FLUKE®
Calibration

8558A

8 1/2 Digit Multimeter

Product Specifications

March 2019 Rev. A

General Specifications

Power

Voltage ..... 100 V to 120 V, 200 V to 240 V
Frequency ..... 47 Hz to 63 Hz
Fuse T1.25AH 250V
Consumption ..... 80 VA max
Power cord ..... IEC 60320-C13 receptacle, NEMA-5-15 plug, cable 3 core 18AWG to SVT

Dimensions

Height ..... 88 mm (3.5 in)
Width (excluding handles) 431 mm (17 in)
Width (including handles) . 440 mm (17.3 in)
Depth (excluding handles) 475 mm (18.7 in)
Depth (including handles). 510 mm (20.1 in)
Weight ..... 9.8 kg (21.5 lb)

Environment

Temperature

Operating..... 0 °C to 50 °C
Specified operation..... 5 °C to 40 °C
Storage..... -20 °C to 70 °C
Calibration (Tcal)..... 20 °C to 25 °C
Warm up..... 3 hours to full specification

Relative Humidity (non-condensing)

Operating..... <90 % (5 °C to 40 °C)
Storage..... <95 % (0 °C to 70 °C)

Altitude

Operating..... 3000 m
Storage..... 12 000 m

Vibration and Shock ..... Complies with MIL-PRF-28800F Class 3

EMC

IEC61326-1 ..... (Controlled EM Environment); CISPR 11, Group 1, Class A
FCC ..... 47 CFR 15 subpart B, this product is considered an exempt device per clause 15.103
Korea (KCC)..... Class A equipment (Industrial Broadcasting & Communication Equipment)

Safety Compliance

Mains ..... IEC 61010-1: Overvoltage Category II, Pollution Degree 2

Measurement..... IEC 61010-2-030: Not Category rated, 1485 Vpk Maximum, 1050 Vrms Maximum

Measurement Isolation

Guard to Safety ground .... <700 pF, >10 GΩ

Lo to Guard

External Guard ON ..... <1700 pF, >10 GΩ (not in Resistance function)

External Guard OFF ..... Lo and Guard terminals internally shorted (<1700 pF, >10 GΩ in Resistance)

Remote Interfaces ..... GPIB IEEE 488.2, USBTMC, Ethernet

Electrical Specifications

Maximum Voltage and Current Inputs

Notes

To avoid potential damage:

- This product must not be used to measure Category rated Mains Voltages.
- The maximum current available from voltage sources being measured must not exceed 200 mA.
- The maximum voltage from current sources being measured must not exceed 5 V.
- Do not permit transient voltages beyond the limits in the tables below.

Maximum dc input equal to maximum RMS input. Maximum peak input is RMS x 1.414.

Specifications apply equally to front and rear input terminals except where noted below.

Front to rear isolation allows opposing polarity of maximum terminal voltage on each input.

Digital I/O Ground (DigGnd) is internally connected to Safety Ground (Ground).

Maximum Common Mode voltage with respect to Safety Ground is 1.7×10^5 VHz.

DCV, ACV, Voltage Digitizing, and Thermocouple

Maximum rms terminal voltages

							SENSE HI
						Hi	250 V
					SENSE LO	1050 V	1050 V
				LO	250 V	1050 V	1050 V
			A	250 V	250 V	1050 V	1050 V
		Guard	250 V	250 V	250 V	1050 V	1050 V
	DigGnd	650 V	650 V	650 V	650 V	1050 V	1050 V
Ground	0 V	650 V	650 V	650 V	650 V	1050 V	1050 V

The A terminal is open circuit in these functions.

DCI, ACI, and Current Digitizing

Maximum rms terminal voltages

							SENSE HI
						Hi	250 V
					SENSE LO	1050 V	1050 V
				LO	250 V	1050 V	1050 V
			A	5 V	250 V	1050 V	1050 V
		Guard	250 V	250 V	250 V	1050 V	1050 V
	DigGnd	650 V	650 V	650 V	650 V	1050 V	1050 V
Ground	0 V	650 V	650 V	650 V	650 V	1050 V	1050 V

DCI, ACI, and Current Digitizing

Maximum rms terminal Currents

	Guard	A	LO	SENSE LO	Hi	SENSE HI
Front Input	N/A	30.2 A	30.2 A	N/A	N/A	N/A
Rear Input	N/A	2.02 A	2.02 A	N/A	N/A	N/A

The SENSE LO, SENSE HI, and HI terminals are open circuit in these functions. The front input A terminal protection is automatic and self-resetting, and does not interrupt current flow.

⚠ Caution

Damage will occur if >30 A is applied to the front current terminals and the current source maximum compliance is >5 V.

The rear input A terminal is protected by a fuse on the rear panel.

Resistance and PRT

Maximum rms terminal voltages

							SENSE HI
						HI	250 V
					SENSE LO	1050 V	1050 V
				LO	250 V	1050 V	1050 V
			A	250 V	250 V	250 V	250 V
		Guard	250 V	250 V	250 V	1050 V	1050 V
	DigGnd	650 V	650 V	650 V	650 V	1050 V	1050 V
Ground	0 V	650 V	650 V	650 V	650 V	1050 V	1050 V

The A terminal is open circuit in these functions.

Performance Specifications

The product specifications describe the Absolute Instrumental Uncertainty of the Product. The product specifications include stability, temperature, and humidity; within specified limits, linearity, line and load regulation, and the reference standard measurement uncertainty. The product specifications are provided at a 99 %, k=2.58, normally distributed and a 95 %, k=2, normally distributed level of confidence. Fluke Calibration guarantees product performance to the 99 % level of confidence.

DC Voltage [1][2][3][4]

DC Voltage maximum resolution is 8 digits

Aperture ≥ 100 µs

95 % Confidence			Relative Accuracy					Absolute Accuracy		
			±(µV/V of reading + µV/V of range)							
Range	**Zin**	**Full Scale**	**Transfer, 20 min** [15]	**24 Hour Tcal ± 1 °C**	**90 day Tcal ± 1 °C**	**365 day Tcal ± 1 °C**	**2 years Tcal ±1 °C**	**365 day Tcal ± 1 °C**	**365 day Tcal ± 5 °C**	**2 year Tcal ± 5 °C**
100 mV	Auto, 10 MΩ, 1 MΩ	202 mv	0.2 + 2.0	1.0 + 2.0	2.0 + 2.0	4.0 + 2.0	8.0 + 2.0	5.9 + 2.0	8.3 + 2.0	17 + 2.0
1 V	Auto, 10 MΩ, 1 MΩ	2.02 V	0.06 + 0.3	1.0 + 0.35	2.0 + 0.4	4.0 + 0.4	8.0 + 0.4	4.1 + 0.4	5.3 + 0.4	11 + 0.4
10 V	Auto, 10 MΩ, 1 MΩ	20.2 V	0.05 + 0.05	0.5 + 0.06	2.0 + 0.06	4.0 + 0.06	8.0 + 0.06	4.1 + 0.06	5.3 + 0.06	11 + 0.06
100 V	Auto, 10 MΩ	202 V	0.4 + 0.3	1.5 + 0.35	3.0 + 0.4	6.0 + 0.4	12 + 0.4	6.1 + 0.4	8.5 + 0.4	17 + 0.4
100 V	1 MΩ	202 V	2.0 + 5.0	2.0 + 5.0	5.0 + 5.0	10 + 5.0	20 + 5.0	10 + 5.0	16 + 5.0	32 + 5.0
1000 V	Auto, 10 MΩ	1050 V	0.4 + 0.5	1.5 + 1.3	3.0 + 1.3	6.0 + 1.3	12 + 1.3	6.2 + 1.3	8.6 + 1.3	17 + 1.3
1000 V	1 MΩ	1050 V	4.0 + 25	4.0 + 25	5.0 + 25	10 + 25	20 + 25	10 + 25	16 + 25	32 + 25

99 % Confidence			Relative Accuracy					Absolute Accuracy		
			±(µV/V of reading + µV/V of range)							
Range	**Zin**	**Full Scale**	**Transfer, 20 min** [15]	**24 Hour Tcal ± 1 °C**	**90 day Tcal ± 1 °C**	**365 day Tcal ± 1 °C**	**2 years Tcal ±1 °C**	**365 day Tcal ± 1 °C**	**365 day Tcal ± 5 °C**	**2 year Tcal ± 5 °C**
100 mV	Auto, 10 MΩ, 1 MΩ	202 mv	0.26 + 2.6	1.29 + 2.6	2.6 + 2.6	5.2 + 2.6	10.3 + 2.6	7.6 + 2.6	10.7 + 2.6	21 + 2.6
1 V	Auto, 10 MΩ, 1 MΩ	2.02 V	0.08 + 0.39	1.29 + 0.45	2.6 + 0.45	5.2 + 0.45	10.3 + 0.45	5.3 + 0.45	6.8 + 0.45	14 + 0.45
10 V	Auto, 10 MΩ, 1 MΩ	20.2 V	0.06 + 0.06	0.65 + 0.08	2.6 + 0.08	5.2 + 0.08	10.3 + 0.08	5.3 + 0.08	6.8 + 0.08	14 + 0.08
100 V	Auto, 10 MΩ	202 V	0.52 + 0.39	1.9 + 0.45	3.9 + 0.45	7.7 + 0.45	15 + 0.45	7.8 + 0.45	10.9 + 0.45	22 + 0.45
100 V	1 MΩ	202 V	2.6 + 6.5	2.6 + 6.5	6.5 + 6.5	13 + 6.5	26 + 6.5	13 + 6.5	21 + 6.5	41 + 6.5
1000 V	Auto, 10 MΩ	1050 V	0.52 + 0.65	1.9 + 1.68	3.9 + 1.68	7.7 + 1.68	15 + 1.68	8.0 + 1.68	11.1 + 1.68	22 + 1.68
1000 V	1 MΩ	1050 V	5.2 + 32	5.2 + 32	6.5 + 32	13 + 32	26 + 32	13 + 32	21 + 32	42 + 32

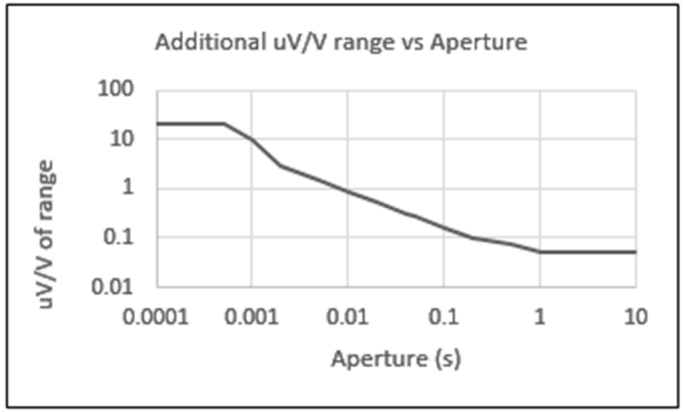
Temperature Coefficient (not applicable if within Tcal ± 1 °C)

Aperture ≥ 100 µs		**± (µV/V of reading/°C + µV/V of range/°C)**
Range	**Zin**	**5 °C to 40 °C** [13]
100 mV	Auto, 10 MΩ, 1 MΩ	0.6 + 0.5
1 V	Auto, 10 MΩ, 1 MΩ	0.3 + 0.25
10 V	Auto, 10 MΩ, 1 MΩ	0.3 + 0.2
100 V	Auto, 10 MΩ	0.6 + 0.25
100 V	1 MΩ	1.5 + 0.25
1000 V	Auto, 10 MΩ	0.6 + 0.2
1000 V	1 MΩ	1.5 + 0.2

Aperture Range ..... 100 µs to 2 s in 200 ns increments, >2 s to 10 s in 1 ms increments.

