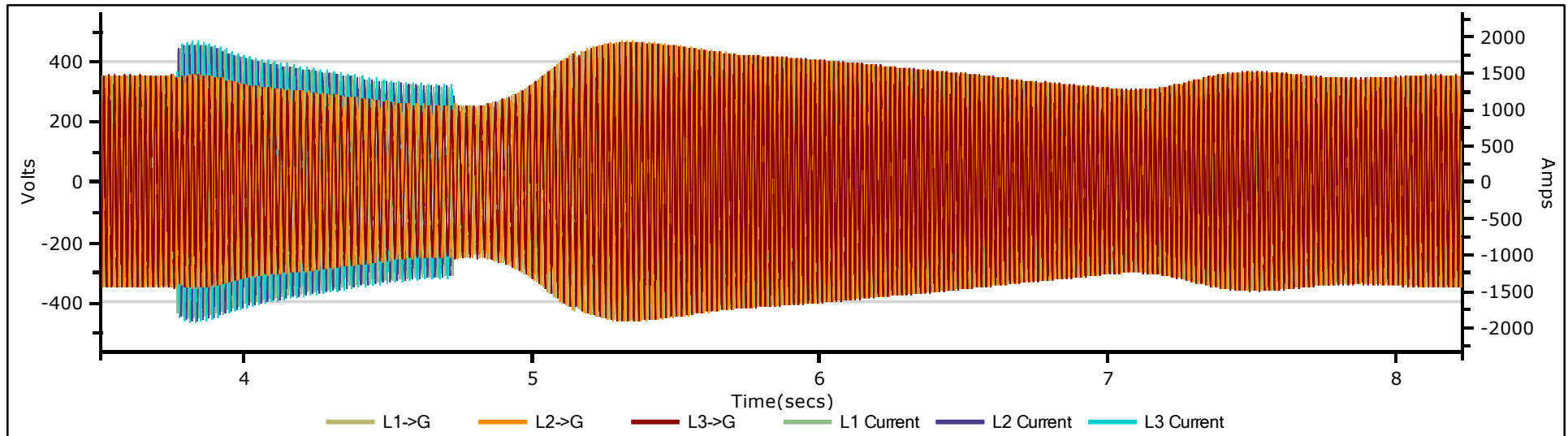
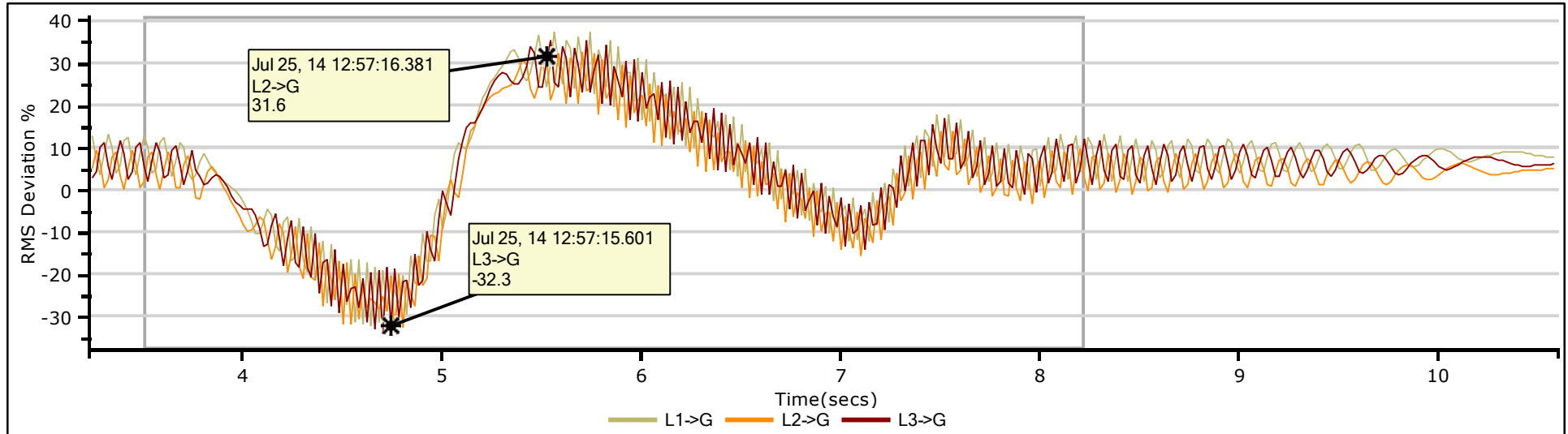


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 7906 - Friday, Jul 25, 2014 12:57:10

Volts Angle: -120.3
Phase Seq: CCW(CBA)



Comments:

0-700-0kW

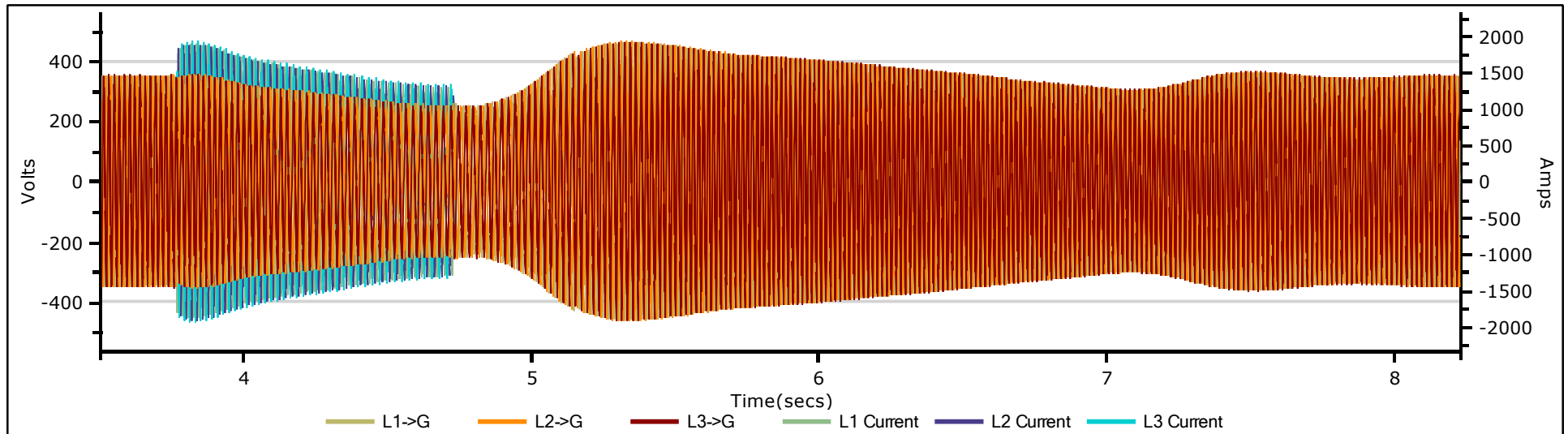
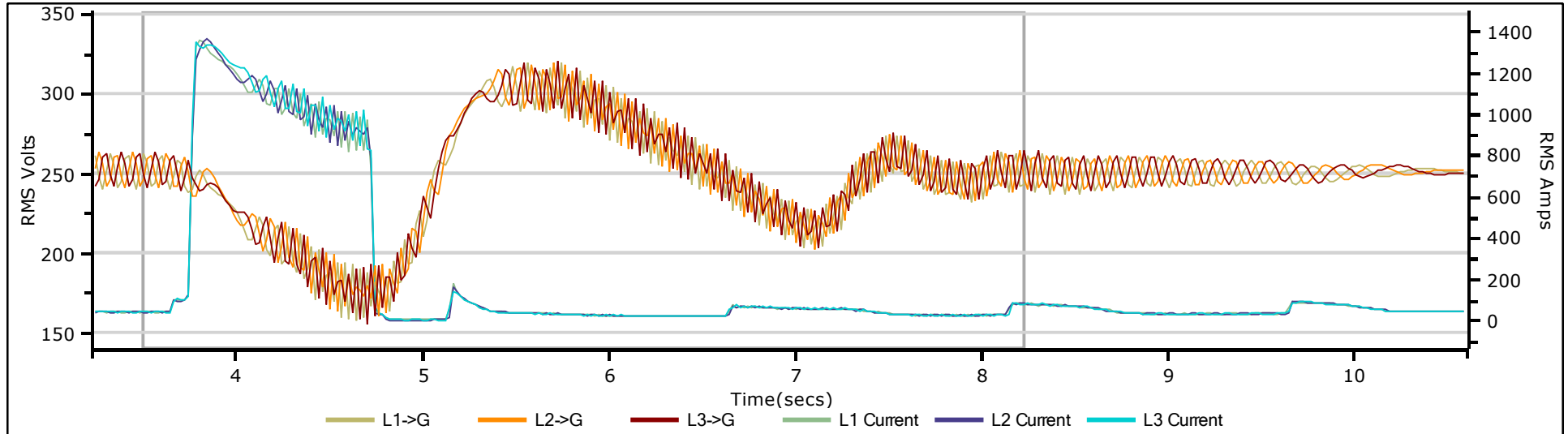


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 7906 - Friday, Jul 25, 2014 12:57:10

Volts Angle: -120.3
Phase Seq: CCW(CBA)



Comments:

0-700kW

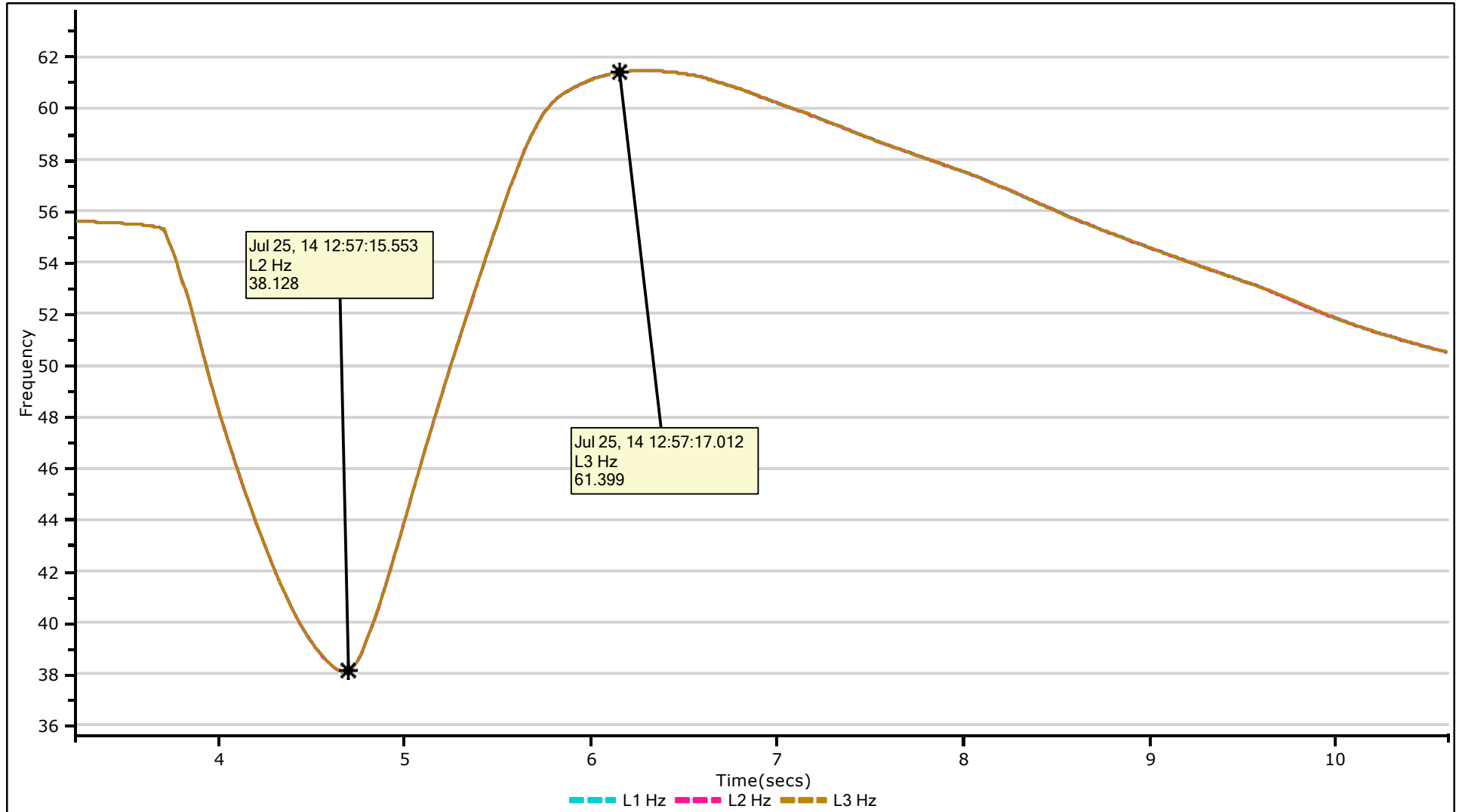


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 7906 - Friday, Jul 25, 2014 12:57:10

Volts Angle: -120.3
Phase Seq: CCW(CBA)



Comments:

0-700-0kW

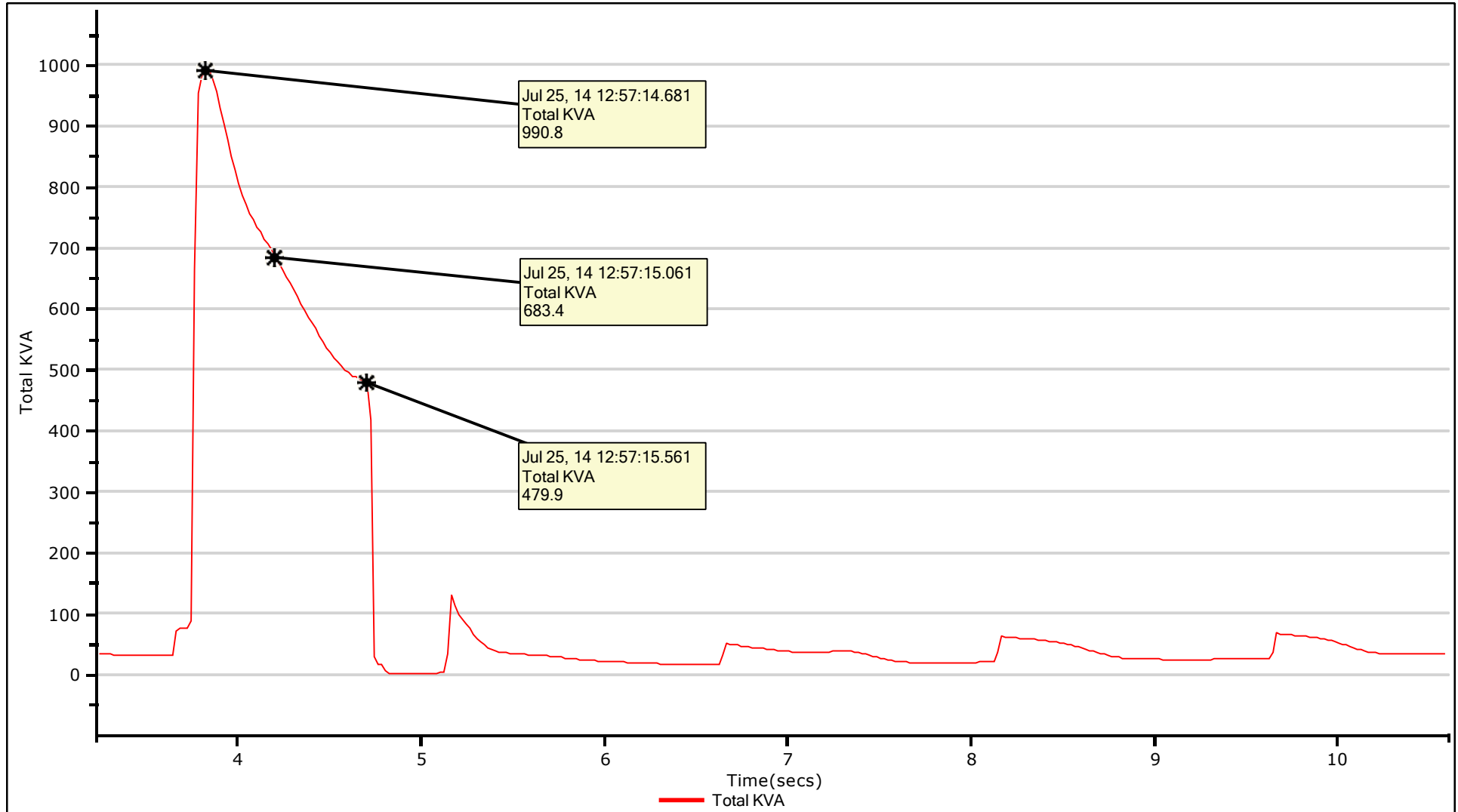


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 7906 - Friday, Jul 25, 2014 12:57:10

Volts Angle: -120.3
Phase Seq: CCW(CBA)



Comments:

0-700-0kW

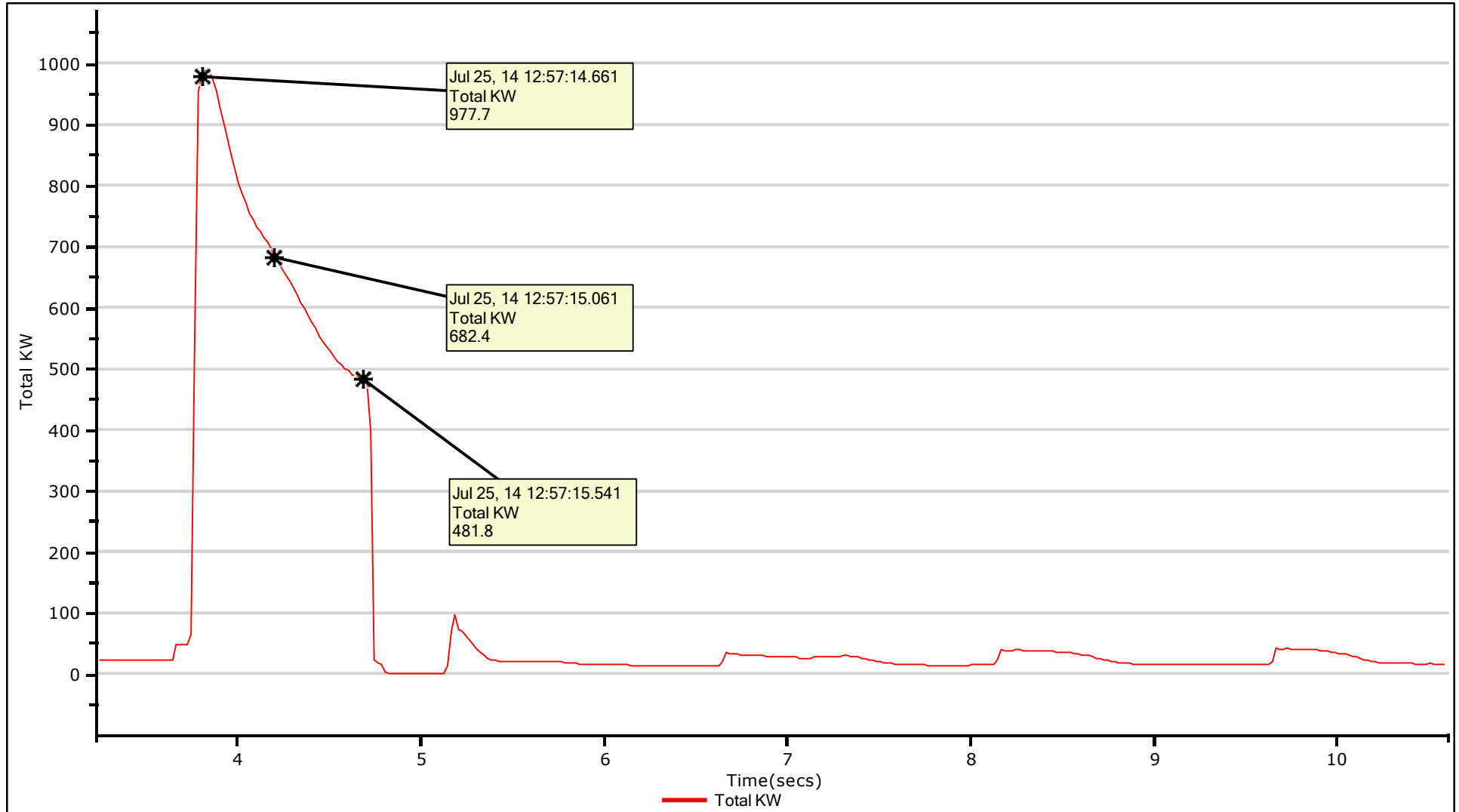


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 7906 - Friday, Jul 25, 2014 12:57:10

Volts Angle: -120.3
Phase Seq: CCW(CBA)



Comments:

0-700-0kW

0-400-0kW

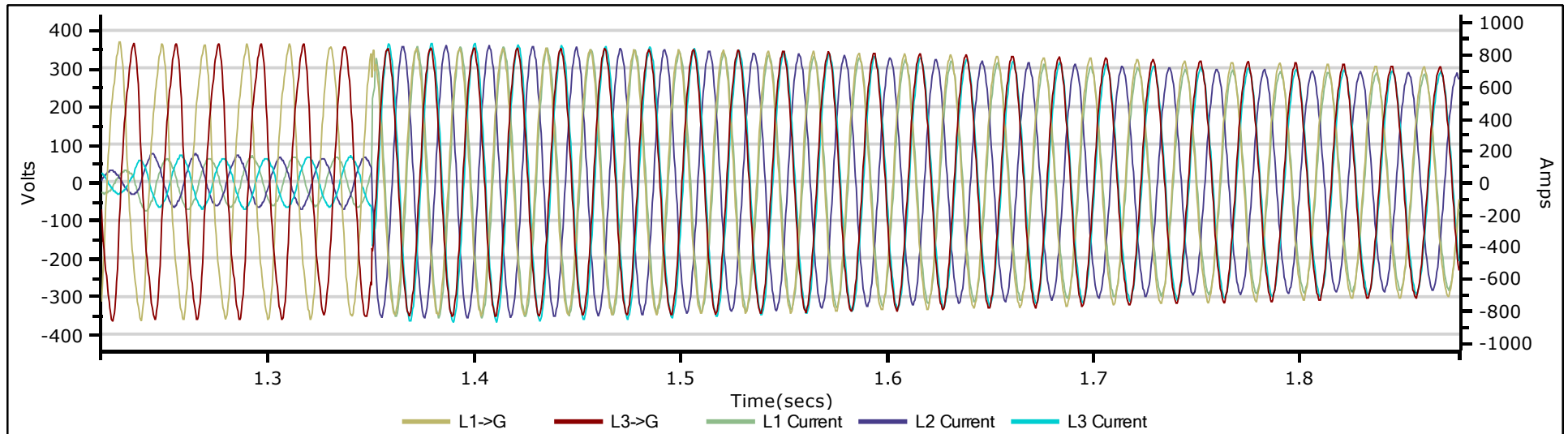
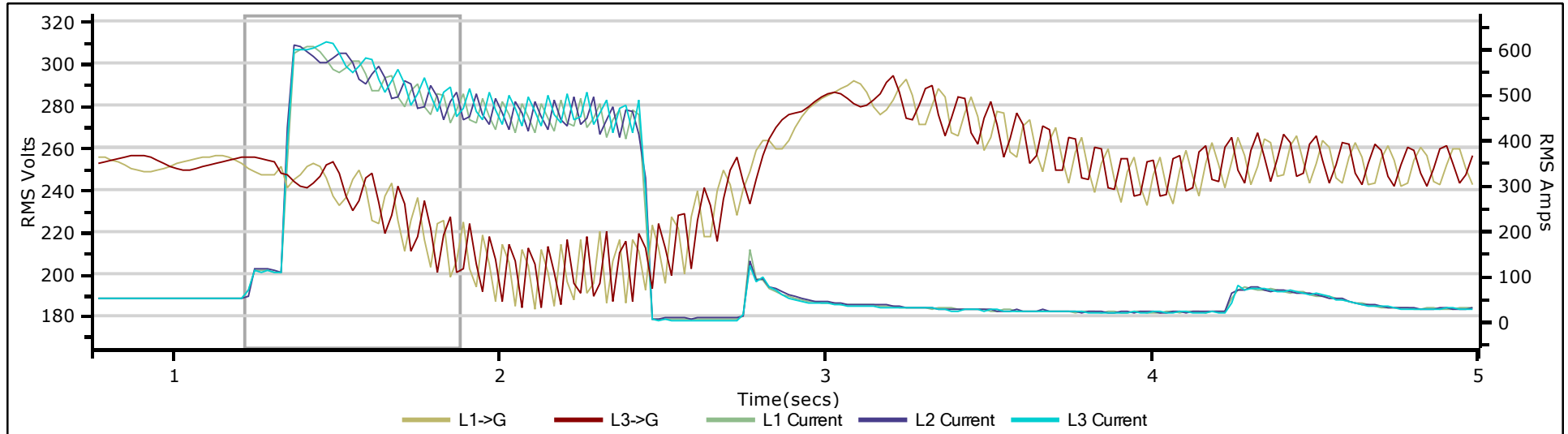


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 8533 - Friday, Jul 25, 2014 12:59:59

Volts Angle: -120.3
Phase Seq: CCW(CBA)



Comments:

0-400-0kW

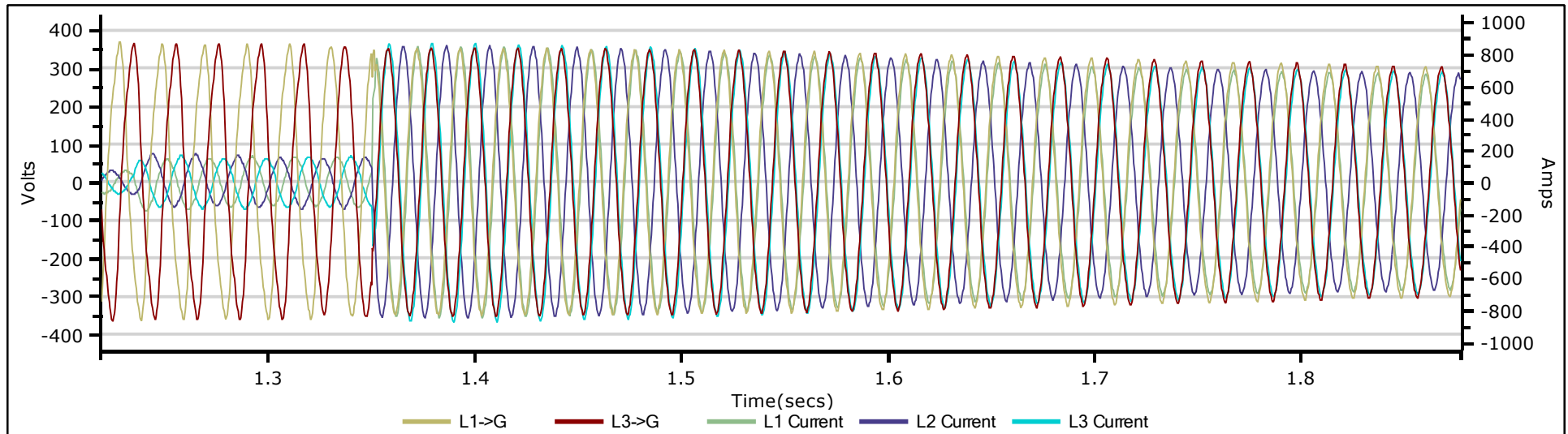
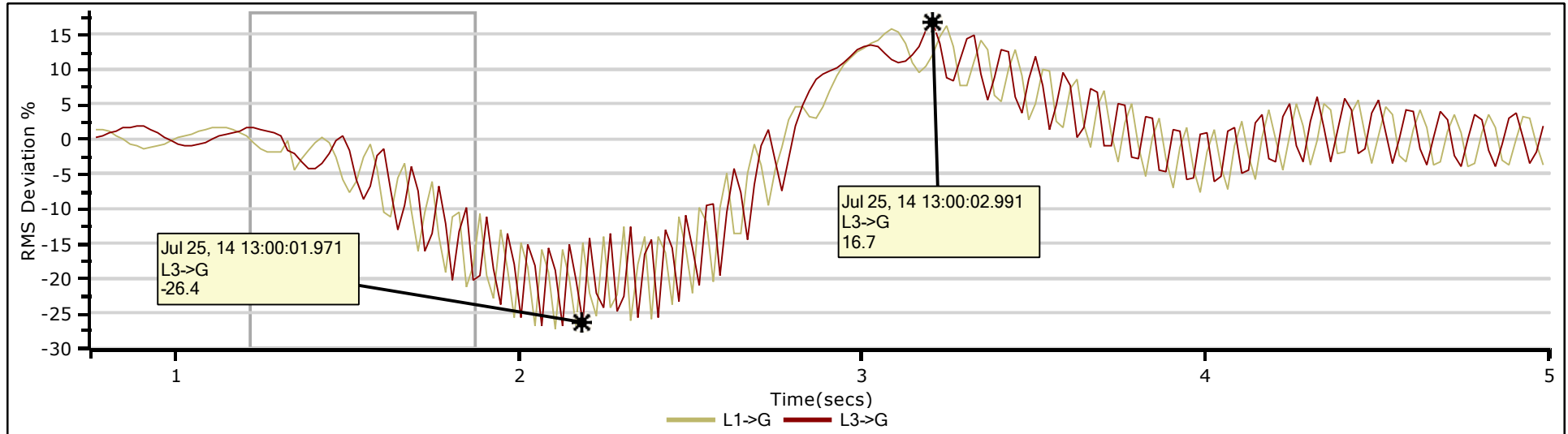


