



MICRO PRECISION CALIBRATION PTE LTD
BLOCK 5008 ANG MO KIO AVENUE 5 #07-02/03
TECHPLACE II SINGAPORE 569874
65 67484384



Certificate of Calibration

Date: January 15, 2020

Cert No. 551220083418413

Customer:

GES SINGAPORE PTE LTD
28 MARSILING LANE
SINGAPORE 739152

Work Order #: SG-11013144

MPC Control #: 5278621
Asset ID: N/A
Gage Type: ELECTRICAL SAFETY ANALYZER
Manufacturer: QUADTECH
Model Number: GUARDIAN 6000
Size: N/A
Temp/RH: 22.2°C / 51 %
Location: Calibration performed at Customer's facility

Serial Number: 5278621
Department: N/A
Performed By: DIVIEERNRAJ CHANDRAN
Received Condition: IN TOLERANCE
Returned Condition: IN TOLERANCE
Cal. Date: January 15, 2020
Cal. Interval: 12 MONTHS
Cal. Due Date: January 15, 2021

Calibration Notes:

Performance test passed. See attached data (3 Pages).

Standards Used to Calibrate Equipment

I.D.	Description.	Model	Serial	Manufacturer	Cal. Due Date	Traceability #
CH2324	CURRENT SHUNT	34330A	0804	AGILENT	Sep 7, 2020	551220083200927
CA8201	225MHZ UNIVERSAL COUNTER	53132A	MY40004745	AGILENT	May 4, 2020	551220082996309
CA8197	80 MHZ FUNCTION / ARBITRARY WAVEFORM GENERATOR	33250A	MY40022550	AGILENT	Apr 20, 2020	551220082932726
CA8105	HIGH VOLTAGE DIGITALMETER	149-10A	VM002242	KIKUSUI ELECTRONICS CORP.	Mar 22, 2020	551220082881472
CA8106	CALIBRATOR FOR W.TESTER	TOS1200	VL002591	KIKUSUI ELECTRONICS CORP.	Mar 22, 2020	551220082881479
CA8198	PRECISION DECADE DC RESISTANCE BOX	SB2015-3	CA8198	CEPREI	Apr 12, 2020	17002776-0001
CA8285	MULTIMETER	3458A	2823A13788	HEWLETT PACKARD	Sep 3, 2020	551220083192129

Calibrating Technician:

DIVIEERNRAJ CHANDRAN

QC Approval:

JUN CALIMAG

Statements of Pass or Fail Conformance: The uncertainty of measurement has been taken into account when determining compliance with specification, as per ILAC-G8:03/2009. All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCCL Z540.3:2006.

The status of compliance with the acceptance criteria is reported as:

PASS - Compliant with specification.

FAIL - Not compliant with specification.

FAIL² - The measured value is not within the acceptance limits. However, a portion of the expanded uncertainty of measurement at 95% is within the specified tolerance.

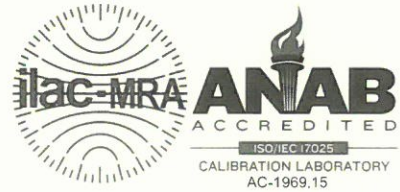
PASS² - The measured value is within acceptance limits. However, a portion of the expanded uncertainty of measurement at 95% exceeds the specified tolerance.

The expanded uncertainty of measurement is stated as the standard uncertainty multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated. This calibration report complies with ISO/IEC 17025:2017 and ANSI/NCCL Z540.3 Method 6-Guard Bands based on Test Uncertainty Ratio. Calibration cycles and resulting due dates were submitted/approved by the customer. Any number of factors may cause an instrument to drift out of tolerance before the next scheduled calibration. Recalibration cycles should be based on frequency of use, environmental conditions and customer's established systematic accuracy. All standards are traceable to SI through the National Institute of Standards and Technology (NIST) and/or recognized national or international standards laboratories. Services rendered include proper manufacturer's service instruction and are warranted for no less than thirty (30) days. The information on this report pertains only to the instrument identified, this may not be reproduced in part or in a whole without the prior written approval of the issuing MP Calibration Laboratory.