Minimum trigger interval is the aperture plus 170 µs. For example at 50 Hz line frequency, 0.1plc, the minimum interval is 0.002 + 0.00011 seconds = 0.00211 seconds (read rate 474 Hz).

Additional errors (aperture ≥ 100 µs):	
Aperture	**µV/V of Reading**
1 s to 10 s	0
100 ms to <1 s	0.05
10 ms to 100 ms	0.50
10 ms to 50 ms	1.00
2 ms	2.00
1 ms	10.00
<500 µs	20.00



Aperture ≥100 µs; additional uncertainty with read rate: (Period = aperture + delay between readings)

Read Period	± (µV/V of reading + µV/V of range)
<20 ms	0.2 + 0.0
<10 ms	0.5 + 0.2
<6 ms	5.0 + 0.5
<3 ms	20 + 2.0
<2 ms	40 + 5.0

Maximum Trigger Rate (Aperture = 100 µs)....(Ascii format - for faster sampling rates see Digitizing)

4700 readings/s

(Maximum Block size of 10 000 000 samples)

Aperture <100 µs

95 % Confidence

			Relative Accuracy				Absolute Accuracy		
			± (µV/V of reading + µV/V of range)						
Range	**Zin**	**Full Scale**	**24 Hour Tcal ± 1 °C**	**90 day Tcal ± 1 °C**	**365 day Tcal ± 1 °C**	**2 years Tcal ± 1 °C**	**365 day Tcal ± 1 °C**	**365 day Tcal ± 5 °C**	**2 year Tcal ± 5 °C**
100 mV	Auto, 10 MΩ, 1 MΩ	202 mv	3.3 + 15	20 + 15	44 + 15	62 + 15	45 + 15	63 + 15	80 + 15
1 V	Auto, 10 MΩ, 1 MΩ	2.02 V	3.3 + 15	20 + 15	44 + 15	62 + 15	45 + 15	59 + 15	76 + 15
10 V	Auto, 10 MΩ, 1 MΩ	20.2 V	3.3 + 15	20 + 15	44 + 15	62 + 15	45 + 15	59 + 15	76 + 15
100 V	Auto, 10 MΩ	202 V	3.3 + 15	20 + 15	44 + 15	62 + 15	45 + 15	59 + 15	76 + 15
100 V	1 MΩ	202 V	3.3 + 15	20 + 15	44 + 15	62 + 15	45 + 15	59 + 15	76 + 15
1000 V	Auto, 10 MΩ	1050 V	3.3 + 15	20 + 15	44 + 15	62 + 15	45 + 15	63 + 15	80 + 15
1000 V	1 MΩ	1050 V	4.0 + 15	20 + 15	44 + 15	62 + 15	45 + 15	63 + 15	80 + 15

99 % Confidence			Relative Accuracy				Absolute Accuracy		
			± (µV/V of reading + µV/V of range)						
Range	**Zin**	**Full Scale**	**24 Hour Tcal ± 1 °C**	**90 day Tcal ± 1 °C**	**365 day Tcal ± 1 °C**	**2 years Tcal ± 1 °C**	**365 day Tcal ± 1 °C**	**365 day Tcal ± 5 °C**	**2 year Tcal ± 5 °C**
100 mV	Auto, 10 MΩ, 1 MΩ	202 mv	4.3 + 19	26 + 19	57 + 19	80 + 19	58 + 19	81 + 19	103 + 19
1 V	Auto, 10 MΩ, 1 MΩ	2.02 V	4.3 + 19	26 + 19	57 + 19	80 + 19	58 + 19	76 + 19	98 + 19
10 V	Auto, 10 MΩ, 1 MΩ	20.2 V	4.3 + 19	26 + 19	57 + 19	80 + 19	58 + 19	76 + 19	98 + 19
100 V	Auto, 10 MΩ	202 V	4.3 + 19	26 + 19	57 + 19	80 + 19	58 + 19	76 + 19	98 + 19
100 V	1 MΩ	202 V	4.3 + 19	26 + 19	57 + 19	80 + 19	58 + 19	76 + 19	98 + 19
1000 V	Auto, 10 MΩ	1050 V	4.3 + 19	26 + 19	57 + 19	80 + 19	58 + 19	81 + 19	103 + 19
1000 V	1 MΩ	1050 V	5.2 + 19	26 + 19	57 + 19	80 + 19	58 + 19	81 + 19	103 + 19

Temperature Coefficient (not applicable if within Tcal ±1 °C)

Aperture < 100 µs		**± (µV/V of reading/°C + µV/V of range/°C)**
Range	**Zin**	**5 °C to 40 °C** [13]
100 mV	Auto, 10 MΩ, 1 MΩ	4.5 + 12
1 V	Auto, 10 MΩ, 1 MΩ	3.3 + 9.3
10 V	Auto, 10 MΩ, 1 MΩ	3.3 + 9.3
100 V	Auto, 10 MΩ	3.3 + 9.3
100 V	1 MΩ	3.3 + 9.3
1000 V	Auto, 10 MΩ	4.5 + 9.3
1000 V	1 MΩ	4.5 + 9.3

Aperture <100 µs "0" to 99.8 µs in 200 ns increments

Minimum trigger interval is the aperture plus 30 µs. For example with aperture = 50 µs, the minimum interval is 50 µs + 30 µs = 80 µs (read rate 12.5 kHz). Note maximum read rate is limited to 20 kHz by other factors; see the System Speed specifications.

(There is an additional 30 µs on each conversion).

All Apertures

CMRR [5]..... 140 dB at dc and 1 Hz - 60 Hz (1 kΩ unbalance)

NMRR [5]..... 70 dB at 50/60 Hz ±0.1 %

Protection ..... All Ranges 1 kV RM

Input Impedance

Auto ..... 100 mV to 10 V Ranges ..... >1 TΩ

100 V and 1000 V Range ..... 10 MΩ ±1 %

10 MΩ ……All Ranges ..... 10 MΩ ±1 %

1 MΩ …… All Ranges ..... 1.01 MΩ ±1 %

Input Current …….. 100 mV to 10 V Ranges (Auto Zin): ... ±20 pA ±1 pA/°C

Settling Time …….. to 10 µV/V of step size: ..... <50 ms

Ratio Accuracy

Range to Range ..... Apply a Root Sum of Squares combination of Net Front Input Accuracy and Net rear Input Accuracy

Within Range ..... Using the 24 hour or 20 minute Transfer Uncertainty specifications as appropriate, apply a Root Sum of Squares combination of specified accuracy of the Front Input signal and the specified accuracy of the Rear Input signal.

DC Current [1][2][3][4]

DC Current maximum resolution is 7 digits

Aperture ≥100 µs

95 % Confidence			Relative Accuracy				Absolute Accuracy		
		± (µA/A of reading + µA/A of range)							
Range	**Full Scale**	**Transfer, 20 min** [15]	**24 Hour Tcal ± 1 °C**	**90 day Tcal ± 1 °C**	**365 day Tcal ± 1 °C**	**2 years Tcal ± 1 °C**	**365 day Tcal ± 1 °C**	**365 day Tcal ± 5 °C**	**2 year Tcal ± 5 °C**
10 µA	20.2 µA	5.0 + 20	11 + 40	18 + 40	25 + 40	38 + 40	29 + 40	31 + 40	47 + 40
100 µA	202 µA	0.25 + 1	8.00 + 5	8.5 + 5	9.0 + 5	14 + 5	10 + 5	12 + 5	18 + 5
1 mA	2.02 mA	0.25 + 1	8.00 + 5	8.5 + 5	9.0 + 5	14 + 5	9.8 + 5	11 + 5	17 + 5
10 mA	20.2 mA	0.25 + 1	9.00 + 5	9.5 + 5	10 + 5	15 + 5	11 + 5	15 + 5	23 + 5
100 mA	202 mA	1.0 + 4	30 + 15	33 + 15	35 + 15	53 + 15	35 + 15	59 + 15	89 + 15
1 A	2.02 A	2.0 + 25	80 + 150	100 + 150	120 + 150	180 + 150	120 + 150	152 + 150	229 + 150

99 % Confidence			Relative Accuracy				Absolute Accuracy		
		± (µA/A of reading + µA/A of range)							
Range	**Full Scale**	**Transfer, 20 min** [15]	**24 Hour Tcal ± 1 °C**	**90 day Tcal ± 1 °C**	**365 day Tcal ± 1 °C**	**2 years Tcal ± 1 °C**	**365 day Tcal ± 1°C**	**365 day Tcal ± 5 °C**	**2 year Tcal ± 5 °C**
10 µA	20.2 µA	6.45 + 26	14 + 52	23 + 52	32 + 52	48 + 52	37 + 52	40 + 52	60 + 52
100 µA	202 µA	0.32 + 1	10 + 6	11 + 6	12 + 6	17 + 6	13 + 6	15 + 6	23 + 6
1 mA	2.02 mA	0.32 + 1	10 + 6	11 + 6	12 + 6	17 + 6	13 + 6	15 + 6	22 + 6
10 mA	20.2 mA	0.32 + 1	12 + 6	12 + 6	13 + 6	19 + 6	14 + 6	20 + 6	30 + 6
100 mA	202 mA	1.3 + 5	39 + 19	42 + 19	45 + 19	68 + 19	45 + 19	76 + 19	115 + 19
1 A	2.02 A	2.6 + 32	103 + 194	129 + 194	155 + 194	232 + 194	155 + 194	197 + 194	295 + 194

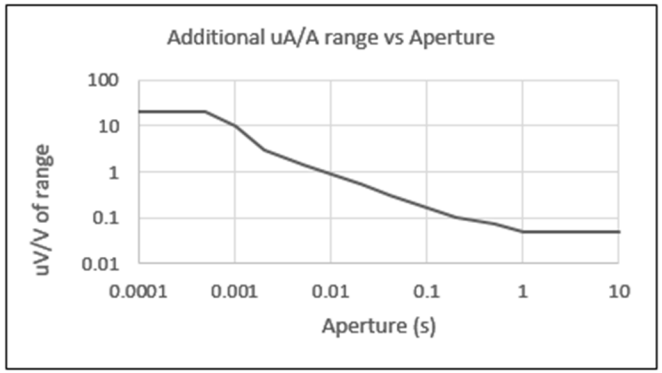
Temperature Coefficient (not applicable if within Tcal ± 1 °C)

Aperture ≥100 µs

Range	± µA/A of reading/°C		± µA/A of reading/°C + µA/A of range/°C
	15 °C to 30 °C		5 °C to 40 °C [13]
10 µA	0.6	or	0.9 + 5
100 µA	0.4	or	0.6 + 1
1 mA	0.4	or	0.6 + 0.5
10 mA	1.2	or	1.8 + 0.5
100 mA	6.0	or	9 + 0.5
1 A	8.0	or	12 + 0.5

Aperture range ..... 100 µs to 2 s in 200 ns increments, >2 s to 10 s in 1 ms increments.
Maximum trigger interval is the aperture plus 170 µs. For example at 50 Hz line frequency, 0.1plc, the maximum interval is 0.002 seconds + 0.00011 seconds = 0.00211 seconds (read rate 474 Hz).

