



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

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CALIBRATION

Valid to: June 19, 2010 Certificate Number: AC - 1334

I. I. Electromagnetic – DC / Low Frequency

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
DC Voltage Source	(0 to 330) mV (0.33 to 3.3) V (3.3 to 33) V (33 to 330) V (100 to 1 020) V	60 μ V/V + 3 μ V 50 μ V/V + 5 μ V 50 μ V/V + 50 μ V 55 μ V/V + 500 μ V 55 μ V/V + 1500 μ V	Fluke 5500A ³	GIDEP & OEM
DC Voltage Measure	(10 to 100) mV 100 mV to 1 V (1 to 10) V (10 to 100) V (100 to 1 000) V	11 μ V/V + 0.3 mV 10 μ V/V + 0.3 mV 10 μ V/V + 0.5 mV 12 μ V/V + 30 μ V 22 μ V/V + 0.1 mV	HP 3458A	GIDEP & OEM
DC Current Source	(0 to 3.3) mA (3.3 to 33) mA (33 to 330) mA (0.33 to 2.2) A (2.2 to 11) A	130 μ A/A + 0.05 μ A 100 μ A/A + 0.25 μ A 100 μ A/A + 3.3 μ A 300 μ A/A + 44 μ A 600 μ A/A + 330 μ A	Fluke 5500A ³	GIDEP & OEM
DC Current Measure	100 μ A to 1 mA (1 to 10) mA (10 to 100) mA 100 mA to 1 A	25 μ V/V + 5 nA 25 μ V/V + 50 nA 40 μ V/V + 500 nA 115 μ V/V + 10 mA	HP 3458A	GIDEP & OEM



PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Voltage Source	(1 to 33) mV (10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	3.5 mV/V + 20 µV 1.5 mV/V + 20 µV 2 mV/V + 20 µV 2.5 mV/V + 20 µV 3.5 mV/V + 33 µV 10 mV/V + 60 µV	Fluke 5500A ³	GIDEP & OEM
	(33 to 330) mV (10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	2.5 mV/V + 50 µV 0.5 mV/V + 20 µV 1 mV/V + 20 µV 1.6 mV/V + 40 µV 2.4 mV/V + 170 µV 37 mV/V + 330 µV		
	(0.33 to 3.3) V (10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	1.5 mV/V + 250 µV 0.3 mV/V + 60 µV 0.8 mV/V + 60 µV 1.4 mV/V + 300 µV 2.4 mV/V + 1.7 mV 5 mV/V + 3.3 mV		
	(3.3 to 33) V (10 to 45) Hz (45 Hz to 10 kHz) (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	1.5 mV/V + 2.5 mV 0.4 mV/V + 0.6 mV 0.8 mV/V + 2.6 mV 1.9 mV/V + 5 mV 2.4 mV/V + 17 mV		
	(33 to 330) V (45 to 1 000) Hz (1 to 10) kHz (10 to 20) kHz	0.5 mV/V + 6.6 mV 0.8 mV/V + 15 mV 0.9 mV/V + 33 mV		
	(330 to 1 020) V (45 to 1 000) Hz (1 to 5) kHz (5 to 10) kHz	0.5 mV/V + 80 mV 2 mV/V + 100 mV 2 mV/V + 500 mV		



PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Current Source	(0.029 to 0.33) mA (10 to 20) Hz (20 to 45) Hz (45 to 1 000) Hz (1 to 5 kHz) (5 to 10) kHz	2.5 mA/A + 0.15 μ A 1.25 mA/A + 0.15 μ A 1.25 mA/A + 0.25 μ A 4 mA/A + 0.15 μ A 12.5 mA/A + 0.15 μ A	Fluke 5500A ³	GIDEP & OEM
	(0.33 to 3.3) mA (10 to 20) Hz (20 to 45) Hz (45 to 1 000) Hz (1 to 5) kHz (5 to 10) kHz	2 mA/A + 0.3 μ A 1 mA/A + 0.3 μ A 1 mA/A + 0.3 μ A 2 mA/A + 0.3 μ A 6 mA/A + 0.3 μ A		
	(3.3 to 33) mA (10 to 20) Hz (20 to 45) Hz (45 to 1 000) Hz (1 to 5) kHz (5 to 10) kHz	2 mA/A + 3 μ A 1 mA/A + 3 μ A 0.9 mA/A + 3 μ A 2 mA/A + 3 μ A 6 mA/A + 3 μ A		
	(33 to 330) mA (10 to 20) Hz (20 to 45) Hz (45 to 1 000) Hz (1 to 5) kHz (5 to 10) kHz	2 mA/A + 30 μ A 1 mA/A + 30 μ A 0.9 mA/A + 30 μ A 2 mA/A + 30 μ A 6 mA/A + 30 μ A		
	(0.33 to 2.2) A (10 to 45) Hz (45 to 1 000) Hz (1 to 5) kHz	2 mA/A + 300 μ A 1 mA/A + 300 μ A 7.5 mA/A + 300 μ A		
	(2.2 to 11) A (45 to 65) Hz (65 to 500) Hz (500 to 1 000) Hz	0.6 mA/A + 2 mA 1 mA/A + 2 mA 3.3 mA/A + 2 mA		