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 8533 - Friday, Jul 25, 2014 12:59:59

Volts Angle: -120.3
Phase Seq: CCW(CBA)



Comments:

0-400-0kW

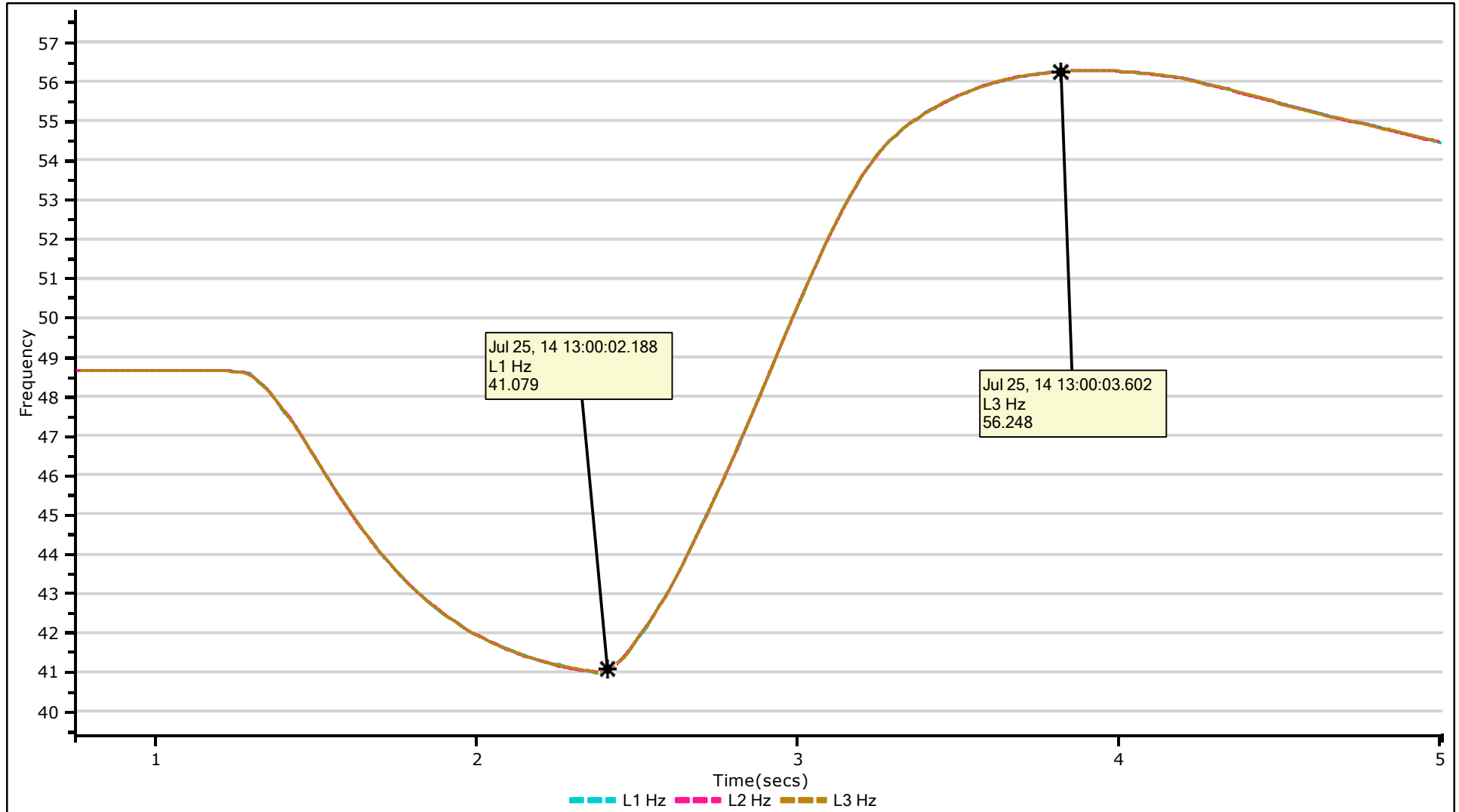


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 8533 - Friday, Jul 25, 2014 12:59:59

Volts Angle: -120.3
Phase Seq: CCW(CBA)



Comments:

0-400-0kW

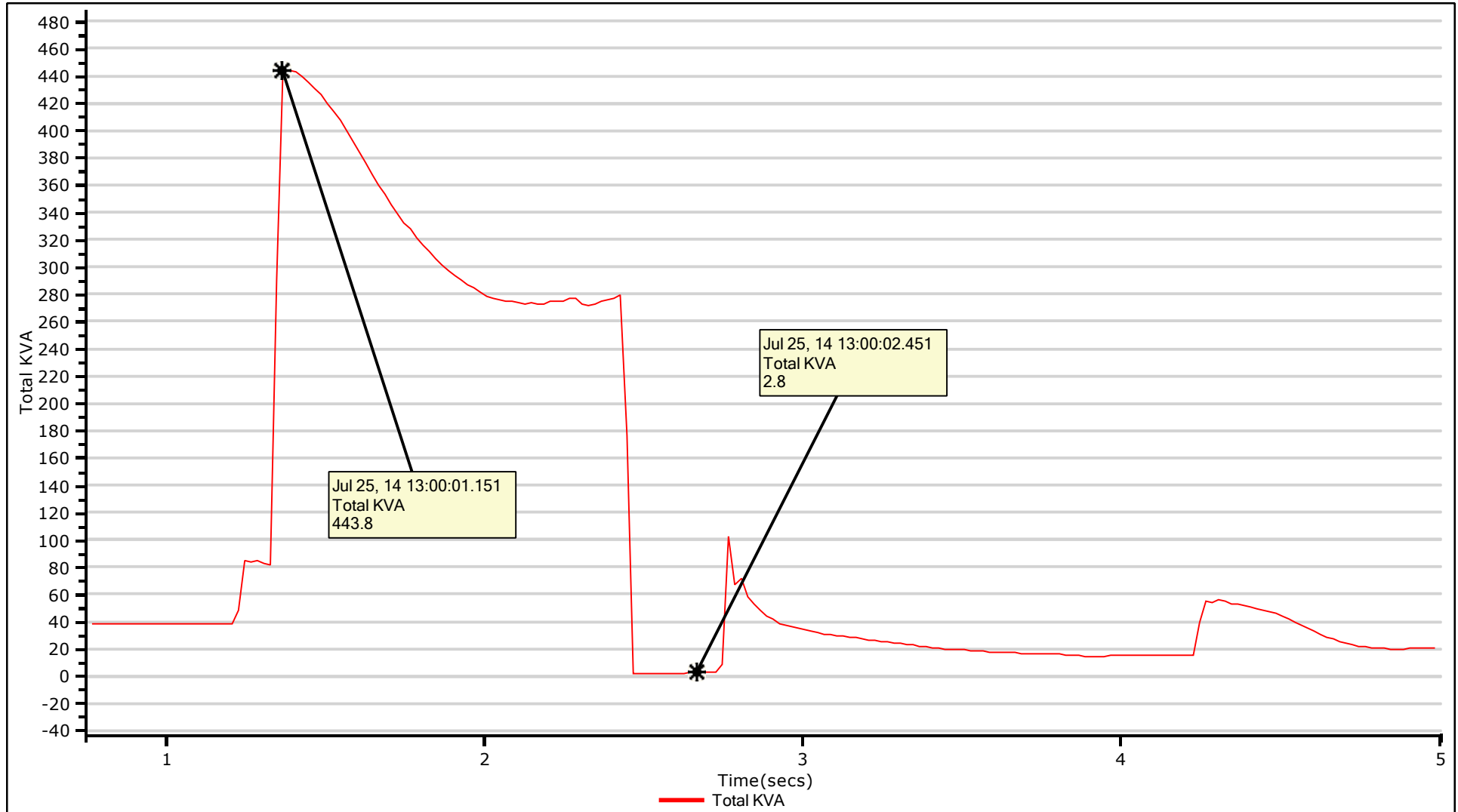


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 8533 - Friday, Jul 25, 2014 12:59:59

Volts Angle: -120.3
Phase Seq: CCW(CBA)



Comments:

0-400-0kW

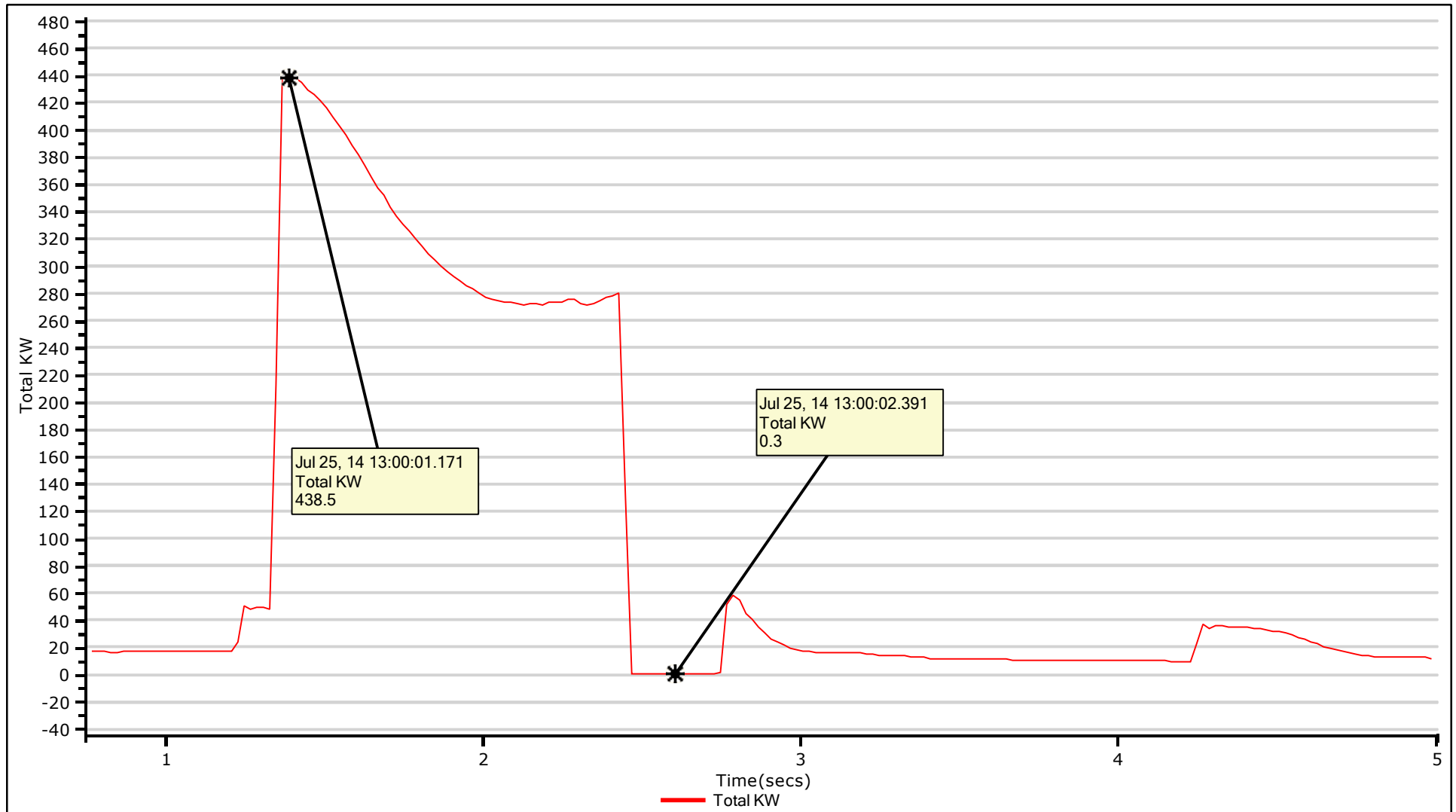


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 8533 - Friday, Jul 25, 2014 12:59:59

Volts Angle: -120.3
Phase Seq: CCW(CBA)



Comments:

0-400-0kW



480-240kW

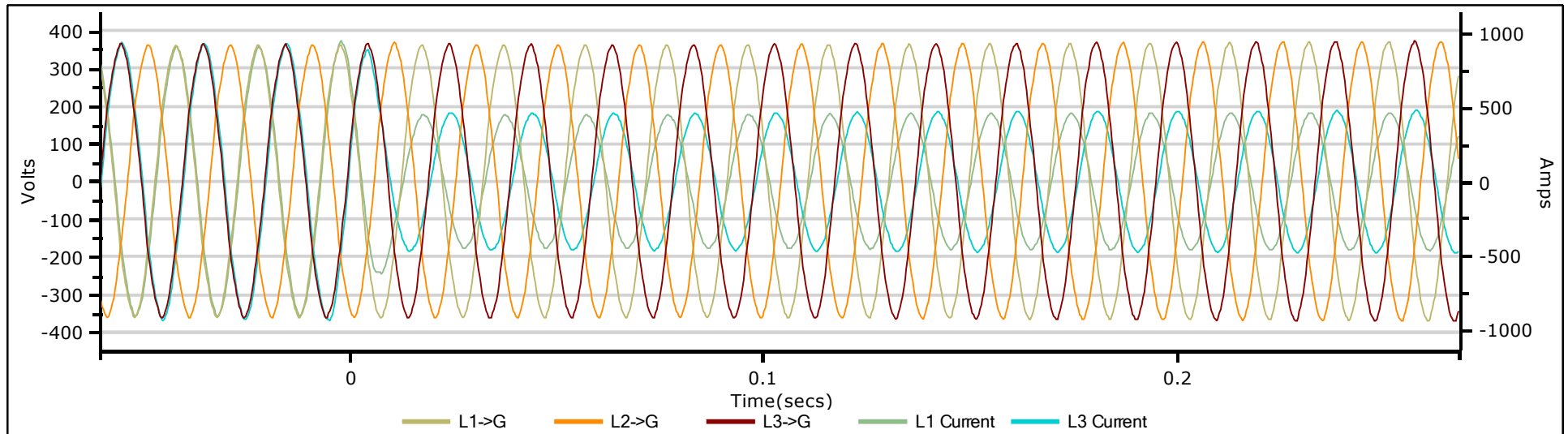
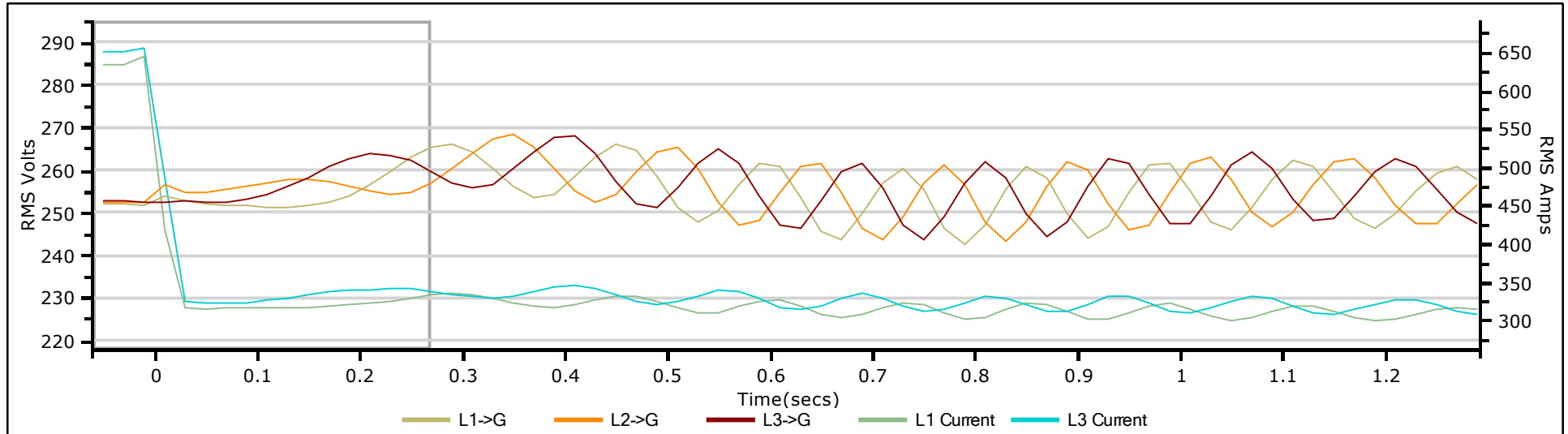


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 8713 - Friday, Jul 25, 2014 13:10:36

Volts Angle: -121.0
Phase Seq: CCW(CBA)



Comments:

480-240W

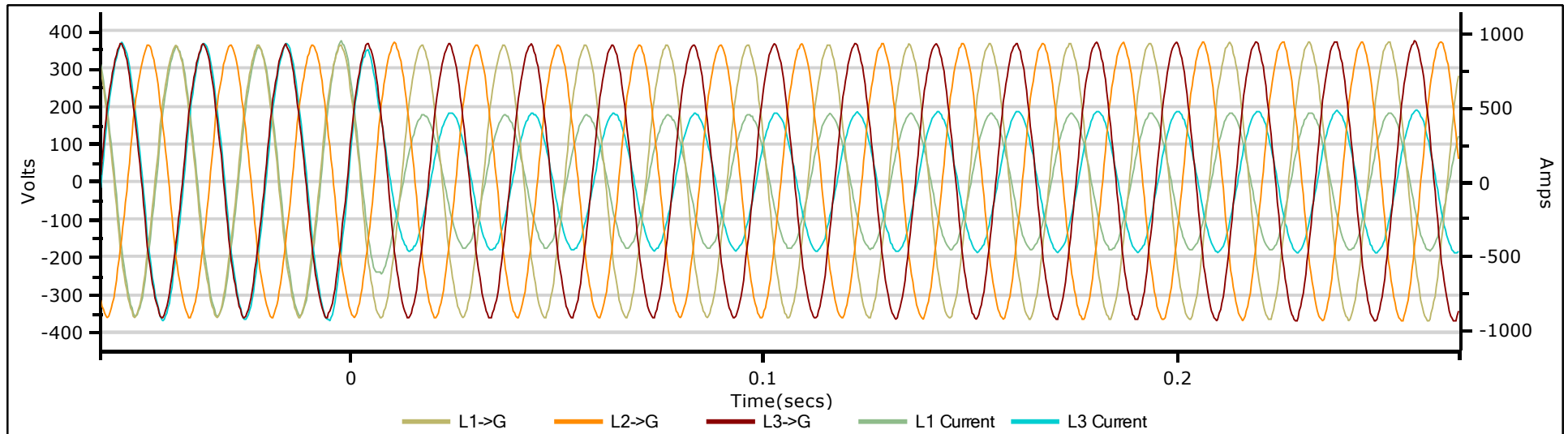
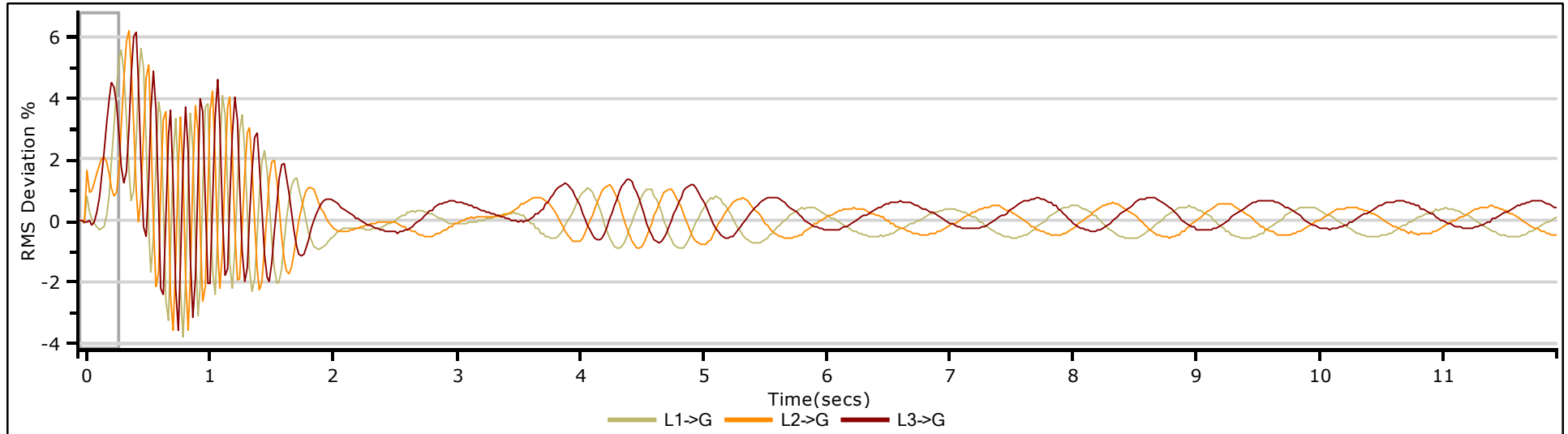


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 8713 - Friday, Jul 25, 2014 13:10:36

Volts Angle: -121.0
Phase Seq: CCW(CBA)



Comments:

480-240W

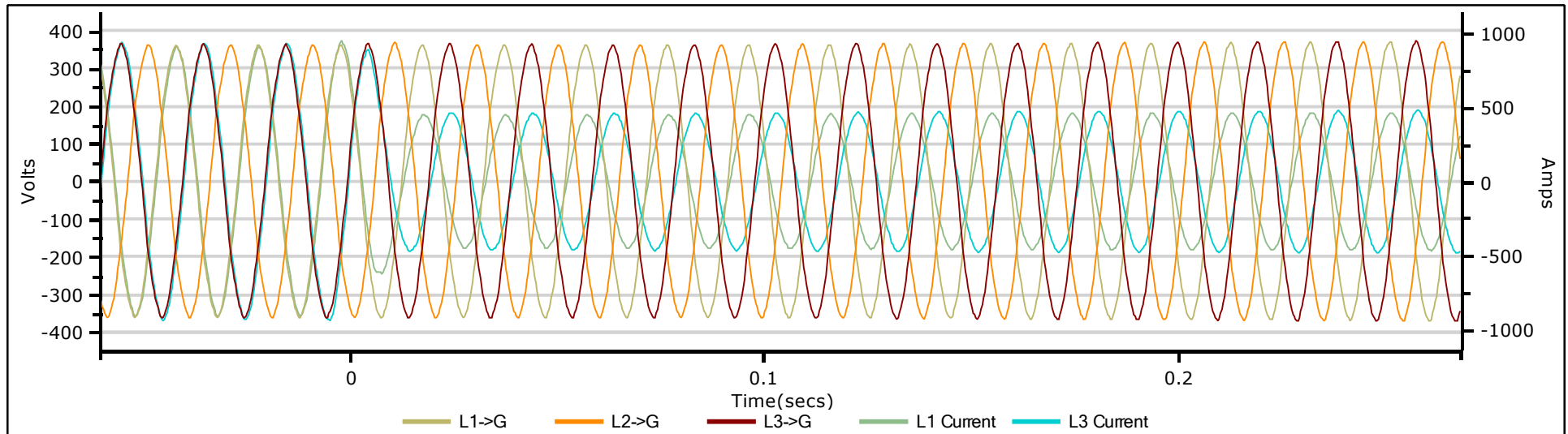
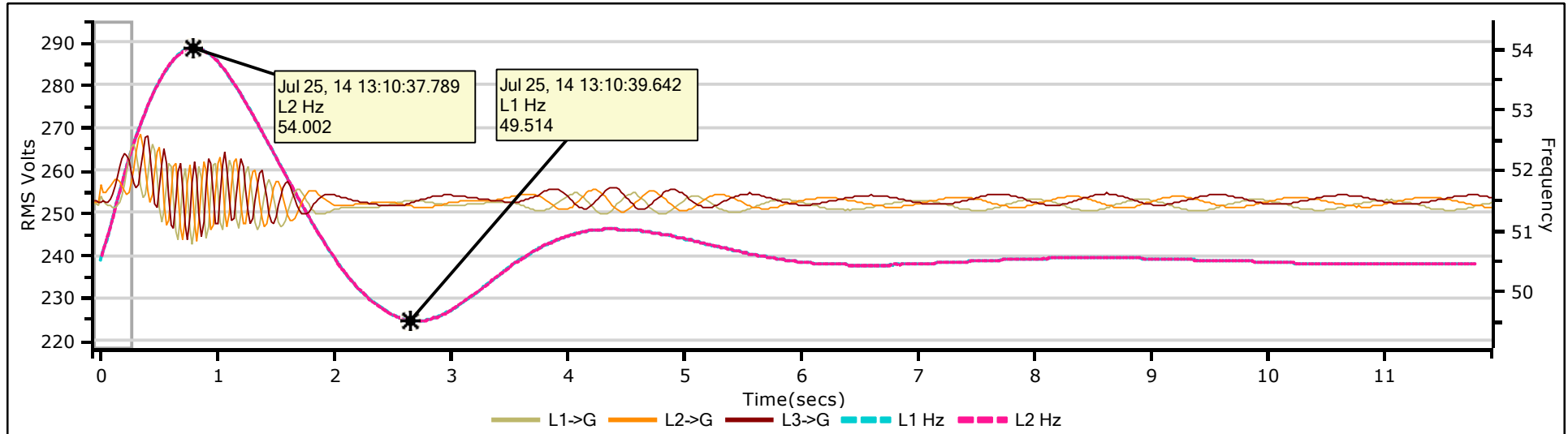


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 8713 - Friday, Jul 25, 2014 13:10:36

Volts Angle: -121.0
Phase Seq: CCW(CBA)



Comments:

480-240W

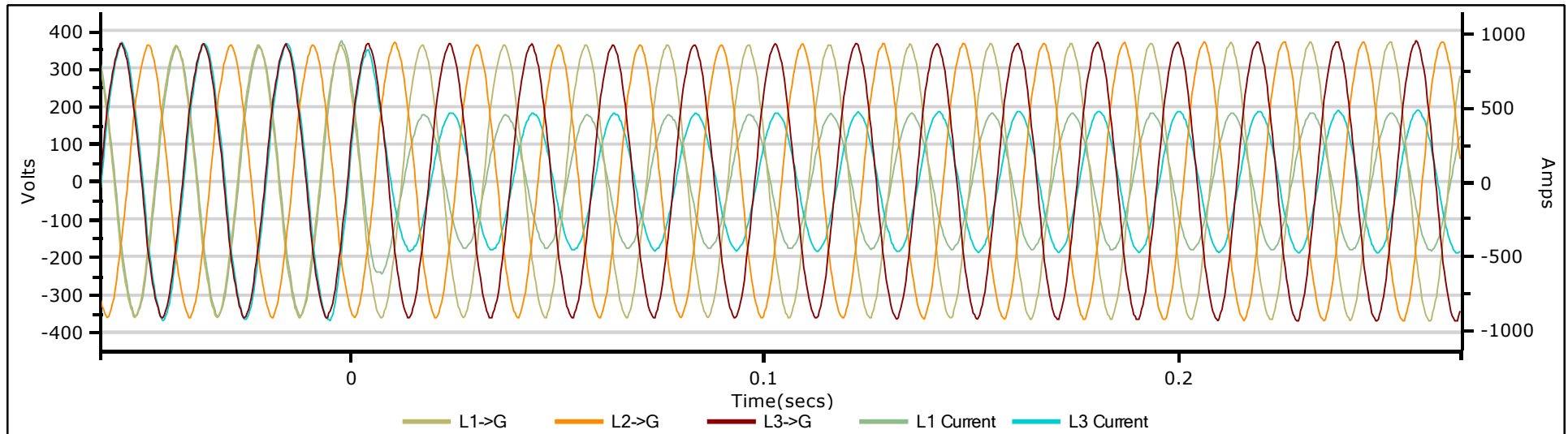
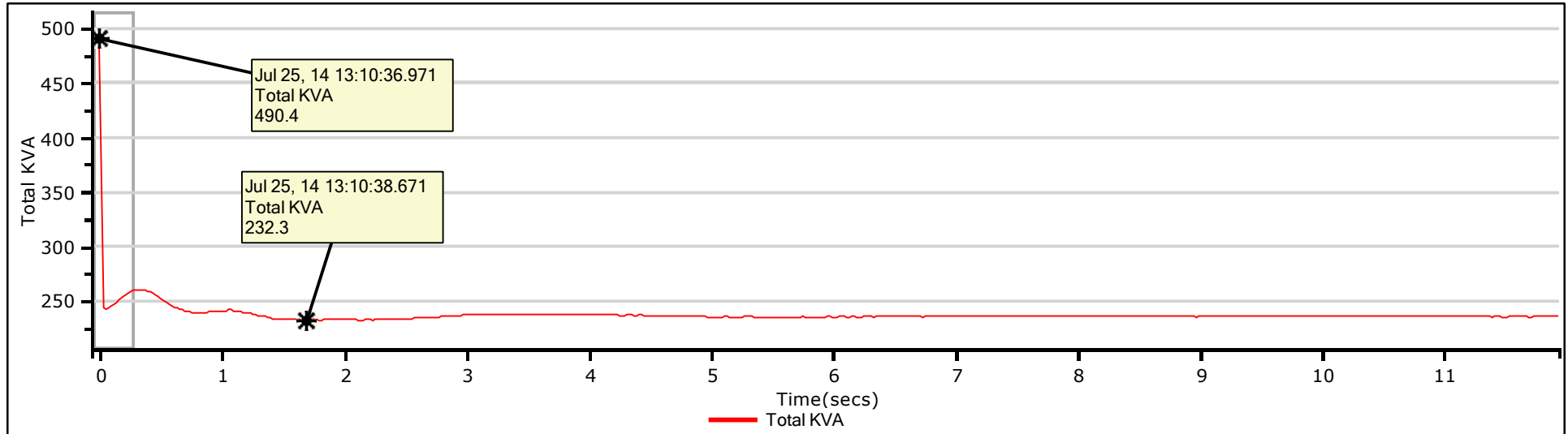