Additional errors (aperture ≥100 µs)	
Aperture	**µA/A of reading**
1 s to 10 s	0
100 ms to <1 s	0.05
10 ms to 100 ms	0.50
10 ms to 50 ms	1.00
2 ms	2.00
1 ms	10.00
< 500 µs	20.00



Additional uncertainty with read rate

Read Rate	µA/A of reading + µA/A of range
>1ms <5ms	20 + 0.5
<1 ms <4 ms	45 + 5

Aperture <100 µs

95 % Confidence		Relative Accuracy				Absolute Accuracy		
		±(µA/A of reading + µA/A of range)						
Range	**Full Scale**	**24 Hour Tcal ± 1 °C**	**90 day Tcal ± 1 °C**	**365 day Tcal ± 1 °C**	**2 years Tcal ± 1 °C**	**365 day Tcal ± 1 °C**	**365 day Tcal ± 5 °C**	**2 year Tcal ± 5 °C**
10 µA	20.2 µA	35 + 80	40 + 80	44 + 80	66 + 80	46 + 80	58 + 80	87 + 80
100 µA	202 µA	5.5 + 70	22 + 70	44 + 70	66 + 70	44 + 70	56 + 70	84 + 70
1 mA	2.02 mA	5.5 + 70	22 + 70	44 + 70	66 + 70	44 + 70	56 + 70	84 + 70
10 mA	20.2 mA	6.5 + 70	22 + 70	44 + 70	66 + 70	44 + 70	56 + 70	84 + 70
100 mA	202 mA	18 + 70	22 + 70	44 + 70	66 + 70	44 + 70	76 + 70	114 + 70
1 A	2.02 A	22 + 125	55 + 125	110 + 125	165 + 125	110 + 125	142 + 125	214 + 125

99 % Confidence		Relative Accuracy				Absolute Accuracy		
		±(µA/A of reading + µA/A of range)						
Range	**Full Scale**	**24 Hour Tcal ± 1 °C**	**90 day Tcal ± 1 °C**	**365 day Tcal ± 1 °C**	**2 years Tcal ± 1 °C**	**365 day Tcal ± 1 °C**	**365 day Tcal ± 5 °C**	**2 year Tcal ± 5 °C**
10 µA	20.2 µA	45 + 103	52 + 103	57 + 103	85 + 103	60 + 103	75 + 103	113 + 103
100 µA	202 µA	7.1 + 90	28 + 90	57 + 90	85 + 90	57 + 90	73 + 90	109 + 90
1 mA	2.02 mA	7.1 + 90	28 + 90	57 + 90	85 + 90	57 + 90	72 + 90	109 + 90
10 mA	20.2 mA	8.4 + 90	28 + 90	57 + 90	85 + 90	57 + 90	72 + 90	109 + 90
100 mA	202 mA	23 + 90	28 + 90	57 + 90	85 + 90	57 + 90	98 + 90	147 + 90
1 A	2.02 A	28 + 161	71 + 161	142 + 161	213 + 161	142 + 161	184 + 161	276 + 161

Temperature Coefficient (not applicable if within Tcal ± 1 °C)

Aperture <100 µs

Range	± µA/A reading/°C	± (µV/V of reading/°C + µV/V of range/°C)
	15 °C to 30 °C	**5 °C to 40 °C** [13]
10 µA	3.0 or	5 + 5
100 µA	3.0 or	5 + 1
1 mA	3.0 or	5 + 0.5
mA	3.0 or	5 + 0.5
100 mA	8.0 or	12 + 0.5
1 A	8.0 or	12 + 0.5

Aperture <100 µs "0" to 99.8 µs in 200 ns increments (there is an additional 30 µs on each conversion).

Maximum trigger interval is the aperture plus 30 µs. For example with aperture = 50 µs, the maximum interval is 50 µs + 30 µs = 80 µs (read rate 12.5 kHz). Note maximum read rate is limited to 20 kHz by other factors; see the System Speed specifications

All Apertures

Settling time

10 µA to 100 mA Ranges to 20 µA/A of step size..... <1 s

1 A Range to 100 µA/A of step size..... <1 s

Current shunt self-heating time to settle to within specification

1 A Range cold to final value..... 20 µA/A in 2 minutes

Input Impedance

Range	Front	Rear
10 µA	100 Ω	100 Ω
100 µA	100 Ω	100 Ω
1 mA	10.5 Ω	10.8 Ω
10 mA	1.5 Ω	1.8 Ω
100 mA	0.8 Ω	1.1 Ω
1 A	0.4 Ω	0.6 Ω

Maximum burden voltage = 2.02 x Range x input Impedance

Measurement voltage burden = input current x Input impedance

Protection

Front Input .....30 A rms, self-resettling

Rear Input.....2 A rms, Rear Panel Fuse

AC Voltage [1][2][4][6][7]

AC Voltage - Wideband/Extended HF

AC Voltage maximum resolution is 7 digits

95 % Confidence				Relative Accuracy				Absolute Accuracy		
				± (µV/V of reading + µV/V of range)						
Range	**Full Scale (rms)**	**Frequency (Hz)**	**Transfer, 20 min** [16]	**24 Hour Tcal ± 1 °C**	**90 day Tcal ± 1 °C**	**365 day Tcal ± 1 °C**	**2 year Tcal ± 1 °C**	**365 day Tcal ± 1 °C**	**365 day Tcal ± 5 °C**	**2 year Tcal ± 5 °C**
10 mV	12.12 mv	1 - 2k	100 + 100	300 + 200	378 + 200	550 + 200	970 + 200	570 + 200	610 + 200	0.10% + 0.02%
(Auto, 10 MΩ, 1 MΩ)		2k - 10k	100 + 100	380 + 200	390 + 200	400 + 200	455 + 200	421 + 200	461 + 200	510 + 200
		10k - 30k	100 + 100	230 + 200	390 + 200	400 + 200	455 + 200	431 + 200	471 + 200	520 + 200
		30k - 100k	200 + 100	0.40% + 0.02%	0.41% + 0.02%	0.42% + 0.02%	0.47% + 0.02%	0.42% + 0.02%	0.43% + 0.02%	0.48% + 0.02%
		100k - 300k	300 + 100	1.30% + 0.06%	1.38% + 0.06%	1.60% + 0.06%	2.27% + 0.06%	1.60% + 0.06%	1.61% + 0.06%	2.28% + 0.06%
		300k - 1M	500 + 100	1.93% + 0.06%	2.09% + 0.06%	2.50% + 0.06%	3.72% + 0.06%	2.50% + 0.06%	2.51% + 0.06%	3.73% + 0.06%
100 mV	121.2 mv	1 - 2k	10 + 5	50 + 10	59 + 10	80 + 10	135 + 10	90 + 10	110 + 10	160 + 10
(Auto, 10 MΩ, 1 MΩ)		2k - 10k	10 + 5	80 + 10	92 + 10	120 + 10	196 + 10	130 + 10	150 + 10	220 + 10
		10k - 30k	10 + 10	120 + 20	151 + 10	220 + 20	388 + 20	230 + 20	250 + 20	410 + 20
		30k - 100k	10 + 15	300 + 200	378 + 200	550 + 200	970 + 200	560 + 200	580 + 200	990 + 200
		100k - 300k	15 + 20	0.13% + 0.05%	0.17% + 0.05%	0.26% + 0.05%	0.47% + 0.05%	0.26% + 0.05%	0.27% + 0.05%	0.48% + 0.05%
		300k - 1M	60 + 50	1.30% + 0.20%	1.33% + 0.20%	1.40% + 0.20%	1.66% + 0.20%	1.40% + 0.20%	1.41% + 0.20%	1.68% + 0.20%
		1M - 2M	100 + 200	1.40% + 0.50%	1.45% + 0.70%	1.60% + 0.70%	2.1% + 0.70%	1.61% + 0.70%	1.63% + 0.70%	2.11% + 0.70%
	[17]	2M - 4M	200 + 400	4.10% + 1.20%	4.23% + 1.20%	4.6% + 1.20%	5.8% + 1.20%	4.6% + 1.20%	4.7% + 1.20%	6.0% + 1.20%
	[17]	4M - 8M	800 + 800	8.5% + 1.20%	8.6% + 1.20%	9.0% + 1.20%	10% + 1.20%	9.0% + 1.20%	9.4% + 1.20%	11% + 1.20%
	[17]	8M - 10M	0.10% + 0.10%	16% + 1.20%	17% + 1.20%	18% + 1.20%	20% + 1.20%	18% + 1.20%	18% + 1.20%	21% + 1.20%

95 % Confidence				Relative Accuracy				Absolute Accuracy		
			± (µV/V of reading + µV/V of range)							
Range	**Full Scale (rms)**	**Frequency (Hz)**	**Transfer, 20 min** [16]	**24 Hour Tcal ± 1 °C**	**90 day Tcal ± 1 °C**	**365 day Tcal ± 1 °C**	**2 year Tcal ± 1 °C**	**365 day Tcal ± 1 °C**	**365 day Tcal ± 5 °C**	**2 year Tcal ± 5 °C**
1 V	1.212 V	1 - 2k	5 + 2	50 + 10	59 + 10	80 + 10	135 + 10	90 + 10	102 + 10	150 + 10
10 V	12.12 V	2k - 10k	5 + 2	80 + 10	92 + 10	120 + 10	196 + 10	130 + 10	142 + 10	210 + 10
(Auto, 10 MΩ, 1 MΩ)		10k - 30k	5 + 2	120 + 20	151 + 20	220 + 20	388 + 20	230 + 20	250 + 20	410 + 20
		30k - 100k	10 + 15	300 + 200	378 + 200	550 + 200	970 + 200	560 + 200	580 + 200	990 + 200
		100k - 300k	15 + 20	0.13% + 0.05%	0.17% + 0.05%	0.26% + 0.05%	0.47% + 0.05%	0.26% + 0.05%	0.27% + 0.05%	0.48% + 0.05%
		300k - 1M	60 + 50	1.30% + 0.20%	1.33% + 0.20%	1.40% + 0.20%	1.66% + 0.20%	1.40% + 0.20%	1.41% + 0.20%	1.68% + 0.20%
		1M - 2M	100 + 200	1.40% + 0.50%	1.45% + 0.70%	1.60% + 0.70%	2.1% + 0.70%	1.61% + 0.70%	1.63% + 0.70%	2.11% + 0.70%
	[17]	2M - 4M	200 + 400	3.40% + 1.00%	3.74% + 1.20%	4.60% + 1.20%	7.1% + 1.20%	4.6% + 1.20%	4.6% + 1.20%	7.11% + 1.20%
	[17]	4M - 8M	800 + 800	7.5% + 1.00%	7.9% + 1.20%	9.00% + 1.20%	12% + 1.20%	9.0% + 1.20%	9.2% + 1.20%	13% + 1.20%
	[17]	8M - 10M	0.10% + 0.100%	14% + 1.00%	15% + 1.20%	18% + 1.20%	25% + 1.20%	18% + 1.20%	18% + 1.20%	25% + 1.20%
100 V	121.2 V	1 - 1k	20 + 5	200 + 10	205 + 10	220 + 10	271 + 10	230 + 10	250 + 10	290 + 10
(10 MΩ)		1k - 2k	20 + 5	950 + 10	963 + 10	0.10% + 0.001%	0.11% + 0.001%	0.10% + 0.001%	0.10% + 0.001%	0.12% + 0.001%
		2k - 10k	100 + 5	1.90% + 0.002%	1.93% + 0.002%	2.00% + 0.002%	2.3% + 0.002%	2.00% + 0.002%	2.01% + 0.002%	2.29% + 0.002%
100 V	121.2 V	1 - 2k	5 + 5	50 + 10	59 + 10	80 + 10	135 + 10	90 + 10	110 + 10	160 + 10
(Auto, 1 MΩ)		2k - 10k	5 + 5	5 + 5	80 + 10	92 + 10	120 + 10	196 + 10	130 + 10	150 + 10
		10k - 30k	5 + 5	120 + 20	151 + 20	220 + 20	388 + 20	230 + 20	250 + 20	410 + 20
		30k - 100k	15 + 20	300 + 200	378 + 200	550 + 200	970 + 200	560 + 200	640 + 200	0.11% + 0.02%
		100k - 300k	20 + 25	0.40% + 0.10%	0.41% + 0.10%	0.42% + 0.10%	0.47% + 0.10%	0.42% + 0.10%	0.44% + 0.10%	0.49% + 0.10%
		300k - 1M	70 + 50	1.30% + 0.70%	1.35% + 0.50%	1.50% + 0.70%	1.98% + 0.50%	1.50% + 0.50%	1.53% + 0.50%	2.02% + 0.50%
1000 V	1050 V	1 - 1k	20 + 7	200 + 10	205 + 10	220 + 10	271 + 10	230 + 10	250 + 10	290 + 10
(10 MΩ)		1k - 2k	20 + 7	950 + 10	963 + 10	0.10% + 0.001%	0.11% + 0.001%	0.10% + 0.001%	0.10% + 0.001%	0.12% + 0.001%
		2k - 10k	100 + 7	1.90% + 0.001%	1.93% + 0.001%	2.00% + 0.001%	2.27% + 0.001%	2.00% + 0.001%	2.01% + 0.001%	2.29% + 0.001%
1000 V	1050 V	1 - 2k	15 + 7	90 + 25	101 + 30	130 + 30	208 + 30	140 + 30	160 + 30	230 + 30
(Auto, 1 MΩ)		2k - 10k	15 + 7	120 + 25	128 + 30	150 + 30	216 + 30	160 + 30	180 + 30	240 + 30
		10k - 30k	15 + 7	180 + 25	216 + 30	300 + 30	513 + 30	310 + 30	330 + 30	530 + 30
		30k - 100k	20 + 20	300 + 100	378 + 200	550 + 200	970 + 200	560 + 200	640 + 200	0.11% + 0.02%