29 Jan 2020



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TECHPLACE II SINGAPORE 569874
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Certificate of Calibration

Date: January 15, 2020

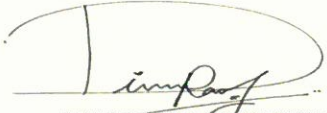
Cert No. 551220083418413

Procedures Used in this Event

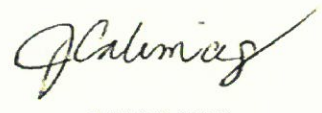
Procedure Name
QUADTECH 6000 Rev. B4

Description
Electrical Safety Analyzer Instruction Manual, Form 150354A

Calibrating Technician:


DIVIEERNRAJ CHANDRAN

QC Approval:


JUN CALIMAG

Statements of Pass or Fail Conformance: The uncertainty of measurement has been taken into account when determining compliance with specification, as per ILAC-G8:03/2009. All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCCL Z540.3-2006.

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FAIL² - The measured value is not within the acceptance limits. However, a portion of the expanded uncertainty of measurement at 95% is within the specified tolerance.

PASS² - The measured value is within acceptance limits. However, a portion of the expanded uncertainty of measurement at 95% exceeds the specified tolerance.

The expanded uncertainty of measurement is stated as the standard uncertainty multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated. This calibration report complies with ISO/IEC 17025:2017 and ANSI/NCCL Z540.3 Method 6-Guard Bands based on Test Uncertainty Ratio. Calibration cycles and resulting due dates were submitted/approved by the customer. Any number of factors may cause an instrument to drift out of tolerance before the next scheduled calibration. Recalibration cycles should be based on frequency of use, environmental conditions and customer's established systematic accuracy. All standards are traceable to SI through the National Institute of Standards and Technology (NIST) and/or recognized national or international standards laboratories. Services rendered include proper manufacturer's service instruction and are warranted for no less than thirty (30) days. The information on this report pertains only to the instrument identified, this may not be reproduced in part or in a whole without the prior written approval of the issuing MP Calibration Laboratory.


29 JAN 2020.



Quadtech Guardian 6000 Electrical Safety Analyzer

Procedure: QUADTECH 6000
 ID Number: 5278621
 Asset Number: N/A

Order Number: SG-11013144
 Serial Number: 5278621
 Calibration Date: January 15, 2020

AC Voltage Accuracy (@60 Hz)

Range	Nominal Value	Lower Limit	As Found	As Left	Error	Upper Limit	Result	Uncertainty (±)
0.5 to 5 kV	1.000 kV	0.985 kV	0.999 kV	0.999 kV	0.10 %	1.015 kV	PASS	0.0012 kV
0.5 to 5 kV	2.000 kV	1.975 kV	1.997 kV	1.997 kV	0.15 %	2.025 kV	PASS	0.00060 kV
0.5 to 5 kV	3.000 kV	2.965 kV	2.994 kV	2.994 kV	0.20 %	3.035 kV	PASS	0.00060 kV
0.5 to 5 kV	4.000 kV	3.955 kV	3.992 kV	3.992 kV	0.20 %	4.045 kV	PASS	0.00060 kV
0.5 to 5 kV	5.000 kV	4.945 kV	4.990 kV	4.990 kV	0.20 %	5.055 kV	PASS	0.00060 kV

DC Voltage Accuracy

Range	Nominal Value	Lower Limit	As Found	As Left	Error	Upper Limit	Result	Uncertainty (±)
0.5 to 6 kV	1.000 kV	0.985 kV	0.996 kV	0.996 kV	0.40 %	1.015 kV	PASS	0.0025 kV
0.5 to 6 kV	2.000 kV	1.975 kV	1.991 kV	1.991 kV	0.45 %	2.025 kV	PASS	0.0048 kV
0.5 to 6 kV	3.000 kV	2.965 kV	2.986 kV	2.986 kV	0.47 %	3.035 kV	PASS	0.0072 kV
0.5 to 6 kV	4.000 kV	3.955 kV	3.982 kV	3.982 kV	0.45 %	4.045 kV	PASS	0.010 kV
0.5 to 6 kV	5.000 kV	4.945 kV	4.977 kV	4.977 kV	0.46 %	5.055 kV	PASS	0.012 kV
0.5 to 6 kV	6.000 kV	5.935 kV	5.971 kV	5.971 kV	0.48 %	6.065 kV	PASS	0.014 kV

