



Durham York Energy Centre
1835 Energy Drive
Ontario ON L1E 2R2
Canada

September 18, 2015

Attention: Doug Huson

Acceptance metering verification was performed on the MFM-L1, MFM-G1 and 600V Substations USS-101, USS-102, USS-103, USS-104, USS-105, USS-106.

For the MFM-L1 and MFM-L1 meters 20MW was used as a reference.

Full Load amps were calculated from corresponding transformer nameplates for the 600V substations and then the matching secondary current was applied to show actual MW's and MVARs.

All values were recorded locally and Covanta staff verified values in the control room.

Secondary meter injections were performed using a Doble 6150 3phase current and voltage injection test set Calibrated March 5 2015.

We thank you for the opportunity to provide service to you and hope you will continue to use our services in the future.

A handwritten signature in black ink that reads "Thomas Cowieson".

Thomas Cowieson
Eaton Electrical Services & Systems
345 Marwood Drive
Oshawa, Ontario
L1H 7P8
Cell: 289-928-0213
24-Hour Emergency Service: 1-800-461-9166
Email: ThomasJCowieson@eaton.com
www.eaton.com www.eatonelectrical.ca
ECRA/ESA 7004736





September 18/2015

MFM –L1 Metering

Voltage Metering

PT ratio = 400:1

<u>VA L-N</u>	<u>VB L-N</u>	<u>VC L-N</u>	<u>Applied</u>	<u>Expected</u>
12.7kV	12.6kV	12.6kV	31.75V	12.7kV
25.5kV	25.4kV	25.3kV	63.5V	25.4kV

Reading L-L in the control Room

Current Metering

CT Ratio = 400:5A

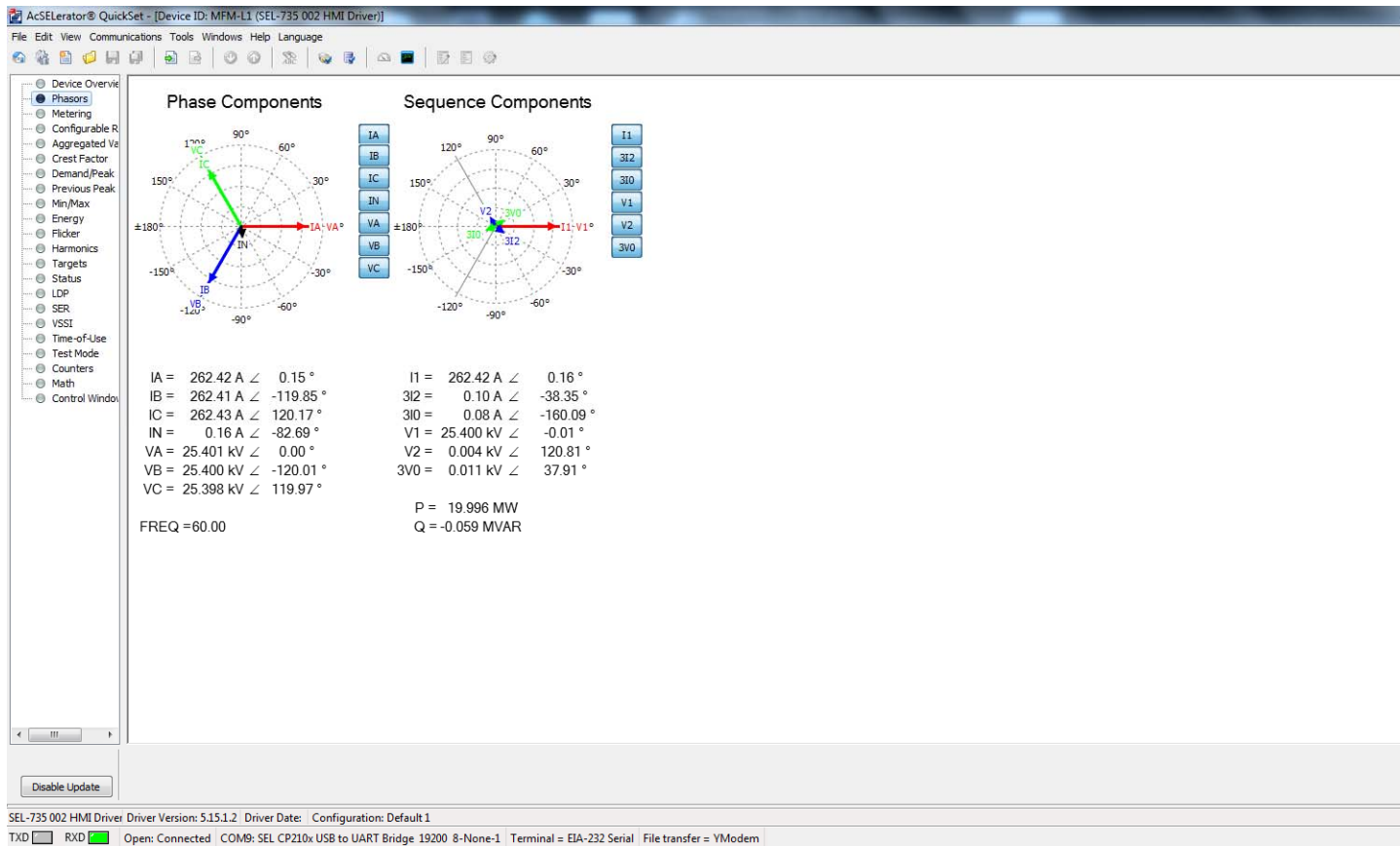
<u>IA</u>	<u>IB</u>	<u>IC</u>	<u>Applied</u>	<u>Expected</u>
<u>79.99A</u>	<u>79.99A</u>	<u>80.01A</u>	<u>1A</u>	<u>80A</u>
<u>400.05A</u>	<u>400.02A</u>	<u>400.03A</u>	<u>5A</u>	<u>400A</u>

