



GWS Metrology Services

Certificate Number:
CBRE-44116-CET

CBRE - GWS LLC
Metrology Services
9410 Bunsen Parkway
Suite 100B
Louisville, KY 40220
502-495-5700



Date of Cal:
12-Jun-2023

Calibration Certificate

Customer :

GE APPLIANCES - A HAIER COMPANY
GE APPLIANCE PARK
LOUISVILLE, KY 40225

Work Order
MAY 2023 AP TECH

PO Number
46417112

Asset Number : C2VK21023V

Manufacturer : YOKOGAWA

Description : POWER METER, DIGITAL

Department : AP2

Location : WATER HEATER GAS LAB

I need to demonstrate +/-0.5% of reading
in kWh. Please include in your calibration certificate

Serial Number : C2VK21023V

Model Number : WT310E

Cal. Location : ON-SITE

Manufacturer spec is:
We test at two ranges.

1. $\pm(0.1\% \text{ of reading} + 0.05\% \text{ of range})$ - Range = 750Watts (150V and 5A)

2. $\pm(0.1\% \text{ of reading} + 0.05\% \text{ of range})$ - Range = 6000Watts (300V and 20A)

Environmental Data

Temp : 23 °C

Humidity : 46 %

Calibration Information

***Calibration Due Date : 06/12/2024

Condition As Received : Meets Listed Specifications

Condition As Returned : Passed

Procedures used for this Calibration:

| Procedure # | Procedure Description | Rev # | Rev Date |
|-------------|--|-------|------------|
| CP-0553 | YOKOGAWA WT310/330 DIGITAL POWER METER | 00 | 10/21/2014 |

Traceability Information

| Asset Number | Description | Cal. Due Date | Reference Number |
|--------------|---------------------------|---------------|------------------|
| MET-0001 | CALIBRATOR, MULTIFUNCTION | 2/17/2024 | CBRE-2733-TSM |
| MET-0731 | SENSOR, TEMP/HUMIDITY | 9/6/2023 | CBRE-7120-TLB |

Traceability to NIST or other national metrology institutes for secondary measurement standards is established through laboratories approved by the CBRE-GWS, LLC Metrology Services quality assurance program. Test reports and calibration certificates maintained by CBRE - GWS are available upon request to the recipient of this calibration report.

Calibrated By: CHARLES THOMPSON - Metrologist

This is to certify that the above listed instrument/gage was inspected by CBRE GWS Metrology Services using a procedure(s) developed from the manufacturer specifications, accepted industry practices and/or customer requirements. The CBRE GWS Metrology Services Quality System conforms to ISO/IEC-17025:2017. It is hereby further certified that the inspection described herein was performed using standards whose values are traceable to the International System of Units (SI) through the National Institute of Standards and Technology (NIST) or other National Metrology Institute (NMI), or have been derived from accepted values of natural constants, or have been derived by the ratio type of self calibration techniques. Uncertainties are estimated at a 95% confidence level. (k=2). The results indicated in this certificate relate only to the item(s) listed above. CBRE GWS Metrology Services responsibility shall in no event nor for any reason whatsoever exceed the purchase price of this calibration.

*** Calibration due dates are only issued if requested by the customer and are based upon customer dictated recall intervals.



GWS Metrology Services

Please recalculate. Should be $\pm 0.39V$

Calibration Certificate (Cont)

Certificate Number : CBRE-44116-CET

CALIBRATION TEST POINTS

* Not accredited for this parameter

VERDICT- (P)=Passed, (A)=Adjusted, (L)=Limited, (F)=Failed, (R)=Report of Value only