99 % Confidence				Relative Accuracy				Absolute Accuracy		
				± (µV/V of reading + µV/V of range)						
Range	**Full Scale (rms)**	**Frequency (Hz)**	**Transfer, 20 min** [16]	**24 Hour Tcal ± 1 °C**	**90 day Tcal ± 1 °C**	**365 day Tcal ± 1 °C**	**2 year Tcal ± 1 °C**	**365 day Tcal ± 1 °C**	**365 day Tcal ± 5 °C**	**2 year Tcal ± 5 °C**
10 mV	12.12 mv	1 - 2k	100 + 100	387 + 258	488 + 258	710 + 258	0.13% + 0.026%	735 + 258	787 + 258	0.13% + 0.026%
(Auto, 10 MΩ, 1 MΩ)		2k - 10k	100 + 100	490 + 260	503 + 260	516 + 260	587 + 260	543 + 260	594 + 260	658 + 260
		10k - 30k	100 + 100	490 + 260	503 + 260	516 + 260	587 + 260	556 + 260	607 + 260	671 + 260
		30k - 100k	200 + 100	0.52% + 0.026%	0.52% + 0.026%	0.54% + 0.026%	0.61% + 0.026%	0.54% + 0.026%	0.55% + 0.026%	0.62% + 0.026%
		100k - 300k	300 + 100	1.68% + 0.077%	1.78% + 0.077%	2.06% + 0.077%	2.93% + 0.077%	2.07% + 0.077%	2.07% + 0.077%	2.94% + 0.077%
		300k - 1M	500 + 100	2.49% + 0.077%	2.69% + 0.077%	3.23% + 0.077%	4.80% + 0.077%	3.23% + 0.077%	3.24% + 0.077%	4.81% + 0.077%
100 mV	121.2 mv	1 - 2k	10 + 5	65 + 13	76 + 13	103 + 13	174 + 13	116 + 13	142 + 13	206 + 13
(Auto, 10 MΩ, 1 MΩ)		2k - 10k	10 + 5	103 + 13	118 + 13	155 + 13	253 + 13	168 + 13	194 + 13	284 + 13
		10k - 30k	10 + 10	155 + 26	195 + 26	284 + 26	500 + 26	297 + 26	323 + 26	529 + 26
		30k - 100k	10 + 15	387 + 258	488 + 258	710 + 258	0.13% + 0.026%	722 + 258	748 + 258	0.13% + 0.026%
		100k - 300k	15 + 20	0.17% + 0.065%	0.22% + 0.065%	0.34% + 0.065%	0.60% + 0.065%	0.34% + 0.065%	0.34% + 0.065%	0.61% + 0.065%
		300k - 1M	60 + 50	1.68% + 0.26%	1.71% + 0.26%	1.81% + 0.26%	2.15% + 0.26%	1.81% + 0.26%	1.82% + 0.26%	2.16% + 0.26%
		1M - 2M	100 + 200	1.94% + 0.90%	1.97% + 0.90%	2.06% + 0.90%	2.41% + 0.90%	2.07% + 0.90%	2.12% + 0.90%	2.47% + 0.90%
	[17]	2M - 4M	200 + 400	5.29% + 1.55%	5.46% + 1.55%	5.93% + 1.55%	7.55% + 1.55%	5.94% + 1.55%	6.07% + 1.55%	7.68% + 1.55%
	[17]	4M - 8M	800 + 800	11.0% + 1.55%	11.1% + 1.55%	11.6% + 1.55%	13.4% + 1.55%	11.6% + 1.55%	12.1% + 1.55%	13.9% + 1.55%
	[17]	8M - 10M	0.10% + 0.10%	21.2% + 1.55%	21.5% + 1.55%	22.6% + 1.55%	26.4% + 1.55%	22.6% + 1.55%	23.3% + 1.55%	27.1% + 1.55%

99 % Confidence				Relative Accuracy				Absolute Accuracy		
				± (µV/V of reading + µV/V of range)						
Range	**Full Scale (rms)**	**Frequency (Hz)**	**Transfer, 20 min** [16]	**24 Hour Tcal ± 1 °C**	**90 day Tcal ± 1 °C**	**365 day Tcal ± 1 °C**	**2 year Tcal ± 1 °C**	**365 day Tcal ± 1 °C**	**365 day Tcal ± 5 °C**	**2 year Tcal ± 5 °C**
1 V	1.212 V	1 - 2k	5 + 2	65 + 13	76 + 13	103 + 13	174 + 13	116 + 13	132 + 13	194 + 13
10 V	12.12 V	2k - 10k	5 + 2	103 + 13	118 + 13	155 + 13	253 + 13	168 + 13	183 + 13	271 + 13
(Auto,		10k - 30k	5 + 2	155 + 26	195 + 26	284 + 26	500 + 26	297 + 26	323 + 26	529 + 26
10 MΩ,		30k - 100k	10 + 15	387 + 258	488 + 258	710 + 258	0.13% + 0.026%	722 + 258	748 + 258	0.13% + 0.026%
1 MΩ)		100k - 300k	15 + 20	0.17% + 0.065%	0.22% + 0.065%	0.34% + 0.065%	0.60% + 0.065%	0.34% + 0.065%	0.34% + 0.065%	0.61% + 0.065%
		300k - 1M	60 + 50	1.68% + 0.26%	1.71% + 0.26%	1.81% + 0.26%	2.15% + 0.26%	1.81% + 0.26%	1.82% + 0.26%	2.16% + 0.26%
		1M - 2M	100 + 200	1.81% + 0.65%	1.87% + 0.90%	2.06% + 0.90%	2.69% + 0.90%	2.07% + 0.90%	2.10% + 0.90%	2.73% + 0.90%
	[17]	2M - 4M	200 + 400	4.39% + 1.29%	4.82% + 1.55%	5.93% + 1.55%	9.12% + 1.55%	5.94% + 1.55%	5.99% + 1.55%	9.17% + 1.55%
	[17]	4M - 8M	800 + 800	9.7% + 1.29%	10.2% + 1.55%	11.6% + 1.55%	16.1% + 1.55%	11.6% + 1.55%	11.9% + 1.55%	16.3% + 1.55%
	[17]	8M - 10M	0.10% + 0.100%	18.6% + 1.29%	19.7% + 1.55%	22.6% + 1.55%	31.7% + 1.55%	22.6% + 1.55%	23.1% + 1.55%	32.2% + 1.55%
100 V	121.2 V	1 - 1k	20 + 5	258 + 13	265 + 13	284 + 13	350 + 13	297 + 13	323 + 13	374 + 13
(10 MΩ)		1k - 2k	20 + 5	0.12% + 0.001%	0.12% + 0.001%	0.13% + 0.001%	0.15% + 0.001%	0.13% + 0.001%	0.13% + 0.001%	0.15% + 0.001%
		2k - 10k	100 + 5	2.45% + 0.003%	2.48% + 0.003%	2.58% + 0.003%	2.93% + 0.003%	2.58% + 0.003%	2.60% + 0.003%	2.95% + 0.003%
100 V	121.2 V	1 - 2k	5 + 5	65 + 13	76 + 13	103 + 13	174 + 13	116 + 13	142 + 13	206 + 13
(Auto,		2k - 10k	5 + 5	103 + 13	118 + 13	155 + 13	253 + 13	168 + 13	194 + 13	284 + 13
1 MΩ)		10k - 30k	5 + 5	155 + 26	195 + 26	284 + 26	500 + 26	297 + 26	323 + 26	529 + 26
		30k - 100k	15 + 20	387 + 258	488 + 258	710 + 258	0.13% + 0.026%	722 + 258	826 + 258	0.14% + 0.026%
		100k - 300k	20 + 25	0.52% + 0.13%	0.52% + 0.13%	0.54% + 0.13%	0.61% + 0.13%	0.54% + 0.13%	0.56% + 0.13%	0.63% + 0.13%
		300k - 1M	70 + 50	1.68% + 0.90%	1.75% + 0.90%	1.94% + 0.90%	2.56% + 0.90%	1.94% + 0.90%	1.98% + 0.90%	2.60% + 0.90%
1000 V	1050 V	1 - 1k	20 + 7	258 + 13	265 + 13	284 + 13	350 + 13	297 + 13	323 + 13	374 + 13
(10 MΩ)		1k - 2k	20 + 7	0.12% + 0.001%	0.12% + 0.001%	0.13% + 0.001%	0.15% + 0.001%	0.13% + 0.001%	0.13% + 0.001%	0.15% + 0.001%
		2k - 10k	100 + 7	2.45% + 0.001%	2.48% + 0.001%	2.58% + 0.001%	2.93% + 0.001%	2.58% + 0.001%	2.60% + 0.001%	2.95% + 0.001%
1000 V	1050 V	1 - 2k	15 + 7	116 + 32	131 + 39	168 + 39	268 + 39	181 + 39	206 + 39	297 + 39
(Auto,		2k - 10k	15 + 7	155 + 32	165 + 39	194 + 39	279 + 39	206 + 39	232 + 39	310 + 39
1 MΩ)		10k - 30k	15 + 7	232 + 32	279 + 39	387 + 39	661 + 39	400 + 39	426 + 39	684 + 39
		30k - 100k	20 + 20	387 + 129	488 + 258	710 + 258	0.13% + 0.026%	722 + 258	826 + 258	0.14% + 0.026%

Temperature Coefficient (not applicable if within Tcal ± 1 °C)

		± µV/V of reading / °C	
Range	**Frequency (Hz)**	**15 °C to 30 °C**	**5 °C to 15 °C, 30 °C to 40 °C**
10 mV (Auto, 10 MΩ, 1 MΩ)	1 - 2k	10	15
	2k - 10k	10	15
	10k - 30k	10	15
	30k - 100k	10	15
	100k - 300k	15	20
	300k - 1M	30	50
100 mV (Auto, 10 MΩ, 1 MΩ)	1 - 2k	5	8
	2k - 10k	5	8
	10k - 30k	5	8
	30k - 100k	5	8
	100k - 300k	15	20
	300k - 1M	30	50
	1M - 2M	100	150
	2M - 4M [17]	250	400
	4M - 8M [17]	1000	1500
	8M - 10M [17]	1400	2000
1 V 10 V (Auto, 10 MΩ, 1 MΩ)	1 - 2k	3	5
	2k - 10k	3	5
	10k - 30k	5	8
	30k - 100k	5	8
	100k - 300k	15	20
	300k - 1M	30	50
	1M - 2M	50	80
	2M - 4M [17]	100	150
	4M - 8M [17]	500	800
	8M - 10M [17]	1000	1500

		± µV/V of reading / °C	
Range	**Frequency (Hz)**	**15 °C to 30 °C**	**5 °C to 15 °C, 30 °C to 40 °C**
100 V (10 MΩ)	1 - 1k	5	8
	1k - 2k	5	8
	2k - 10k	30	50
100 V (Auto, 1 MΩ)	1 - 2k	5	8
	2k - 10k	5	8
	10k - 30k	5	8
	30k - 100k	20	30
	100k - 300k	40	60
	300k - 1M	80	120
1000 V (10 MΩ)	1 - 1k	5	8
	1k - 2k	5	8
	2k - 10k	30	50
1000 V (Auto, 1 MΩ)	1 - 2k	5	8
	2k - 10k	5	8
	10k - 30k	5	8
	30k - 100k	20	30

Reading rate		
RMS Filter	**Acquisition time (seconds)**	**Read rate (Hz)**
0.1 Hz	62	0.016
1 Hz	6.2	0.16
10 Hz	0.62	1.6
40 Hz	0.156	6.4
100 Hz	0.063	16
1000 Hz	0.015	67

Read rate 3x slower for Extended HF.