Power

Voltages set a 0 , 240 , 120 deg for all tests

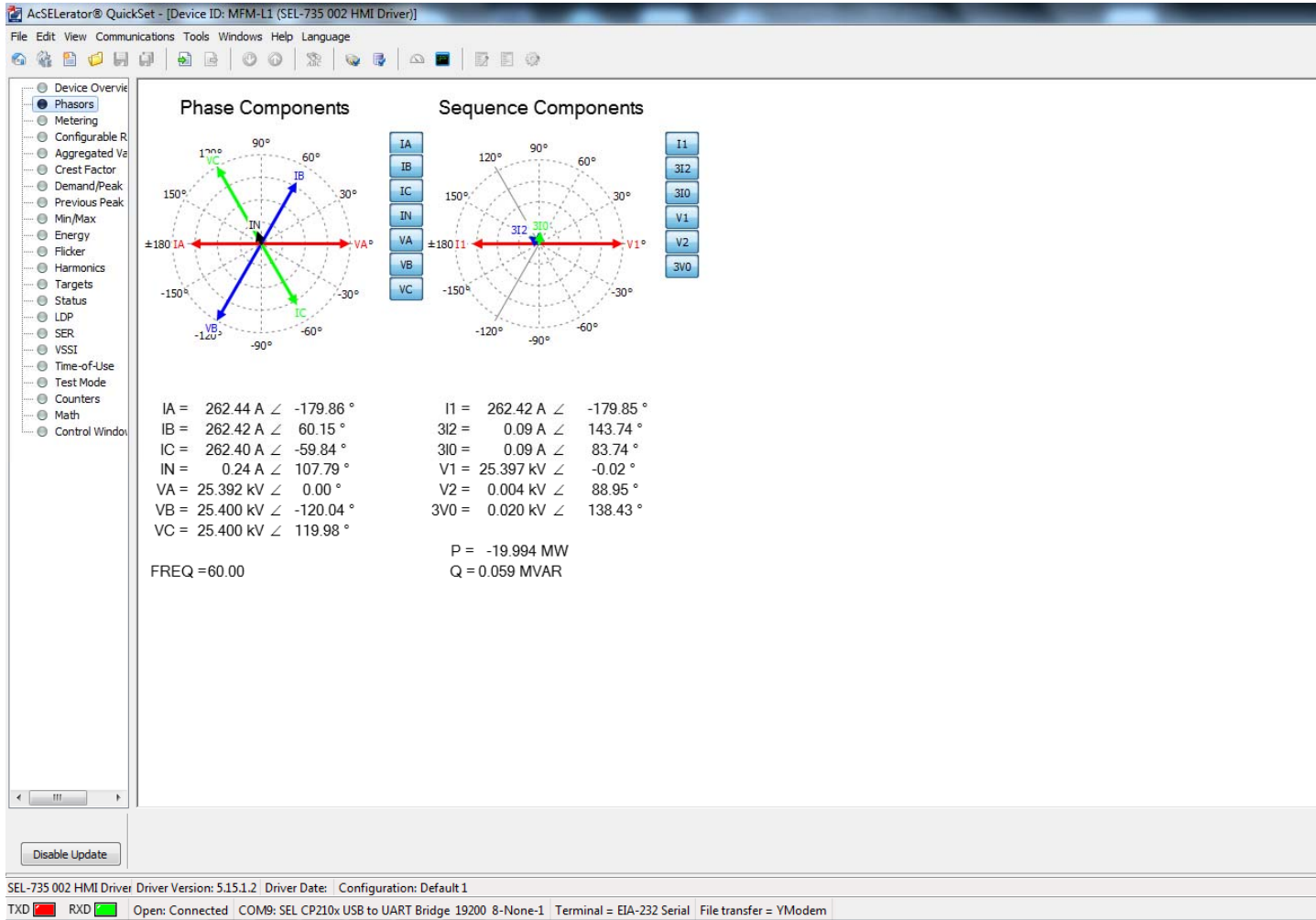
Purely Resistive Receiving

63.5V and 3.28 applied Current 0 ,240 , 120 deg = 19.996MW, 19.996MVA, 0Vars