| Description | Nominal | Tol - | Tol + | As Found | As Left | Units | Verdict | Comment |
|--------------------|---------|---------|---------|----------|---------|-------|---------|---------|
| Freq 150V/0A | 60.000 | 59.964 | 60.036 | 59.999 | 59.999 | Hz | P | |
| Freq 0V/1A | 60.000 | 59.964 | 60.036 | 59.999 | 59.999 | Hz | P | |
| 15V @ 60Hz | 15.000 | 14.970 | 15.030 | 14.995 | 14.995 | V | P | |
| 30V @ 60Hz | 30.000 | 29.940 | 30.060 | 29.990 | 29.990 | V | P | |
| 60V @ 60Hz | 60.000 | 59.880 | 60.120 | 59.981 | 59.981 | V | P | |
| 150V @ 60Hz | 150.00 | 149.70 | 150.30 | 149.96 | 149.96 | V | P | |
| 150V MEAN @ 60Hz | 150.00 | 149.70 | 150.30 | 149.96 | 149.96 | V | P | |
| 150V @ 1kHz | 100.00 | 99.60 | 100.40 | 99.97 | 99.97 | V | P | |
| 150V @ 10kHz | 100.00 | 98.85 | 101.15 | 100.01 | 100.01 | V | P | |
| 150V @ 20kHz | 100.00 | 98.35 | 101.65 | 100.12 | 100.12 | V | P | |
| 150V @ 50kHz | 100.00 | 97.15 | 102.85 | 100.30 | 100.30 | V | P | |
| 150V @ 100kHz | 100.00 | 95.15 | 104.85 | 98.84 | 98.84 | V | P | |
| 150V MEAN @ 100kHz | 100.00 | 95.15 | 104.85 | 98.81 | 98.81 | V | P | |
| 300V @ 60Hz | 300.00 | 299.40 | 300.60 | 299.93 | 299.93 | V | P | |
| 600V DC | 60.00 | 58.74 | 61.26 | 59.99 | 59.99 | V | P | |
| 600V DC | -60.00 | -61.26 | -58.74 | -59.98 | -59.98 | V | P | |
| 600V DC | 100.00 | 98.70 | 101.30 | 99.98 | 99.98 | V | P | |
| 600V DC | -100.00 | -101.30 | -98.70 | -99.98 | -99.98 | V | P | |
| 600V DC | 300.00 | 298.50 | 301.50 | 299.97 | 299.97 | V | P | |
| 600V DC | -300.00 | -301.50 | -298.50 | -299.91 | -299.91 | V | P | |
| 600V DC | 600.00 | 598.20 | 601.80 | 599.96 | 599.96 | V | P | |
| 600V DC | -600.00 | -601.80 | -598.20 | -599.89 | -599.89 | V | P | |
| 600V @ 60Hz | 60.00 | 59.34 | 60.66 | 59.99 | 59.99 | V | P | |
| 600V @ 60Hz | 100.00 | 99.30 | 100.70 | 99.99 | 99.99 | V | P | |
| 600V @ 60Hz | 300.00 | 299.10 | 300.90 | 299.95 | 299.95 | V | P | |
| 600V @ 60Hz | 600.00 | 598.80 | 601.20 | 599.96 | 599.96 | V | P | |
| 5mA @ 60Hz | 5.0000 | 4.9900 | 5.0100 | 4.9982 | 4.9982 | mA | P | |
| 10mA @ 60Hz | 10.000 | 9.980 | 10.020 | 9.996 | 9.996 | mA | P | |
| 10mA @ 1kHz | 10.000 | 9.970 | 10.030 | 9.996 | 9.996 | mA | P | |
| 10mA @ 10kHz | 10.000 | 9.900 | 10.100 | 10.001 | 10.001 | mA | P | |
| 10mA @ 20kHz | 10.000 | 9.860 | 10.140 | 10.017 | 10.017 | mA | P | |
| 20mA @ 60Hz | 20.000 | 19.960 | 20.040 | 19.992 | 19.992 | mA | P | |
| 50mA @ 60Hz | 50.000 | 49.900 | 50.100 | 49.982 | 49.982 | mA | P | |
| 100mA @ 60Hz | 100.00 | 99.80 | 100.20 | 99.96 | 99.96 | mA | P | |
| 0.5A @ 60Hz | 500.00 | 499.00 | 501.00 | 499.95 | 499.95 | mA | P | |
| 1A DC | 0.1000 | 0.0980 | 0.1020 | 0.1001 | 0.1001 | A | P | |
| 1A DC | -0.1000 | -0.1020 | -0.0980 | -0.0999 | -0.0999 | A | P | |
| 1A DC | 0.2000 | 0.1980 | 0.2020 | 0.2000 | 0.2000 | A | P | |
| 1A DC | -0.2000 | -0.2020 | -0.1980 | -0.1999 | -0.1999 | A | P | |
| 1A DC | 0.6000 | 0.5970 | 0.6030 | 0.6000 | 0.6000 | A | P | |
| 1A DC | -0.6000 | -0.6030 | -0.5970 | -0.5999 | -0.5999 | A | P | |
| 1A DC | 1.0000 | 0.9970 | 1.0030 | 0.9999 | 0.9999 | A | P | |
| 1A DC | -1.0000 | -1.0030 | -0.9970 | -0.9999 | -0.9999 | A | P | |
| 1A @ 10Hz | 1.0000 | 0.9970 | 1.0030 | 0.9997 | 0.9997 | A | P | |
| 1A @ 60Hz | 0.1000 | 0.0990 | 0.1010 | 0.1000 | 0.1000 | A | P | |
| 1A @ 60Hz | 0.2000 | 0.1990 | 0.2010 | 0.2000 | 0.2000 | A | P | |
| 1A @ 60Hz | 0.6000 | 0.5980 | 0.6020 | 0.5999 | 0.5999 | A | P | |
| 1A @ 60Hz | 1.0000 | 0.9980 | 1.0020 | 0.9999 | 0.9999 | A | P | |
| 1A @ 1kHz | 1.0000 | 0.9970 | 1.0030 | 1.0001 | 1.0001 | A | P | |
| 1A @ 10kHz | 1.0000 | 0.9900 | 1.0100 | 1.0056 | 1.0056 | A | P | |
| 2A @ 60Hz | 2.0000 | 1.9960 | 2.0040 | 2.0001 | 2.0001 | A | P | |
| 5A DC | 5.0000 | 4.9850 | 5.0150 | 4.9999 | 4.9999 | A | P | |
| 5A DC | -5.0000 | -5.0150 | -4.9850 | -5.0007 | -5.0007 | A | P | |
| 5A @ 60Hz | 5.0000 | 4.9900 | 5.0100 | 5.0001 | 5.0001 | A | P | |
| 5A @ 1kHz | 5.0000 | 4.9850 | 5.0150 | 5.0015 | 5.0015 | A | P | |
| 10A @ 60Hz | 10.000 | 9.980 | 10.020 | 10.002 | 10.002 | A | P | |
| 20A @ 60Hz | 20.000 | 19.960 | 20.040 | 20.005 | 20.005 | A | P | |