Auto Counter Gate setting will not affect the read-rate.. Setting Gate time manually may reduce the read rate.

Type ..... True RMS, AC Coupled measures AC component with up to 1000 V DC bias on any range
DC Coupling produces the root sum of squares of the AC and DC components $\sqrt{(ac^2 + dc^2)}$

Specified Range

10 mV Range ..... From 10 % of range to full range

100 mV to 1 kV Ranges ..... From 1 % of range to full range

CMRR..... >90 dB DC to 60 Hz (1kΩ unbalance)

Peak Input (RMS not to exceed full scale value)

10 mV to 100V Ranges ..... 2 x Range

1000 V Range ..... 1050V * 1.414

Protection on all ranges ..... 1050 V RMS

Input Impedance

Auto	10 mV to 10V Ranges	>1 TΩ in parallel with 80 pF ±5 pF
	100 V and 1000 V Range	1.01 MΩ ±1 % in parallel with 50 pF ±5 pF
10 MΩ	10 mV to 10V Ranges	10 MΩ ±1 % in parallel with 80 pF ±5 pF
	100 V and 1000 V Range	10 MΩ ±1 % in parallel with 50 pF ±5 pF
1 MΩ	10 mV to 10V Ranges	1.01 MΩ ±1 % in parallel with 80 pF ±5 pF
	100 V and 1000 V Range	1.01 MΩ ±1 % in parallel with 50 pF ±5 pF

DC Accuracy (DC Coupled) ..... Add ± (50 μV/V of Reading + 50 μV/V of Range + 20 μV)

AC Coupling ..... 330 nF into 1.01 MΩ or 10 MΩ

Volt.Hertz limit ..... 3×10^7 (allows 3 V at 10 MHz)

Frequency Secondary Measurement: see frequency counter specification

Other secondary reading values are not specified.

AC Current [1][2][4][6]

AC Current- Wideband

AC Current maximum resolution is 7 digits

95 % Confidence				Relative Accuracy				Absolute Accuracy		
				±(µA/A of reading + µA/A of range)						
Range	**Full Scale (rms)**	**Frequency (Hz)**	**Transfer, 20 min** [16]	**24 Hour Tcal ± 1 °C**	**90 day Tcal ± 1 °C**	**365 day Tcal ± 1 °C**	**2 year Tcal ± 1 °C**	**365 day Tcal ± 1 °C**	**365 day Tcal ± 5 °C**	**2 year Tcal ± 5 °C**
10 µA	20.2 µA	1 - 2k	150.0 + 3	2000 + 300	2136 + 300	2500 + 300	3606 + 300	2510 + 300	3910 + 300	3630 + 300
		2k - 10k	150.0 + 3	2000 + 300	2136 + 300	2500 + 300	3606 + 300	2510 + 300	3910 + 300	3630 + 300
		10k - 30k	150.0 + 10	2000 + 300	2136 + 300	2500 + 300	3606 + 300	2510 + 300	3910 + 300	3650 + 300
100 µA	202 µA	1 - 2k	20.0 + 10	250 + 100	263 + 100	300 + 100	415 + 100	310 + 100	450 + 100	440 + 100
1 mA	2.02 mA	2k - 10k	20.0 + 7	500 + 100	527 + 100	600 + 100	831 + 100	610 + 100	890 + 100	850 + 100
10 mA	20.2 mA	10k - 30k	20.0 + 10	700 + 100	726 + 100	800 + 100	1044 + 100	820 + 100	1110 + 100	1080 + 100
		30k -100k	50.0 + 20	4500 + 150	4630 + 150	5000 + 150	6265 + 150	5010 + 150	6630 + 150	6310 + 150
100 mA	202 mA	1 - 2k	10.0 + 7	250 + 100	263 + 100	300 + 100	415 + 100	300 + 100	450 + 100	440 + 100
		2k - 10k	10.0 + 7	500 + 100	527 + 100	600 + 100	831 + 100	600 + 100	890 + 100	850 + 100
		10k - 30k	10.0 + 15	700 + 100	726 + 100	800 + 100	1044 + 100	800 + 100	1110 + 100	1090 + 100
1 A	2.02 A	1 - 2k	10.0 + 10	250 + 150	263 + 150	300 + 150	415 + 150	300 + 150	450 + 150	460 + 150
		2k - 10k	10.0 + 10	550 + 150	563 + 150	600 + 150	730 + 150	610 + 150	770 + 150	780 + 150
		10k - 30k	10.0 + 20	650 + 150	691 + 150	800 + 150	1137 + 150	810 + 150	1230 + 150	1220 + 150

99 % Confidence				Relative Accuracy				Absolute Accuracy		
				±(μA/A of reading + μA/A of range)						
Range	**Full Scale (rms)**	**Frequency (Hz)**	**Transfer, 20 min** [16]	**24 Hour Tcal ± 1 °C**	**90 day Tcal ± 1 °C**	**365 day Tcal ± 1 °C**	**2 year Tcal ± 1 °C**	**365 day Tcal ± 1 °C**	**365 day Tcal ± 5 °C**	**2 year Tcal ± 5 °C**
10 μA	20.2 μA	1 - 2k	194 + 4	2580 + 387	2755 + 387	3225 + 387	4651 + 387	3238 + 387	5044 + 387	4683 + 387
		2k - 10k	194 + 4	2580 + 387	2755 + 387	3225 + 387	4651 + 387	3238 + 387	5044 + 387	4683 + 387
		10k - 30k	194 + 13	2580 + 387	2755 + 387	3225 + 387	4651 + 387	3238 + 387	5044 + 387	4709 + 387
100 μA	202 μA	1 - 2k	26 + 13	323 + 129	340 + 129	387 + 129	536 + 129	400 + 129	581 + 129	568 + 129
1 mA	2.02 mA	2k - 10k	26 + 9	645 + 129	680 + 129	774 + 129	1072 + 129	787 + 129	1148 + 129	1097 + 129
10 mA	20.2 mA	10k - 30k	26 + 13	903 + 129	937 + 129	1032 + 129	1347 + 129	1058 + 129	1432 + 129	1393 + 129
		30k -100k	65 + 26	5805 + 194	5973 + 194	6450 + 194	8082 + 194	6463 + 194	8553 + 194	8140 + 194
100 mA	202 mA	1 - 2k	13 + 9	323 + 129	340 + 129	387 + 129	536 + 129	387 + 129	581 + 129	568 + 129
		2k - 10k	13 + 9	645 + 129	680 + 129	774 + 129	1072 + 129	774 + 129	1148 + 129	1097 + 129
		10k - 30k	13 + 19	903 + 129	937 + 129	1032 + 129	1347 + 129	1032 + 129	1432 + 129	1406 + 129
1 A	2.02 A	1 - 2k	13 + 13	323 + 194	340 + 194	387 + 194	536 + 194	387 + 194	581 + 194	593 + 194
		2k - 10k	13 + 13	710 + 194	726 + 194	774 + 194	941 + 194	787 + 194	993 + 194	1006 + 194
		10k - 30k	13 + 26	839 + 194	891 + 194	1032 + 194	1467 + 194	1045 + 194	1587 + 194	1574 + 194

AC Current Temperature Coefficient (not applicable if within Tcal ± 1 °C)

		± µA/A of reading/°C	
Range	**Frequency (Hz)**	**15 °C to 30 °C**	**5 °C to 15 °C, 30 °C to 40 °C**
10 µA	1 - 10	5	8
	10 - 10k	5	8
	10k - 30k	10	15
100 µA	1 - 10	5	8
1 mA	10 - 10k	5	8
10 mA	10k - 30k	5	8
	30k -100k	10	15
100 mA	1 - 10	5	8
	10 - 10k	5	8
	10k - 30k	10	15
1 A	1 - 10	10	15
	10 - 10k	10	15
	10k - 30k	20	30

Settling time

10 µA to 100 mA Ranges to
20 µA/A of step size..... <1 s

Current shunt self-heating time to settle to within specification

1 A Range cold to final value..... 20 µA/A in 2 minutes

DC Accuracy (DC Coupled)..... Add ±(100 µA/A Reading + 50 µA/A Range + 20 nA)

Input Impedance

Range	Front	Rear
10 µA	100Ω	100Ω
100 µA	100Ω	100Ω
1 mA	10.5Ω	10.8Ω
10 mA	1.5Ω	1.8Ω
100 mA	0.8Ω	1.1Ω
1 A	0.4Ω	0.6Ω

Maximum burden voltage = 2.02 x Range x input Impedance
Measurement voltage burden = input current x Input impedance

Protection

Front Input.....30 A rms, self-resetting
Rear Input .....2 A rms, Rear Panel Fuse

Peak Input (RMS not to exceed full scale value): 2 x Range

Reading rate

RMS Filter	Acquisition time (seconds)	Read rate (Hz)
0.1 Hz	62	0.016
1 Hz	6.2	0.16
10 Hz	0.62	1.6
40 Hz	0.156	6.4
100 Hz	0.063	16
1000 Hz	0.015	67

Auto Counter Gate setting will not affect the read-rate.
Setting Gate time manually may reduce the read rate.
Frequency as Secondary Measurement - see frequency counter specifications

Resistance [1][2][3][4][10]