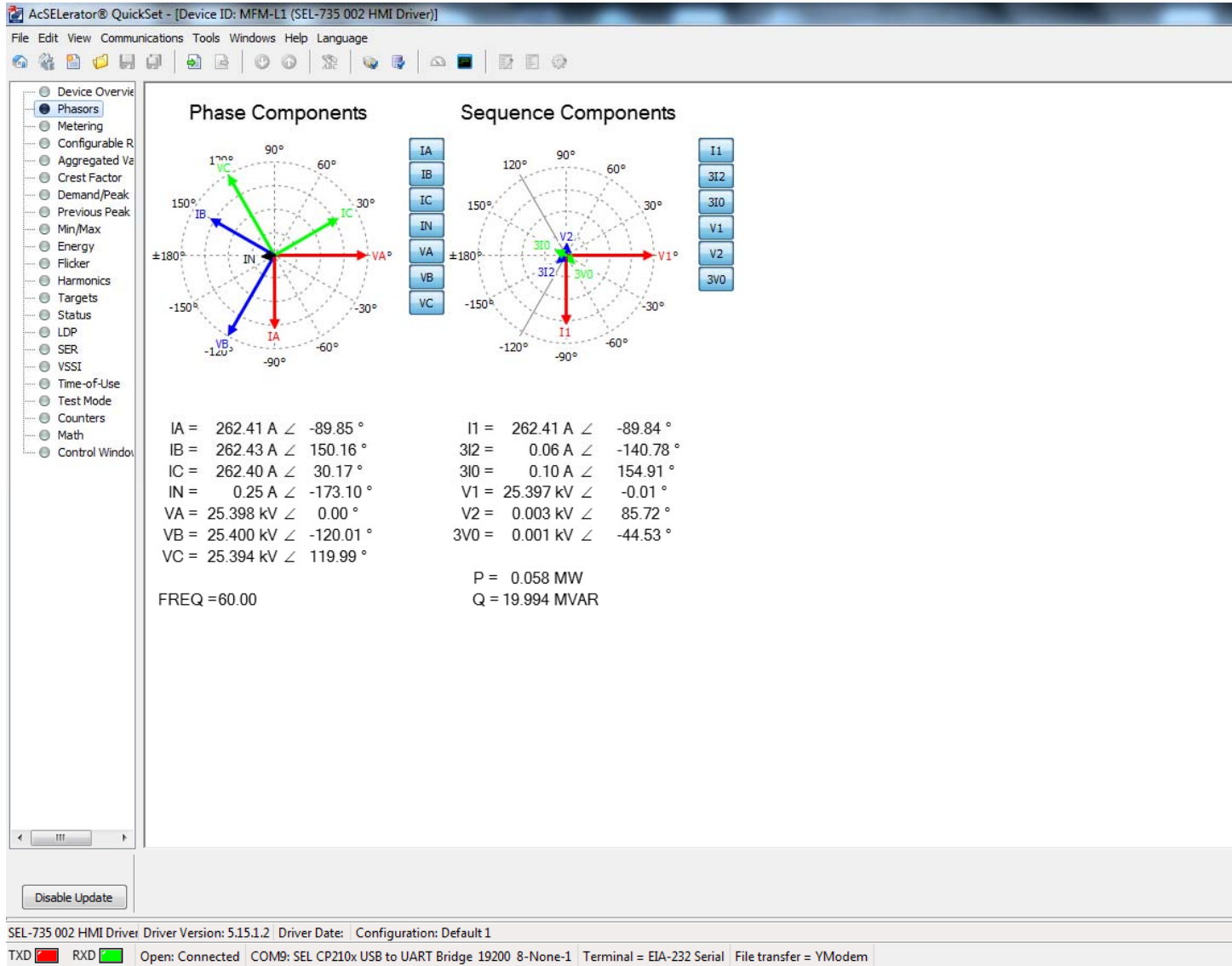
Purely Resistive Exporting

63.5V and 3.28A applied Current 180 , 60, 300 deg = - 19.996MW, 19.996MVA, 0 Vars



