

SECTION 6 SPECIFICATIONS

General

POWER SUPPLY

Voltage	:	100/120/220/240V ±10%
Line Frequency	:	48 to 62Hz
Consumption	:	<300 Watts
Fuses	:	220/240V : 3.0A 100/120V : 6.25A

CLIMATE CONDITIONS

Operating Temperature	:	0°C to +50°C (except where specified)
Storage Temperature ^[1]	:	-40°C to +70°C
Maximum Relative Humidity	:	75% @ 40°C
Warm-up Time	:	Four hours to meet all specifications

MECHANICAL

Dimensions	:	Height 178mm (7") Width 454mm (17.9") Depth 563mm (22.2")
Weight	:	30 Kg (66 lbs)

OPERATING INDICATIONS

Scale length	:	Output display – 7½ digits max. e.g. 1.9999999V. Mode display – 7½ digits max. in Offset Mode. For other modes see Section 4
Indication	:	Symbols lit on display and illuminated keys

AUTORANGE : Available on IEEE 488 interface only. See Sect. 5

SAFETY : The 4000 has been designed to meet BSI 4743, IEC 348, and UL 1244 specifications.

PEAK TERMINAL VOLTAGES

Guard to Ground	:	920V
Lo to Guard or Ground	:	920V
Hi to Guard or Ground	:	1556V
Rear panel digital inputs to Ground	:	0V to +5V. NB. Digital Common is internally strapped to Ground.
to Lo or Guard	:	920V
to Hi	:	1556V

[1] External Temperature stress may affect calibration stability

DC Voltage

Stability and Accuracy

MODEL	RANGE	STABILITY [2]		ACCURACY RELATIVE TO CALIBRATION STANDARDS		
		±(ppm Output + ppm FS) [4]		±(ppm Output + ppm FS) [4]		
		10 Mins	24 Hours	24 Hours	23°C ±1°C 90 Days	1 Year
4000A	100.00μV - to - 100.00000mV	0.3 + 0.3μV	0.6 + 0.3μV	2.0 + 0.4μV	4 + 0.4μV	8 + 0.4μV
	1.0000000V	0.2 + 0.25	0.5 + 0.25	1.0 + 0.4	3 + 0.4	6 + 0.4
	10.000000V	0.2 + 0.05	0.3 + 0.05	0.5 + 0.25	2 + 0.25	4 + 0.25
	100.00000V	0.2 + 0.13	0.5 + 0.13	1.0 + 0.5	3 + 0.5	6 + 0.5
	1000.0000V	0.3 + 0.1	0.5 + 0.1	2.0 + 0.25	4 + 0.25	8 + 0.25
4000	100.00μV - to - 100.00000mV	0.3 + 0.3μV	1.5 + 0.3μV	3.0 + 0.5μV	6 + 0.5μV	12 + 0.5μV
	1.0000000V	0.2 + 0.25	1.2 + 0.25	2.0 + 1.0	4 + 1.0	8 + 1.0
	10.000000V	0.2 + 0.05	0.6 + 0.05	1.0 + 0.5	3 + 0.5	6 + 0.5
	100.00000V	0.2 + 0.13	1.2 + 0.13	2.0 + 1.0	4 + 1.0	8 + 1.0
	1000.0000V	0.3 + 0.1	1.2 + 0.1	3.0 + 1.5	6 + 1.5	11 + 1.5

Noise

BANDWIDTH RANGE	2.5kHz	Average over 1 Line Period (pk-to-pk)	Average over 10 Line Periods (pk-to-pk)	DC - 2Hz Typical Null Detector (pk-to-pk)
	(RMS)			
100μV - 100mV	2μV	0.2μV	0.05μV	0.1μV
1V	3μV	1.5μV	0.5μV	0.5μV
10V	10μV	5μV	2μV	2μV
100V	400μV	50μV	25μV	25μV
1000V	2.5mV	500μV	150μV	150μV

(For 10kHz-wide band, multiply 2.5kHz figures by 2)
(For DC-10Hz, multiply DC-2Hz figures by 2)
(For RMS, divide pk-to-pk figures by 6)

Notes:

- [2] Stability figures repeatable only in the same environmental conditions.
- [3] Datron Instruments traceability to National Standards.
- [4] FS (Full Scale) = 2 x Nominal Range.

ACCURACY RELATIVE TO CALIBRATION STANDARDS ±(ppm Output + ppm FS) [4]			CALIBRATION UNCERTAINTY ±ppm [3]	TEMPERATURE COEFFICIENT ±ppm Output/°C 13°C - 18°C 28°C - 33°C	OUTPUT	
24 Hours	23°C ±5°C 90 days	1 Year			IMPEDANCE	COMPLIANCE
4.0 + 0.5μV	6.0 + 0.5μV	10 + 0.5μV	5	1.4	100Ω	—
2.5 + 0.5	4.5 + 0.5	8 + 0.5	3	0.8	<0.1mΩ	25mA
1.0 + 0.25	2.5 + 0.25	5 + 0.25	2	0.3	<0.1mΩ	25mA
2.5 + 0.5	4.5 + 0.5	8 + 0.5	4	0.8	<1mΩ	25mA
3.5 + 0.25	5.5 + 0.25	10 + 0.25	4	0.8	<10mΩ	25mA
7 + 0.5μV	10 + 0.5μV	16 + 0.5μV	5	2.4	100Ω	—
5 + 1.0	7 + 1.0	11 + 1.0	3	1.4	<0.1mΩ	25mA
3 + 0.5	5 + 0.5	8 + 0.5	2	1.0	<0.1mΩ	25mA
5 + 1.0	7 + 1.0	11 + 1.0	4	1.6	<1mΩ	25mA
7 + 1.5	10 + 1.5	15 + 1.5	4	2.0	<10mΩ	25mA