CALIBRATION TEST POINTS

* Not accredited for this parameter

VERDICT- (P)=Passed, (A)=Adjusted, (L)=Limited, (F)=Failed, (R)=Report of Value only

| Description | Nominal | Tol - | Tol + | As Found | As Left | Units | Verdict | Comment |
|-------------------------------|---------|---------|---------|----------|---------|-------|---------|---------|
| 15V/1A @ 60Hz - PF 1 | 15.000 | 14.970 | 15.030 | 14.999 | 14.999 | W | P | |
| 30V/1A @ 60Hz - PF 1 | 30.000 | 29.940 | 30.060 | 29.992 | 29.992 | W | P | |
| 60V/1A @ 60Hz - PF 1 | 60.000 | 59.880 | 60.120 | 59.985 | 59.985 | W | P | |
| 150V/1A @ 60Hz - PF 1 | 150.00 | 149.70 | 150.30 | 149.98 | 149.98 | W | P | |
| 150V-100V/1A @ 1kHz - PF 1 | 100.00 | 99.50 | 100.50 | 99.98 | 99.98 | W | P | |
| 150V-100V/1A @ 10kHz - PF 1 | 100.00 | 98.85 | 101.15 | 100.55 | 100.55 | W | P | |
| 300V/1A @ 60Hz - PF 1 | 300.00 | 299.40 | 300.60 | 299.95 | 299.95 | W | P | |
| 600V-60V/1A @ DC | 60.00 | 58.74 | 61.26 | 59.99 | 59.99 | W | P | |
| 600V- -60V/1A @ DC | -60.00 | -61.14 | -58.86 | -59.97 | -59.97 | W | P | |
| 600V-100V/1A @ DC | 100.00 | 98.70 | 101.30 | 99.96 | 99.96 | W | P | |
| 600V- -100V/1A @ DC | -100.00 | -101.10 | -98.90 | -99.96 | -99.96 | W | P | |
| 600V/1A @ DC | 600.00 | 598.20 | 601.80 | 599.85 | 599.85 | W | P | |
| 600V- -600/1A @ DC | -600.00 | -600.60 | -599.40 | -599.79 | -599.79 | W | P | |
| 600V-60/1A @ 60Hz - PF 1 | 60.00 | 59.34 | 60.66 | 59.99 | 59.99 | W | P | |
| 600V-100V/1A @ 60Hz - PF 1 | 100.00 | 99.30 | 100.70 | 99.99 | 99.99 | W | P | |
| 600V/1A @ 60Hz - PF 1 | 600.00 | 598.80 | 601.20 | 599.97 | 599.97 | W | P | |
| 150V-100V/5mA @ 60Hz - PF 1 | 500.00 | 498.75 | 501.25 | 499.90 | 499.90 | mW | P | |
| 150V-100V/10mA @ 60Hz - PF 1 | 1.0000 | 0.9980 | 1.0030 | 0.9998 | 0.9998 | W | P | |
| 150V-100V/10mA @ 1kHz - PF 1 | 1.0000 | 0.9950 | 1.0050 | 0.9997 | 0.9997 | W | P | |
| 150V-100V/10mA @ 10kHz - PF 1 | 1.0000 | 0.9890 | 1.0120 | 0.9997 | 0.9997 | W | P | |
| 150V-100V/10mA @ 20kHz - PF 1 | 1.0000 | 0.9790 | 1.0220 | 0.9997 | 0.9997 | W | P | |
| 150V-100V/20mA @ 60Hz - PF 1 | 2.0000 | 1.9950 | 2.0050 | 2.0033 | 2.0033 | W | P | |
| 150V-100V/50mA @ 60Hz - PF 1 | 5.0000 | 4.9900 | 5.0100 | 4.9992 | 4.9992 | W | P | |
| 150V-100V/100mA @ 60Hz - PF 1 | 10.000 | 9.975 | 10.025 | 9.998 | 9.998 | W | P | |
| 150V-100V/2A @ 60Hz - PF 1 | 200.00 | 199.50 | 200.50 | 199.98 | 199.98 | W | P | |
| 150V-100V/5A @ 60Hz - PF 1 | 500.00 | 498.75 | 501.25 | 499.99 | 499.99 | W | P | |
| 150V-100V/10A @ 60Hz - PF 1 | 1.0000 | 0.9975 | 1.0025 | 0.9999 | 0.9999 | kW | P | |
| 150V-100V/20A @ 60Hz - PF 1 | 2.0000 | 1.9950 | 2.0050 | 2.0000 | 2.0000 | kW | P | |