Resistance 4 Wire

Resistance maximum resolution is 8 digits

95 % Confidence			Relative Accuracy					Absolute Accuracy		
			± (μΩ/Ω of reading + μΩ/Ω of range)							
Range	**Full Scale**	**"Mode"**	**Transfer, 20 min [15]**	**24 Hour Tcal ± 1 °C**	**90 day Tcal ± 1 °C**	**365 day Tcal ± 1 °C**	**2 year Tcal ± 1 °C**	**365 day Tcal ± 1 °C**	**365 day Tcal ± 5 °C**	**2 year Tcal ± 5 °C**
1 Ω	2.02 Ω	Normal	2.0 + 4.5	6.0 + 4.5	11 + 4.5	15 + 4.5	30 + 4.5	15 + 4.5	21 + 4.5	32 + 4.5
10 Ω	20.2 Ω	Normal	0.8 + 2.0	4.0 + 2.0	8.0 + 2.0	12 + 2.0	24 + 2.0	12 + 2.0	15 + 2.0	22 + 2.0
100 Ω	202 Ω	Normal	0.2 + 0.6	3.0 + 0.6	6.5 + 0.6	10 + 0.6	20 + 0.5	10 + 0.5	12 + 0.5	18 + 0.5
1 kΩ	2.02 kΩ	Normal	0.2 + 0.6	2.0 + 0.6	6.0 + 0.6	10 + 0.6	20 + 0.5	10 + 0.5	12 + 0.5	18 + 0.5
10 kΩ	20.2 kΩ	Normal	0.2 + 0.6	2.0 + 0.6	6.0 + 0.6	10 + 0.6	20 + 0.5	10 + 0.5	12 + 0.5	18 + 0.5
100 kΩ	202 kΩ	Normal	0.2 + 0.6	2.0 + 0.6	6.0 + 0.6	10 + 0.6	20 + 0.5	10 + 0.5	12 + 0.5	18 + 0.5
1 MΩ	2.02 MΩ	Normal	0.5 + 1.5	1.0 + 1.5	5.5 + 1.5	10 + 1.5	20 + 1.0	11 + 1.0	13 + 1.0	20 + 1.0
10 MΩ	20.2 MΩ	Normal	2.5 + 15	4.0 + 15	12 + 15	20 + 15	40 + 10	21 + 10	29 + 10	43 + 10
100 MΩ	202 MΩ	Normal	15 + 150	40 + 150	43 + 150	45 + 150	90 + 100	51 + 100	131 + 100	197 + 100
1 GΩ	2.02 GΩ	Normal	200 + 1500	300 + 1500	450 + 1500	600 + 1500	1200 + 1500	600 + 1500	1410 + 1500	2110 + 1500
1 Ω	2.02 Ω	Lo Current	2.0 + 4.0	6.0 + 4.5	11 + 4.5	15 + 4.5	30 + 4.5	15 + 4.5	21 + 4.5	32 + 4.5
10 Ω	20.2 Ω	Lo Current	0.8 + 1.4	40 + 2.0	8 + 2.0	12 + 2.0	24 + 2.0	12 + 2.0	15 + 2.0	22 + 2.0
100 Ω	202 Ω	Lo Current	2.5 + 2.0	8.7 + 2.0	11.2 + 2.0	14 + 2.0	21 + 2.0	14.4 + 2.0	17 + 2.0	25 + 2.0
1 kΩ	2.02 kΩ	Lo Current	2.5 + 2.0	9.3 + 2.0	11.8 + 2.0	15 + 2.0	22 + 2.0	16 + 2.0	18 + 2.0	27 + 2.0
10 kΩ	20.2 kΩ	Lo Current	2.5 + 2.0	12.9 + 2.0	15.4 + 2.0	19 + 2.0	26 + 2.0	19 + 2.0	21 + 2.0	32 + 2.0
100 kΩ	202 kΩ	Lo Current	5.0 + 0.6	12.9 + 0.6	15.4 + 0.6	19 + 0.6	26 + 0.6	19 + 0.6	21 + 0.6	32 + 0.6
1 MΩ	2.02 MΩ	Lo Current	7.0 + 1.0	11.6 + 1.0	13.6 + 1.0	17 + 1.0	24 + 1.0	17 + 1.0	25 + 1.0	38 + 1.0
10 MΩ	20.2 MΩ	Lo Current	20 + 10	40 + 10	43 + 10	46 + 10	55 + 10	46 + 10	126 + 10	190 + 10
100 MΩ	202 MΩ	Lo Current	250 + 100	250 + 100	350 + 100	500 + 100	1000 + 100	515 + 100	1320 + 100	1970 + 100
1 GΩ	2.02 GΩ	Lo Current	250 + 1500	300 + 1	450 + 1500	600 + 1500	1200 + 1500	600 + 1500	1410 + 1500	2110 + 1500
10 MΩ	20.2 MΩ	HV	2.0 + 1	5.8 + 1	6.5 + 1	7.0 + 1	14 + 1	15 + 1	17 + 1	26 + 1
100 MΩ	202 MΩ	HV	3.5 + 10	7.4 + 10	8.0 + 10	9.0 + 10	18.0 + 10	60 + 10	68 + 10	102 + 10
1 GΩ	2.02 GΩ	HV	20 + 100	27 + 100	28 + 100	30 + 100	60.0 + 100	150 + 100	230 + 100	345 + 100
10 GΩ [14]	20.2 GΩ	HV	250 + 1000	250 + 1000	350 + 1000	500 + 1000	1000 + 1000	525 + 1000	1330 + 1000	1990 + 1000

99 % Confidence				Relative Accuracy				Absolute Accuracy		
			±(μΩ/Ω of reading + μΩ/Ω of range)							
Range	**Full Scale**	**"Mode"**	**Transfer, 20 min** [15]	**24 Hour Tcal ± 1 °C**	**90 day Tcal ± 1 °C**	**365 day Tcal ± 1 °C**	**2 year Tcal ± 1 °C**	**365 day Tcal ± 1 °C**	**365 day Tcal ± 5 °C**	**2 year Tcal ± 5 °C**
1 Ω	2.02 Ω	Normal	2.6 + 5.8	7.7 + 5.8	14 + 5.8	19 + 5.8	39 + 5.8	20 + 5.8	28 + 5.8	41 + 5.8
10 Ω	20.2 Ω	Normal	1.0 + 2.6	5.2 + 2.6	10 + 2.6	15 + 2.6	31 + 2.6	16 + 2.6	19 + 2.6	29 + 2.6
100 Ω	202 Ω	Normal	0.3 + 0.7	3.9 + 0.7	8.4 + 0.7	13 + 0.7	26 + 0.7	13 + 0.7	16 + 0.7	23 + 0.7
1 kΩ	2.02 kΩ	Normal	0.3 + 0.7	2.6 + 0.7	7.7 + 0.7	13 + 0.7	26 + 0.7	13 + 0.7	16 + 0.7	23 + 0.7
10 kΩ	20.2 kΩ	Normal	0.3 + 0.7	2.6 + 0.7	7.7 + 0.7	13 + 0.7	26 + 0.7	13 + 0.7	16 + 0.7	23 + 0.7
100 kΩ	202 kΩ	Normal	0.3 + 0.7	2.6 + 0.7	7.7 + 0.7	13 + 0.7	26 + 0.7	13 + 0.7	16 + 0.7	24 + 0.7
1 MΩ	2.02 MΩ	Normal	0.6 + 1.9	1.3 + 1.9	7.1 + 1.9	13 + 1.9	26 + 1.9	14 + 1.9	17 + 1.9	26 + 1.9
10 MΩ	20.2 MΩ	Normal	3.2 + 19	5.2 + 19	15 + 19	26 + 19	52 + 19	27 + 19	37 + 19	56 + 19
100 MΩ	202 MΩ	Normal	19 + 194	52 + 194	55 + 194	58 + 194	116 + 194	66 + 194	170 + 194	254 + 194
1 GΩ	2.02 GΩ	Normal	260 + 1940	390 + 1940	580 + 1940	775 + 1940	1550 + 1940	780 + 1940	1820 + 1940	2530 + 1940
1 Ω	2.02 Ω	Lo Current	2.6 + 5.8	7.7 + 5.8	14 + 5.8	19 + 5.8	39 + 5.8	20 + 5.8	28 + 5.8	41 + 5.8
10 Ω	20.2 Ω	Lo Current	1.0 + 2.6	5.2 + 2.6	5.8 + 2.6	15 + 2.6	31 + 2.6	16 + 2.6	19 + 2.6	29 + 2.6
100 Ω	202 Ω	Lo Current	3.2 + 2.6	11.2 + 2.6	14.4 + 2.6	18 + 2.6	27 + 2.6	18.6 + 2.6	22 + 2.6	33 + 2.6
1 kΩ	2.02 kΩ	Lo Current	3.2 + 2.6	12.0 + 2.6	15.2 + 2.6	20 + 2.6	29 + 2.6	20 + 2.6	23 + 2.6	35 + 2.6
10 kΩ	20.2 kΩ	Lo Current	3.2 + 2.6	16.6 + 2.6	19.9 + 2.6	24 + 2.6	33 + 2.6	25 + 2.6	28 + 2.6	41 + 2.6
100 kΩ	202 kΩ	Lo Current	6.5 + 0.8	16.6 + 0.8	19.9 + 0.8	24 + 0.8	33 + 0.8	25 + 0.8	28 + 0.8	41 + 0.8
1 MΩ	2.02 MΩ	Lo Current	9.0 + 1.3	14.9 + 1.3	17.5 + 1.3	21 + 1.3	30 + 1.3	22 + 1.3	33 + 1.3	49 + 1.3
10 MΩ	20.2 MΩ	Lo Current	26 + 13	52 + 13	55 + 13	59 + 13	71 + 13	60 + 13	163 + 13	245 + 13
100 MΩ	202 MΩ	Lo Current	323 + 129	323 + 129	580 + 129	645 + 129	1290 + 129	664 + 129	1700 + 129	2540 + 129
1 GΩ	2.02 GΩ	Lo Current	323 + 1940	390 + 1940	580 + 1940	775 + 1940	1550 + 1940	780 + 1940	1820 + 1940	2530 + 1940
10 MΩ	20.2 MΩ	HV	2.6 + 1.29	7.5 + 1.29	8.4 + 1.29	9.0 + 1.29	18 + 1.29	19 + 1.29	22 + 1.29	34 + 1.29
100 MΩ	202 MΩ	HV	4.5 + 12.9	9.5 + 12.9	10.3 + 12.9	11.6 + 12.9	23.2 + 12.9	77 + 12.9	88 + 12.9	132 + 12.9
1 GΩ	2.02 GΩ	HV	26 + 129	35 + 129	36 + 129	39 + 129	77.4 + 129	194 + 129	297 + 129	445 + 129
10 GΩ [14]	20.2 GΩ	HV	323 + 1290	323 + 1290	452 + 1290	645 + 1290	1290 + 1290	677 + 1290	1720 + 1290	2570 + 1290

Temperature Coefficient (not applicable if within Tcal ± 1 °C)

Range	"Mode"	± µΩ/Ω of reading/°C 15 °C to 30 °C		± (µΩ/Ω of reading/°C + Ω/°C) 5 °C to 40 °C [13]
1 Ω	Normal	1.5	or	2.5 + 1.5 µ
10 Ω	Normal	0.6	or	1.0 + 15 µ
100 Ω	Normal	0.5	or	0.8 + 20 µ
1 kΩ	Normal	0.5	or	0.8 + 200 µ
10 kΩ	Normal	0.5	or	0.8 + 2 m
100 kΩ	Normal	0.5	or	0.8 + 20 m
1 MΩ	Normal	0.6	or	1.0 + 200 m
10 MΩ	Normal	2	or	3.0 + 2
100 MΩ	Normal	20	or	30 + 20
1 GΩ	Normal	200	or	300 + 200
1 Ω	Lo Current	1.5	or	2.5 + 1.5 µ
10 Ω	Lo Current	0.6	or	1.0 + 15 µ
100 Ω	Lo Current	0.6	or	1.0 + 150 µ
1 kΩ	Lo Current	0.6	or	1.0 + 1.5 m
10 kΩ	Lo Current	0.6	or	1.0 + 15 m
100 kΩ	Lo Current	0.6	or	1.0 + 20 m
1 MΩ	Lo Current	2	or	3.0 + 200 m
10 MΩ	Lo Current	20	or	30 + 2
100 MΩ	Lo Current	200	or	300 + 20
1 GΩ	Lo Current	200	or	300 + 100
10 MΩ	HV	0.6	or	1.0 + 2.5
100 MΩ	HV	2	or	3.0 + 25
1 GΩ	HV	20	or	30 + 250
10 GΩ [14]	HV	200	or	300 + 2.5 k