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 8713 - Friday, Jul 25, 2014 13:10:36

Volts Angle: -121.0
Phase Seq: CCW(CBA)



Comments:

480-240kW

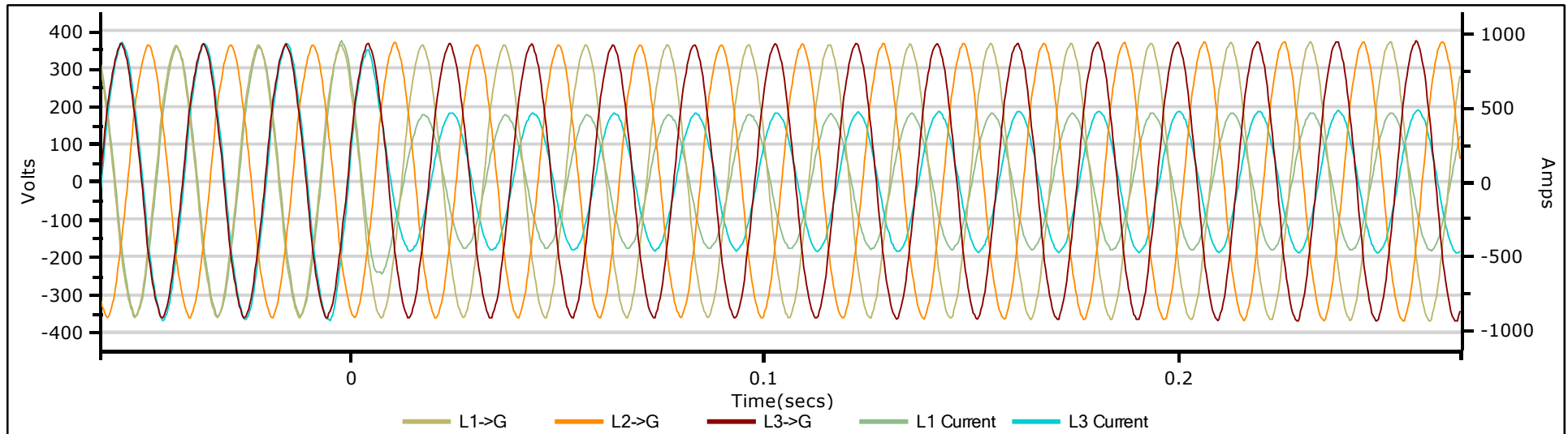
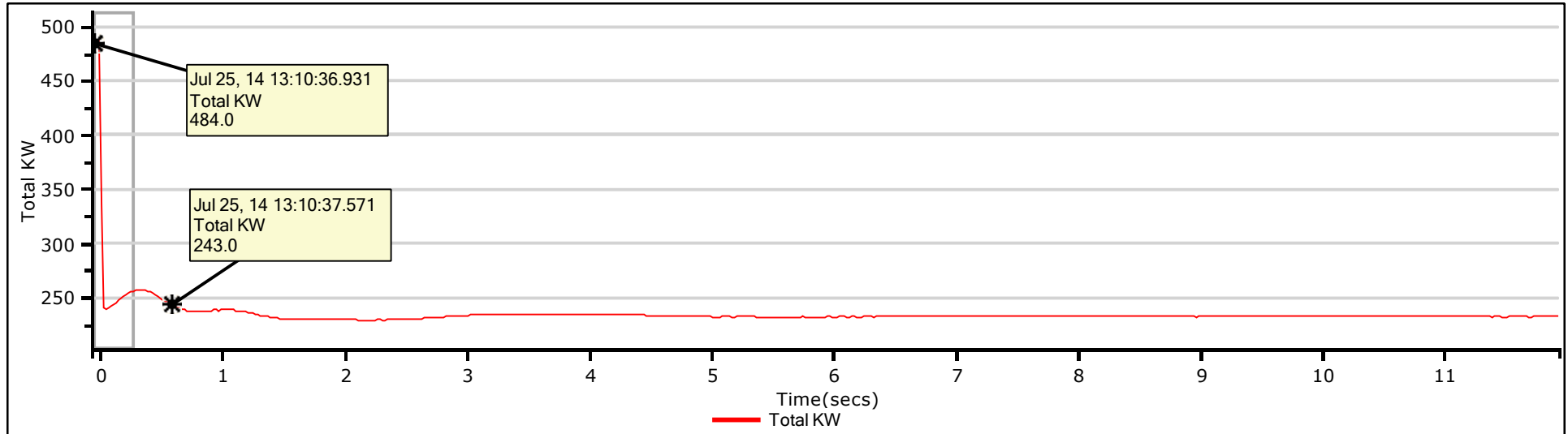


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 8713 - Friday, Jul 25, 2014 13:10:36

Volts Angle: -121.0
Phase Seq: CCW(CBA)



Comments:

480-240kW



480-200-0kW

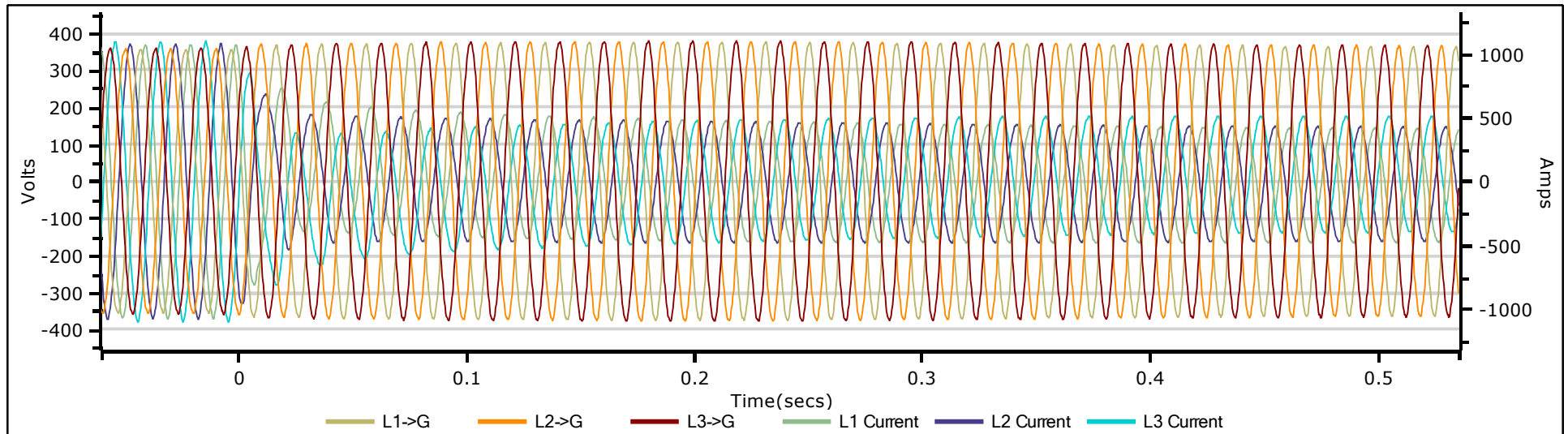
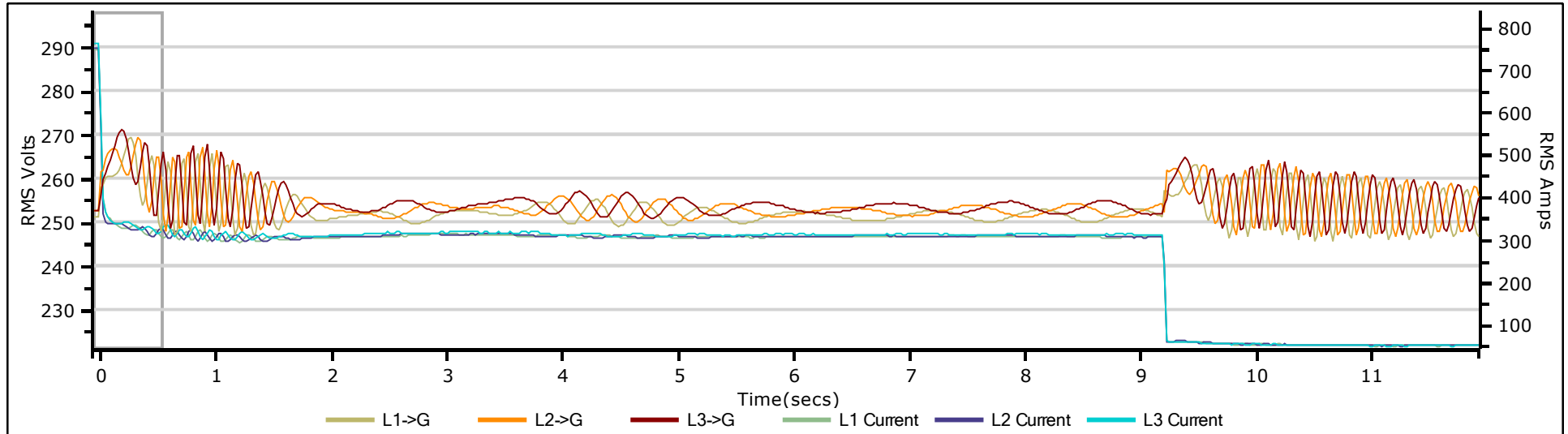


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 9491 - Friday, Jul 25, 2014 13:51:54

Volts Angle: -121.0
Phase Seq: CCW(CBA)



Comments:

480-200-0kw .8pf

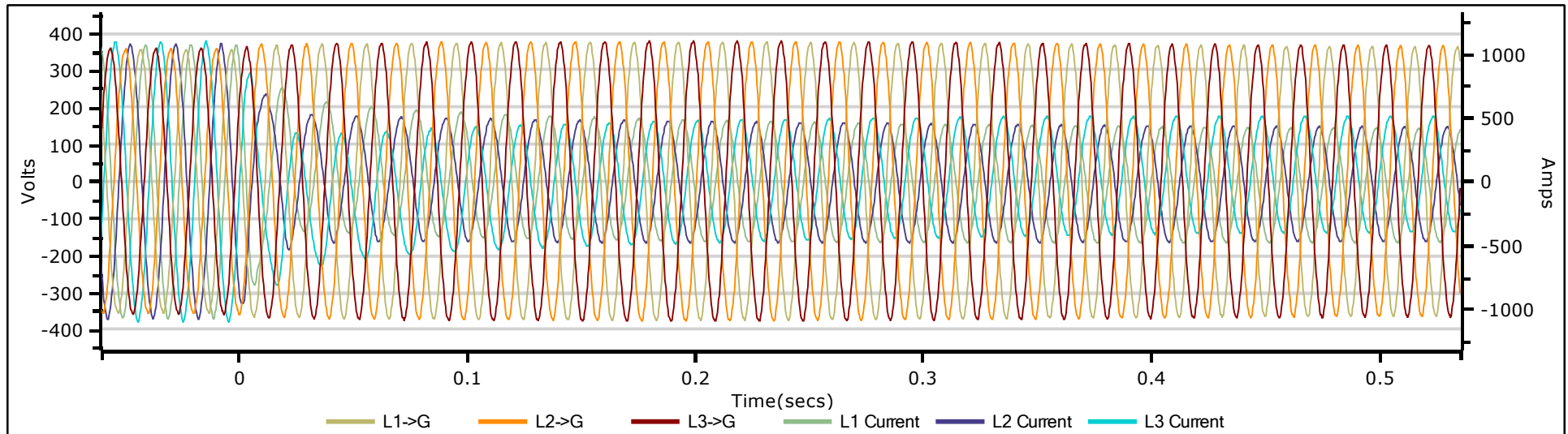
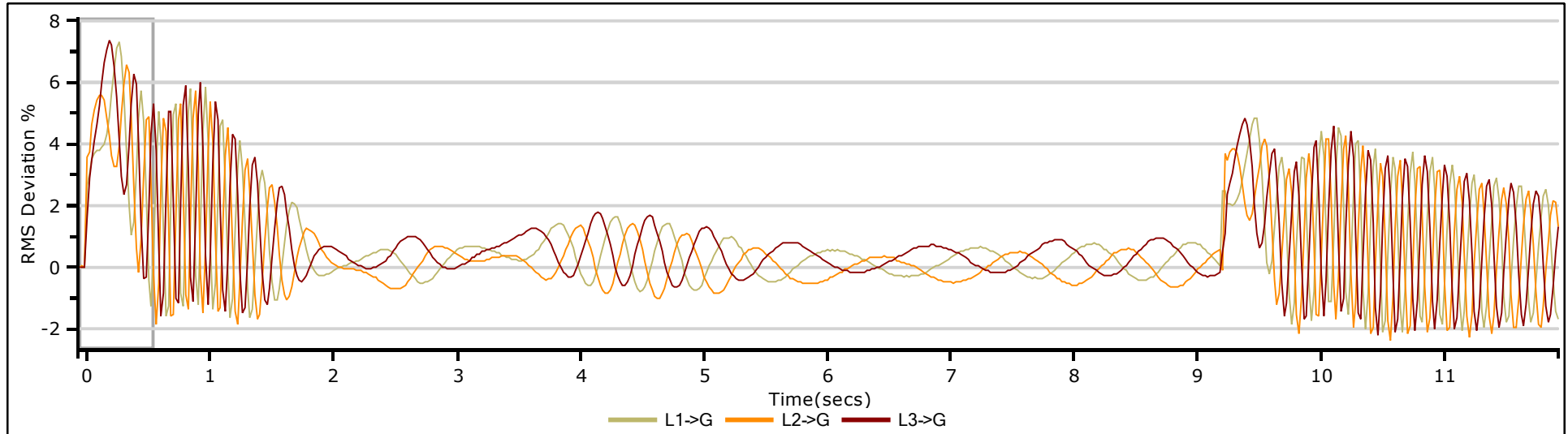


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 9491 - Friday, Jul 25, 2014 13:51:54

Volts Angle: -121.0
Phase Seq: CCW(CBA)



Comments:

480-200-0kw .8pf

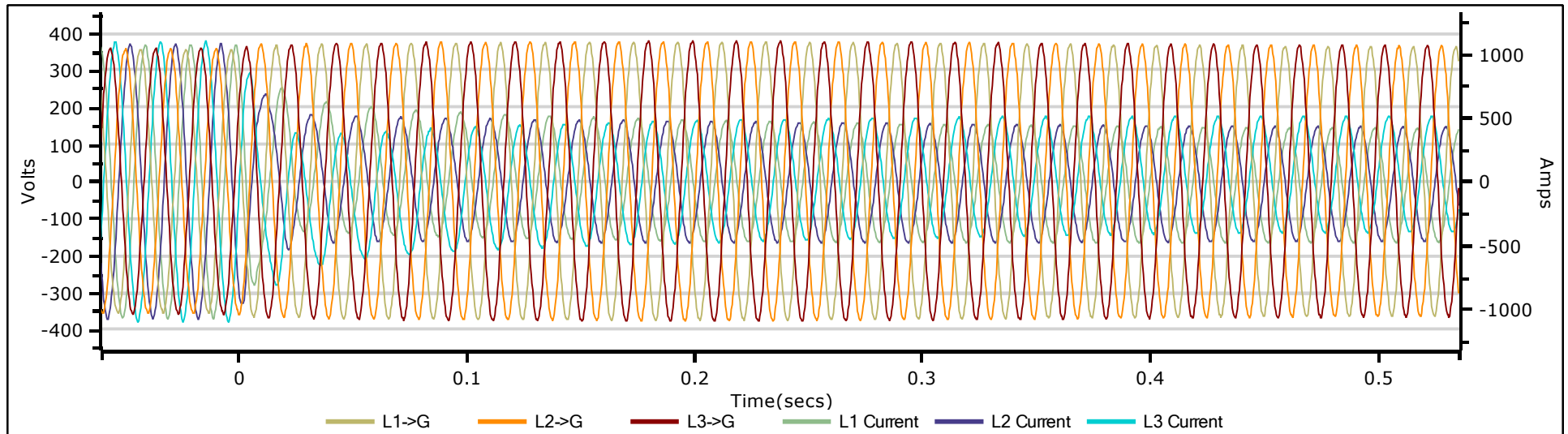
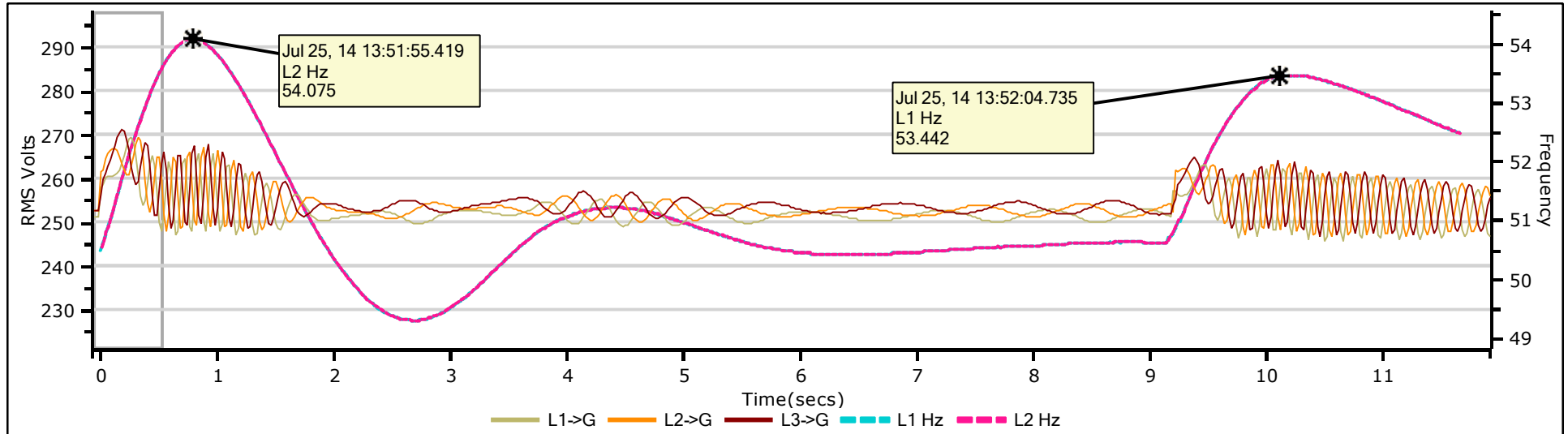


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 9491 - Friday, Jul 25, 2014 13:51:54

Volts Angle: -121.0
Phase Seq: CCW(CBA)



Comments:

480-200-0kw .8pf

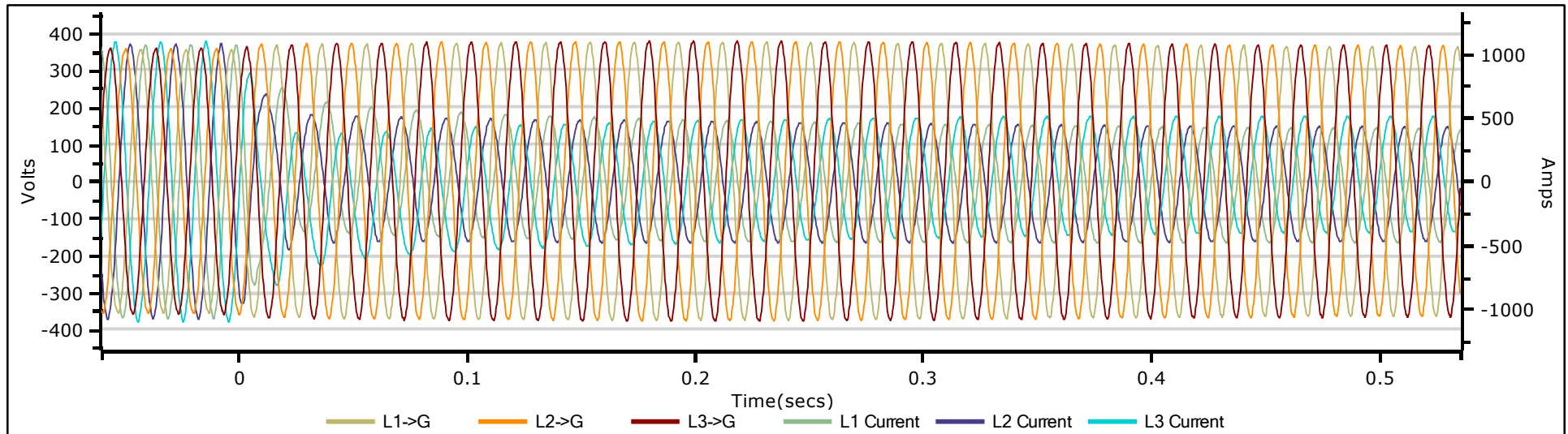
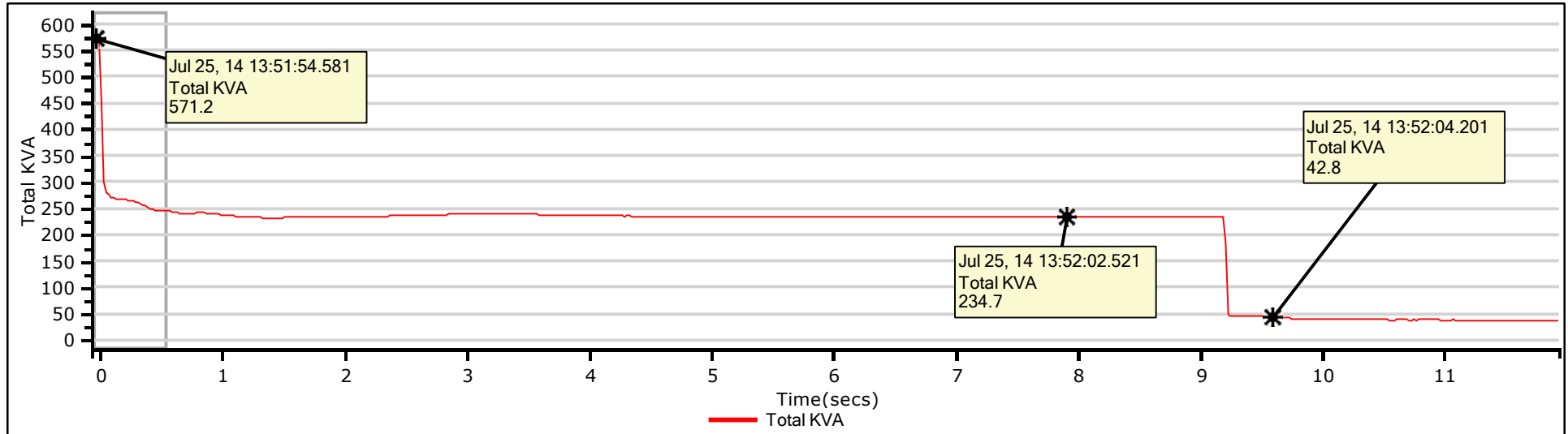


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 9491 - Friday, Jul 25, 2014 13:51:54

Volts Angle: -121.0
Phase Seq: CCW(CBA)



Comments:

480-200-0kw .8pf

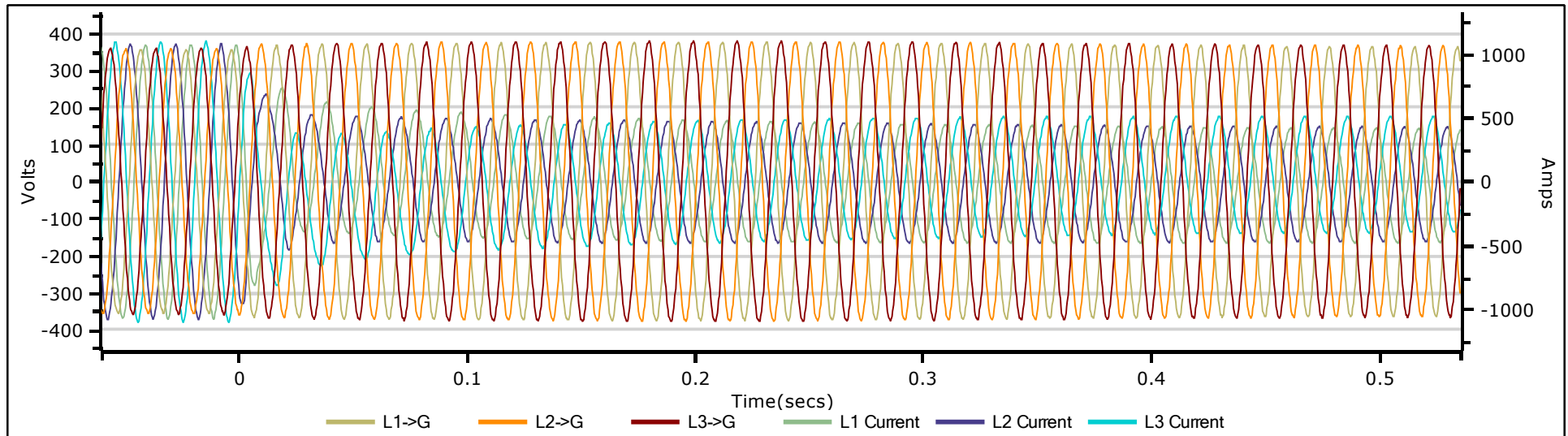
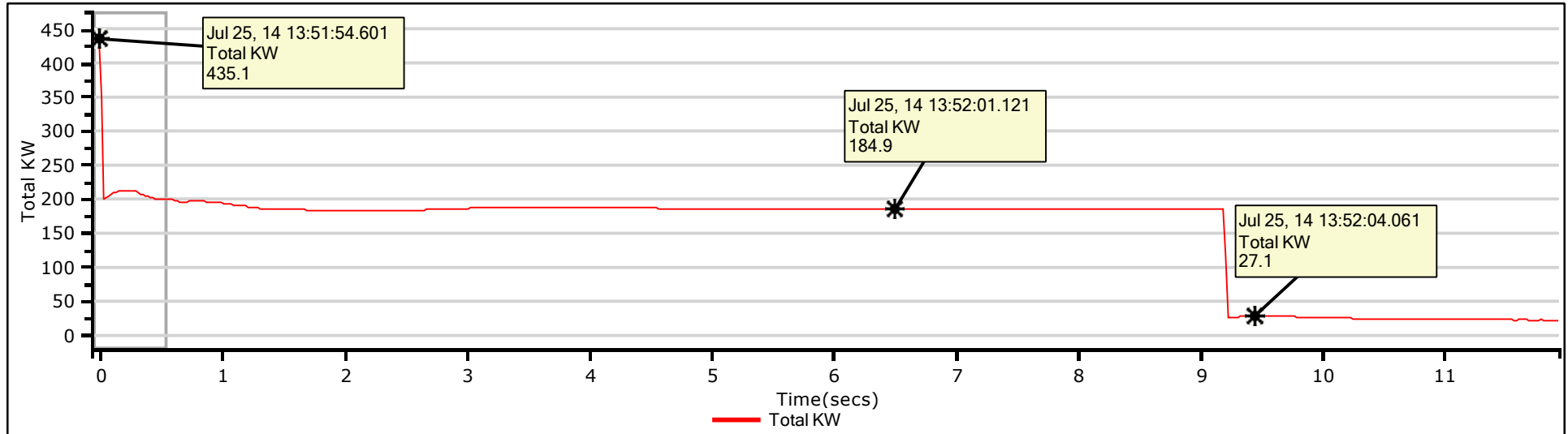


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 9491 - Friday, Jul 25, 2014 13:51:54

Volts Angle: -121.0
Phase Seq: CCW(CBA)



Comments:

480-200-0kw .8pf



150-500kW_0.8pf

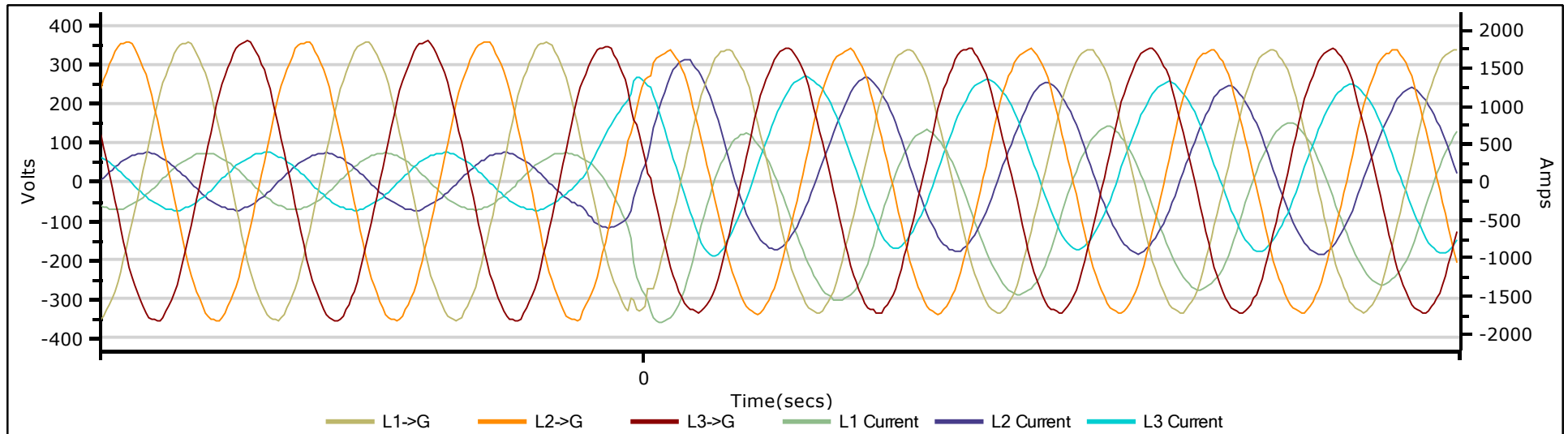
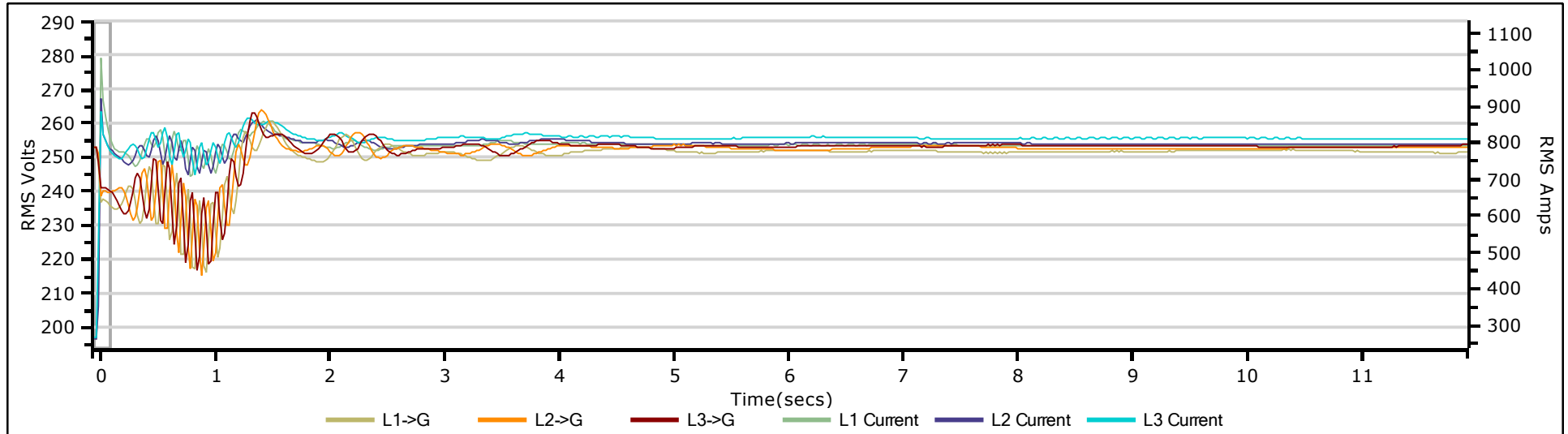


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 9215 - Friday, Jul 25, 2014 13:41:41

Volts Angle: -120.7
Phase Seq: CCW(CBA)



Comments:

150-500kw .8pf

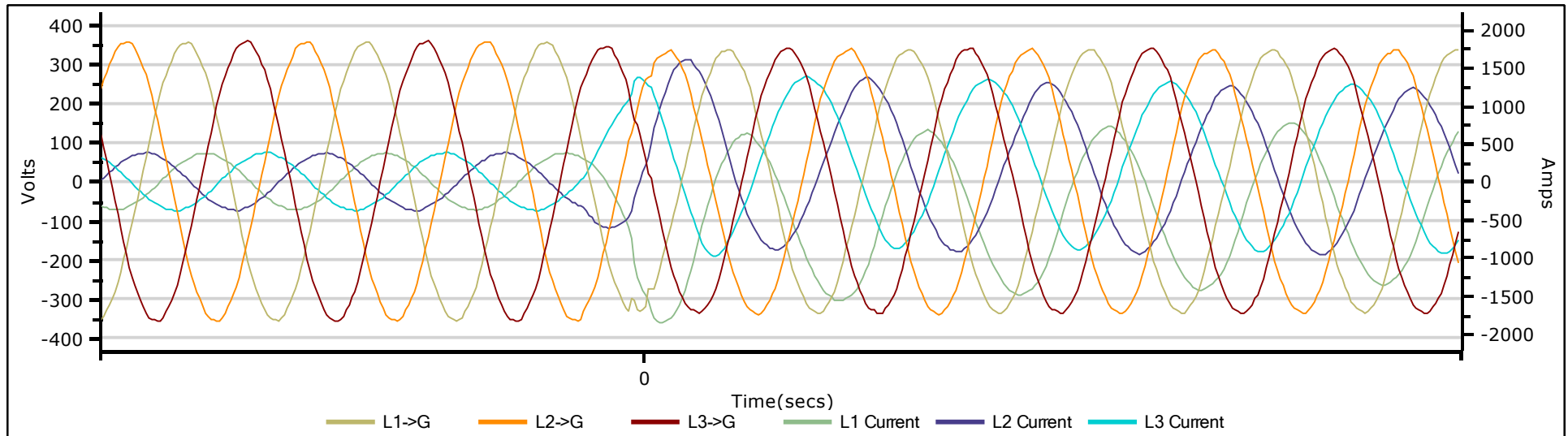
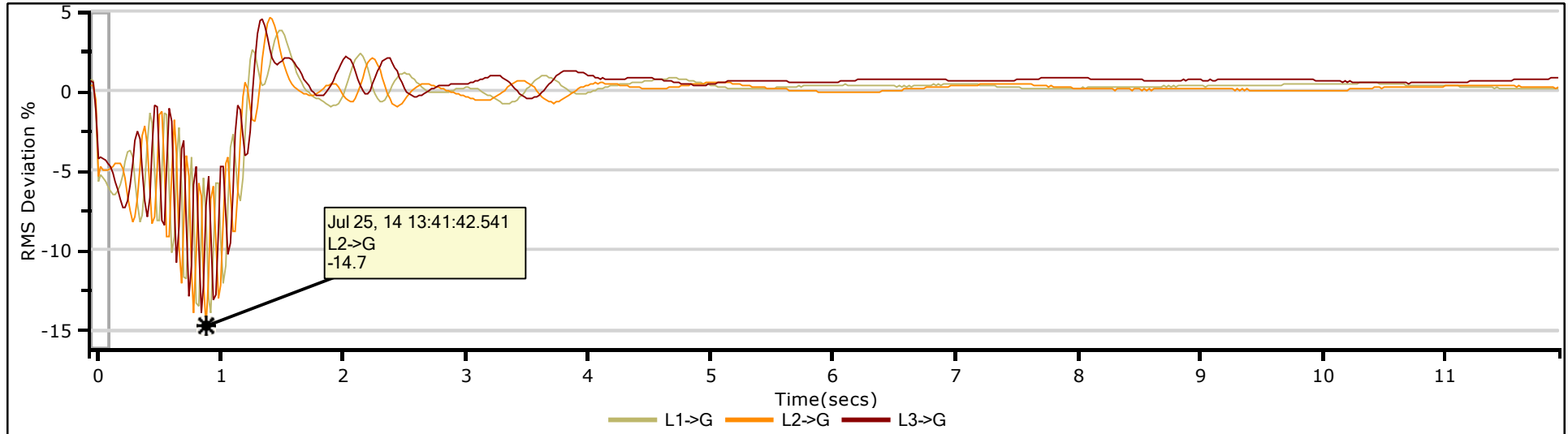


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 9215 - Friday, Jul 25, 2014 13:41:41

Volts Angle: -120.7
Phase Seq: CCW(CBA)



Comments:

150-500kw .8pf

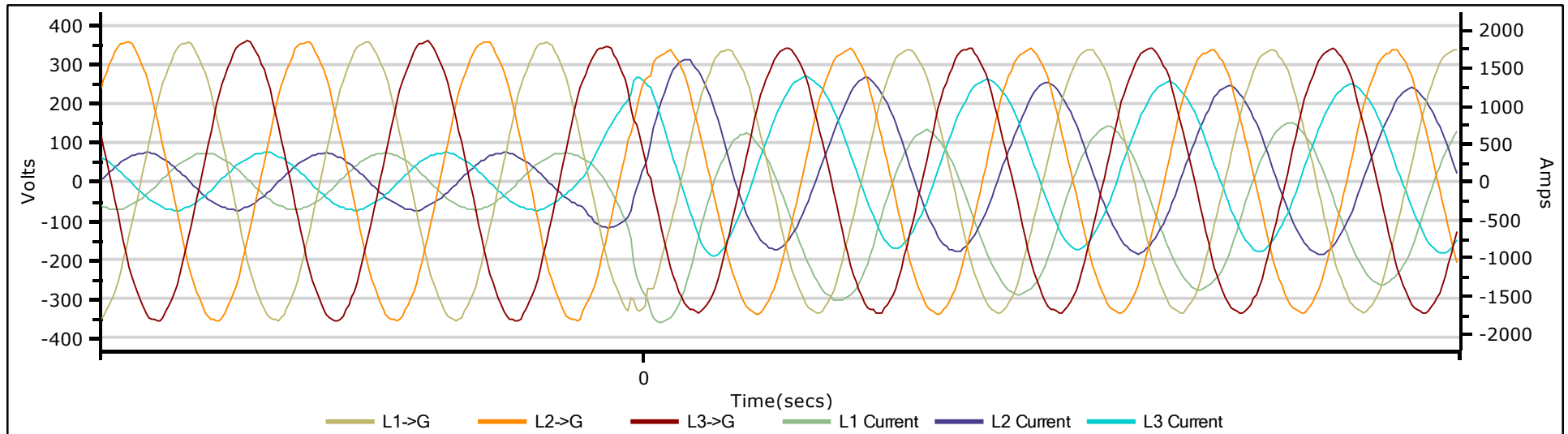
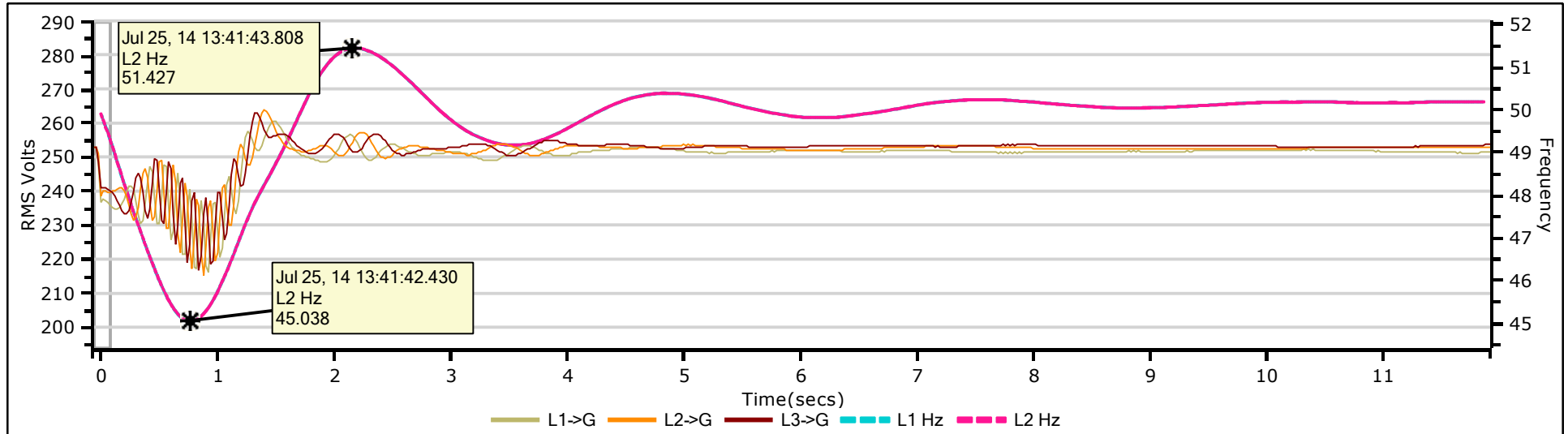


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 9215 - Friday, Jul 25, 2014 13:41:41

Volts Angle: -120.7
Phase Seq: CCW(CBA)



Comments:

150-500kw .8pf

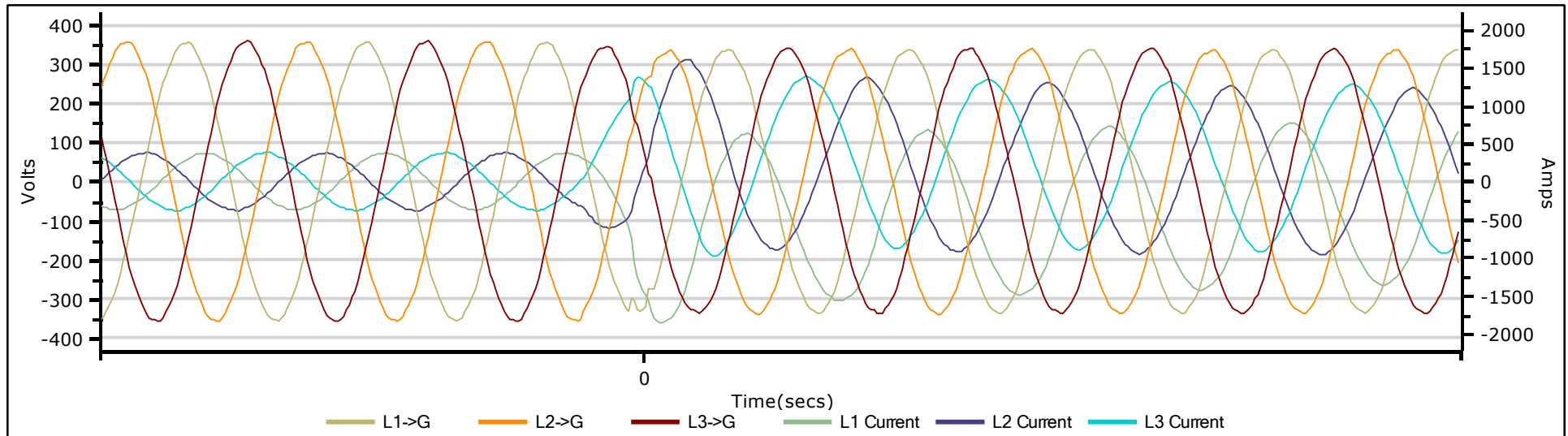
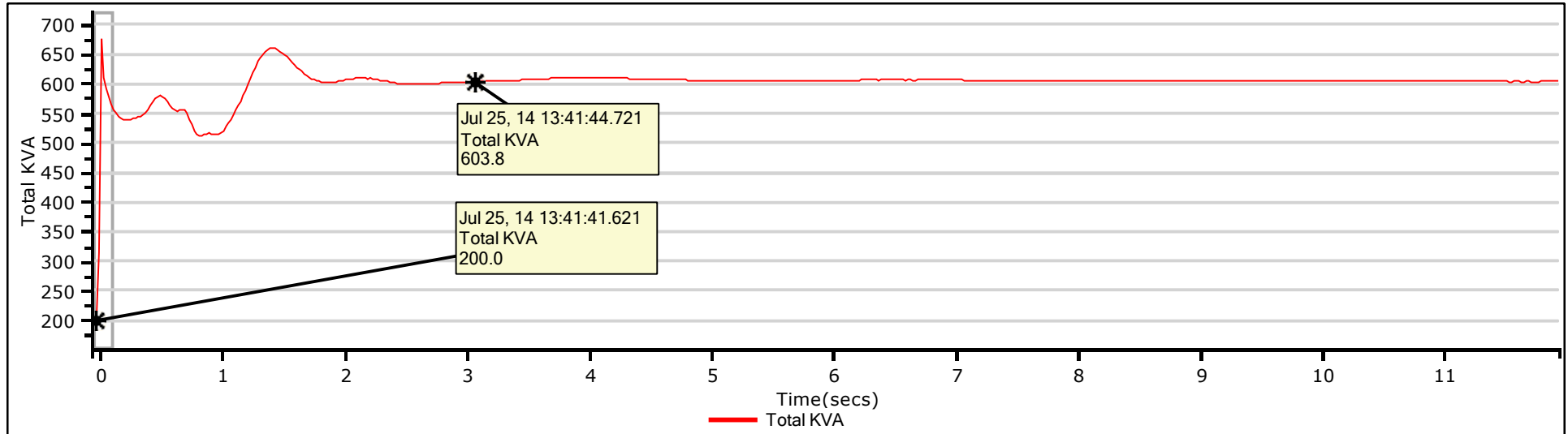


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 9215 - Friday, Jul 25, 2014 13:41:41

Volts Angle: -120.7
Phase Seq: CCW(CBA)



Comments:

150-500kw .8pf

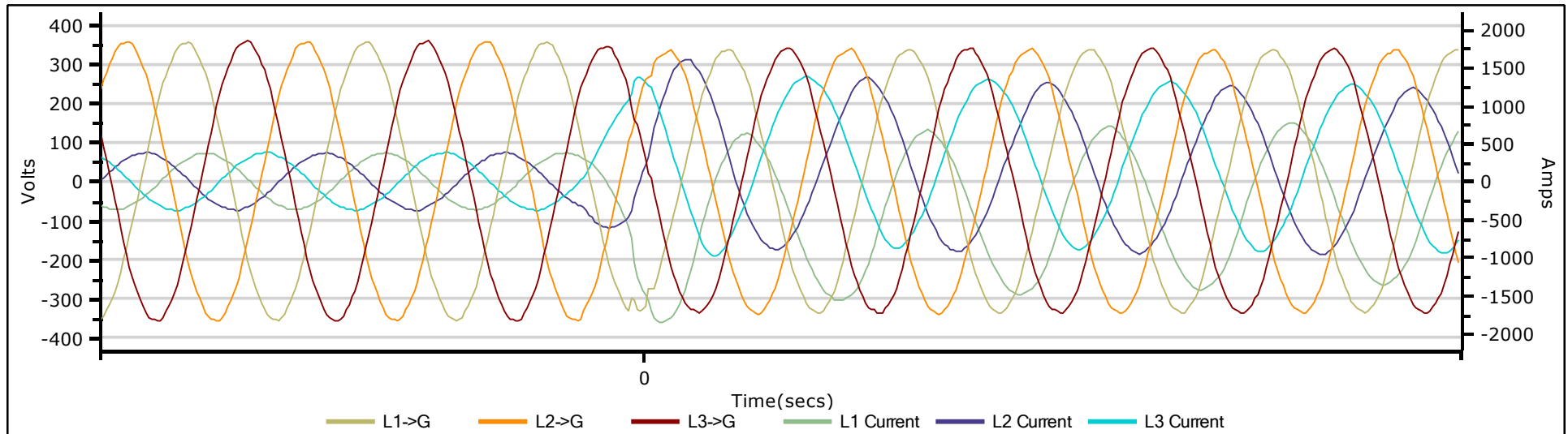
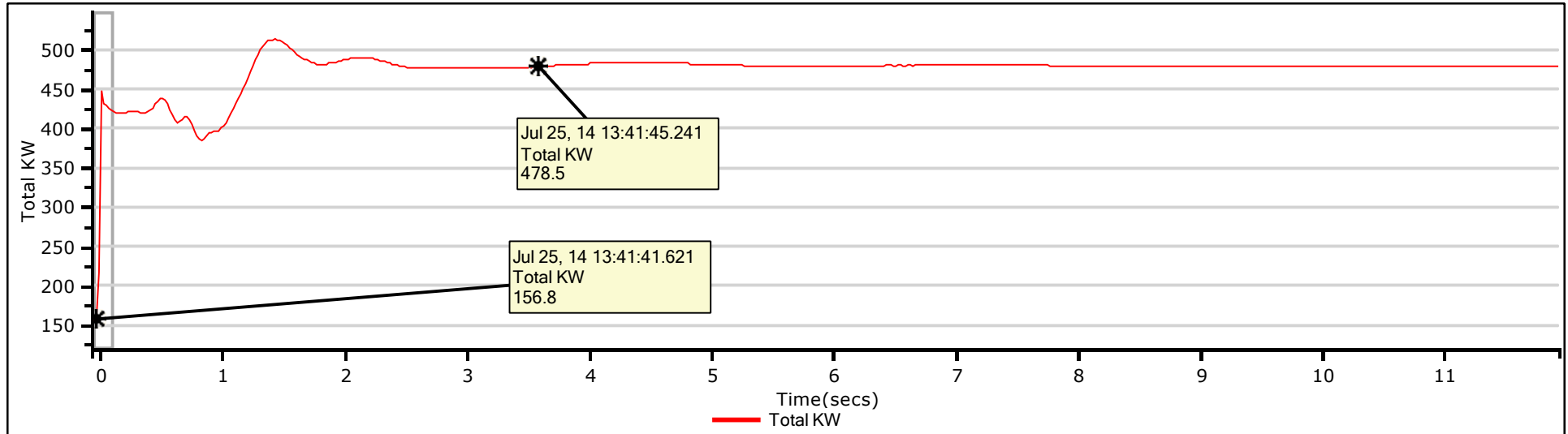


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 9215 - Friday, Jul 25, 2014 13:41:41

Volts Angle: -120.7
Phase Seq: CCW(CBA)



Comments:

150-500kw .8pf



700kw_0.8pF

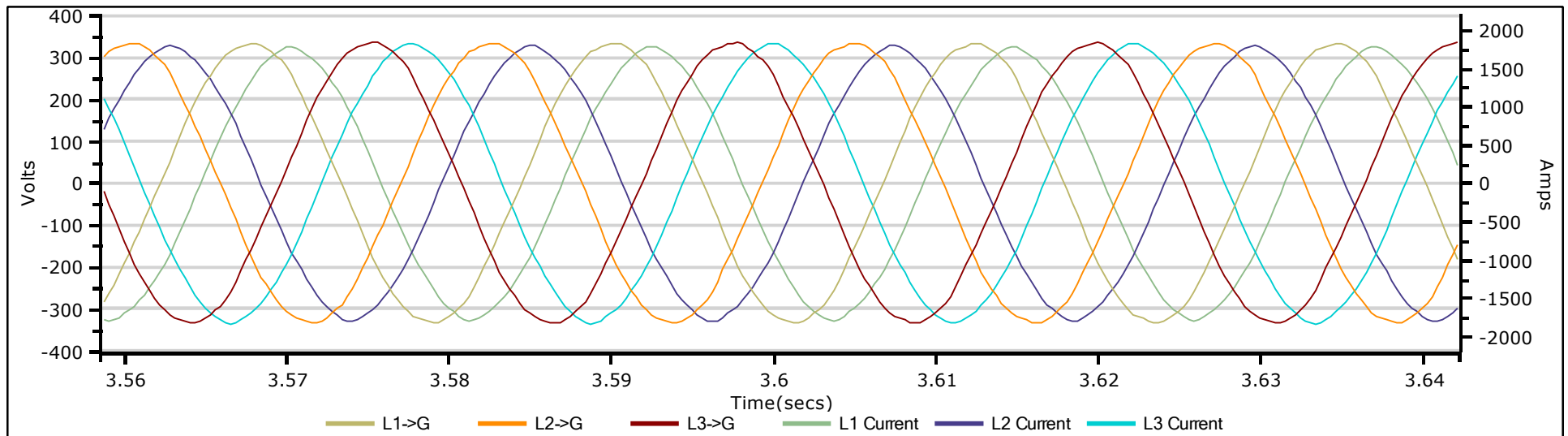
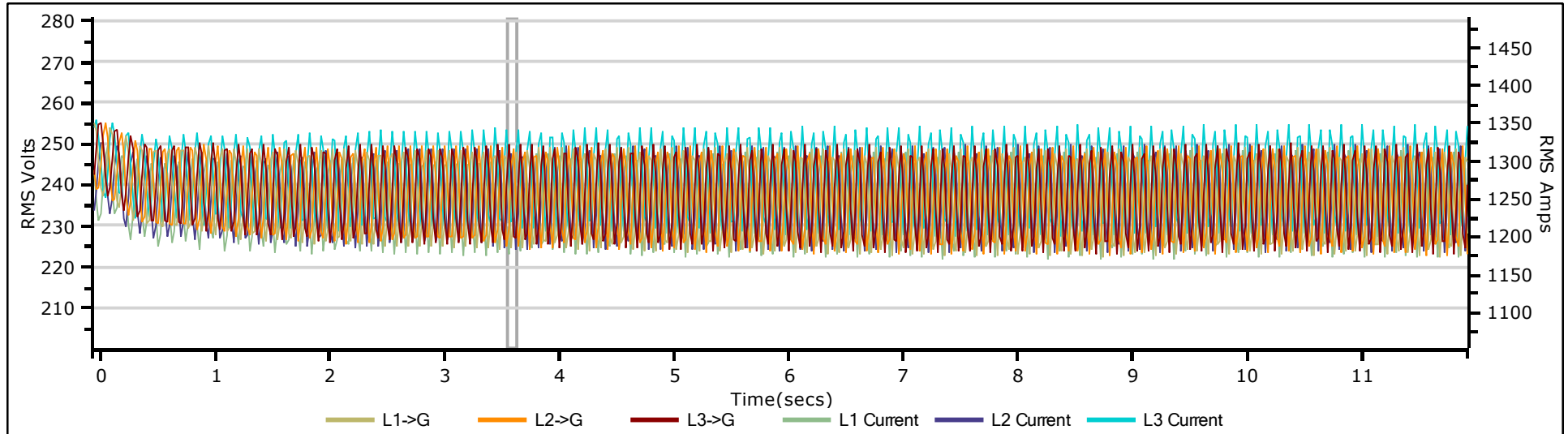


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 9250 - Friday, Jul 25, 2014 13:44:32

Volts Angle: -122.5
Phase Seq: CCW(CBA)



Comments:

700kW - .8pf

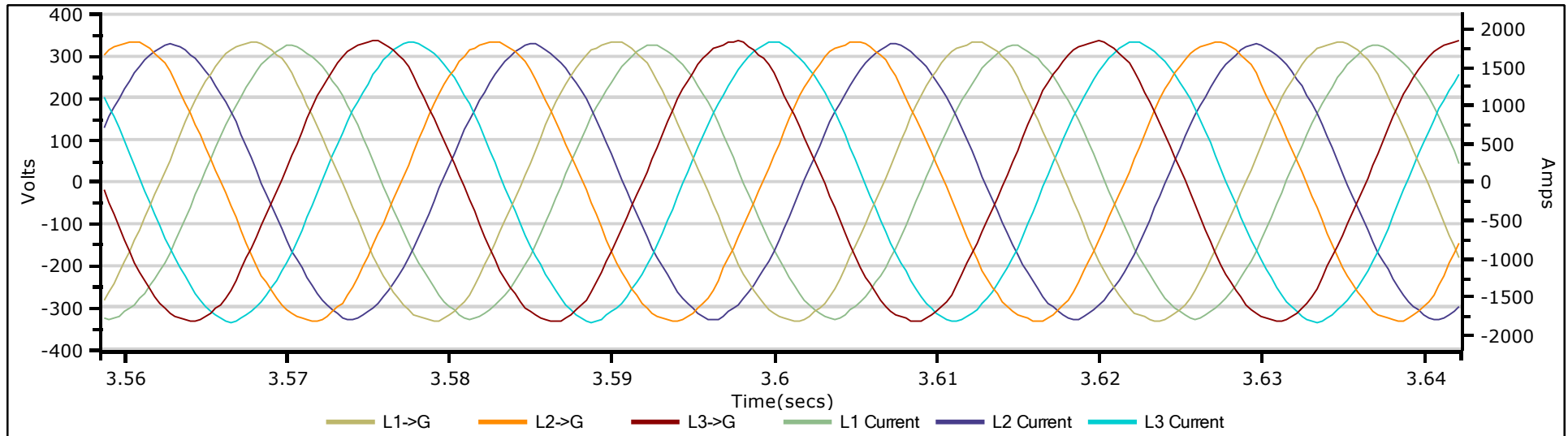
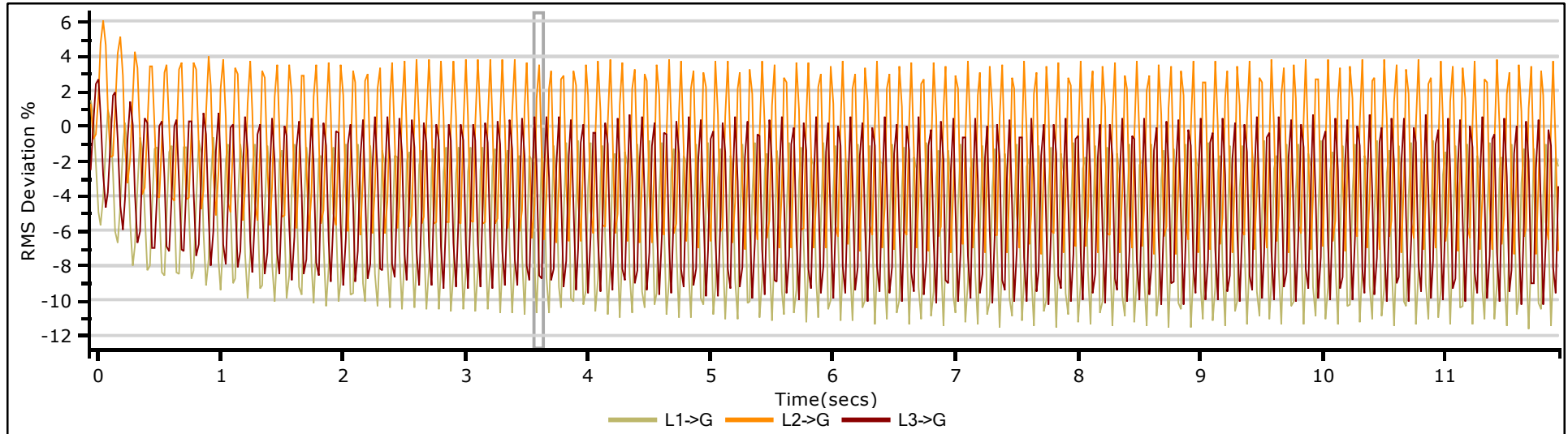