The verdicts above are based upon a direct comparison of the measured value at the time of calibration, to a published or customer supplied tolerance for the specification listed.
CBRE-GWS does not include the measurement uncertainty in making these determinations unless specifically requested. It is the responsibility of the user of this equipment to determine if the accept / reject tolerances meet the requirements of the intended measurement process.

Certificate Comments :

No Additional Comments

Expanded measurement uncertainty at an approximate 95% confidence level (k=2)

DC Voltage

0 to 200 mV $\pm 0.1 \mu V + 4.5 \mu V/V + 0.6R$

200 mV to 2 V $\pm 0.4 \mu V + 3 \mu V/V + 0.6R$

(2 to 20) V $\pm 4 \mu V + 3 \mu V/V + 0.6R$

(20 to 200) V $\pm 40 \mu V + 4.5 \mu V/V + 0.6R$

(200 to 1 000) V $\pm 0.5mV + 4.5 \mu V/V + 0.6R$

AC Voltage

1 mV to 200 mV

(10 to 40) Hz $\pm 4 \mu V + 130 \mu V/V + 0.6R$

(40 to 100) Hz $\pm 4 \mu V + 110 \mu V/V + 0.6R$

100 Hz to 2 kHz $\pm 2 \mu V + 105 \mu V/V + 0.6R$

(2 to 10) kHz $\pm 4 \mu V + 105 \mu V/V + 0.6R$

(10 to 30) kHz $\pm 8 \mu V + 305 \mu V/V + 0.6R$

(30 to 100) kHz $\pm 20 \mu V + 705 \mu V/V + 0.6R$

(100 to 300) kHz $\pm 0.3\%iv + 0.2 mV + 0.6R$

(300 to 500) kHz $\pm 1 \%iv + 2 mV + 0.6R$

200 mV to 2 V

(10 to 40) Hz $\pm 20 \mu V + 105 \mu V/V + 0.6R$

(40 to 100) Hz $\pm 20 \mu V + 85 \mu V/V + 0.6R$

100 Hz to 2 kHz $\pm 20 \mu V + 65 \mu V/V + 0.6R$

(2 to 10) kHz $\pm 22 \mu V + 85 \mu V/V + 0.6R$



GWS Metrology Services

(10 to 30) kHz $\pm 40 \mu\text{V} + 205 \mu\text{V/V} + 0.6\text{R}$
(30 to 100) kHz $\pm 0.2 \text{mV} + 505 \mu\text{V/V} + 0.6\text{R}$
(100 to 300) kHz $\pm 0.3 \% \text{iv} + 2 \text{mV} + 0.6\text{R}$
(300 to 500) kHz $\pm 1 \% \text{iv} + 2 \text{mV} + 0.6\text{R}$

2 V to 20 V

(10 to 40) Hz $\pm 0.2 \text{mV} + 105 \mu\text{V/V} + 0.6\text{R}$
(40 to 100) Hz $\pm 0.2 \text{mV} + 85 \mu\text{V/V} + 0.6\text{R}$
100 Hz to 2 kHz $\pm 0.2 \text{mV} + 65 \mu\text{V/V} + 0.6\text{R}$
(2 to 10) kHz $\pm 0.2 \text{mV} + 85 \mu\text{V/V} + 0.6\text{R}$
(10 to 30) kHz $\pm 0.4 \text{mV} + 205 \mu\text{V/V} + 0.6\text{R}$
(30 to 100) kHz $\pm 2 \text{mV} + 505 \mu\text{V/V} + 0.6\text{R}$