AC Current Accuracy (@60 Hz)

Range	Nominal Value	Lower Limit	As Found	As Left	Error	Upper Limit	Result	Uncertainty (±)
1 µA to 40 mA	0.500 mA	0.490 mA	0.500 mA	0.500 mA	0.00 %	0.510 mA	PASS	0.00059 mA
1 µA to 40 mA	1.000 mA	0.985 mA	1.010 mA	1.010 mA	1.00 %	1.015 mA	PASS	0.00063 mA
1 µA to 40 mA	2.000 mA	1.975 mA	1.990 mA	1.990 mA	0.50 %	2.025 mA	PASS	0.00074 mA
1 µA to 40 mA	5.000 mA	4.945 mA	4.980 mA	4.980 mA	0.40 %	5.055 mA	PASS	0.0017 mA
1 µA to 40 mA	10.000 mA	9.895 mA	9.990 mA	9.990 mA	0.10 %	10.105 mA	PASS	0.0027 mA
1 µA to 40 mA	20.00 mA	19.75 mA	19.95 mA	19.95 mA	0.25 %	20.25 mA	PASS	0.0074 mA
1 µA to 40 mA	35.00 mA	34.60 mA	34.77 mA	34.77 mA	0.66 %	35.40 mA	PASS	0.014 mA



Quadtech Guardian 6000 Electrical Safety Analyzer

Procedure: QUADTECH 6000
 ID Number: 5278621
 Asset Number: N/A

Order Number: SG-11013144
 Serial Number: 5278621
 Calibration Date: January 15, 2020

DC Current Accuracy

Range	Nominal Value	Lower Limit	As Found	As Left	Error	Upper Limit	Result	Uncertainty (±)
0.1 µA to 20 mA	0.200 mA	0.193 mA	0.198 mA	0.198 mA	1.00 %	0.207 mA	PASS	0.00057 mA
0.1 µA to 20 mA	0.500 mA	0.490 mA	0.500 mA	0.500 mA	0.00 %	0.510 mA	PASS	0.00057 mA
0.1 µA to 20 mA	1.000 mA	0.985 mA	0.990 mA	0.990 mA	1.00 %	1.015 mA	PASS	0.00057 mA
0.1 µA to 20 mA	2.000 mA	1.975 mA	1.990 mA	1.990 mA	0.50 %	2.025 mA	PASS	0.00058 mA
0.1 µA to 20 mA	5.000 mA	4.945 mA	4.970 mA	4.970 mA	0.60 %	5.055 mA	PASS	0.00065 mA
0.1 µA to 20 mA	10.000 mA	9.895 mA	9.940 mA	9.940 mA	0.60 %	10.105 mA	PASS	0.00082 mA
0.1 µA to 20 mA	15.00 mA	14.80 mA	15.08 mA	15.08 mA	0.53 %	15.20 mA	PASS	0.0057 mA

Insulation DC Voltage Accuracy

Function Tested	Nominal Value	Lower Limit	As Found	As Left	Error	Upper Limit	Result	Uncertainty (±)
0.500 kV	0.500 kV	0.490 kV	0.501 kV	0.501 kV	0.20 %	0.510 kV	PASS	0.0013 kV
1.000 kV	1.000 kV	0.985 kV	0.998 kV	0.998 kV	0.20 %	1.015 kV	PASS	0.0025 kV