Voltage and Current Parameters

Range	"Mode"	Measurement Current	Measurement Voltage at Full Scale
1 Ω	Normal	100 mA	200 mV
10 Ω	Normal	10 mA	200 mV
100 Ω	Normal	10 mA	2 V
1 kΩ	Normal	1 mA	2 V
10 kΩ	Normal	100 µA	2 V
100 kΩ	Normal	100 µA	20 V
1 MΩ	Normal	10 µA	20 V
10 MΩ	Normal	1 µA	20 V
100 MΩ	Normal	100 nA	20 V
1 GΩ	Normal	10 nA	20 V
1 Ω	Lo Current	100 mA	200 mV
10 Ω	Lo Current	10 mA	200 mV
100 Ω	Lo Current	1 mA	200 mV
1 kΩ	Lo Current	100 µA	200 mV
10 kΩ	Lo Current	10 µA	200 mV
100 kΩ	Lo Current	10 µA	2 V
1 MΩ	Lo Current	1 µA	2 V
10 MΩ	Lo Current	100 nA	2 V
100 MΩ	Lo Current	10 nA	2 V
1 GΩ	Lo Current	10 nA	20 V
10 MΩ	HV	10 µA	200 V
100 MΩ	HV	1 µA	200 V
1 GΩ	HV	100 nA	200 V
10 GΩ [14]	HV	10 nA	200 V

Aperture.....100 µs to 2 s in 200 ns increments, >2 s to 10 s in 1 ms increments

Additional errors with aperture

Aperture	µΩ/Ω of reading + µΩ/Ω of range
<10 ms	0 + 0.5
<4 ms	1 + 2
<2 ms	10 + 10
<1ms	20 + 20

Additional errors with read rate:

Read Rate	µΩ/Ω of reading + µΩ/Ω of range
>1ms <5ms	20 + 0.5
<1 ms	45 + 5

Maximum Trigger Rate (Aperture ≤ 100 µs)..... 4700 readings/s (Ascii format - for faster sampling rates see Digitizing).

(Maximum Block size of 10 000 000 samples)

Minimum trigger interval is the aperture plus 170 µs. For example at 50 Hz line frequency, 0.1plc, the minimum interval is 0.002 + 0.00011 seconds = 0.00211 seconds (read rate 474 Hz).

Tru Ohms mode available on 1 Ω to 10 kΩ ranges. Read Rate reduced in Tru Ohms Mode. Specification for Tru Ohms same as corresponding Normal or Lo Current ranges.

2 Wire Adder.....± (10 pA/Ir) x 10^6 µΩ/Ω of Reading ±50 mΩ ±3 mΩ/°C),

where Ir is the measurement current, where the temperature related factor is based on the temperature difference between the present operating temperature and the temperature where the instrument was last zeroed.

Maximum 4 wire Lead Resistance.....10 Ω in any or all leads, 1 Ω on the 1 Ω Range

Ω Guarding

Range	Minimum Parallel Guard Resistance
1 Ω, 10 Ω	200 Ω
100 Ω	2 kΩ
1 kΩ, 10 kΩ, 100 kΩ, 1 MΩ	20 kΩ
10 MΩ, 100 MΩ, 1 GΩ, 10 GΩ	200 kΩ

Rx = Rd x (1 + (Rd x Rg)/(Ra x Rb)) where Rx = Resistor being measured

Rd = displayed value

Ra = parallel resistor from Hi to Guard

Rb = parallel resistor from Lo to Guard

Rg = Ω Guard lead resistance (<1 Ω)

Full Scale Measurement Voltage

Normal Mode..... 200 mV / 2 V / 20 V

Lo Current Mode ..... 20mV/200 mV / 2 V / 20 V

High Voltage Mode..... 200 V

Protection (All Ranges) ..... 1050 V RMS

Ratio Accuracy

Range to Range ..... Combine total Front Input accuracy and total Rear Input accuracy by Root Sum of Squares

Within Range..... Using the 24 hour or 20 minute Transfer Uncertainty specifications as appropriate, apply a Root Sum of Squares combination of the specified accuracy of the Front Input signal and the specified accuracy of the Rear Input signal

Settling Time

Filter Off..... Up to 100 kΩ Range <0.05 s to 10 μΩ/Ω

Filter On..... Up to 100 kΩ Range <1 s to 10 μΩ/Ω

Digitizing [2][3][4][9][18][19]

Digitize DC Voltage

18-bit resolution for aperture 0 to ≤3 ms

			Relative Accuracy				Absolute Accuracy		
95 % Confidence			±(μV/V of reading + μV/V of range)						
Range	**Zin**	**Full Scale**	**24 Hour Tcal ± 1 °C**	**90 day Tcal ± 1 °C**	**365 day Tcal ± 1 °C**	**2 years Tcal ± 1 °C**	**365 day Tcal ± 1 °C**	**365 day Tcal ± 5 °C**	**2 year Tcal ± 5 °C**
100 mV	Auto, 10 MΩ, 1 MΩ	202 mV	3.3 + 15	20 + 15	44 + 15	62 + 15	49 + 15	67 + 15	80 + 15
1 V	Auto, 10 MΩ, 1 MΩ	2.02 V	3.3 + 15	20 + 15	44 + 15	62 + 15	49 + 15	63 + 15	76 + 15
10 V	Auto, 10 MΩ, 1 MΩ	20.2 V	3.3 + 15	20 + 15	44 + 15	62 + 15	49 + 15	63 + 15	76 + 15
100 V	Auto, 10 MΩ	202 V	3.3 + 15	20 + 15	44 + 15	62 + 15	49 + 15	63 + 15	76 + 15
100 V	1 MΩ	202 V	3.3 + 15	20 + 15	44 + 15	62 + 15	49 + 15	63 + 15	76 + 15
1000 V	Auto, 10 MΩ	1050 V	3.3 + 15	20 + 15	44 + 15	62 + 15	49 + 15	67 + 15	80 + 15
1000 V	1 MΩ	1050 V	4.0 + 15	20 + 15	44 + 15	62 + 15	49 + 15	67 + 15	80 + 15

99 % Confidence			Relative Accuracy				Absolute Accuracy		
			±(µV/V of reading + µV/V of range)						
Range	**Zin**	**Full Scale**	**24 Hour Tcal ± 1 °C**	**90 day Tcal ± 1 °C**	**365 day Tcal ± 1 °C**	**2 years Tcal ± 1 °C**	**365 day Tcal ± 1 °C**	**365 day Tcal ± 5 °C**	**2 year Tcal ± 5 °C**
100 mV	Auto, 10 MΩ, 1 MΩ	202 mV	4.3 + 19	26 + 19	57 + 19	80 + 19	63 + 19	86 + 19	103 + 19
1 V	Auto, 10 MΩ, 1 MΩ	2.02 V	4.3 + 19	26 + 19	57 + 19	80 + 19	63 + 19	81 + 19	98 + 19
10 V	Auto, 10 MΩ, 1 MΩ	20.2 V	4.3 + 19	26 + 19	57 + 19	80 + 19	63 + 19	81 + 19	98 + 19
100 V	Auto, 10 MΩ	202 V	4.3 + 19	26 + 19	57 + 19	80 + 19	63 + 19	81 + 19	98 + 19
100 V	1 MΩ	202 V	4.3 + 19	26 + 19	57 + 19	80 + 19	63 + 19	81 + 19	98 + 19
1000 V	Auto, 10 MΩ	1050 V	4.3 + 19	26 + 19	57 + 19	80 + 19	63 + 19	86 + 19	103 + 19
1000 V	1 MΩ	1050 V	5.2 + 19	26 + 19	57 + 19	80 + 19	63 + 19	86 + 19	103 + 19

If Filter Off is selected, add 40 µV/V of reading + 35 µV/V of range

Temperature Coefficient (not applicable if within Tcal ± 1 °C)

		± (µV/V of reading / °C + µV/V of Range/°C)
Range	**Zin**	**5 °C to 40 °C** [13]
100 mV	Auto, 10 MΩ, 1 MΩ	4.5 + 12.0
1 V	Auto, 10 MΩ, 1 MΩ	3.3 + 9.30
10 V	Auto, 10 MΩ, 1 MΩ	3.3 + 9.30
100 V	Auto, 10 MΩ	3.3 + 9.30
100 V	1 MΩ	3.3 + 9.30
1000 V	Auto, 10 MΩ	4.5 + 9.30
1000 V	1 MΩ	4.5 + 9.30

Low Pass Filter Bandwidths

Filter	Bandwidth
Off	10 mV to 10 V ranges are approximately 15 MHz-20 MHz BW.
100 kHz	Approximates to single pole RC up to 10 MHz
3 MHz	4-pole at 3MHz

18-bit Resolution for Aperture 0 to ≤3 ms

95 % Confidence				Relative Accuracy				Absolute Accuracy		
				±(μA/A of reading + μA/A of range)						
Range		Full Scale		24 Hour Tcal ± 1 °C	90 day Tcal ± 1 °C	365 day Tcal ± 1 °C	2 years Tcal ± 1 °C	365 day Tcal ± 1 °C	365 day Tcal ± 5 °C	2 year Tcal ± 5 °C
10	μA	20.2	μA	35 + 80	40 + 80	44 + 80	66 + 80	48 + 80	60 + 80	78 + 80
100	μA	202	μA	6 + 70	22 + 70	44 + 70	66 + 70	48 + 70	60 + 70	78 + 70
1	mA	2.02	mA	6 + 70	22 + 70	44 + 70	66 + 70	48 + 70	60 + 70	78 + 70
10	mA	20.2	mA	7 + 70	22 + 70	44 + 70	66 + 70	48 + 70	60 + 70	78 + 70
100	mA	202	mA	18 + 70	22 + 70	44 + 70	66 + 70	48 + 70	80 + 70	98 + 70
1	A	2.02	A	22 + 125	55 + 125	110 + 125	165 + 125	112 + 125	144 + 125	197 + 125

99 % Confidence				Relative Accuracy				Absolute Accuracy		
				±(μA/A of reading + μA/A of range)						
Range		Full Scale		24 Hour Tcal ± 1 °C	90 day Tcal ± 1 °C	365 day Tcal ± 1 °C	2 years Tcal ± 1 °C	365 day Tcal ± 1 °C	365 day Tcal ± 5 °C	2 year Tcal ± 5 °C
10	μA	20.2	μA	45 + 103	52 + 103	57 + 103	85 + 103	62 + 103	78 + 103	101 + 103
100	μA	202	μA	7 + 90	28 + 90	57 + 90	85 + 90	62 + 90	78 + 90	101 + 90
1	mA	2.02	mA	7 + 90	28 + 90	57 + 90	85 + 90	62 + 90	78 + 90	101 + 90
10	mA	20.2	mA	8 + 90	28 + 90	57 + 90	85 + 90	62 + 90	78 + 90	101 + 90
100	mA	202	mA	23 + 90	28 + 90	57 + 90	85 + 90	62 + 90	104 + 90	126 + 90
1	A	2.02	A	28 + 161	71 + 161	142 + 161	213 + 161	144 + 161	186 + 161	254 + 161

If Filter Off is selected, add 40 μA/A of reading + 70 μA/A of range.