Other Specifications

Overrange	100% On 100μV to 100V Ranges; 20% on 1000V range (1200V).
True Bipolar Output	Capable of delivering ±1200V with respect to Output Lo at up to 25mA.
Settling Time	0.1s 1s 5s Proximity to step size 100ppm 10ppm 1ppm
Remote / Local Sensing	Selectable remote or local voltage sensing on 1V to 1000V ranges.
Remote / Local Guarding	Selectable remote or local guard connection Maximum Guard to Ground voltage: 650Vrms (2.5kV flash test).
Common Mode Rejection Ratio	140dB at DC - 400Hz

Current

Accuracy

MODEL	RANGE	ACCURACY RELATIVE TO CALIBRATION STANDARDS ±(ppm Output + ppm FS) [4]					
		23°C ±1°C			23°C ±5°C		
		24 Hours	90 Days	1 Year	24 Hours	90 Days	1 Year
4000/4000A	100.0000µA	5 + 5	20 + 5	40 + 5	15 + 5	30 + 5	50 + 5
	1.000000mA	5 + 5	20 + 5	40 + 5	15 + 5	30 + 5	50 + 5
	10.000000mA	5 + 5	20 + 5	40 + 5	15 + 5	30 + 5	50 + 5
	100.0000mA	5 + 5	20 + 5	40 + 5	15 + 5	30 + 5	50 + 5
	1.000000A[5]	10 + 10	50 + 10	75 + 10	40 + 10	80 + 10	100 + 5

Notes:

- [3] Datron Instruments traceability to National Standards.
 [4] FS (Full Scale) = 2 x Nominal Range.
 [5] Accuracy figures are "typical" for outputs in excess of 1 Ampere.

Resistance

Accuracy

MODEL	RANGE [1]	ACCURACY RELATIVE TO CALIBRATION STANDARDS ±(ppm Output + ppm FS) [4]					
		23°C ±1°C			23°C ±5°C		
		24 Hours	90 Days	1 Year	24 Hours	90 Days	1 Year
4000/4000A	1.0000000Ω	10	15	25	30	35	45
	10.000000Ω	4	10	15	15	20	25
	100.00000Ω	1.5	3	5	5	7	9
	1.0000000kΩ	1.5	3	5	5	7	9
	10.000000kΩ	1.5	3	5	5	7	9
	100.00000kΩ	1.5	3	8	5	7	12
	1.0000000MΩ	4	10	15	15	20	25
	10.000000MΩ	10	25	35	30	40	50

Notes:

- [1] Range figures are nominal. Actual calibrated values are displayed.
 [3] Datron Instruments traceability to National Standards.
 [4] FS (Full Scale) = 2 x Nominal Range.

Noise

CALIBRATION UNCERTAINTY ±ppm [3]	TEMPERATURE COEFFICIENT ±ppm Output/°C 13°C - 18°C 28°C - 33°C	OUTPUT		BANDWIDTHS		
		IMPEDANCE	COMPLIANCE	2.5kHz (RMS)	Average over 1 Line Period (pk-to-pk)	Average over 10 Line Periods (pk-to-pk)
10	6	> 20GΩ	} 1.5 volts to full specification - 3 volts maximum	500pA	300pA	200pA
10	6	> 2GΩ		5nA	3nA	2nA
10	6	>200MΩ		50nA	30nA	20nA
10	6	> 20MΩ		1μA	500nA	400nA
25	15	> 1MΩ		25μA	25μA	10μA

For LF RMS noise divide pk-pk figures by 6.

Other Specifications

Overrange True Bipolar Output Settling Time Sense and Guard	100% on all ranges Capable of delivering ±2 Amperes 1 second to specification Local only - Remote not available
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CALIBRATION UNCERTAINTY ±ppm [3]	TEMPERATURE COEFFICIENT ±ppm Output/°C 13°C - 18°C 28°C - 33°C	SPECIFIED CURRENT (Is)	MAXIMUM CURRENT (Im)	ADDITIONAL UNCERTAINTY for Is < I < Im (ppm)
15	10	100mA	250mA	75.I ²
10	6	10mA	100mA	(4.5x10 ³).I ²
5	2	10mA	25mA	(4.5x10 ³).I ²
5	2	1mA	10mA	(4.5x10 ⁴).I ²
5	2	100μA	2.5mA	(4.5x10 ⁵).I ²
12	2	100μA	1mA	(4.5x10 ⁶).I ²
20	6	10μA	100μA	(4.5x10 ⁷).I ²
25	10	1μA	10μA	(4.5x10 ⁸).I ²

Other Specifications

Connection	Selectable 2 or 4 wire connection to resistors. In 2 wire, displayed value includes lead resistance.
Guarding Protection	Selectable remote or local guard connection. All resistors fuse-protected to max applied voltage of 120V rms.