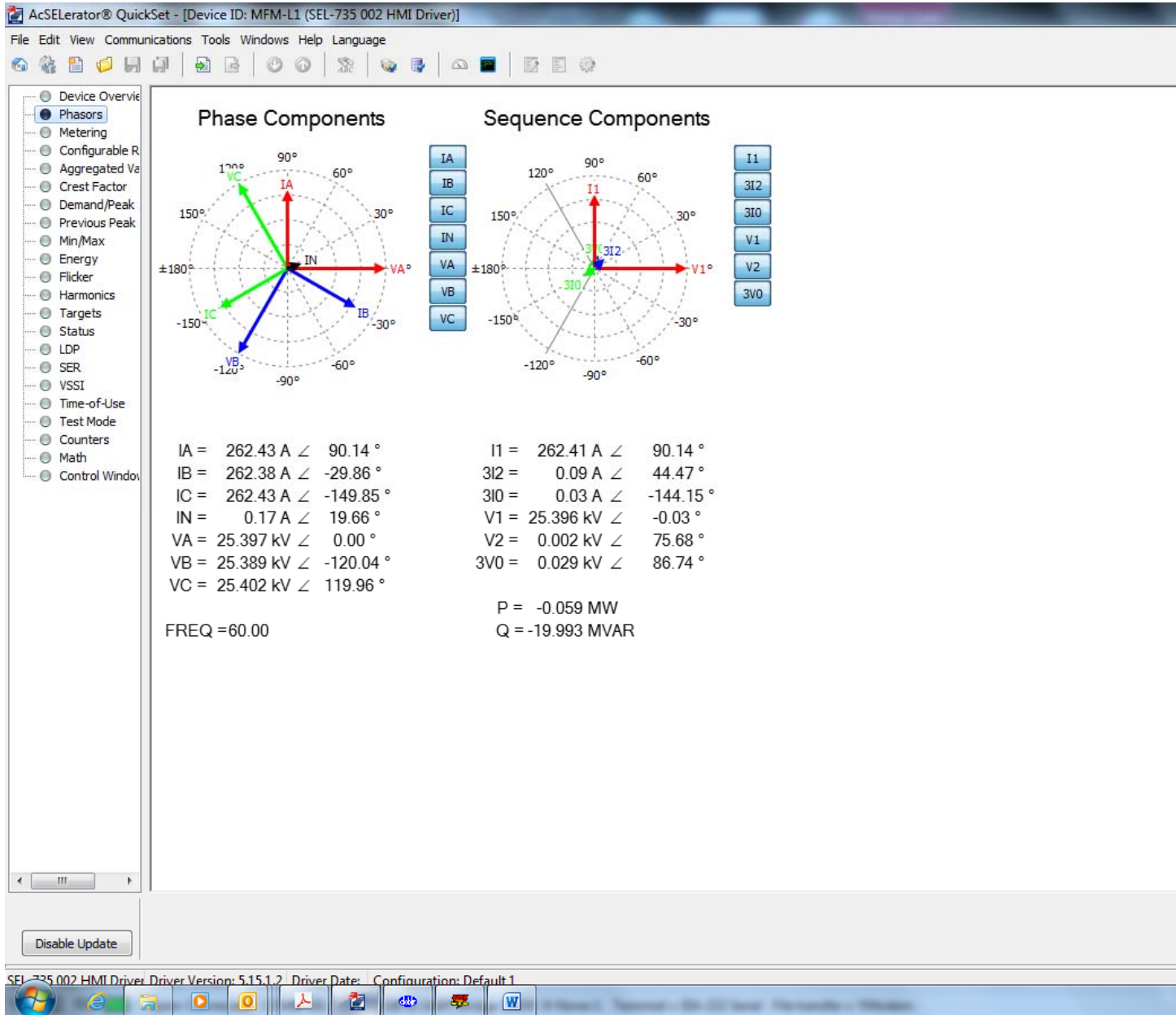
Full Vars No Watts Receiving

63.5V and 3.28A applied Current 270 , 150 , 30 deg = 60kW , 19.996MVA, 19.996MVar



Full Vars No Watts Exporting

63.5V and 3.28A applied Current 90 , 330 , 210 deg = -60kW , 19.996MVA, -19.996MVar



Confirmed with Operations in Control room Doug Huson

Tested with Doble 6150

Calibrated Date March 5 /2015

Tested By Thomas Cowieson



September 18/2015

MFM –G1 Metering

Voltage Metering

PT ratio = 120:1

<u>VA L-N</u>	<u>VB L-N</u>	<u>VC L-N</u>	<u>Applied</u>	<u>Expected</u>
4.018KV	3.988kV	3.950	33.2V	3.984kV
8.037kV	7.977kV	7.900	66.4V	7.967kV

Reading L-L in the control Room

Current Metering

CT Ratio = 1200:5A

<u>IA</u>	<u>IB</u>	<u>IC</u>	<u>Applied</u>	<u>Expected</u>
<u>240.05</u>	<u>240.06</u>	<u>240.1</u>	<u>1A</u>	<u>240A</u>
<u>1200.63</u>	<u>1200.73</u>	<u>1200.67</u>	<u>5A</u>	<u>1200A</u>

Power

Voltages set a 0 , 240 , 120 deg for all tests

Purely Resistive Receiving

66.4V and 3.49 applied Current 0 , 240 , 120 deg = 20.04MW, 0MVAR,

Purely Resistive Exporting

63.5V and 3.28A applied Current 180 , 60, 300 deg = -20.04MW, 0MVAR

Full Vars No Watts Receiving

66.4V and 3.49A applied Current 270 , 150 , 30 deg = 0MW, 20.04MVAR

Full Vars No Watts Exporting

63.5V and 3.28A applied Current 90 , 330 , 210 deg = 0MW, -20.04MVAR

Values confirmed in control room with Doug Huson