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 9250 - Friday, Jul 25, 2014 13:44:32

Volts Angle: -122.5
Phase Seq: CCW(CBA)



Comments:

700kW - .8pf

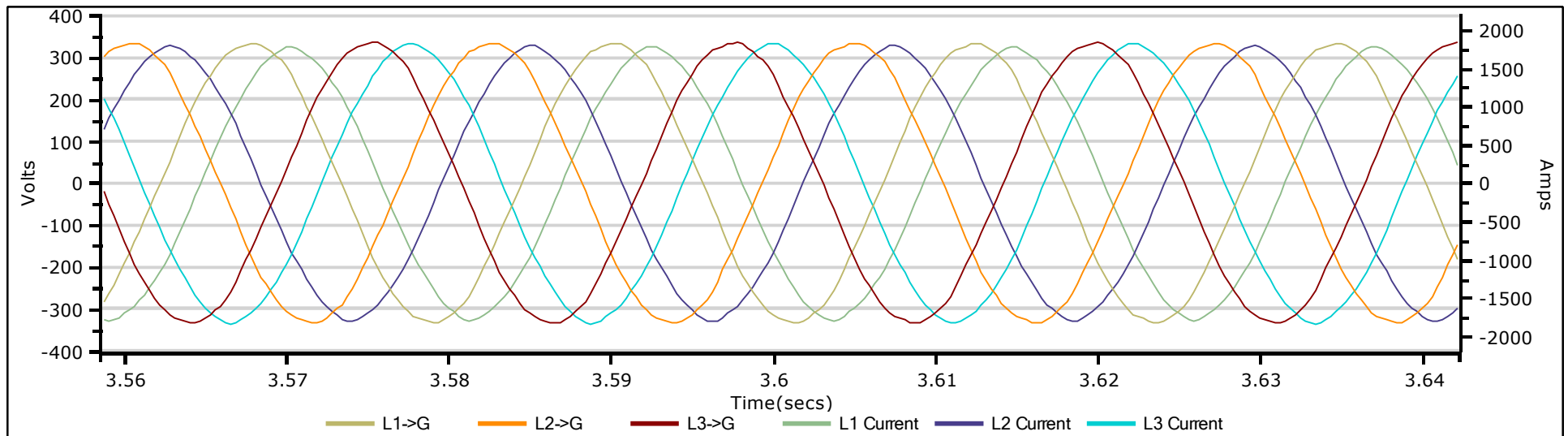
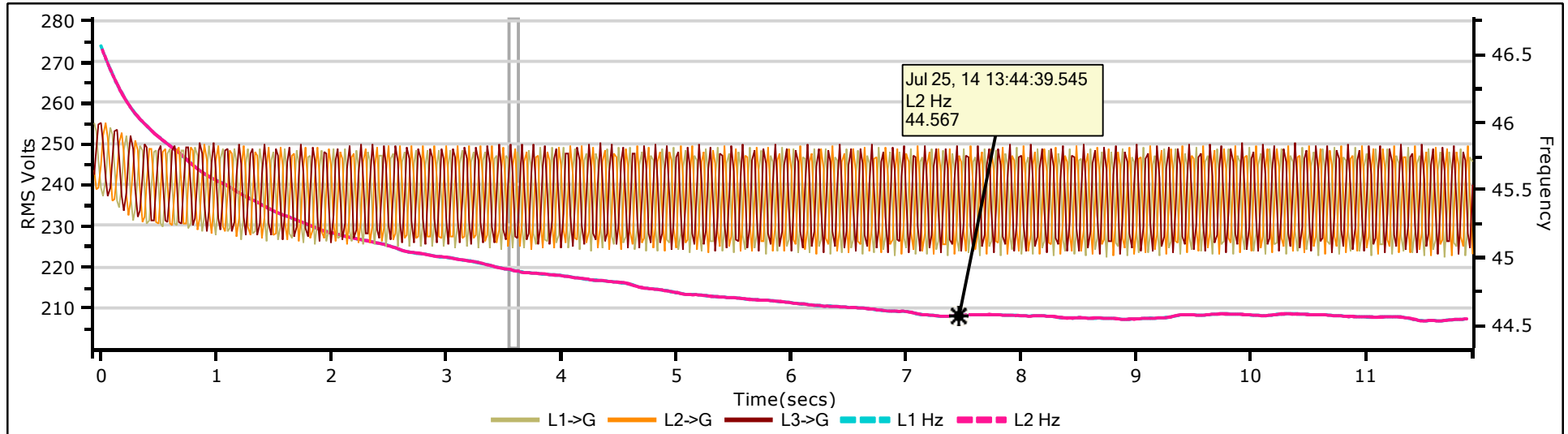


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 9250 - Friday, Jul 25, 2014 13:44:32

Volts Angle: -122.5
Phase Seq: CCW(CBA)



Comments:

700kW - .8pf

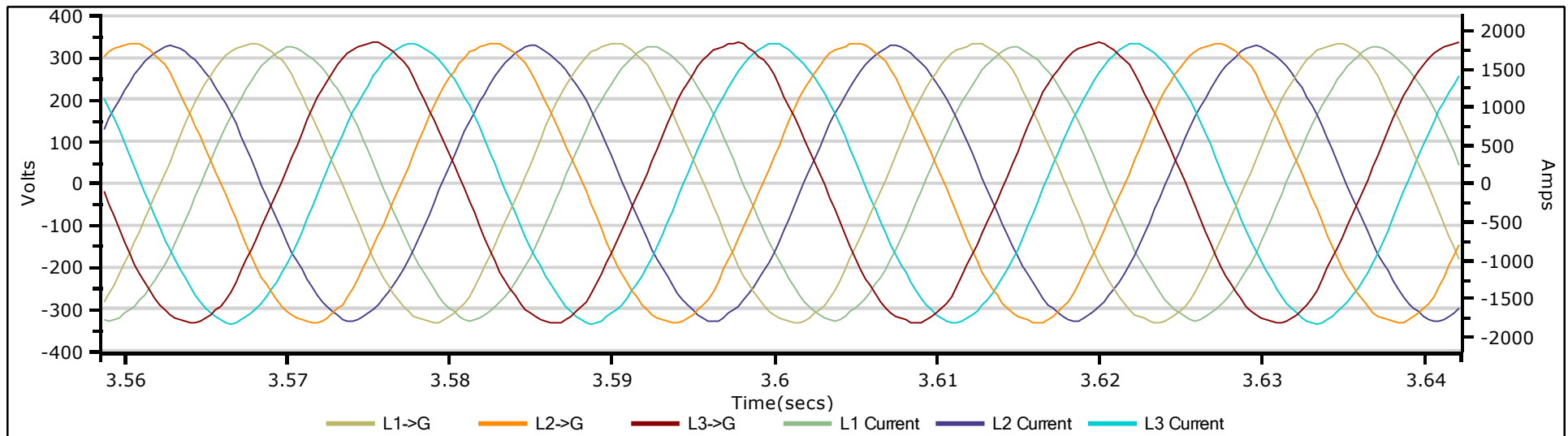
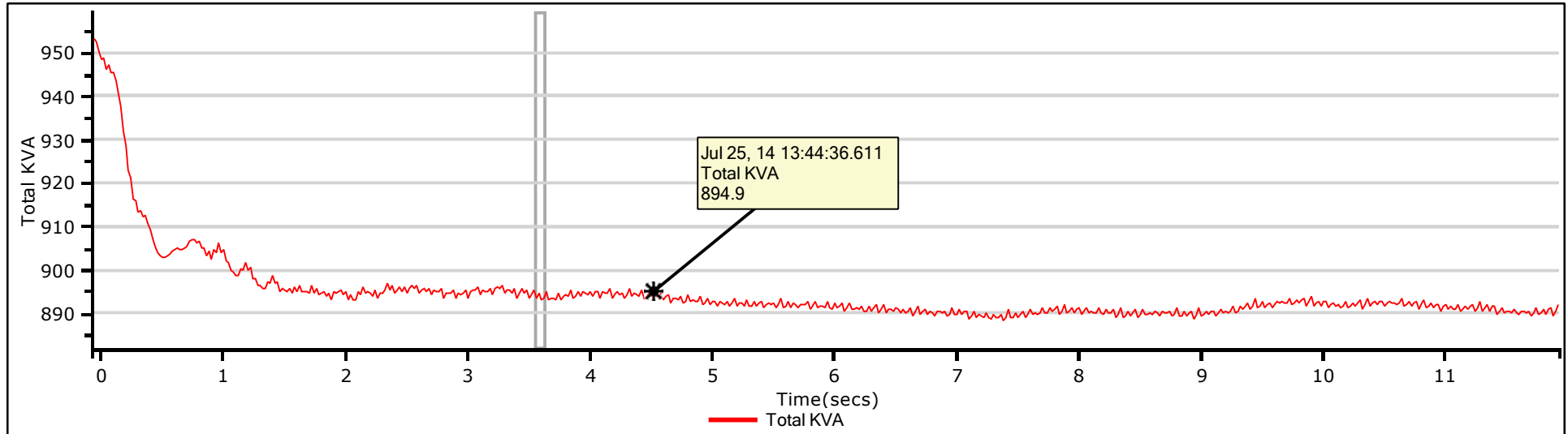


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 9250 - Friday, Jul 25, 2014 13:44:32

Volts Angle: -122.5
Phase Seq: CCW(CBA)



Comments:

700kW - .8pf

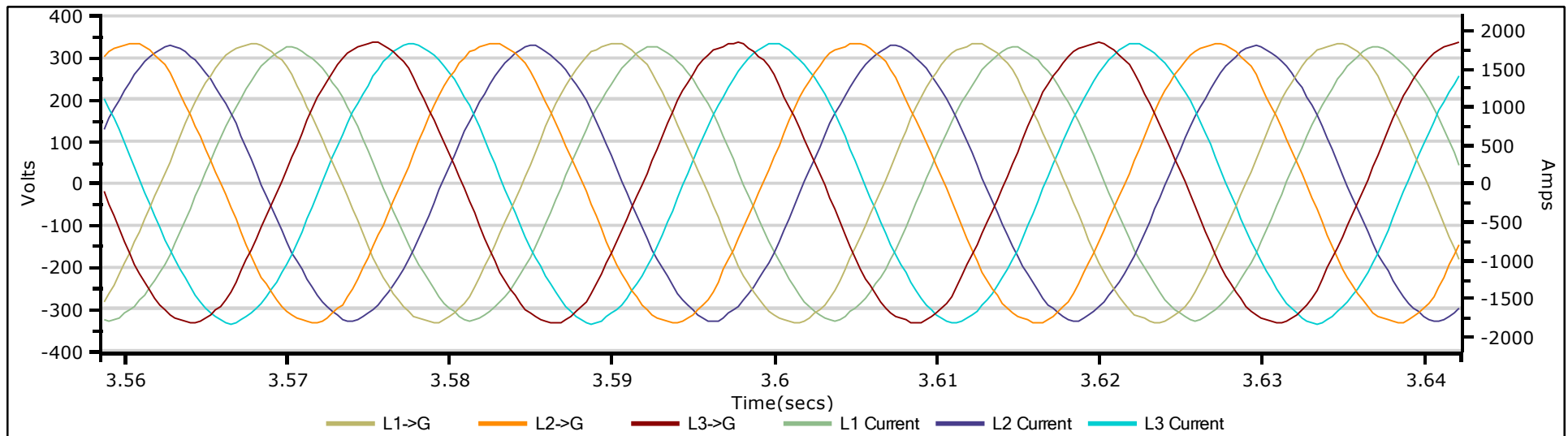
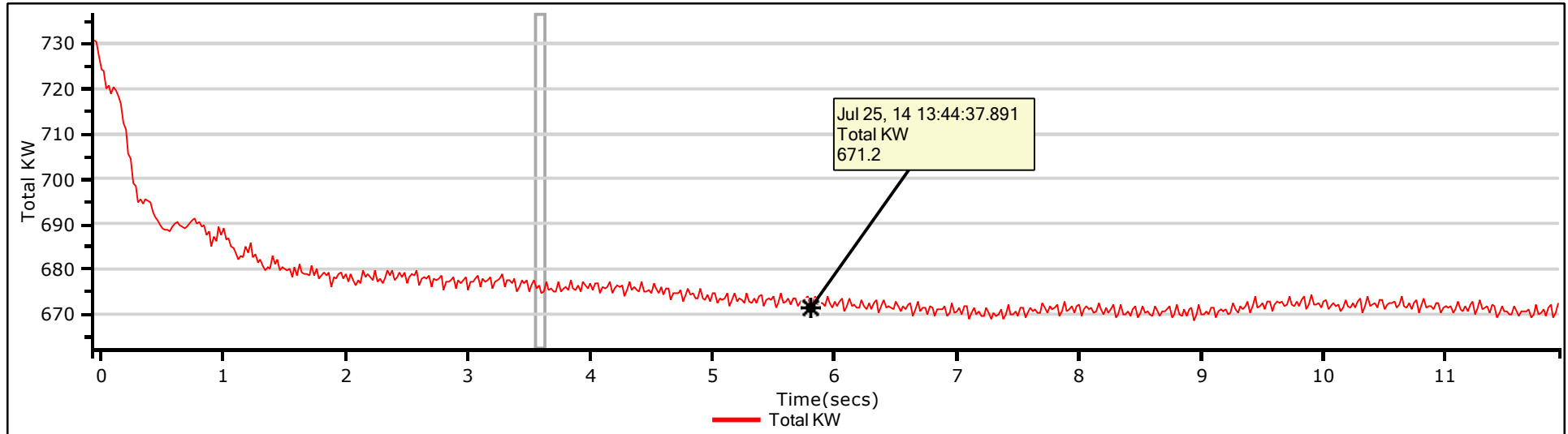


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 9250 - Friday, Jul 25, 2014 13:44:32

Volts Angle: -122.5
Phase Seq: CCW(CBA)



Comments:

700kW - .8pf



700kW Steady

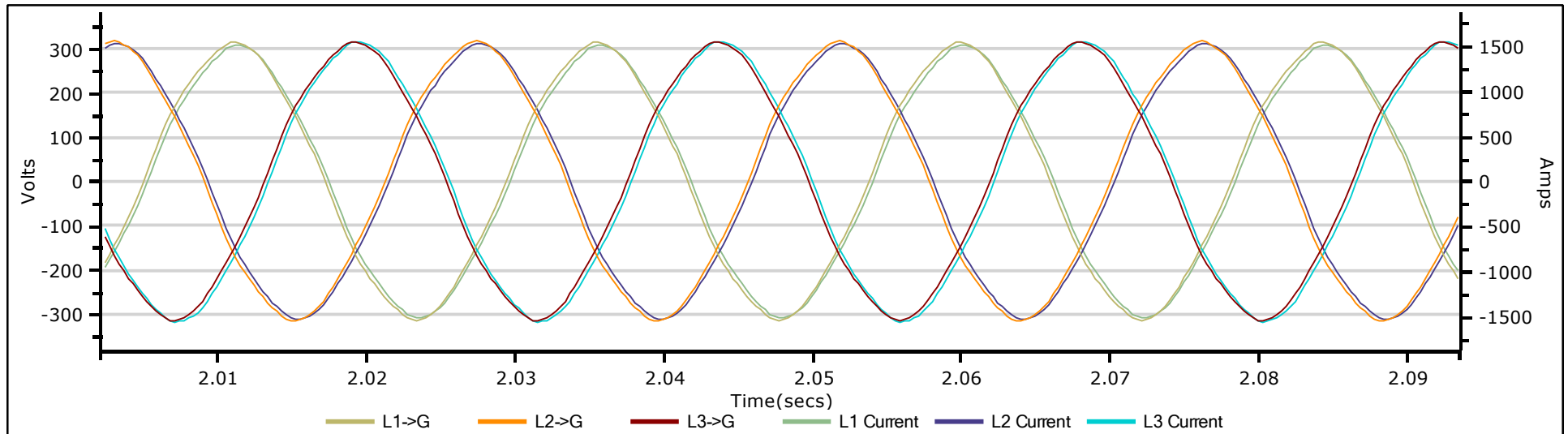
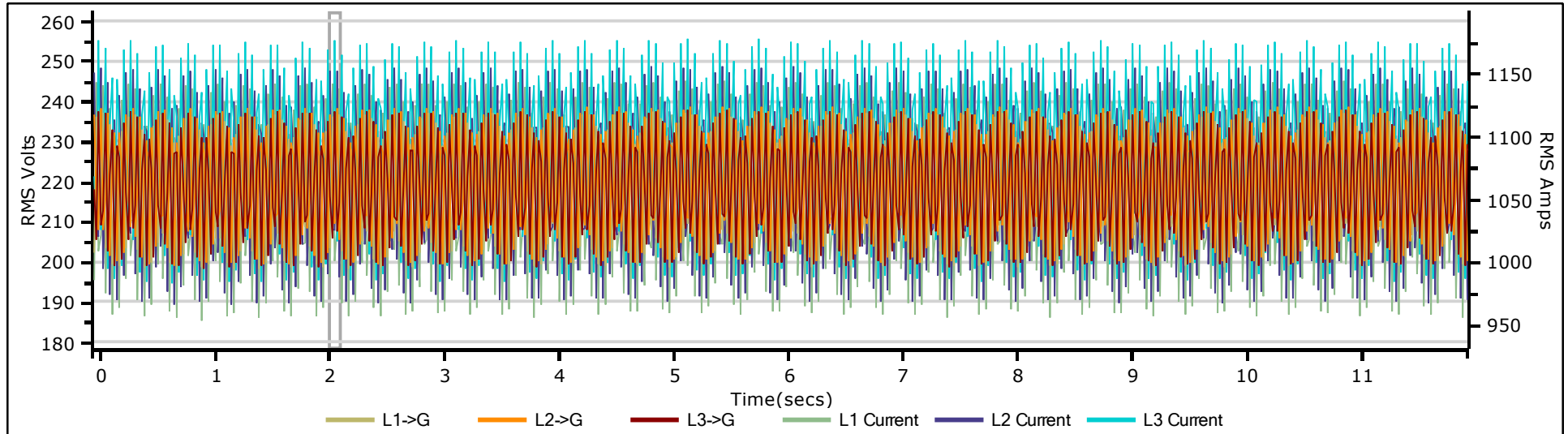


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 7676 - Friday, Jul 25, 2014 12:56:22

Volts Angle: -121.3
Phase Seq: CCW(CBA)



Comments:

700kW

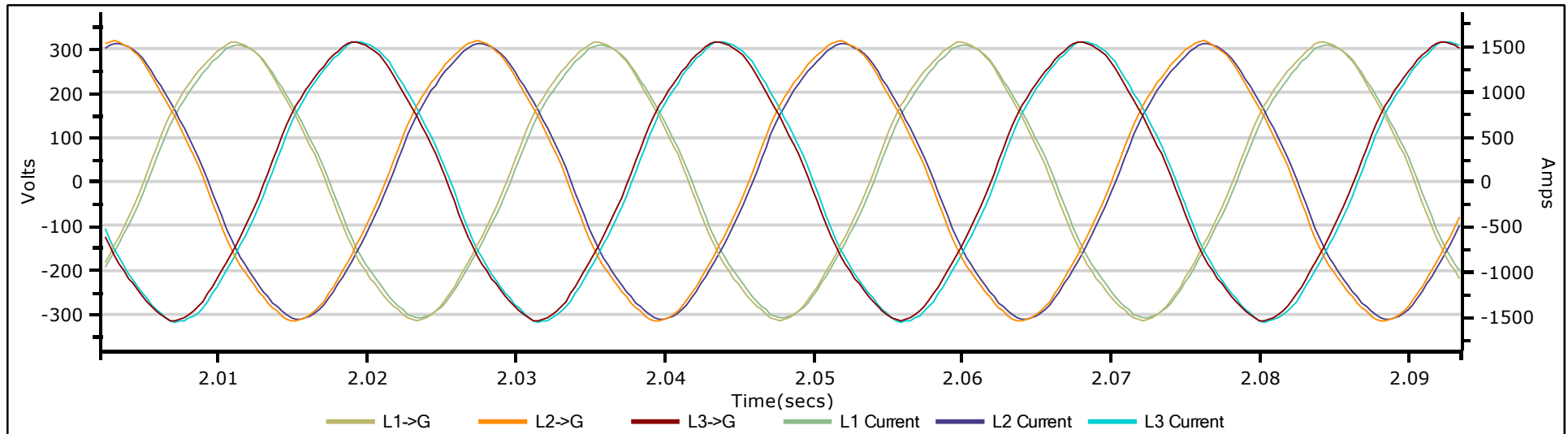
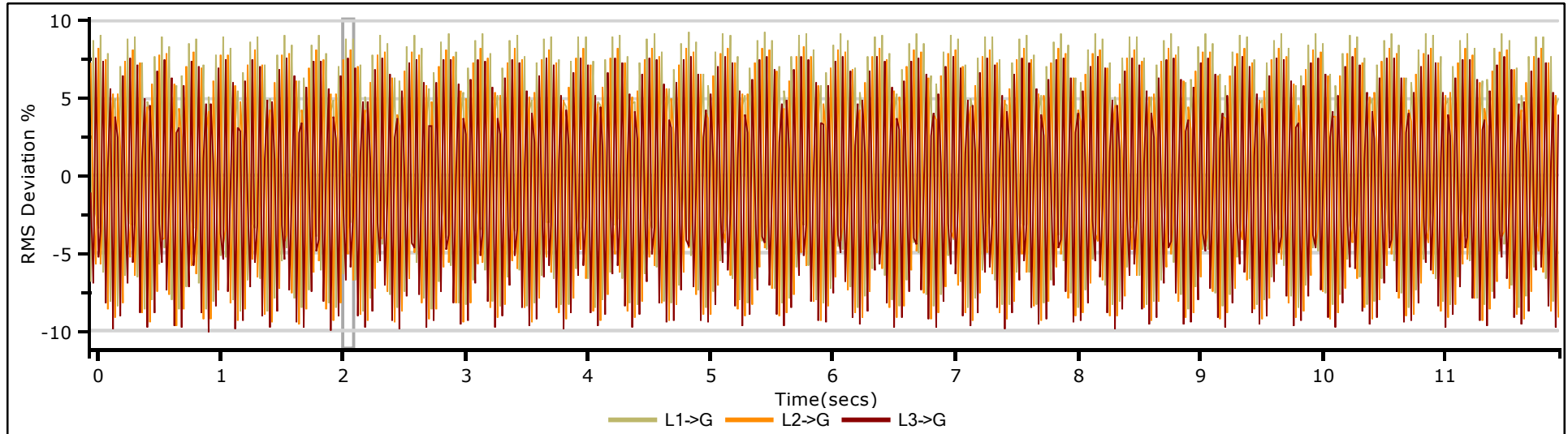


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 7676 - Friday, Jul 25, 2014 12:56:22

Volts Angle: -121.3
Phase Seq: CCW(CBA)



Comments:

700kW

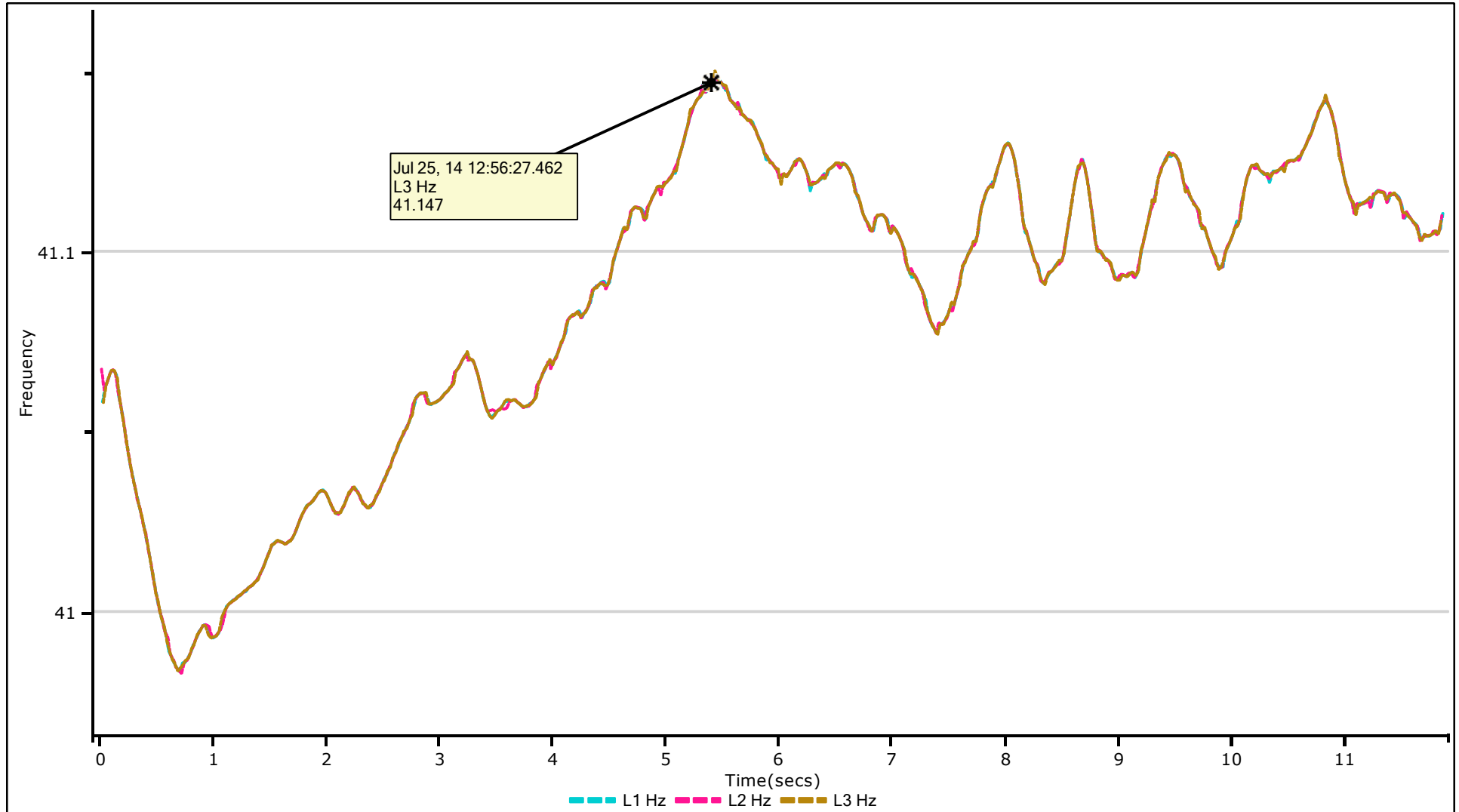


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 7676 - Friday, Jul 25, 2014 12:56:22

Volts Angle: -121.3
Phase Seq: CCW(CBA)



Comments:

700kW

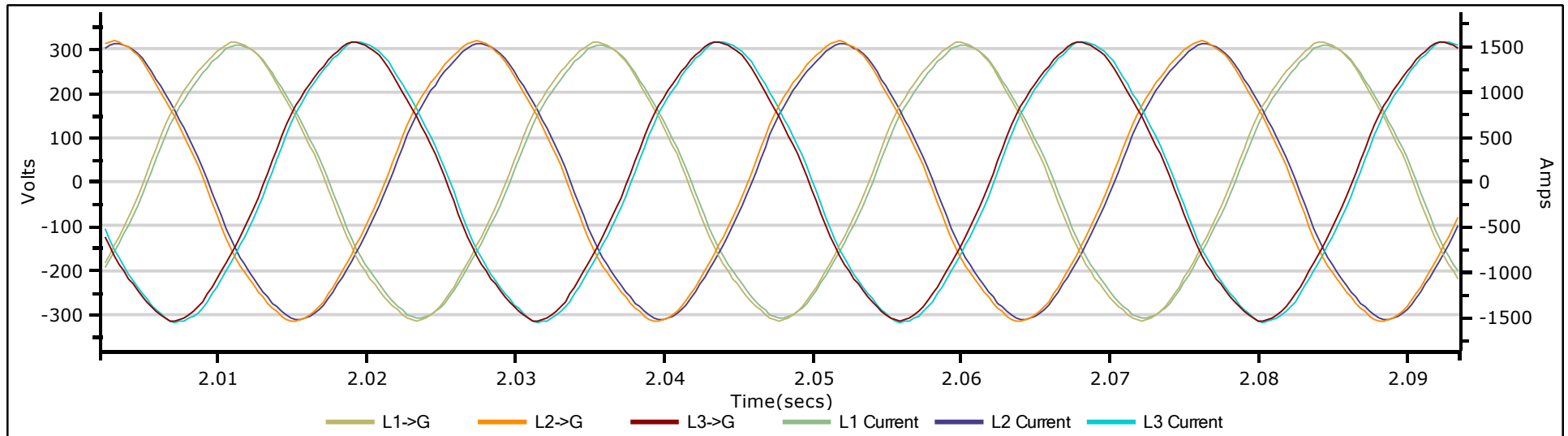
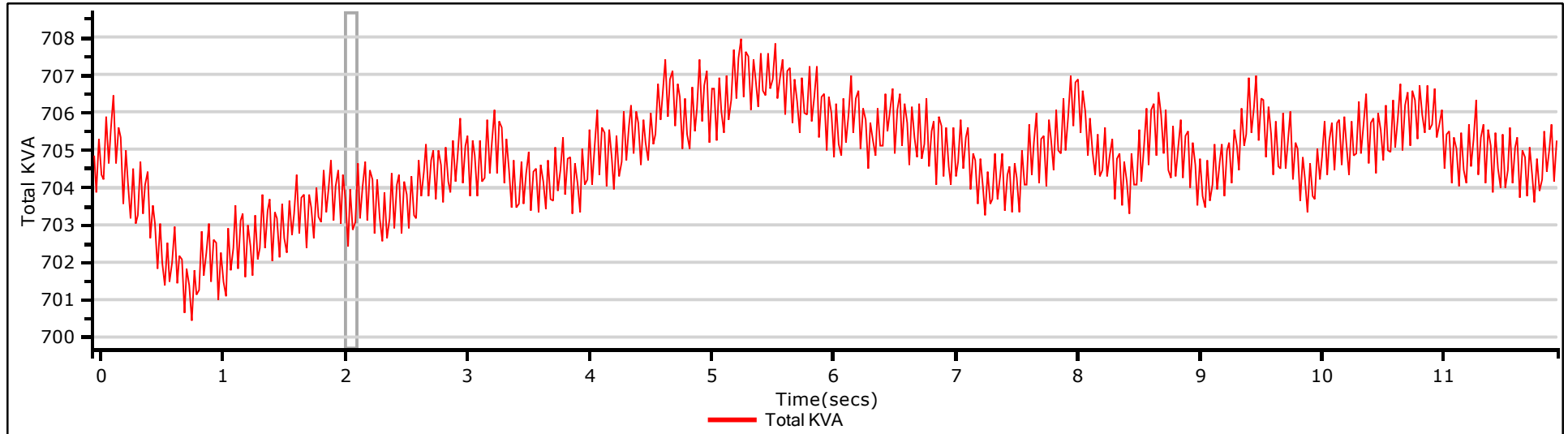


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 7676 - Friday, Jul 25, 2014 12:56:22

Volts Angle: -121.3
Phase Seq: CCW(CBA)



Comments:

700kW

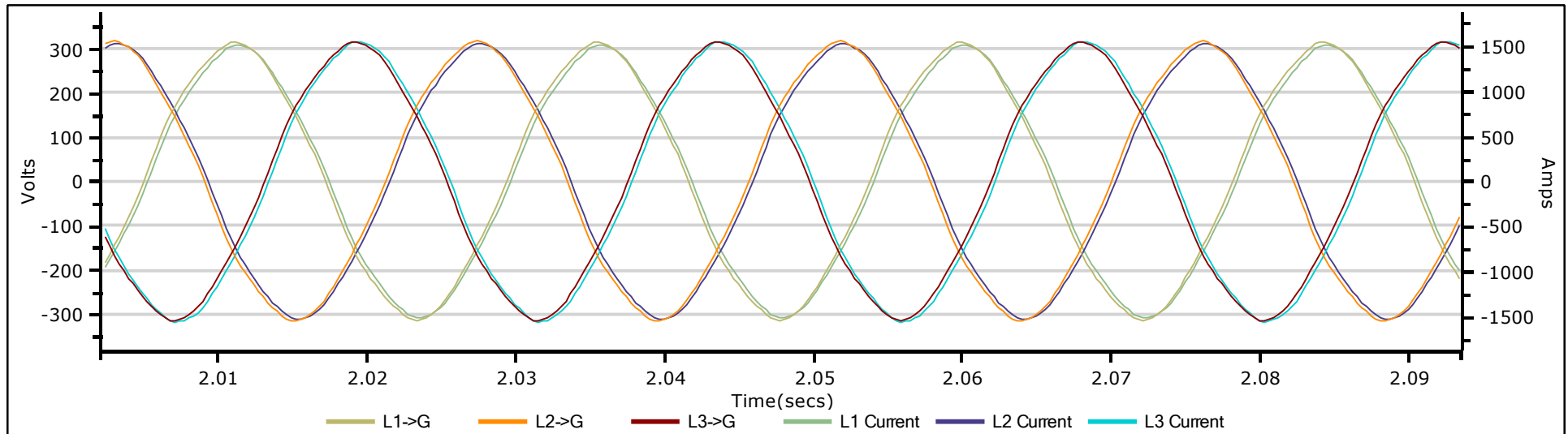
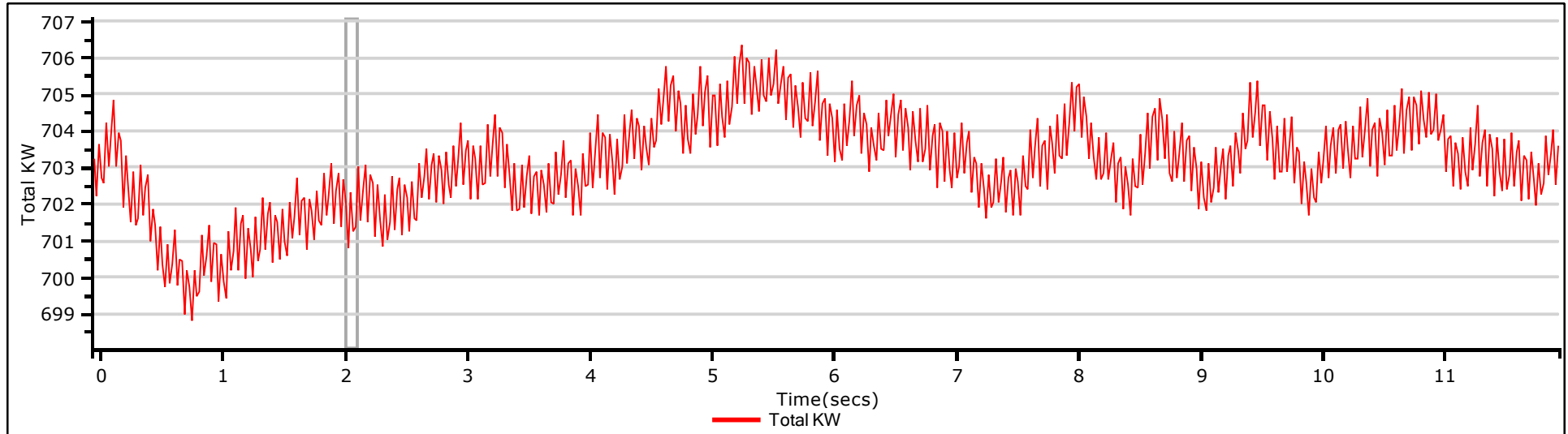


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 7676 - Friday, Jul 25, 2014 12:56:22

Volts Angle: -121.3
Phase Seq: CCW(CBA)



Comments:

700kW

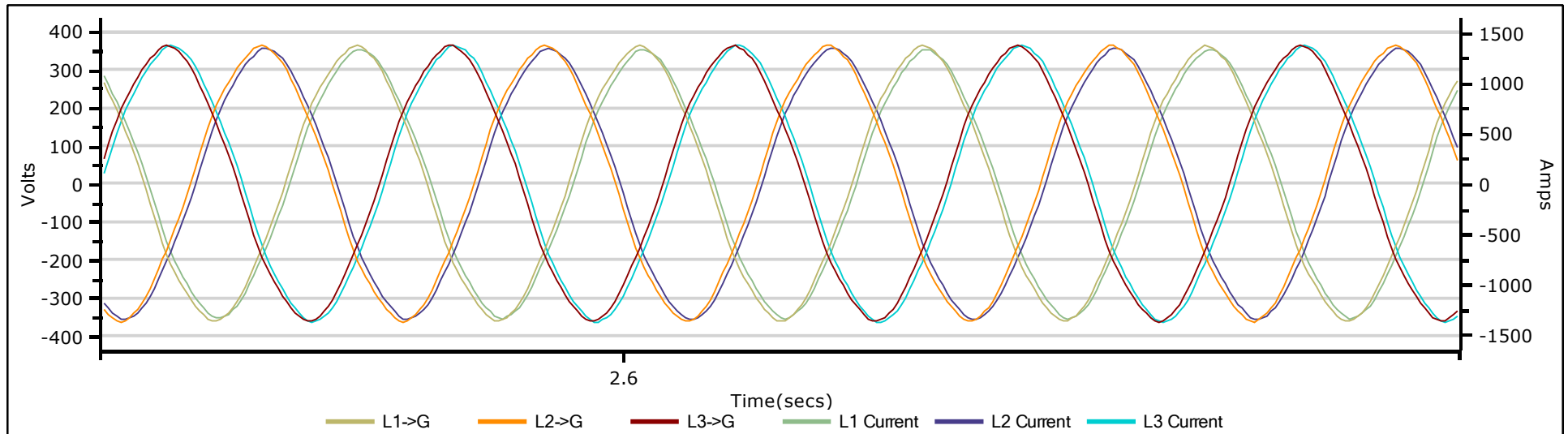
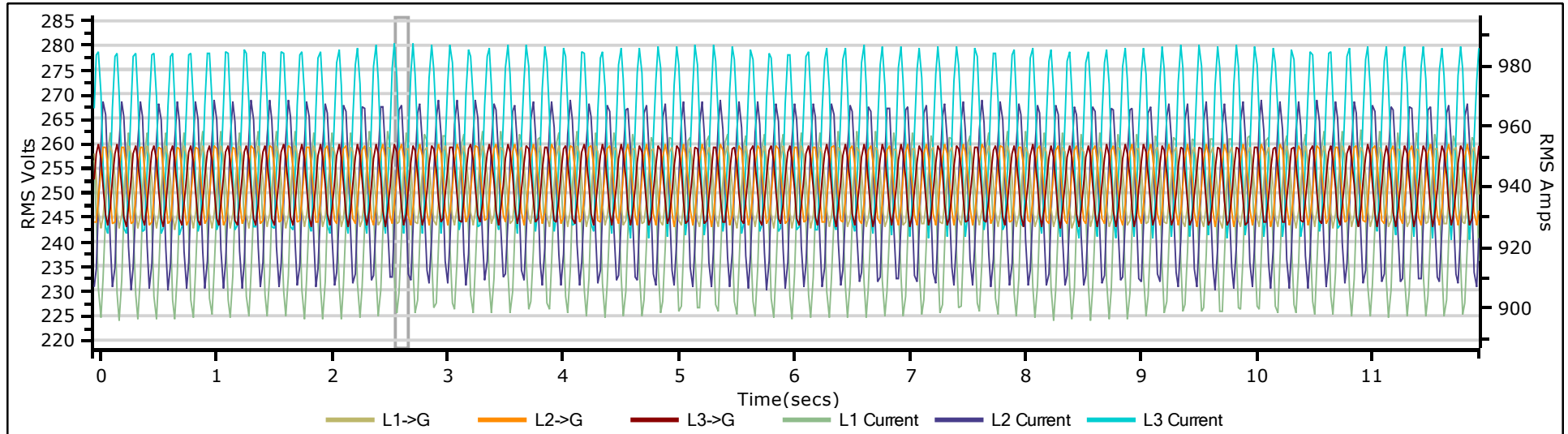


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 8675 - Friday, Jul 25, 2014 13:02:53

Volts Angle: -120.0
Phase Seq: CCW(CBA)



Comments:

700kW

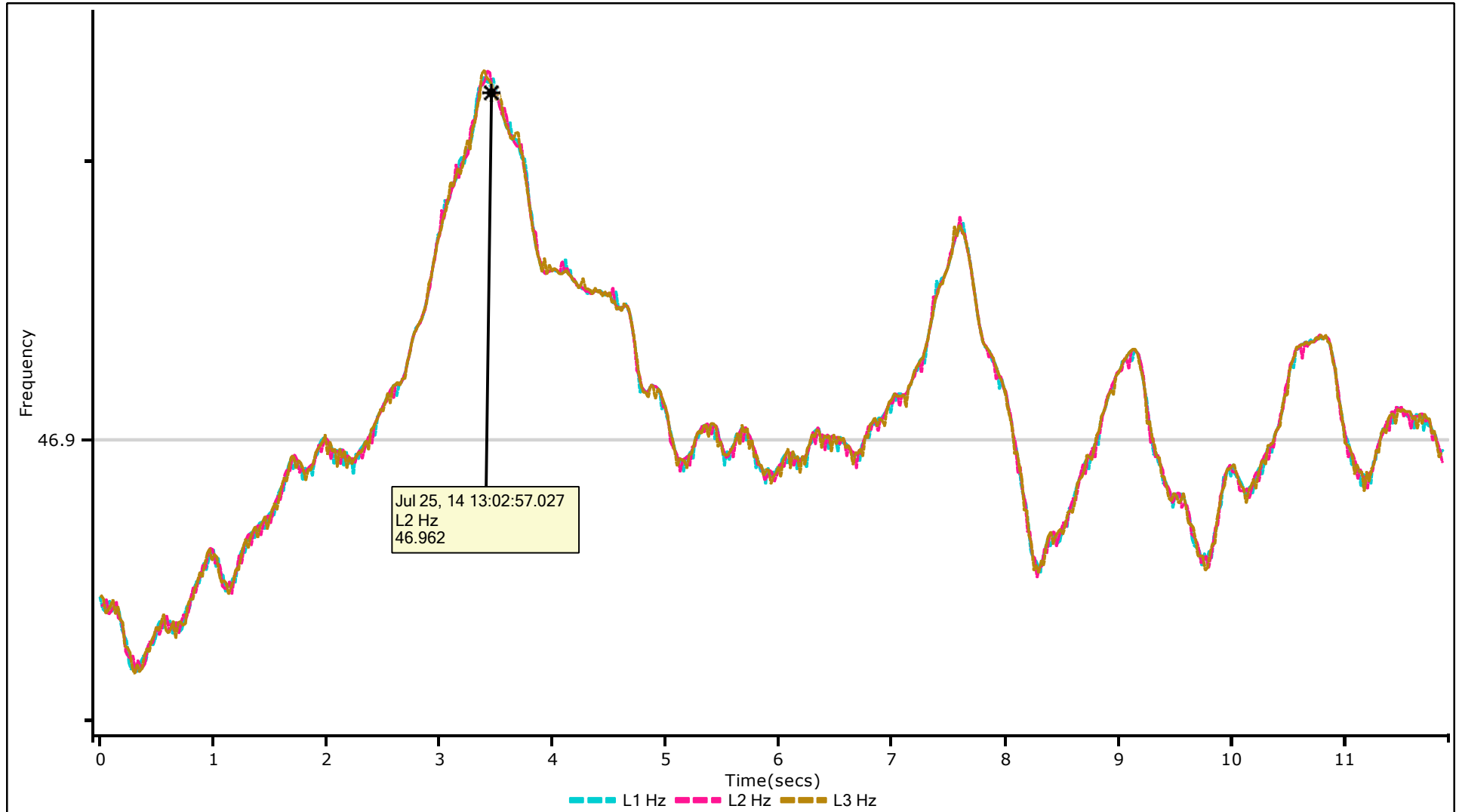


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 8675 - Friday, Jul 25, 2014 13:02:53

Volts Angle: -120.0
Phase Seq: CCW(CBA)



Comments:

700kW

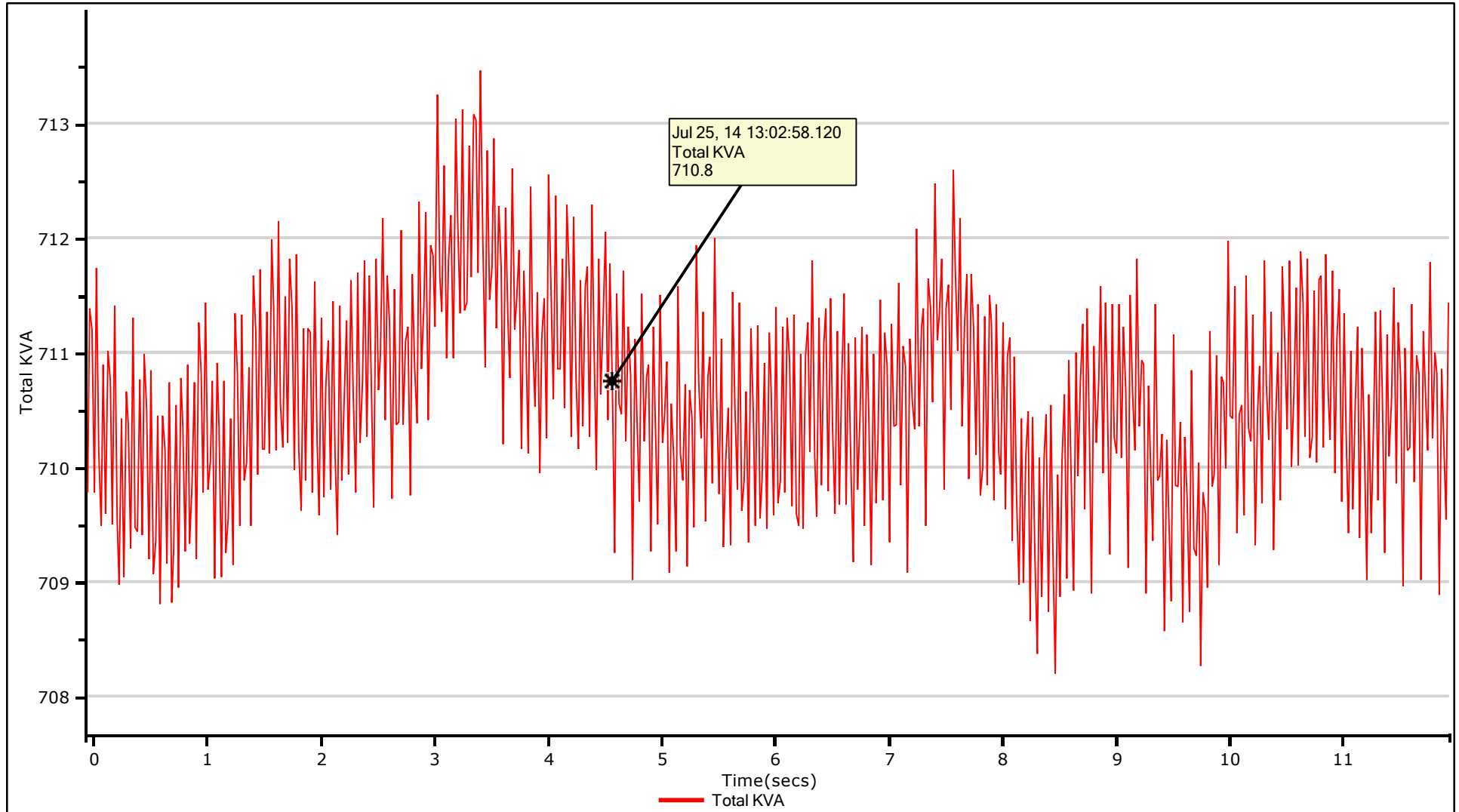


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 8675 - Friday, Jul 25, 2014 13:02:53

Volts Angle: -120.0
Phase Seq: CCW(CBA)



Comments:

700kW

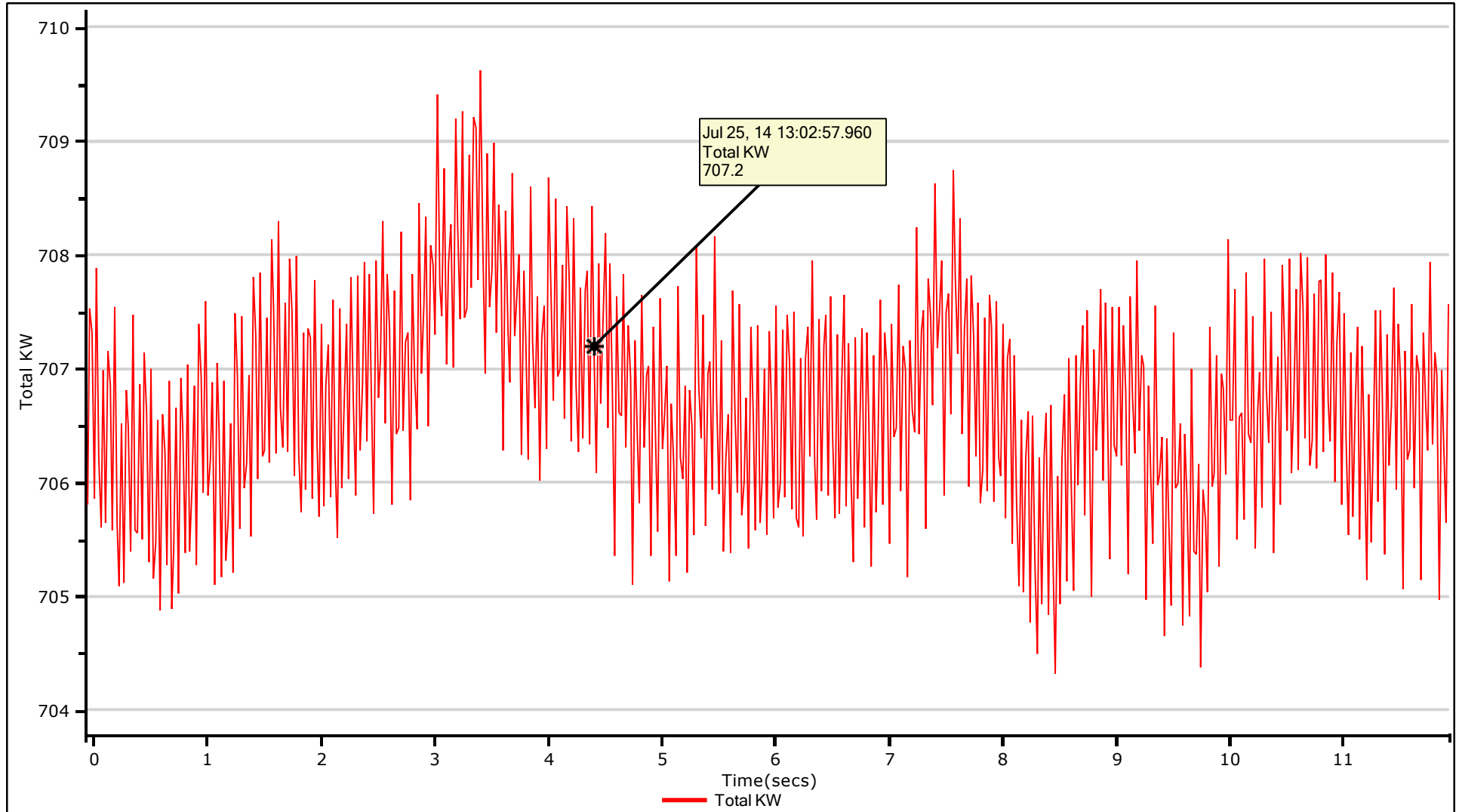


Waveform Capture

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 8675 - Friday, Jul 25, 2014 13:02:53

Volts Angle: -120.0
Phase Seq: CCW(CBA)



Comments:

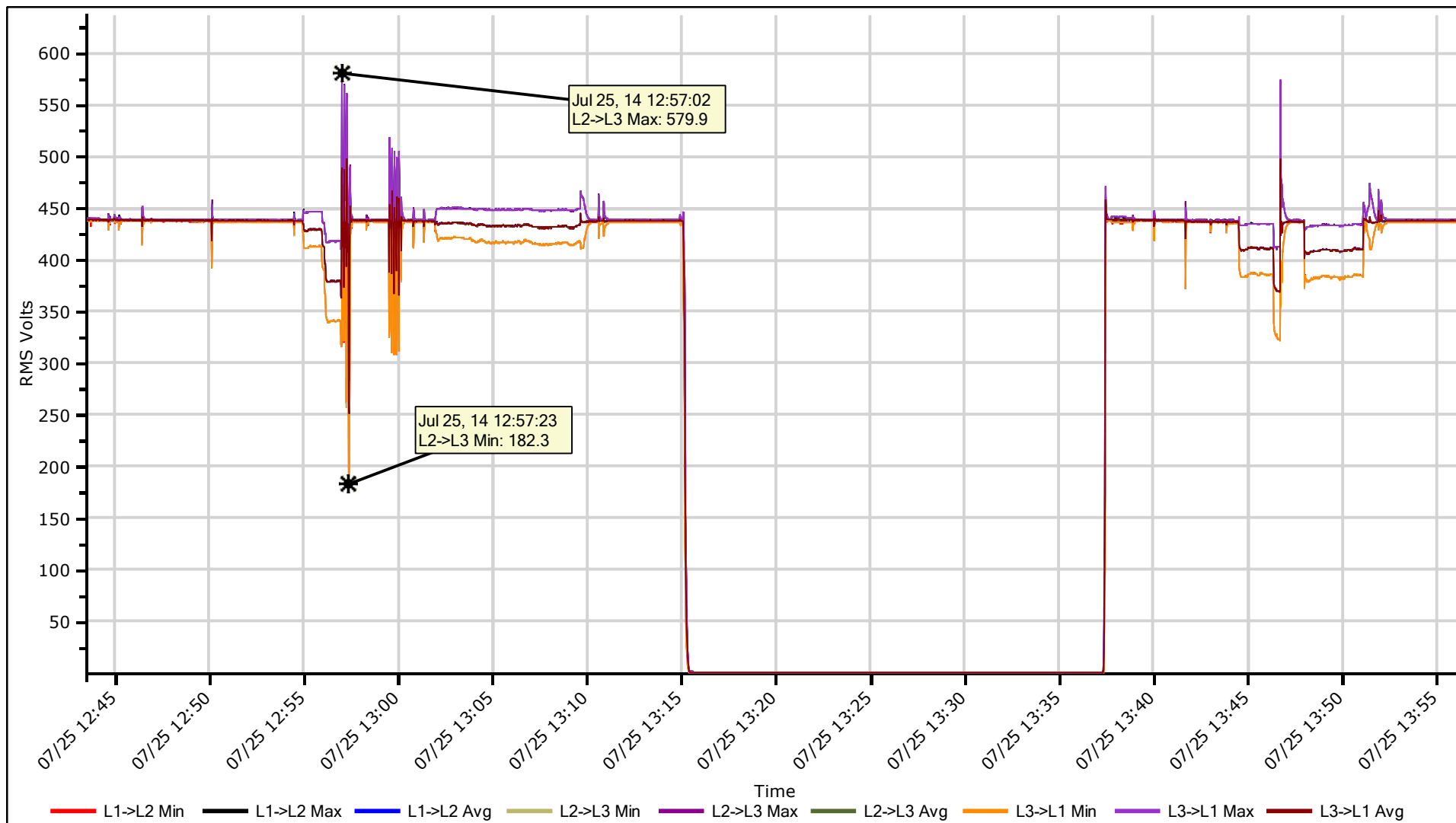
700kW



RMS Voltage

7/29/2014

Site: 24134
ComRent International Langenburg Water
Jul 25, 14 12:43 - Jul 25, 14 13:56



Comments:

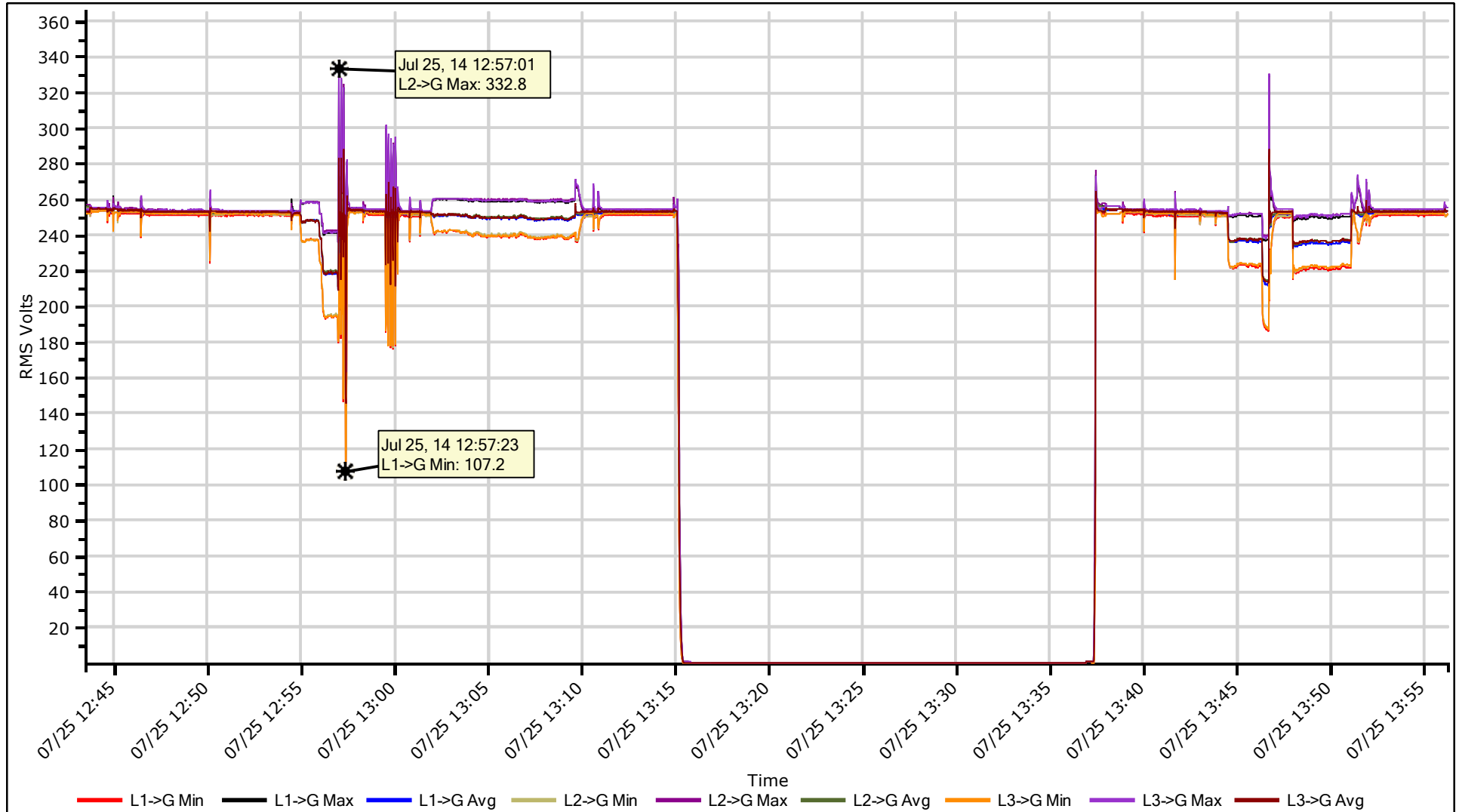
Voltage, Ph-Ph



RMS Voltage

7/29/2014

Site: 24134
ComRent International Langenburg Water
Jul 25, 14 12:43 - Jul 25, 14 13:56