Insulation Resistance Accuracy

Voltage Setting	Nominal Value	Lower Limit	As Found	As Left	Error	Upper Limit	Result	Uncertainty (±)
500 V	1.00 MΩ	0.85 MΩ	1.01 MΩ	1.01 MΩ	1.00 %	1.15 MΩ	PASS	0.0057 MΩ
500 V	10.00 MΩ	9.45 MΩ	10.02 MΩ	10.02 MΩ	0.20 %	10.55 MΩ	PASS	0.0057 MΩ
500 V	100.0 MΩ	94.5 MΩ	99.0 MΩ	99.0 MΩ	1.00 %	105.5 MΩ	PASS	0.059 MΩ
500 V	1000 MΩ	895 MΩ	980 MΩ	980 MΩ	2.00 %	1105 MΩ	PASS	0.59 MΩ
500 V	10.00 GΩ	8.45 GΩ	9.56 GΩ	9.56 GΩ	4.40 %	11.55 GΩ	PASS	0.013 GΩ
1000 V	1.00 MΩ	0.85 MΩ	0.98 MΩ	0.98 MΩ	2.00 %	1.15 MΩ	PASS	0.0057 MΩ
1000 V	10.00 MΩ	9.45 MΩ	10.11 MΩ	10.11 MΩ	1.10 %	10.55 MΩ	PASS	0.0057 MΩ
1000 V	100.0 MΩ	94.5 MΩ	99.8 MΩ	99.8 MΩ	0.20 %	105.5 MΩ	PASS	0.059 MΩ
1000 V	1000 MΩ	895 MΩ	981 MΩ	981 MΩ	1.90 %	1105 MΩ	PASS	0.59 MΩ
1000 V	10.00 GΩ	8.45 GΩ	9.56 GΩ	9.56 GΩ	4.40 %	11.55 GΩ	PASS	0.013 GΩ

Ground Bond AC Current Accuracy

Function Tested	Nominal Value	Lower Limit	As Found	As Left	Error	Upper Limit	Result	Uncertainty (±)
5.000 A	5.000 A	4.947 A	5.002 A	5.002 A	0.04 %	5.053 A	PASS	0.0073 A
10.000 A	10.000 A	9.897 A	9.985 A	9.985 A	0.15 %	10.103 A	PASS	0.014 A
15.00 A	15.00 A	14.82 A	14.97 A	14.97 A	0.20 %	15.18 A	PASS	0.022 A
20.00 A	20.00 A	19.77 A	19.96 A	19.96 A	0.20 %	20.23 A	PASS	0.029 A
25.00 A	25.00 A	24.72 A	24.95 A	24.95 A	0.20 %	25.28 A	PASS	0.036 A
30.00 A	30.00 A	29.67 A	29.94 A	29.94 A	0.20 %	30.33 A	PASS	0.043 A



Quadtech Guardian 6000 Electrical Safety Analyzer

Procedure: QUADTECH 6000
ID Number: 5278621
Asset Number: N/A

Order Number: SG-11013144
Serial Number: 5278621
Calibration Date: January 15, 2020

Resistance Accuracy

Function Tested	Nominal Value	Lower Limit	As Found	As Left	Error	Upper Limit	Result	Uncertainty (±)
@ 25 A	100.0 mΩ	98.7 mΩ	99.5 mΩ	99.5 mΩ	0.50 %	101.3 mΩ	PASS	0.15 mΩ

Timer Accuracy Check

Nominal Value	As Found	As Left	Error	Uncertainty (±)
5.00 s	5.00 s	5.00 s	0.00 %	0.14 s
10.00 s	9.99 s	9.99 s	-0.10 %	0.14 s

TE83090 QUADTECH GUARDIAN 6000 SETUP RECORD

ID Number: 91683 (5278621)Performed By: Tan Hong chengDate: 29 Jan 2020

Memory 1 12345678		
PARAMETER	VALUE	SETTING
Step 1		
Mode	GR	GR
Current	20.00A	20.00A
High Limit	100.0mΩ	100.0mΩ
Low Limit	Disable	Disable
Test Time	3.0s	3.0s
Step 2		
Mode	WDC	WDC
Voltage	2.100 kV	2.100kV
High Limit	5.00mA	5.00mA
Low Limit	Disable	Disable
Arc Limit	Disable	Disable
Test Time	3.0s	3.0s
Ramp Time	1.0s	1.0s

Key Lock locked ☒ (Key Lock LED illuminated)Program displayed: M01 (M01)

Approved by:

Performer: Tan Hong chengDate: 29 Jan 2020

Verified By: Test Engineering

Name: Htay Ei LwinTitle Product, Test EngineerSignature: Htay Ei LwinDate: 29 Jan 2020

End User Approval: Manufacturing Technician

Name: Kuan KeliTitle TechnicianSignature: KuanDate: 29 Jan 2020