Tested with Doble 6150

Calibrated Date March 5 /2015

Tested By Thomas Cowieson



September 18/2015

USS-101

Voltage Metering

PT ratio = 600/120 wye

<u>VA L-L</u>	<u>VB L-L</u>	<u>VC L-L</u>	<u>Applied</u>	<u>Expected</u>
300.6V	300.8V	300.8V	34.65V	300V
599.9V	600.4V	600.2V	69.3V	600V

Current Metering

CT Ratio = 4000:5A

<u>IA</u>	<u>IB</u>	<u>IC</u>	<u>Applied</u>	<u>Expected</u>
<u>799.6A</u>	<u>800A</u>	<u>799.7A</u>	<u>1A</u>	<u>800A</u>
<u>4000A</u>	<u>4000A</u>	<u>4000A</u>	<u>5A</u>	<u>4000A</u>

Transformers Full Load amps with Fans is 3208Amps

3208/800 CT Ratio = 4.01Amps Secondary

Power

Voltages set a 0 , 240 , 120 deg for all tests

Purely Resistive Receiving

69.28V and 4.01A applied Current 0 ,240 , 120 deg = 3.334MW, 0Vars ,1.00PF

Purely Resistive Exporting

69.28V and 4.01A applied Current 180, 60, 300 deg = -3.334MW, 0Vars, -1PF

Full Vars No Watts Receiving

69.28V and 4.01A applied Current 270 ,150, 30 deg = 0MW, 3.334Mvar, 0 PF

Full Vars No Watts Exporting

69.28V and 4.01A applied Current 90,330, 210 deg = 0MW, -3.334Mvar, 0 PF

Verified in control room with Doug Huson

Tested with Doble 6150

Calibrated Date March 5 /2015

Tested By Thomas Cowieson



September 18/2015

USS-102

Voltage Metering

PT ratio = 600/120 wye

<u>VA L-L</u>	<u>VB L-L</u>	<u>VC L-L</u>	<u>Applied</u>	<u>Expected</u>
300.6V	300.8V	300.8V	34.65V	300V
599.9V	600.4V	600.2V	69.3V	600V