Comments:

Voltage, Ph-Gnd

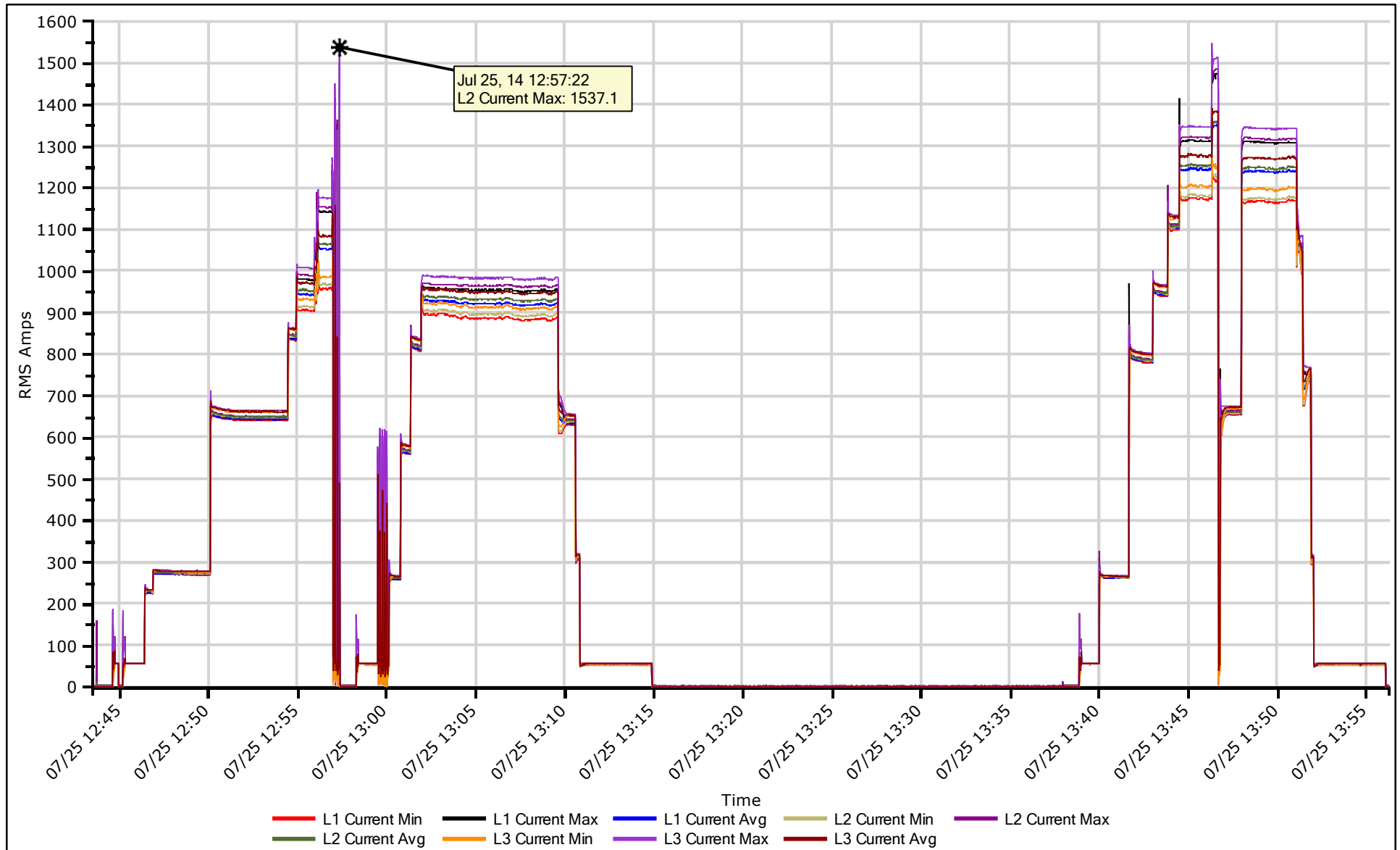


RMS Current

Site: 24134
ComRent International Langenburg Water
Jul 25, 14 12:43 - Jul 25, 14 13:56

7/29/2014

Avg Lo/Hi: 0.3/1549



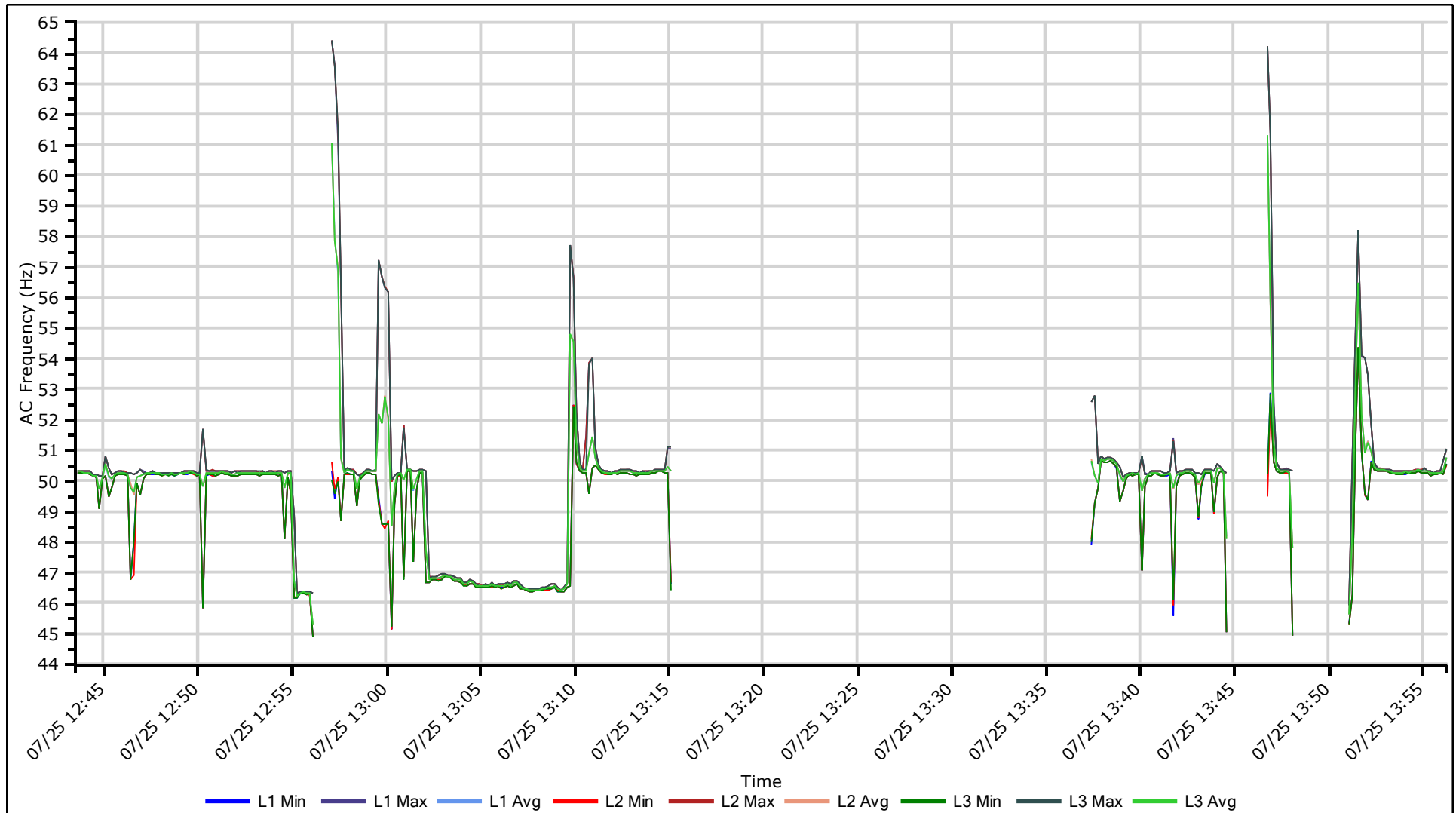


AC Frequency

Site: 24134
ComRent International Langenburg Water
Jul 25, 14 12:43 - Jul 25, 14 13:56

7/29/2014

L1 Lo/Hi: 44.87/61.27
L2 Lo/Hi: 44.87/61.19
L3 Lo/Hi: 44.87/61.28



Comments:

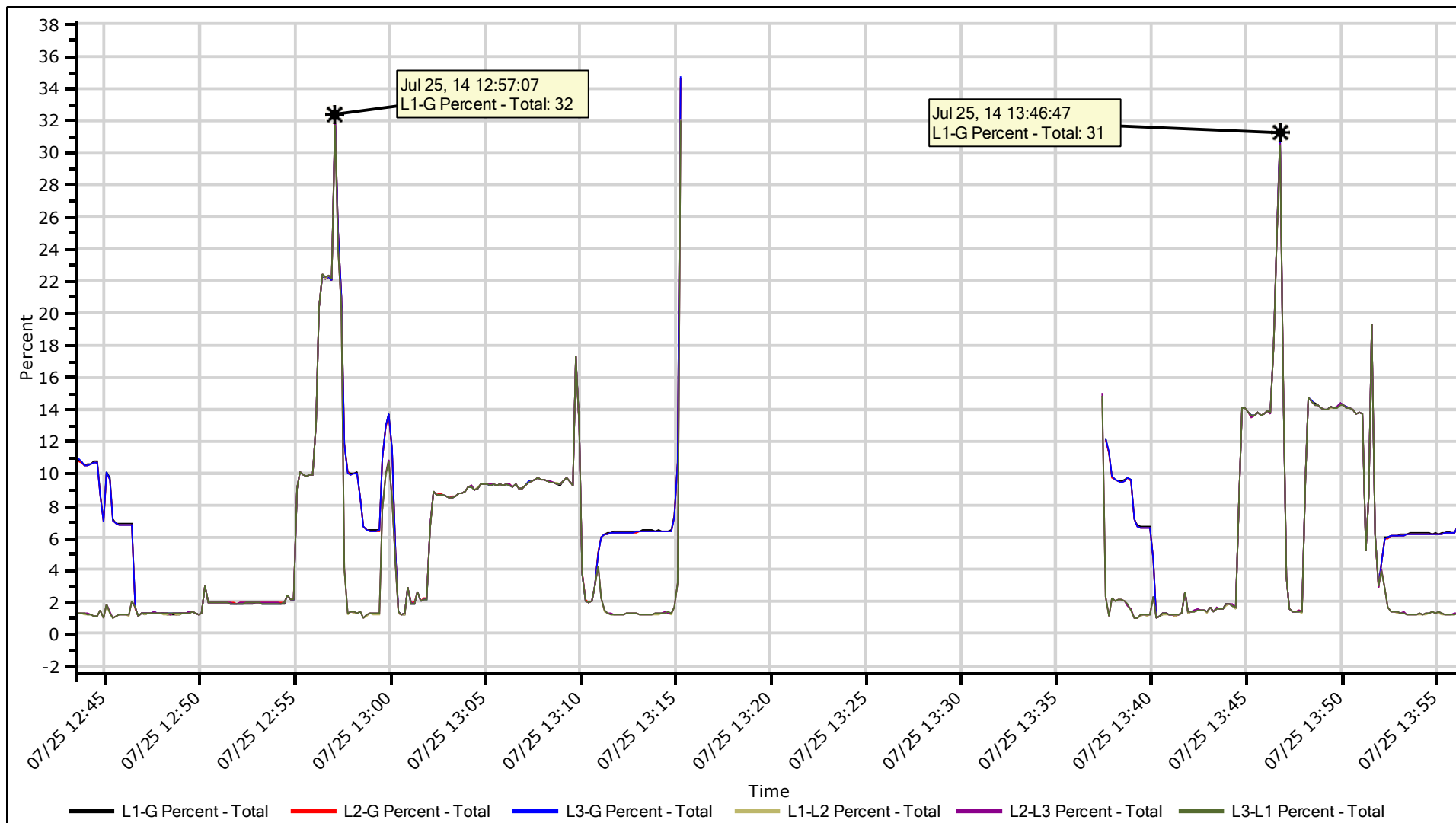
Frequency 20 Cycle Average.



THD Logs

7/29/2014

Site: 24134
ComRent International Langenburg Water
Jul 25, 14 12:43 - Jul 25, 14 13:56



Comments:

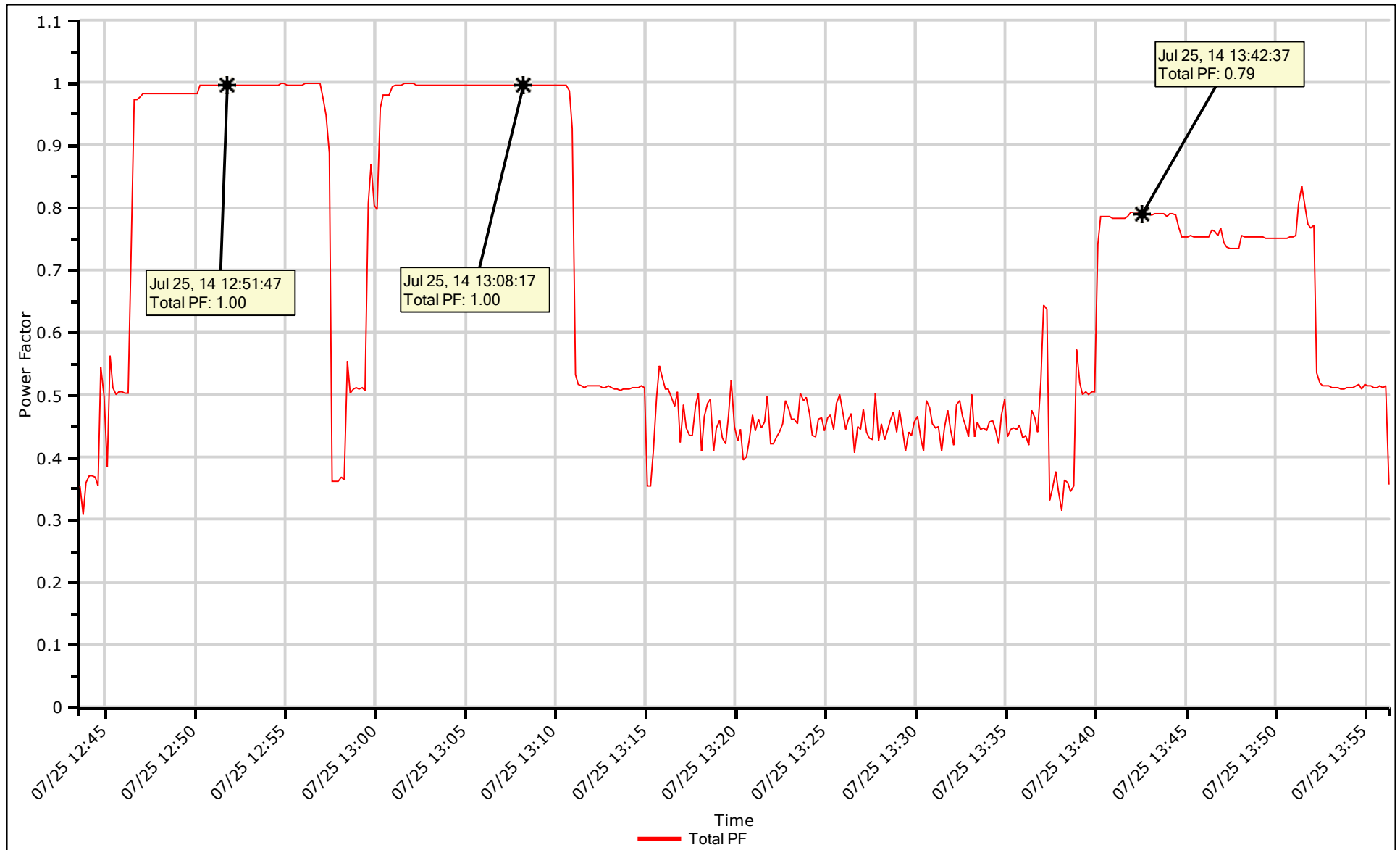
% THD



Power Factor

7/29/2014

Site: 24134
ComRent International Langenburg Water
Jul 25, 14 12:43 - Jul 25, 14 13:56

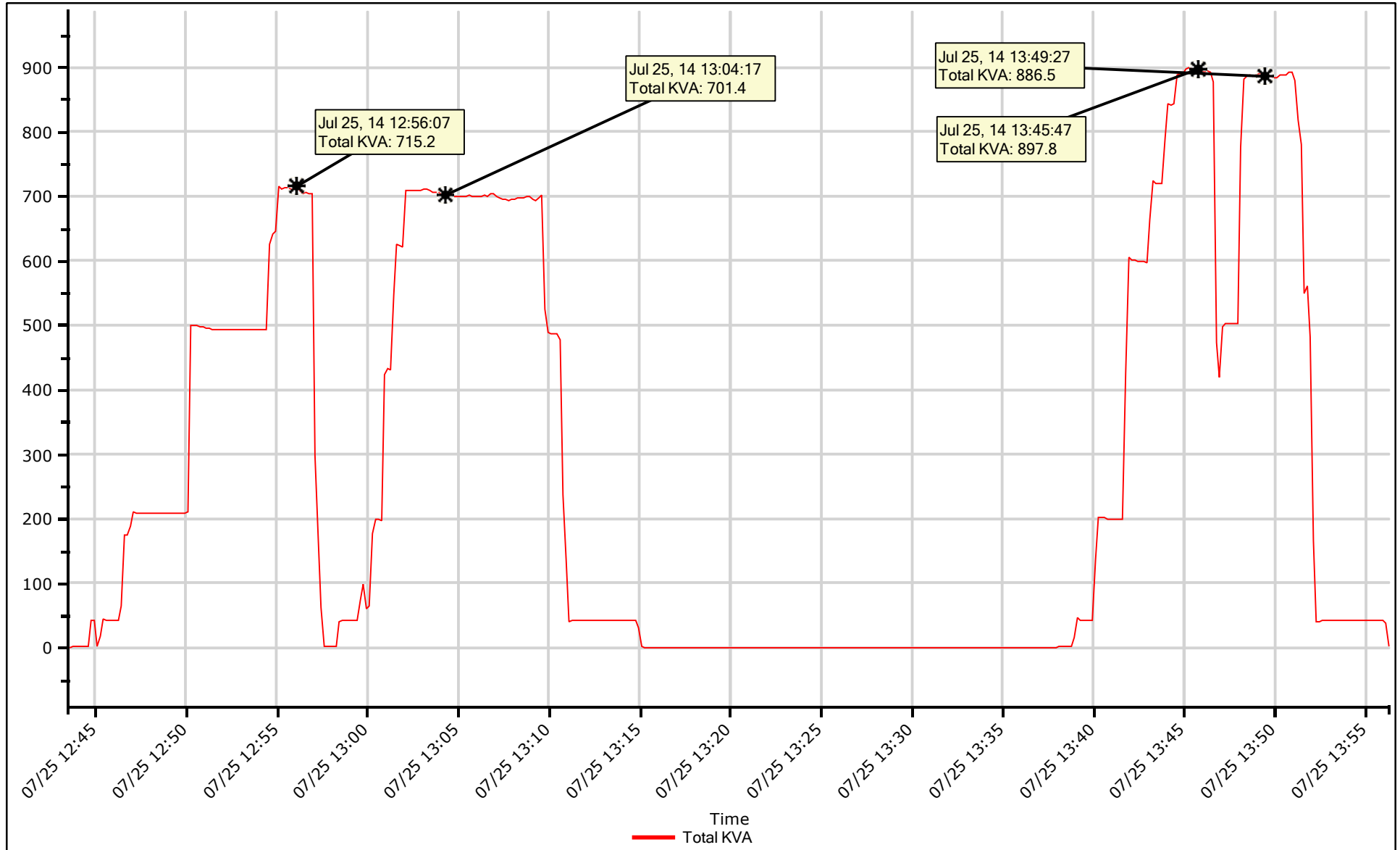




Total KVA

7/29/2014

Site: 24134
ComRent International Langenburg Water
Jul 25, 14 12:43 - Jul 25, 14 13:56

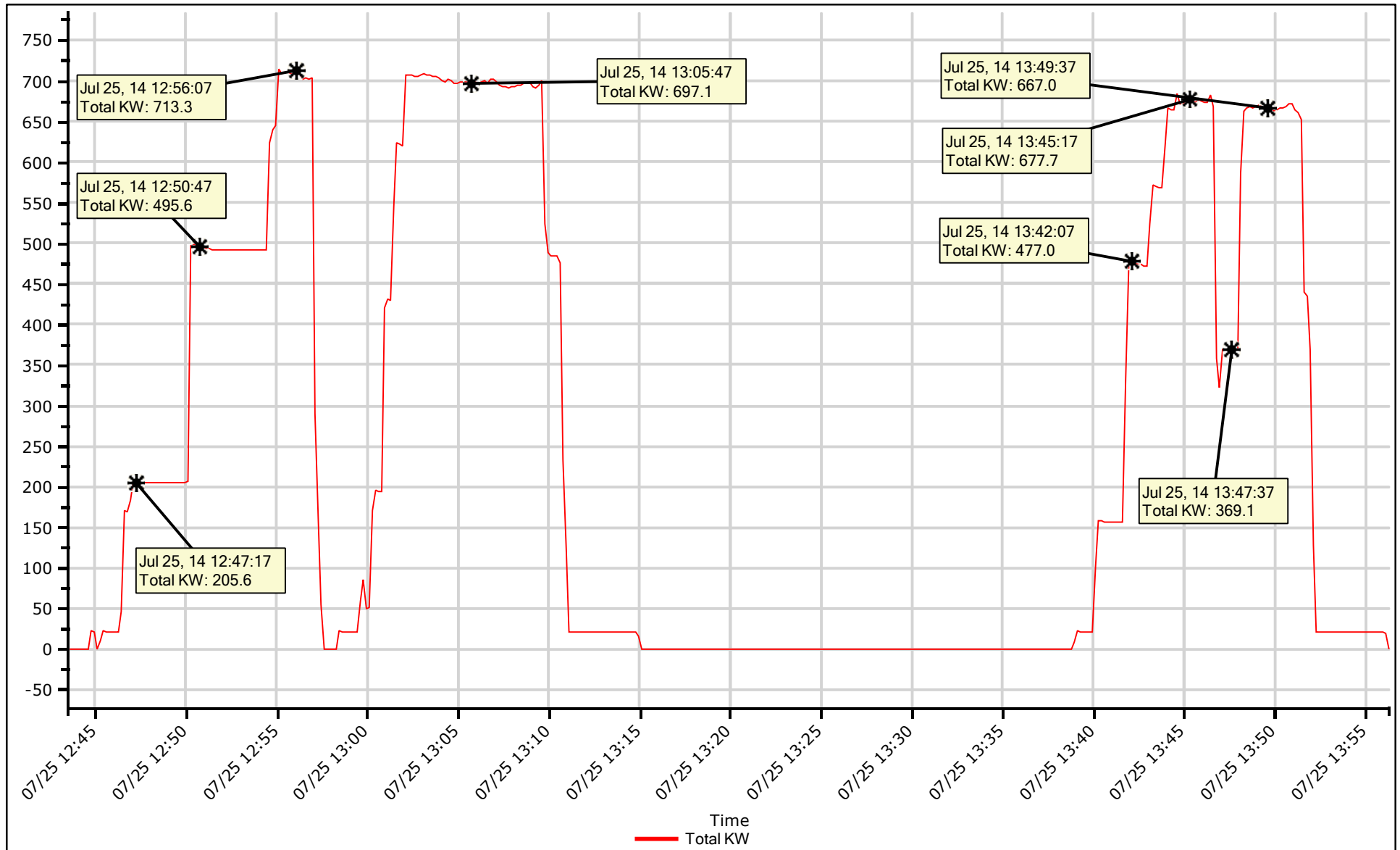




Total KW

7/30/2014

Site: 24134
ComRent International Langenburg Water
Jul 25, 14 12:43 - Jul 25, 14 13:56



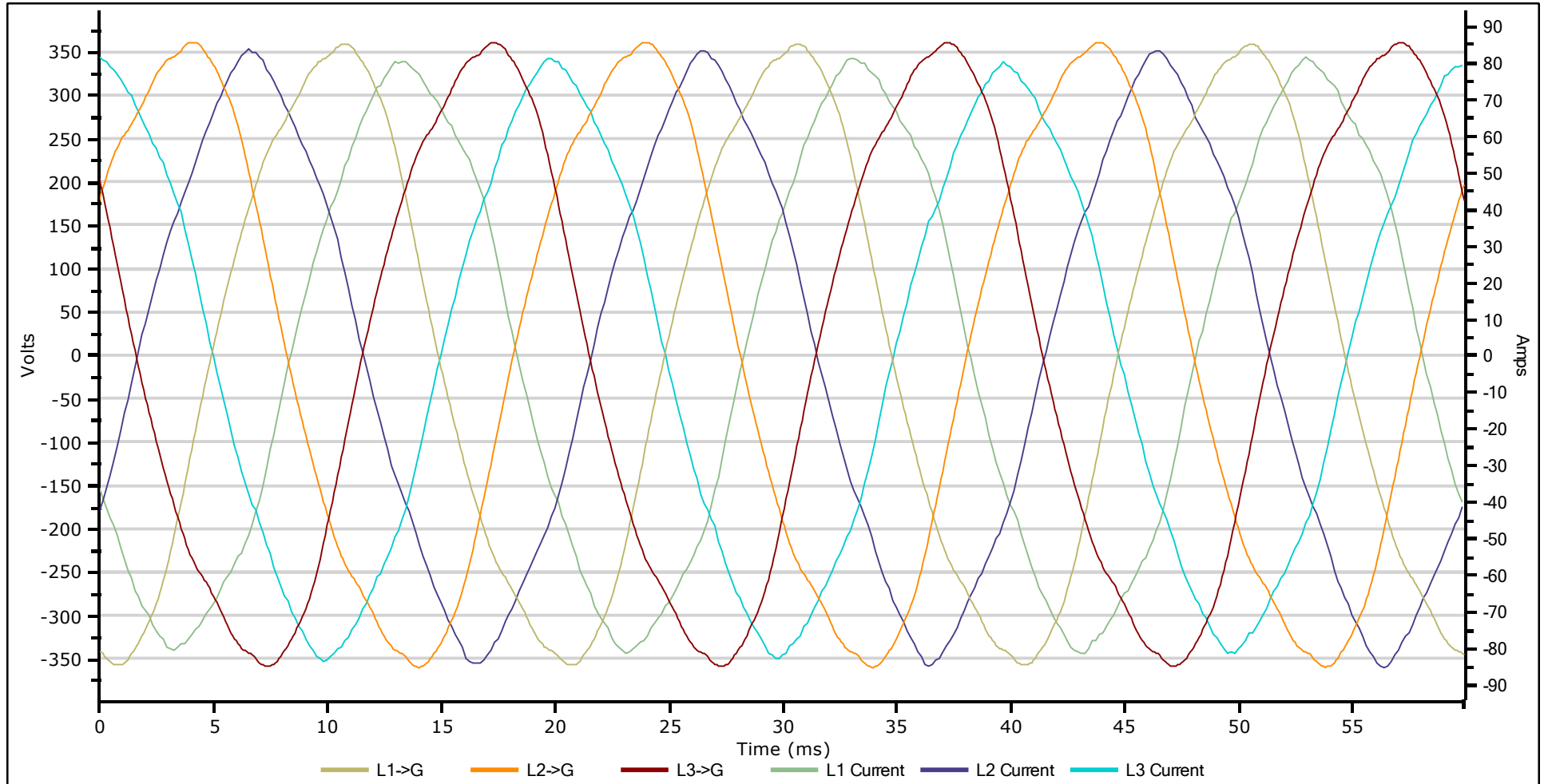


Snapshot

7/29/2014

Site: 24134
ComRent International Langenburg Water
Event 5884 - Friday, Jul 25, 2014 12:45:38