20 V to 200 V

(10 to 40) Hz $\pm 2 \text{mV} + 105 \mu\text{V/V} + 0.6\text{R}$
(40 to 100) Hz $\pm 2 \text{mV} + 85 \mu\text{V/V} + 0.6\text{R}$
100 Hz to 2 kHz $\pm 2 \text{mV} + 65 \mu\text{V/V} + 0.6\text{R}$
(2 to 10) kHz $\pm 2 \text{mV} + 85 \mu\text{V/V} + 0.6\text{R}$
(10 to 20) kHz $\pm 4 \text{mV} + 205 \mu\text{V/V} + 0.6\text{R}$

200 V to 1 000 V

(10 to 40) Hz $\pm 20 \text{mV} + 110 \mu\text{V/V} + 0.6\text{R}$
(40 to 10) kHz $\pm 20 \text{mV} + 95 \mu\text{V/V} + 0.6\text{R}$

Resistance – Source

0 to 11 Ohm $\pm 0.009 \% \text{iv} + 0.006 \text{Ohm} + 0.6$
(11 to 33) Ohm $\pm 0.009 \% \text{iv} + 0.01 \text{Ohm} + 0.6\text{R}$
(33 to 330) Ohm $\pm 0.007 \% \text{iv} + 0.01 \text{Ohm} + 0.6\text{R}$
330 Ohm to 3.3 kOhm $\pm 0.007 \% \text{iv} + 0.06 \text{Ohm} + 0.6\text{R}$
(3.3 to 33) kOhm $\pm 0.007 \% \text{iv} + 0.6 \text{Ohm} + 0.6\text{R}$
(33 to 110) kOhm $\pm 0.008 \% \text{iv} + 6 \text{Ohm} + 0.6\text{R}$
(110 to 330) kOhm $\pm 0.009 \% \text{iv} + 6 \text{Ohm} + 0.6\text{R}$
330 kOhm to 3.3 MOhm $\pm 0.012 \% \text{iv} + 55 \text{Ohm} + 0.6\text{R}$
(3.3 to 11) MOhm $\pm 0.047 \% \text{iv} + 550 \text{Ohm} + 0.6\text{R}$
(11 to 33) MOhm $\pm 0.078 \% \text{iv} + 550 \text{Ohm} + 0.6\text{R}$
(33 to 110) MOhm $\pm 0.39 \% \text{iv} + 5.55 \text{kOhm} + 0.6\text{R}$
(110 to 330) MOhm $\pm 0.39 \% \text{iv} + 16.5 \text{kOhm} + 0.6\text{R}$

DC Current

0 to 200 μA $\pm 0.4 \text{nA} + 12 \mu\text{A/A} + 0.6\text{R}$
200 μA to 2 mA $\pm 4 \text{nA} + 12 \mu\text{A/A} + 0.6\text{R}$
(2 to 20) mA $\pm 40 \text{nA} + 13 \mu\text{A/A} + 0.6\text{R}$
(20 to 200) mA $\pm 8 \mu\text{A} + 36 \mu\text{A/A} + 0.6\text{R}$
(200 to 2) A $\pm 16 \mu\text{A} + 170 \mu\text{A/A} + 0.6\text{R}$

AC Current

29 μA to 200 μA
10 Hz to 10 kHz $\pm 20 \text{nA} + 280 \mu\text{A/A} + 0.6\text{R}$

200 μA to 2 mA
10 Hz to 10 kHz $\pm 200 \text{nA} + 280 \mu\text{A/A} + 0.6\text{R}$

2 mA to 20 mA
10 Hz to 10 kHz $\pm 2 \mu\text{A} + 280 \mu\text{A/A} + 0.6\text{R}$

20 mA to 200 mA
10 Hz to 10 kHz $\pm 20 \mu\text{A} + 250 \mu\text{A/A} + 0.6\text{R}$

200 mA to 2 A
10 Hz to 2 kHz $\pm 0.2 \text{mA} + 600 \mu\text{A/A} + 0.6\text{R}$
2 kHz to 5 kHz $\pm 0.2 \text{mA} + 700 \mu\text{A/A} + 0.6\text{R}$

Calibration Certificate (Cont)

Certificate Number : CBRE-44116-CET