Current Metering

CT Ratio = 4000:5A

<u>IA</u>	<u>IB</u>	<u>IC</u>	<u>Applied</u>	<u>Expected</u>
<u>799.6A</u>	<u>800A</u>	<u>799.7A</u>	<u>1A</u>	<u>800A</u>
<u>4000A</u>	<u>4000A</u>	<u>4000A</u>	<u>5A</u>	<u>4000A</u>

Transformers Full Load amps with Fans is 3208Amps

3208/800 CT Ratio = 4.01Amps Secondary

Power

Voltages set a 0 , 240 , 120 deg for all tests

Purely Resistive Receiving

69.28V and 4.01A applied Current 0 ,240 , 120 deg = 3.336MW, 0Vars ,1.00PF

Purely Resistive Exporting

69.28V and 4.01A applied Current 180, 60, 300 deg = -3.336MW, 0Vars, -1PF

Full Vars No Watts Receiving

69.28V and 4.01A applied Current 270 ,150, 30 deg = 0MW, 3.336Mvar, 0 PF

Full Vars No Watts Exporting

69.28V and 4.01A applied Current 90,330, 210 deg = 0MW, -3.336Mvar, 0 PF

Verified in control room with Doug Huson

Tested with Doble 6150

Calibrated Date March 5 /2015

Tested By Thomas Cowieson



September 18/2015

USS-103

Voltage Metering

PT ratio = 600/120 wye

<u>VA L-L</u>	<u>VB L-L</u>	<u>VC L-L</u>	<u>Applied</u>	<u>Expected</u>
300.8V	300.7V	300.7V	34.65V	300V
600.1V	600.0V	600.0V	69.3V	600V

Current Metering

CT Ratio = 1200:5A

<u>IA</u>	<u>IB</u>	<u>IC</u>	<u>Applied</u>	<u>Expected</u>
<u>240.0A</u>	<u>240.0A</u>	<u>239.9A</u>	<u>1A</u>	<u>240A</u>
<u>1200A</u>	<u>1200A</u>	<u>1200A</u>	<u>5A</u>	<u>1200A</u>

Transformers Full Load amps with Fans is 1106Amps

1106/240 CT Ratio = 4.61Amps Secondary

Power

Voltages set a 0 , 240 , 120 deg for all tests

Purely Resistive Receiving

69.28V and 4.61A applied Current 0 ,240 , 120 deg = 1.150MW, 0Vars ,1.00PF

Purely Resistive Exporting

69.28V and 4.61A applied Current 180, 60, 300 deg = -1.150MW, 0Vars, -1PF

Full Vars No Watts Receiving

69.28V and 4.61A applied Current 270 ,150, 30 deg = 0MW, 1.150Mvar, 0 PF

Full Vars No Watts Exporting

69.28V and 4.61A applied Current 90,330, 210 deg = 0MW, -1.150Mvar, 0 PF

Verified in control room with Doug Huson

Tested with Doble 6150

Calibrated Date March 5 /2015

Tested By Thomas Cowieson



September 18/2015

USS-104

Voltage Metering

PT ratio = 600/120 wye

<u>VA L-L</u>	<u>VB L-L</u>	<u>VC L-L</u>	<u>Applied</u>	<u>Expected</u>
300.4V	300.4V	300.2V	34.65V	300V
600.3V	600.1V	600.0V	69.3V	600V

Current Metering

CT Ratio = 1200:5A

<u>IA</u>	<u>IB</u>	<u>IC</u>	<u>Applied</u>	<u>Expected</u>
<u>239.9A</u>	<u>239.9A</u>	<u>239.9A</u>	<u>1A</u>	<u>240A</u>
<u>1200A</u>	<u>1200A</u>	<u>1200A</u>	<u>5A</u>	<u>1200A</u>