Volts Angle: -120.5
Phase Seq: CCW(CBA)



Power:

	L1	L2	L3		L1	L2	L3	Total
RMS V:	254	254	254	KVA:	14.1	14.2	14.4	42.7
RMS I:	56	56	57	KW:	6.87	7.26	7.34	21.5
CF V:	1.4	1.4	1.4	KVAR:	12.3	12.2	12.3	36.9
CF I:	1.4	1.5	1.5	PF:	0.486	0.511	0.512	0.503

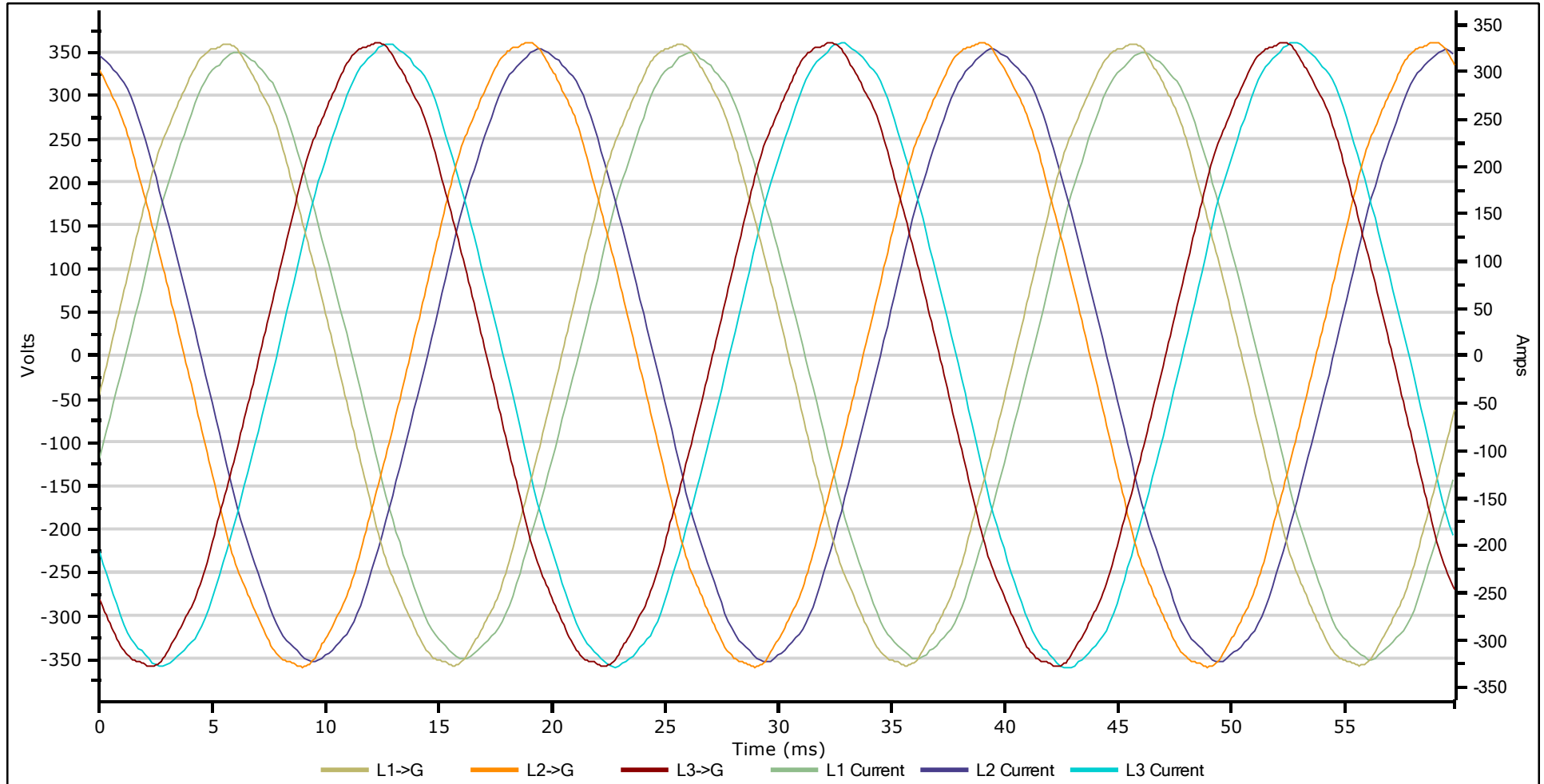


Snapshot

7/29/2014

Site: 24134
ComRent International Langenburg Water
Event 5997 - Friday, Jul 25, 2014 12:46:38

Volts Angle: -120.4
Phase Seq: CCW(CBA)



Power:

	L1	L2	L3		L1	L2	L3	Total
RMS V:	252	253	253	KVA:	57.1	58.1	58.9	174
RMS I:	226	229	232	KW:	55.7	56.4	57.3	169
CF V:	1.4	1.4	1.4	KVAR:	12.9	13.7	13.6	40.2
CF I:	1.4	1.4	1.4	PF:	0.974	0.972	0.973	0.973

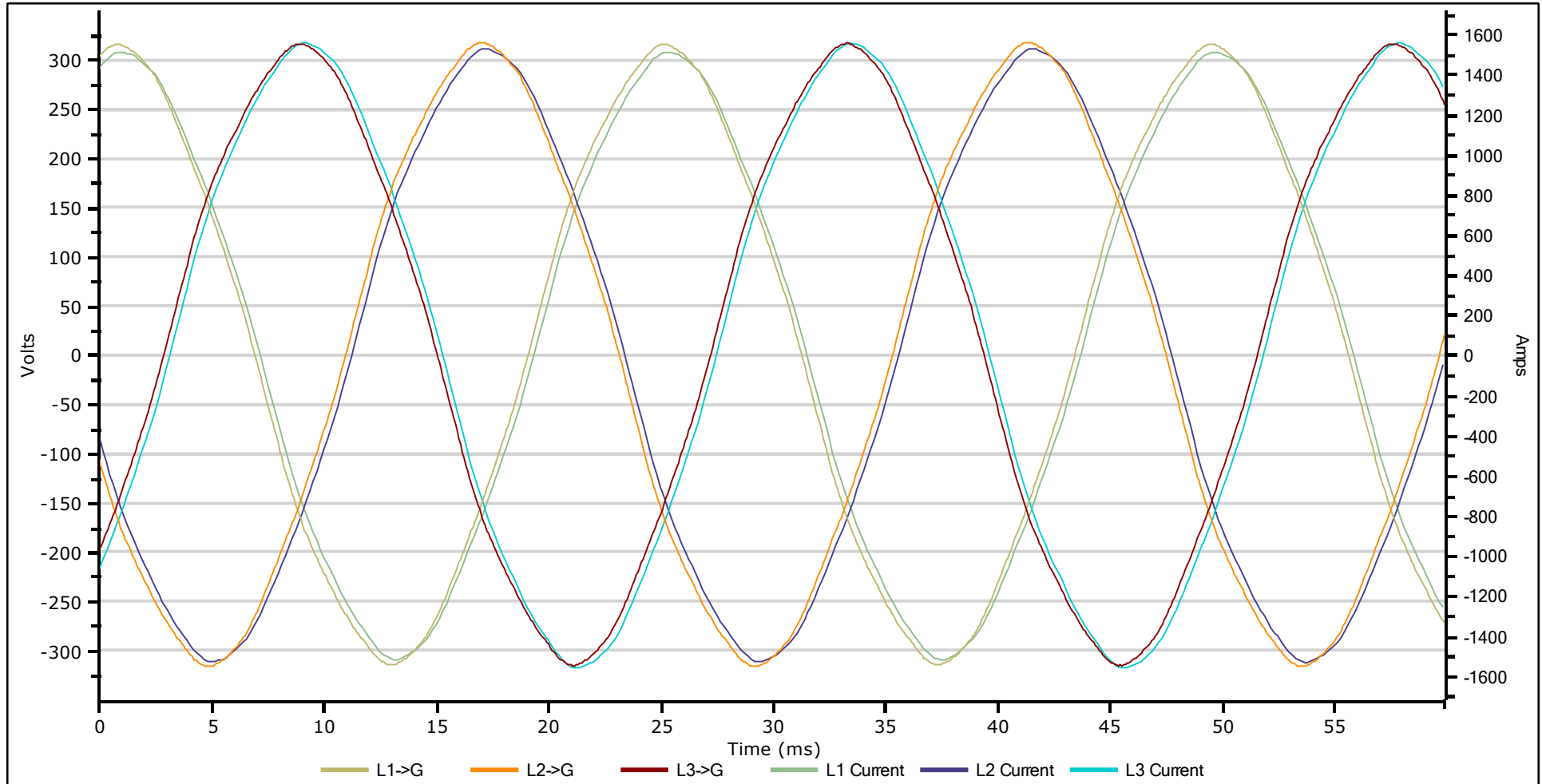


Snapshot

7/29/2014

Site: 24134
ComRent International Langenburg Water
Event 7701 - Friday, Jul 25, 2014 12:56:38

Volts Angle: -128.3
Phase Seq: CCW(CBA)



Power:

	L1	L2	L3		L1	L2	L3	Total
RMS V:	220	236	202	KVA:	235	268	200	703
RMS I:	1070	1136	990	KW:	235	268	199	701
CF V:	1.4	1.3	1.6	KVAR:	14.5	16.9	15.9	47.3
CF I:	1.4	1.3	1.6	PF:	0.998	0.998	0.997	0.998

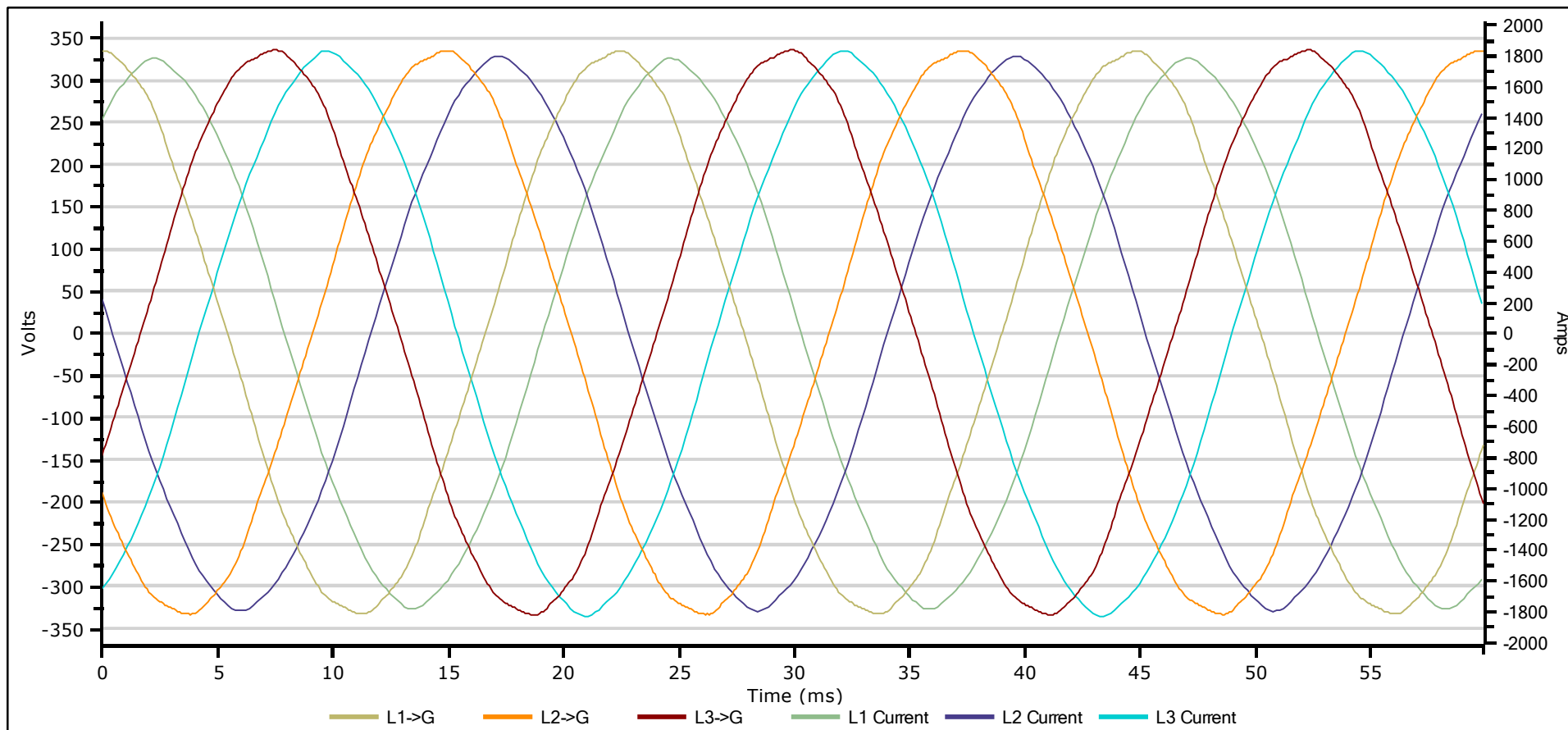


Snapshot

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 9251 - Friday, Jul 25, 2014 13:44:38

Volts Angle: -121.0
Phase Seq: CCW(CBA)



Power:

	L1	L2	L3		L1	L2	L3	Total
RMS V:	226	248	235	KVA:	288	320	283	891
RMS I:	1277	1288	1201	KW:	216	254	201	671
CF V:	1.5	1.3	1.4	KVAR:	190	195	199	584
CF I:	1.4	1.4	1.5	PF:	0.750	0.794	0.711	0.753

Comments:

0.8pf

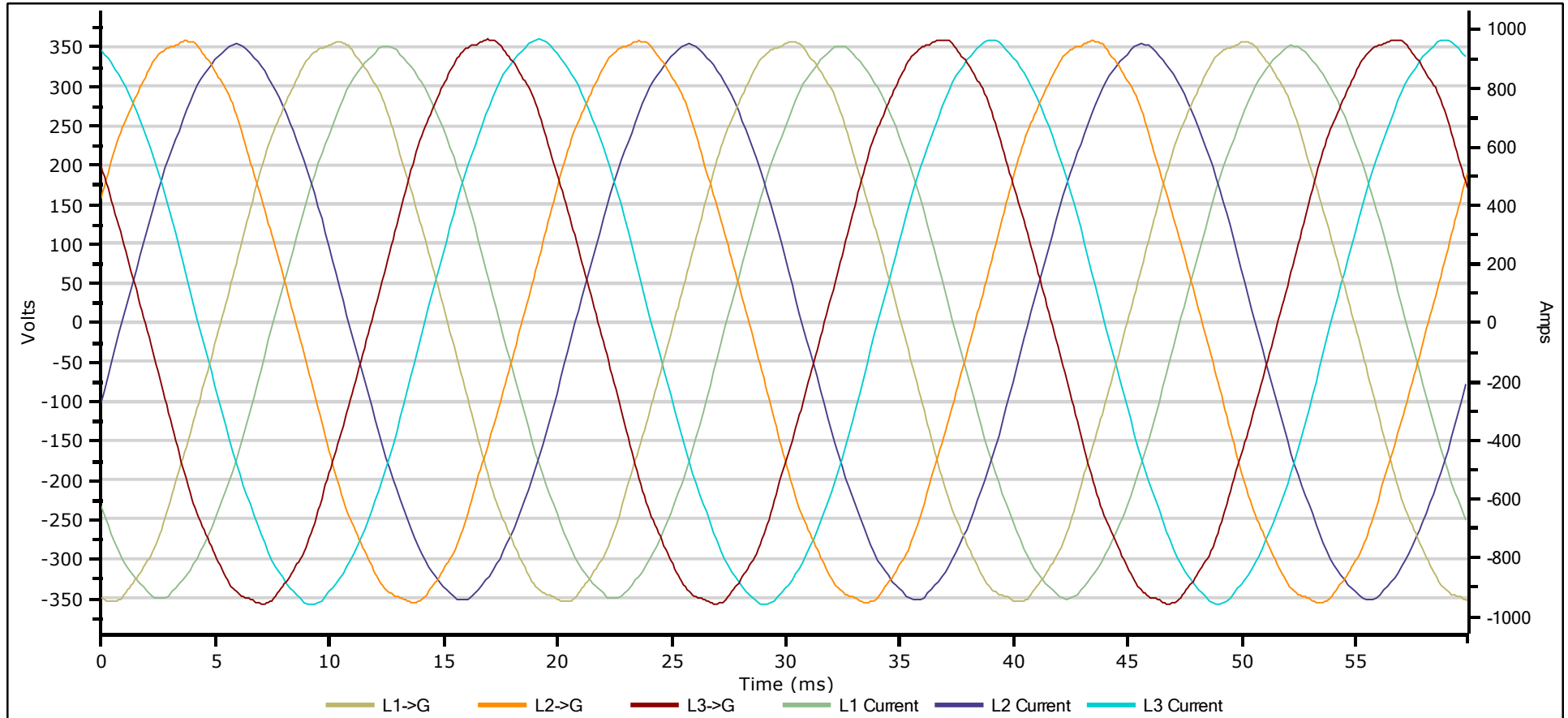


Snapshot

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 9393 - Friday, Jul 25, 2014 13:47:38

Volts Angle: -120.9
Phase Seq: CCW(CBA)



Power:

	L1	L2	L3		L1	L2	L3	Total
RMS V:	252	252	253	KVA:	166	166	171	502
RMS I:	657	659	675	KW:	123	121	125	369
CF V:	1.4	1.4	1.4	KVAR:	111	113	116	341
CF I:	1.4	1.4	1.4	PF:	0.742	0.730	0.733	0.735

Comments:

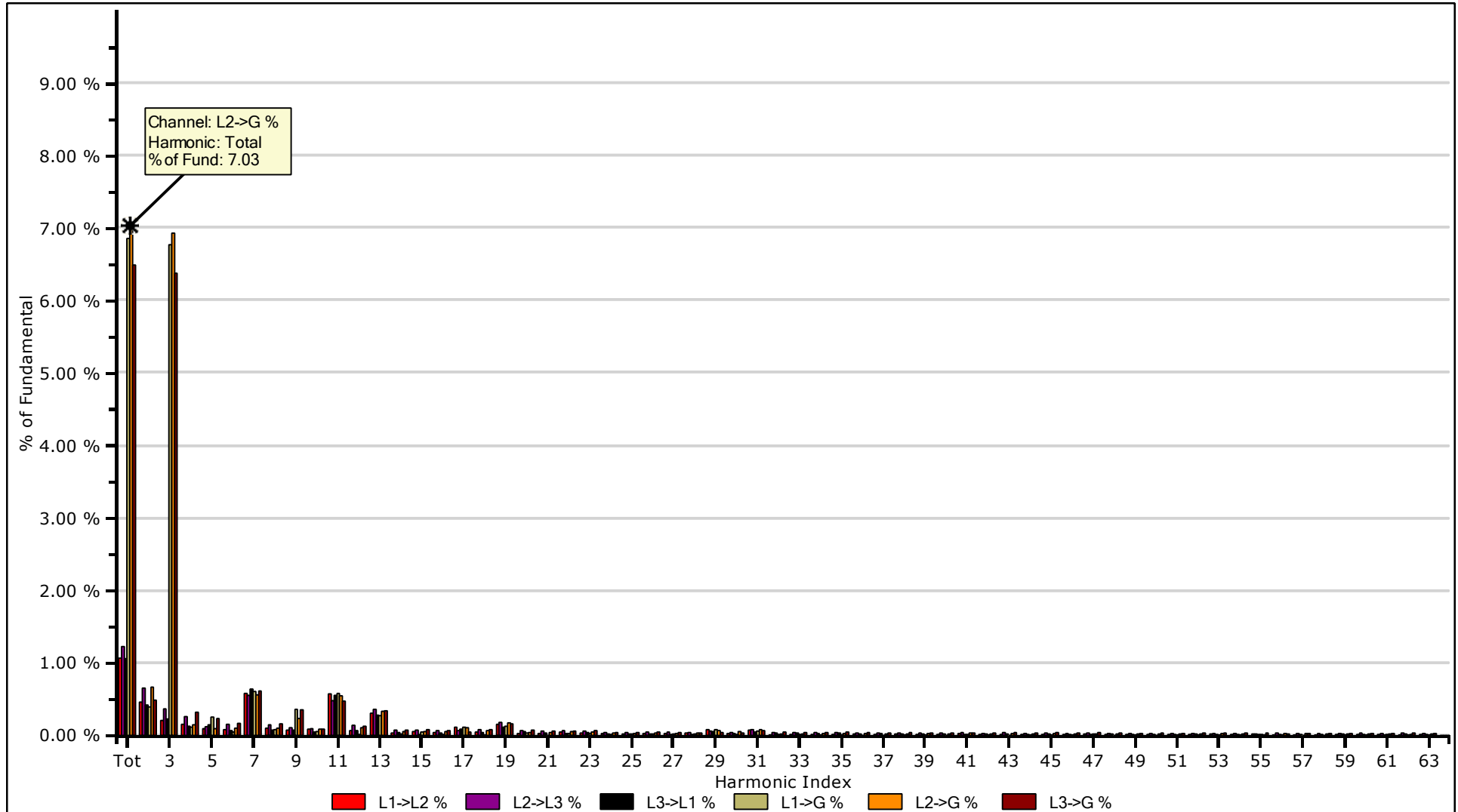
0.8pf



Snapshot Harmonics

7/29/2014

Site: 24134
ComRent International Langenburg Water
Event 5884 - Friday, Jul 25, 2014 12:45:38



Comments:

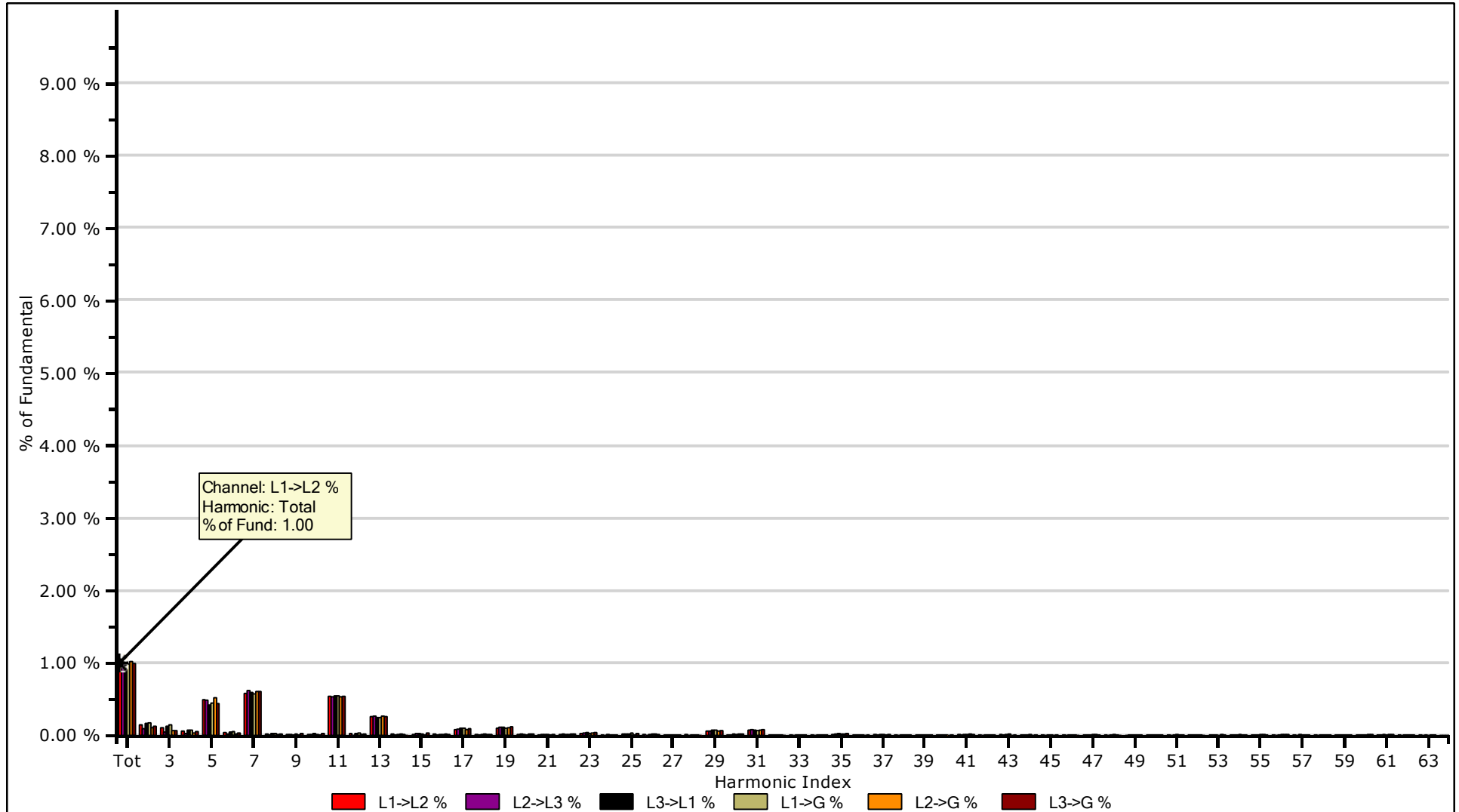
21kW - 43kVA



Snapshot Harmonics

7/29/2014

Site: 24134
ComRent International Langenburg Water
Event 5997 - Friday, Jul 25, 2014 12:46:38



Comments:

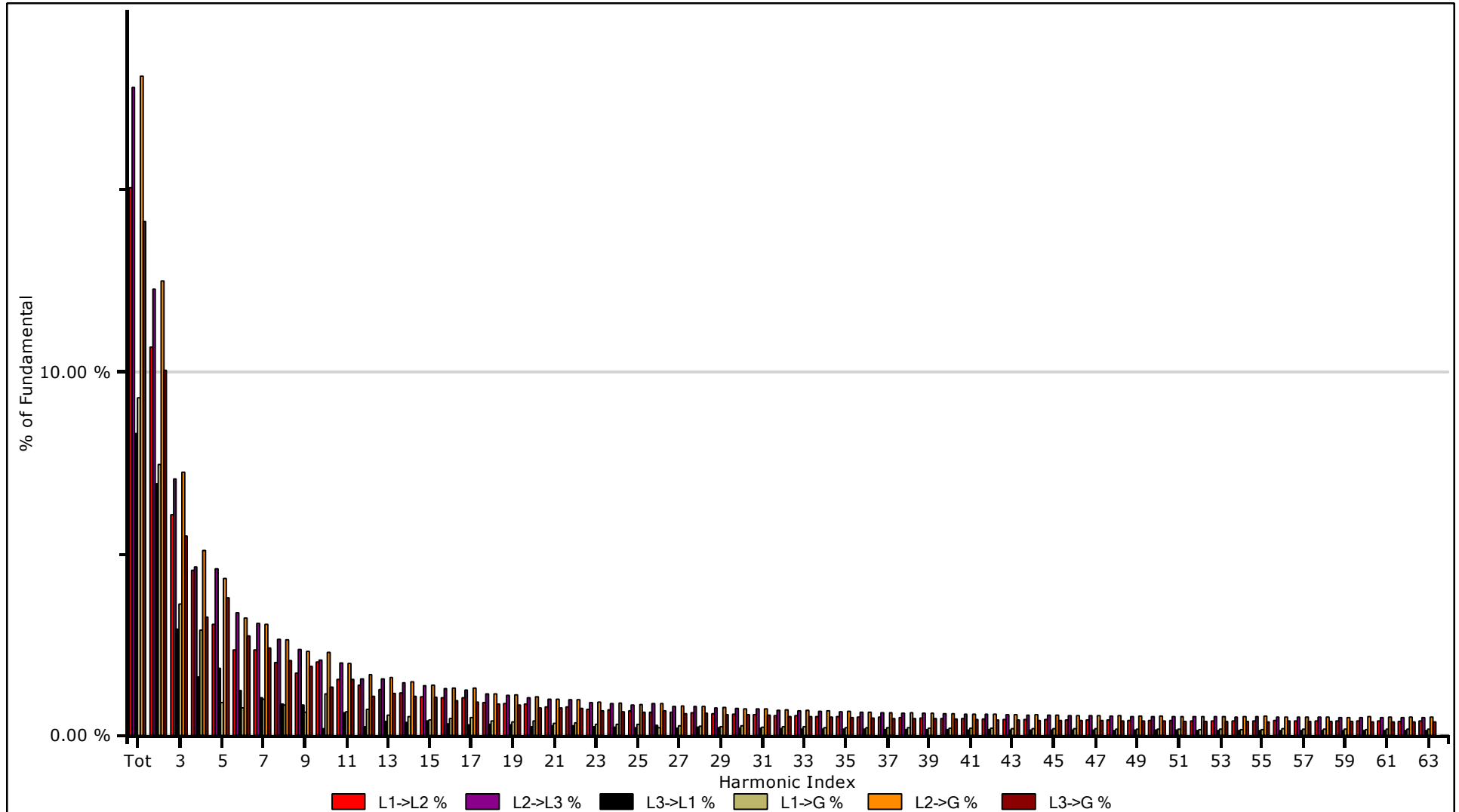
169kW - 174kVa



Snapshot Harmonics

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 9251 - Friday, Jul 25, 2014 13:44:38



Comments:

Freq instability causes harmonic content



Snapshot Harmonics

7/30/2014

Site: 24134
ComRent International Langenburg Water
Event 9393 - Friday, Jul 25, 2014 13:47:38