Temperature Coefficient (not applicable if within Tcal ± 1 °C)

Range	± µA/A reading/°C	± (µA/A of reading/°C ± µA/A of range/°C)
	15 °C to 30 °C	5 °C to 40 °C [13]
10 µA	3.0	or 5.0 + 5
100 µA	3.0	or 5.0 + 1
1 mA	3.0	or 5.0 + 0.5
10 mA	3.0	or 5.0 + 0.5
100 mA	8.0	or 12 + 0.5
1 A	8.0	or 12 + 0.5

Low Pass Filter bandwidths

	Bandwidth with Filter Setting		
Range	100 kHz	3 MHz	Off
10µA	100 kHz	500kHz	500kHz
100µA	100 kHz	500kHz	500kHz
1mA	100 kHz	2MHz	2MHz
10mA	100 kHz	4MHz	4MHz
100mA	100 kHz	2MHz	2MHz
1A	100 kHz	500kHz	500kHz

Digitizing: Voltage and Current

Digitizing internal buffer capacity:

Non-time-stamped	10 000 000
Time-stamped	5 000 000

Maximum Digitizing Sample rate:

Internal trigger	5 MHz
External trigger	5 MHz

Dynamic Performance (for 2xFull Scale pk-pk signal)

RMS Signal to noise ratio (Aperture = 0 ns)

Filter	100kHz	3MHz	Full
Range			
100mV	76 dB	70 dB	60 dB
1V	80 dB	80 dB	80 dB
10V	80 dB	80 dB	80 dB
100V	80 dB	80 dB	80 dB
1000V	80 dB	80 dB	80 dB

Dynamic Performance (for 2xFull Scale pk-pk signal)

FFT harmonics and spurii at 1kHz (Aperture = 0 ns)

Filter	100kHz	3MHz	Full
Range			
100mV	-100 dB	-80 dB	-74 dB
1V	-100 dB	-100 dB	-90 dB
10V	-100 dB	-100 dB	-100 dB
100V	-94 dB	-94 dB	-94 dB
1000V	-100 dB	-100 dB	-100 dB

Dynamic Performance (for 2xFull Scale pk-pk signal)

RMS Signal to noise ratio (Aperture = 0 ns)

Filter	100kHz	3MHz	Full
Range			
10 µA	60 dB	51 dB	50 dB
100 µA	76 dB	70 dB	70 dB
1 mA	80 dB	74 dB	74 dB
10 mA	80 dB	77 dB	76 dB
100 mA	70 dB	66 dB	60 dB
1 A	70 dB	66 dB	60 dB
10 A	67 dB	62 dB	62 dB
30 A	77 dB	72 dB	72 dB

Dynamic Performance (for 2xFull Scale pk-pk signal)

FFT harmonics and spurii at 1 kHz (Aperture = 0 ns)

Filter	100kHz	3MHz	Full
Range			
10 µA	-74 dB	-62 dB	-62 dB
100 µA	-90 dB	-80 dB	-80 dB
1 mA	-94 dB	-80 dB	-80 dB
10 mA	-94 dB	-92 dB	-90 dB
100 mA	-92 dB	-76 dB	-76 dB
1 A	-90 dB	-80 dB	-76 dB
10 A	-80 dB	-78 dB	-76 dB
30 A	-90 dB	-88 dB	-86 dB

PRT Temperature [2][12]

PRT Temperature readout accuracy (99 % Confidence)

Secondary resistance reading accuracy (99 %): ±0.5 mΩ

Temperature readout values are calculated using the IEC 60751 industrial PRT (385 curve) conversion algorithm

Temperature readout accuracy (Ro = 100): ±5 mK

Temperature readout accuracy (Ro = 25): ±10 mK

Thermocouple [2][12]

Thermocouple temperature readout accuracy 99 %

Secondary voltage reading accuracy (99 %): ±5 µV

Temperature readout values are calculated:

Types K, S, J, E, B, R: ±5 mK
(NIST Monograph 175 conversion algorithm)

Type T: ≥120 K (-123 °C): ±5 mK
<120 K (-123 °C): ±15 mK
(NIST Monograph 175 conversion algorithm)

Type N: ≥120 K (-153 °C): ±5 mK
≥100 K, < 120 K (≥ -173 °C < -153 °C): ±25 mK
<100 K (< -173 °C): ±50mK
(NIST Monograph 175 conversion algorithm)

Types L, U: ±5 mK
(ITS 90 algorithm)

Type C: ±5 mK
(IEC 60584-1: 2013 algorithm)

Notes to Performance Specifications

1. Specifications apply for default configuration for aperture and resolution.
2. Assumes 3 hour warm-up period.
3. Input zero or offset null required whenever the temperature moves more than ±1 °C from the temperature at which the previous Zero operation was performed. Or NULL using Math.
4. For all specification tables, TCal = Ambient calibration temperature.
5. Integration time >1 Power Line cycle.
6. Valid for signals >1 % Full Scale. Signals must be DC coupled <40 Hz.
7. Maximum Volt.Hertz 3 x 10^7.
8. Maximum input to front and rear terminals is 2 A.
9. DCV Digitizing and DCV aperture <100 µs : for inputs > 160 % of range add 20 µV/V of range.
10. Tru Ohms mode available on 2 Ω to 20 kΩ ranges. Read Rate reduced in Tru Ohms Mode. Specification for Tru Ohms same as corresponding Normal or Lo Current range.
11. Valid for 4-wire sensor.
12. Not including sensor uncertainty.
13. The zero TC specification only needs to be applied if an input zero has not been performed within ±1 °C of the current operating temperature.
14. >2 GΩ Relative Humidity Operating <80 % to 30 °C <70 % to 40 °C.
15. Transfer specification for DCV, DCI, and Ohms applies to measurement made between 10 % and 120 % of range for deviations of up to 10 % of the initial measurement made using the same configuration for range, filter, aperture, delay etc. Specification accounts for linearity and noise but excludes temperature coefficient which should be calculated from the data provided according to the environment in which the instrument is used.
16. Transfer specification for ACV and ACI applies to measurements made between 10 % of range and full scale and accounts for deviations of up to 1 % of frequency and 10 % of amplitude of the initial measurement. Measurement must be made using the same configuration for range, filter, aperture, delay etc. The quoted transfer specification accounts for linearity, flatness and noise but excludes temperature coefficient which should be calculated from the data provided according to the environment in which the instrument is used.
17. Extended HF mode must be selected.
18. Differential non-linearity is included in the specification.
19. For AC signals refer to the ACV/ACI specification.

Frequency Counter

99 % Confidence

Input Rear BNC

Minimum frequency ..... 10 Hz
Maximum frequency ..... 100 MHz
Maximum V ..... 5 Vpk
Minimum V ..... 0.5 Vpp

Gate time	Display Resolution
1 s	8½
100 ms	7½
10 ms	6½
1 ms	5½
100 µs	4½

Input Signal Voltage

Minimum frequency ..... 1 Hz
Maximum frequency ..... 10 MHz
Signal Amplitude > 10 % of Range to limit set by maximum VHz

Input Signal Current

Minimum frequency ..... 1 Hz
Maximum frequency ..... 100 kHz
Signal Amplitude > 10 % of Range or >20 µA

Frequency Accuracy

Initial adjustment ..... ±0.1 µHz/Hz
Temperature coefficient ..... ±0.05 µHz/Hz
Operating temperature range ..... ±0.5 µHz/Hz
Aging ..... ±1.0 µHz/Hz per year

System Speed

Change configuration and take one reading in remote control	GPIB	USB	Ethernet
DCV ≤10 V range to/from DCV ≤10 V range	125/s	150/s	130/s
DCV to DCV > 10 V range	75/s	80/s	75/s
Other function to DCV	50/s	50/s	55/s

Reading Speed	To Volatile memory		To GPIB	To USB	To Ethernet
DCV, DCI readings	20 000/s		-	-	-
DCV, DCI readings	100 000/s	[F]	-	-	-
Normal Ohms, DCI Ext Shunt, Thermocouple, and PRT 2W	4 700/s		-	-	-
ACV, ACI, ACI Ext Shunt (1 kHz filter)	66/s		-	-	-
Capacitance	13/s		-	-	-
Digitize capture rate into volatile buffer	5 000 000/s		-	-	-
Digitize captured data transfer to volatile memory	500 000/s		-	-	-
DCV, DCI single "READ?"s	-	[e]	230/s	500/s	230/s
DCV, DCI SYNC triggered TALK? to GPIB	-	[e]	1500/s	n/a	n/a
DCV, DCI SYNC triggered TALK? to GPIB	-	[b]	2000/s	n/a	n/a
DCV, DCI SYNC triggered TALK? to GPIB	-	[B]	2000/s	n/a	n/a
DCV, DCI continuous FNOW?	-	[b][F]	200 000/s	500 000/s	75 000/s
DCV, DCI continuous FNOW?	-	[B][F]	100 000/s	300 000/s	75 000/s
Bus Transfer Speed					
Readings from volatile memory	-	[e]	4000/s	30 000/s	50 000/s
Readings from volatile memory	-	[b]	8000/s	100 000/s	180 000/s
Readings from volatile memory	-	[B]	7000/s	90 000/s	180 000/s
Readings from volatile memory	-	[b][F]	200 000/s	500 000/s	200 000/s
Readings from volatile memory	-	[B][F]	100 000/s	400 000/s	200 000/s

Notes:
[e] = engineering format rounded to 4.5 digits for display
[b] = 2 byte binary format
[B] = 4 byte binary format
[F] = 2-byte or 4-bite binary captured with DISP OFF, STATS OFF, and PRESET FAST mode. PRESET FAST selects 2 byte binary, 4 byte can be set if required.

Tru Ohms, Scan, and auto-range front/rear settling delay times

Range of setting .....0 s to 65 000 s

Resolution of setting .....1 ms

Accuracy of setting .....0.5 ms

External Frequency Reference Clock

Frequency Ref In BNC	Maximum input	±5 Vpk
	Minimum input	0.2 Vpp
	Impedance	50 Ω
	Frequency – user selectable	1 MHz / 10 MHz
	Frequency lock range	±5 µHz/Hz

Triggering

UI Delay Resolution Settings		
Time (seconds)		
From	Up to	Setting Resolution
0	0	N/A
0.000 000 030	40.000 000 00	10 ns
40.000 000 00	400.000 000 0	100 ns
400.000 000 0	4000.000 000	1 µs
4000.000 000	40 000.000 00	10 µs
40 000.000 00	400 000.000 0	100 µs
400 000.000 0	4 000 000.000	1 ms
Note setting resolution is also pkpk jitter for delays (but not timers)		

Timer resolution settings		
Time (seconds)		
From	Up to	Setting Resolution
0.000 000 02	40.000 000 00	10 ns
40.000 000 00	400.000 000 0	100 ns
400.000 000 0	4000.000 000	1 µs
4000.000 000	40 000.000 00	10 µs
40 000.000 00	400 000.000 0	100 µs
400 000.000 0	4 000 000.000	1 ms

Trigger Latency

Digitizing and AC functions

Ext Trigger edge at rear BNC to ADC conversion begin ..... 60 ns to 100 ns

Jitter ..... 10 ns pkpk

Maximum input frequency ..... 25 MHz

DC functions, Ohms; Capacitance; PRT; Thermocouple

Ext Trigger edge at rear BNC to ADC conversion begin ..... 2.8 µs

Jitter ..... 0.2 µs

DC functions, aperture ≥100 µs: aperture closed to reading complete ..... <170 µs

Conversion time overhead (additional to aperture setting)

Digitize ..... 200 ns ..... 200 ns

DC functions, aperture <100 µs ..... 30 µs ..... 30 µs

Trigger source INTernal (signal level)

Setting resolution ..... 1 % of range ..... 1 % of range

Accuracy ..... 5 % of range ..... 5 % of range

Range ..... ±200 % ..... ±200 %

Trig In BNC

Maximum input ..... ±5 Vpk

Threshold selectable ..... TTL or ±0.1 V

Impedance ..... 10 kΩ

Trig Out BNC

Output levels ..... 3.3 V / 0 V

Source selectable from:

Off

Signal acquired - 1 µs pulse

Aperture open - level

Reading count complete - 1 µs pulse

On event - 1 µs pulse when an enabled event occurs in operation status register or questionable status registers

Reading complete - 1 µs pulse

Output polarity ..... Negative or positive pulse or level