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AC Voltage - Measure	(1 to 10) mV (1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz (1 to 4) MHz (4 to 8) MHz	0.3 mV/V + 3 mV 0.2 mV/V + 1.1 mV 0.3 mV/V + 1.1 mV 1.0 mV/V + 1.1 mV 5.0 mV/V + 1.1 mV 40 mV/V + 2 mV 12 mV/V + 5 μV 70 mV/V + 7 μV 200 mV/V + 8 μV	HP 3458A	GIDEP & OEM
	(10 to 100) mV (1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz (1 to 4) MHz (4 to 8) MHz (8 to 10) MHz	72 μV/V + 5 mV 72 μV/V + 2 mV 142 μV/V + 2 mV 302 μV/V + 2 mV 802 μV/V + 2 mV 3.0 mV/V + 10 mV 10 mV/V + 10 mV 15 mV/V + 10 mV 40 mV/V + 8 μV 150 mV/V + 100 μV		
	100 mV to 1 V (1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz (1 to 4) MHz (4 to 8) MHz (8 to 10) MHz	72 μV/V + 40 μV 72 μV/V + 20 μV 142 μV/V + 20 μV 302 μV/V + 20 μV 802 μV/V + 20 μV 3.0 mV/V + 0.1 mV 10 mV/V to 0.1 mV 15 mV/V + 0.1 mV 40 mV/V + 0.8 mV 150 mV/V + 1 mV		
	(1 to 10) V (1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz (1 to 4) MHz (4 to 8) MHz (8 to 10) MHz	72 μV/V + 40 μV 72 μV/V + 20 μV 142 μV/V + 20 μV 302 μV/V + 20 μV 802 μV/V + 20 μV 3.0 mV/V + 0.1 mV 10 mV/V to 0.1 mV 15 mV/V + 0.1 mV 40 mV/V + 0.8 mV 150 mV/V + 1 mV		

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Voltage -- Measure	<p>(10 to 100) V (1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz</p> <p>(100 to 1 000) V (1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz</p>	<p>200 $\mu\text{V}/\text{V}$ + 4 mV 200 $\mu\text{V}/\text{V}$ + 2 mV 200 $\mu\text{V}/\text{V}$ + 2 mV 350 $\mu\text{V}/\text{V}$ + 2 mV 1.2 mV/V + 2 mV 4.0 mV/V + 10 mV 150 mV/V + 10 mV</p> <p>400 $\mu\text{V}/\text{V}$ + 40 mV 400 $\mu\text{V}/\text{V}$ + 20 mV 600 $\mu\text{V}/\text{V}$ + 20 mV 1.2 mV/V + 20 mV 3.0 mV/V + 20 mV</p>	HP 3458A	GIDEP & OEM
AC Current -- Measure	<p>(5 to 100) μA (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 1 kHz</p> <p>100 μA to 1 mA (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (5 to 20) kHz (20 to 50) kHz (50 to 100) kHz</p> <p>(1 to 10) mA (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (5 to 20) kHz (20 to 50) kHz (50 to 100) kHz</p>	<p>4.0 mA/A + 30 nA 1.5 mA/A + 30 nA 0.6 mA/A + 30 nA 0.6 mA/A + 30 nA</p> <p>4.0 mA/A + 0.2 mA 1.5 mA/A + 0.2 mA 0.6 mA/A + 0.2 mA 0.3 mA/A + 0.2 mA 0.6 mA/A + 0.4 mA 4.0 mA/A + 0.4 mA 5.5 mA/A + 1.5 mA</p> <p>4.0 mA/A + 2 mA 1.5 mA/A + 2 mA 0.6 mA/A + 2 mA 0.3 mA/A + 2 mA 0.6 mA/A + 2 mA 4.0 mA/A + 4 mA 5.5 mA/A + 15 mA</p>	HP 3458A	GIDEP & OEM



PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Current – Measure (cont.)	(10 to 100) mA (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (5 to 20) kHz (20 to 50) kHz (50 to 100) kHz 100 mA to 1 A (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (5 to 20) kHz (20 to 50) kHz	4.0 mA/A + 20 mA 1.5 mA/A + 20 mA 0.6 mA/A + 20 mA 0.3 mA/A + 20 mA 0.6 mA/A + 20 mA 4.0 mA/A + 40 mA 5.5 mA/A + 150 mA 4.0 mA/A + 200 mA 1.6 mA/A + 200 mA 0.8 mA/A + 200 mA 1.0 mA/A + 200 mA 3.0 mA/A + 200 mA 10 mA/A + 400 mA	HP 3458A	GIDEP & OEM
Resistance Source	(0 to 11) Ω (11 to 33) Ω (33 to 110) Ω (110 to 330) Ω (330 to 1100) Ω (1.1 to 3.3) kΩ (3.3 to 11) kΩ (11 to 33) kΩ (33 to 110) kΩ (110 to 330) kΩ (330 to 1100) kΩ (1.1 to 3.3) MΩ (3.3 to 11) MΩ (11 to 33) MΩ (33 to 110) MΩ (110 to 330) MΩ	0.12 mΩ/Ω + 8 mΩ 0.12 mΩ/Ω + 15 mΩ 0.09 mΩ/Ω + 15 mΩ 0.09 mΩ/Ω + 15 mΩ 0.09 mΩ/Ω + 60 mΩ 0.09 mΩ/Ω + 60 mΩ 0.09 mΩ/Ω + 600 mΩ 0.09 mΩ/Ω + 600 mΩ 0.11 mΩ/Ω + 6 Ω 0.12 mΩ/Ω + 6 Ω 0.15 mΩ/Ω + 55 Ω 0.15 mΩ/Ω + 55 Ω 0.6 mΩ/Ω + 550 Ω 1 mΩ/Ω + 550 Ω 5 mΩ/Ω + 5.5 kΩ 5 mΩ/Ω + 16.5 kΩ	Fluke 5500A ³	GIDEP & OEM
Resistance – Measure	(0 to 10) Ω (10 to 100) Ω 100 Ω to 1 kΩ (1 to 10) kΩ (10 to 100) kΩ 100 kΩ to 1 MΩ (1 to 10) MΩ (10 to 100) MΩ 100 MΩ to 1 GΩ	18 μΩ/ Ω + 50 μΩ 13 μΩ/ Ω + 0.5 mΩ 11 μΩ/ Ω + 0.5 mΩ 11 μΩ/ Ω + 5 mΩ 11 μΩ/ Ω + 50 mΩ 15 μΩ/ Ω + 2 Ω 53 μΩ/ Ω + 100 Ω 503 μΩ/ Ω + 1 kΩ 5.0 mΩ/ Ω + 10 kΩ	HP 3458A	GIDEP & OEM

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Capacitance --Source	<p>DC and (50 to 1 000) Hz (0.33 to 0.5) nF (0.5 to 1.1) nF (1.1 to 3.3) nF (3.3 to 11) nF (11 to 33) nF (33 to 110) nF (110 to 330) nF (0.33 to 1.1) μF (1.1 to 3.3) μF</p> <p>DC and (50 to 400) Hz (3.3 to 11) μF (11 to 33) μF</p> <p>DC and (50 to 200) Hz (33 to 110) μF</p> <p>DC and (50 to 100) Hz (110 to 330) μF (0.33 to 1.1) mF</p>	<p>5 mF/F + 0.01 nF 5 mF/F + 0.01 nF 5 mF/F + 0.01 nF 5 mF/F + 0.01 nF 2.5 mF/F + 0.1 nF 2.5 mF/F + 0.1 nF 2.5 mF/F + 0.3 nF 2.5 mF/F + 1 nF 3.5 mF/F + 3 nF</p> <p>3.5 mF/F + 10 nF 4 mF/F + 30 nF</p> <p>5 mF/F + 100 nF</p> <p>7 mF/F + 300 nF 10 mF/F + 300 nF</p>	Fluke 5500A ³	GIDEP & OEM
Thermocouple Temperature Simulation	<p>(Type B) (600 to 800) °C (800 to 1 000) °C (1 000 to 1 550) °C (1 550 to 1 820) °C</p> <p>(Type C) (0 to 150) °C (150 to 650) °C (650 to 1 000) °C (1 000 to 1 800) °C (1 800 to 2 316) °C</p> <p>(Type E) (-250 to -100) °C (-100 to -25) °C (-25 to 350) °C (350 to 650) °C (650 to 1 000) °C</p>	<p>0.44 °C 0.34 °C 0.30 °C 0.33 °C</p> <p>0.30 °C 0.26 °C 0.31 °C 0.50 °C 0.84 °C</p> <p>0.50 °C 0.16 °C 0.14 °C 0.16 °C 0.21 °C</p>	Fluke 5500A ³	GIDEP & OEM



PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Thermocouple Temperature Simulation (cont.)	(Type J)		Fluke 5500A ³	GIDEP & OEM
	(-210 to -100) °C	0.27 °C		
	(-100 to -30) °C	0.16 °C		
	(-30 to 150) °C	0.14 °C		
	(150 to 760) °C	0.17 °C		
	(760 to 1 200) °C	0.23 °C		
	(Type K)			
	(-200 to -100) °C	0.33 °C		
	(-100 to -25) °C	0.18 °C		
	(-25 to 120) °C	0.16 °C		
	(120 to 1 000) °C	0.26 °C		
	(1 000 to 1 372) °C	0.40 °C		
	(Type L)			
	(-200 to -100) °C	0.37 °C		
	(-100 to 800) °C	0.26 °C		
	(800 to 900) °C	0.17 °C		
	(Type N)			
	(-200 to -100) °C	0.40 °C		
	(-100 to -25) °C	0.22 °C		
	(-25 to 120) °C	0.19 °C		
	(120 to 410) °C	0.18 °C		
	(410 to 1 300) °C	0.27 °C		
	(Type R)			
	(0 to 250) °C	0.57 °C		
	(250 to 400) °C	0.35 °C		
	(400 to 1 000) °C	0.33 °C		
	(1 000 to 1 767) °C	0.40 °C		
	(Type S)			
(0 to 250) °C	0.47 °C			
(250 to 1 000) °C	0.36 °C			
(1 000 to 1 400) °C	0.37 °C			
(1 400 to 1 767) °C	0.46 °C			
(Type T)				
(-250 to -150) °C	0.63 °C			
(-150 to 0) °C	0.24 °C			
(0 to 120) °C	0.16 °C			
(120 to 400) °C	0.14 °C			
(Type U)				
(-200 to 0) °C	0.59 °C			
(0 to 600) °C	0.27 °C			



II. Thermodynamic

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Thermometers	0.01 °C ice point reference (-199 to 660) °C	0.105 °C 0.047 °C	Hart TPW Cell PRT w/BlackStack	GIDEP & OEM

III. Mechanical

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Pressure Hydraulic Pneumatic	(10 to 1 500) psig (150 to 15 000) psig (1 to 300) psig	1.2 psig 6.2 psig 0.085 psig	M&G Deadweight Tester M&G RK-300	GIDEP & OEM
	(-14.7 to 0) psig +/- 0.36 psig +/- 0.9 psig +/- 2.5 psig +/- 7.5 psig (11 to 17) psig	0.028 psig 0.006 psig 0.009 psig 0.003 psig 0.007 psig 0.01 psig	Mensor APC600	
Torque Wrench	(4 to 50) lb-in (30 to 400) lb-in (80 to 1 000) lb-in (25 to 250) lb-ft	0.17 lb-in 1.0 lb-in 3.5 lb-in 0.87 lb-ft	CDI 2000 Multitest calibration system	GIDEP & OEM
Torque Measuring Equipment	(4 to 50) lb-in (30 to 400) lb-in (80 to 1 000) lb-in (25 to 250) lb-ft	0.029 lb-in 0.18 lb-in 0.48 lb-in 0.12 lb-ft	Torque wheel/arm with mass	GIDEP & OEM
Force Compression Tension	(0 to 500) lb (0 to 500) lb	0.061 lbf 0.061 lbf	Class F Weights Class F Weights	GIDEP & OEM
Stopwatches & Digital Timers	(0 to 24) hr	487 ms	Universal Counter NIST Time Signal	GIDEP & OEM
Tachometers	(0 to 99,999) RPM	1.3 RPM	Frequency Generator & Counter	GIDEP & OEM

IV. Dimensional

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Calipers	Up to 6 in (6 to 24) in (24 to 48) in	171 μin 338 μin 653 μin	Grade 2 gage blocks	GIDEP & OEM
Micrometers	Up to 24 in	249 μin	Grade 2 gage blocks	GIDEP & OEM
Indicators	Up to 1 in	89.9 μin	Grade 2 gage blocks	GIDEP & OEM
Test Indicators	Up to 0.060 in	74.6 μin		
Height Gage	Up to 24 in	267 μin	Grade 2 gage blocks	GIDEP & OEM

Notes:

1. Best Measurement Uncertainties (Expanded Uncertainty) are based on approximately a 95% confidence interval, using a coverage of $k=2$
2. This scope is part of and must be included with the Certificate of Accreditation No AC - 1334
3. The measurands stated that are generated with the Fluke 5500A and the uncertainty statements, V , A , Ω and F are the symbols for volts, amperes, ohms and farads respectively, while the best measurement uncertainty is read as units of output plus the one-year floor specification where used.



Vice-President