Transformers Full Load amps with Fans is 1106Amps

1106/240 CT Ratio = 4.61Amps Secondary

Power

Voltages set a 0 , 240 , 120 deg for all tests

Purely Resistive Receiving

69.28V and 4.61A applied Current 0 ,240 , 120 deg = 1.150MW, 0Vars ,1.00PF

Purely Resistive Exporting

69.28V and 4.61A applied Current 180, 60, 300 deg = -1.150MW, 0Vars, -1PF

Full Vars No Watts Receiving

69.28V and 4.61A applied Current 270 ,150, 30 deg = 0MW, 1.150Mvar, 0 PF

Full Vars No Watts Exporting

69.28V and 4.61A applied Current 90,330, 210 deg = 0MW, -1.150Mvar, 0 PF

Verified in control room with Doug Huson

Tested with Doble 6150

Calibrated Date March 5 /2015

Tested By Thomas Cowieson



September 18/2015

USS-105

Voltage Metering

PT ratio = 600/120 wye

<u>VA L-L</u>	<u>VB L-L</u>	<u>VC L-L</u>	<u>Applied</u>	<u>Expected</u>
300.4V	300.4V	300.2V	34.65V	300V
600.3V	600.1V	600.0V	69.3V	600V

Current Metering

CT Ratio = 2500:5A

<u>IA</u>	<u>IB</u>	<u>IC</u>	<u>Applied</u>	<u>Expected</u>
<u>499.8A</u>	<u>499.9A</u>	<u>499.9A</u>	<u>1A</u>	<u>500A</u>
<u>2500A</u>	<u>2500A</u>	<u>2500A</u>	<u>5A</u>	<u>2500A</u>

Transformers Full Load amps with Fans is 2566Amps

2566/500 CT Ratio = 5.132Amps Secondary

Power

Voltages set a 0 , 240 , 120 deg for all tests

Purely Resistive Receiving

69.28V and 5.132A applied Current 0 ,240 , 120 deg = 2.667MW, 0Vars ,1.00PF

Purely Resistive Exporting

69.28V and 5.132A applied Current 180, 60, 300 deg = -2.667MW, 0Vars, -1PF

Full Vars No Watts Receiving

69.28V and 5.132A applied Current 270 ,150, 30 deg = 0MW, 2.667Mvar, 0 PF

Full Vars No Watts Exporting

69.28V and 5.132A applied Current 90,330, 210 deg = 0MW, -2.667Mvar, 0 PF

Verified in control room with Doug Huson

Tested with Doble 6150

Calibrated Date March 5 /2015

Tested By Thomas Cowieson



September 18/2015

USS-106

Voltage Metering

PT ratio = 600/120 wye

<u>VA L-L</u>	<u>VB L-L</u>	<u>VC L-L</u>	<u>Applied</u>	<u>Expected</u>
300.8V	300.8V	300.7V	34.65V	300V
600.2V	599.9V	599.9V	69.3V	600V

Current Metering

CT Ratio = 2500:5A

<u>IA</u>	<u>IB</u>	<u>IC</u>	<u>Applied</u>	<u>Expected</u>
<u>499.8A</u>	<u>499.8A</u>	<u>499.8A</u>	<u>1A</u>	<u>500A</u>
<u>2499A</u>	<u>2499A</u>	<u>2499A</u>	<u>5A</u>	<u>2500A</u>

Transformers Full Load amps with Fans is 2566Amps

2566/500 CT Ratio = 5.132Amps Secondary

Power

Voltages set a 0 , 240 , 120 deg for all tests

Purely Resistive Receiving

69.28V and 5.132A applied Current 0 ,240 , 120 deg = 2.666MW, 0Vars ,1.00PF

Purely Resistive Exporting

69.28V and 5.132A applied Current 180, 60, 300 deg = -2.666MW, 0Vars, -1PF

Full Vars No Watts Receiving

69.28V and 5.132A applied Current 270 ,150, 30 deg = 0MW, 2.666Mvar, 0 PF

Full Vars No Watts Exporting

69.28V and 5.132A applied Current 90,330, 210 deg = 0MW, -2.666Mvar, 0 PF

Verified in control room with Doug Huson

Tested with Doble 6150

Calibrated Date March 5 /2015

Tested By Thomas Cowieson