

# DIGITAL MULTIMETER 7150



- 6½ to 3½ digits
- 20ppm dc volts
- True rms ac

All measurement functions plus IEEE-488 are standard in the 7150 providing system and bench performance at low cost.

**DC Volts:** 100nV to 1000V  
Continuous integration using pulse width conversion provides scale lengths from 3½ to 6½ digits with superb linearity.

**AC Volts:** 1μV to 750V  
True rms ac measurement with high bandwidth and 10:1 crest factor.

**Resistance:** 10mΩ to 20MΩ  
2-wire and 4-wire measurement are provided up to 20MΩ with as little as 20ppm error.

- 2- and 4-wire ohms
- Diode test
- Current 1μA to 2A

**Current:** dc 1μA to 2A  
True rms AC 10μA to 2A  
Basic current measurement with 0.02% accuracy. Range may be extended using any shunt resistor of appropriate value.

**Digital Calibration**  
Calibration via the IEEE488 or RS232 interface. See the description in the DMM introduction.

**Systems Interface**  
The IEEE488 interface is included as standard with full Talk/Listen and Talk Only operation. Commands are in easily understood ENGLISH format but may be abbreviated to reduce message size. Communication with all popular controllers is fast to set up and easy to implement.

- Digital calibration
- IEEE488 included
- Fully programmable

**Null**  
Electronic null for dc volts, current and resistance. Lead resistance and thermal emf's are eliminated from the measurement.

## ACCURACY

The following apply to the Accuracy sections:  
Limits of Error:

expressed as  $\pm$  [% reading + digits]  
apply after 2 hours warm-up  
ac inputs > 10% of range  
dc and resistance with null in use

Calibration Temperature ( $T_c$ ) is the temperature of the calibration environment. Solartron calibration occurs at 20°C and is directly traceable to the National Physical Laboratory. Re-calibration is valid at  $T_c$  from 18°C to 25°C.

Temperature Coefficient need be applied only outside the temperature span quoted with  $T_c$ .

## VOLTAGE DC

### SCALE LENGTH & SENSITIVITY

6½ digits, display:	1.999999
GPIB:	2.350000
5½ digits, display or GPIB:	2.35000
Range	0.2V    2V    20V    200V    1000V
5½ digits 1µV	10µV 100µV 1mV 10mV
6½ digits 100nV*	1µV 10µV 100µV 1mV

\*1µV at the display.

### ACCURACY 5½ digits.

Limits of Error, all ranges.

For 24hrs, at $T_e \pm 1^\circ\text{C}$ :	0.002 + 5
For 2 years, at $T_e \pm 5^\circ\text{C}$ :	0.01 + 5

### Temperature coefficients

Limits of error:	<0.0015%rdg/°C
Zero (Null not in use):	<0.2µV/°C
Setting time, sample:	<20ms
Range of Null:	>±100µV
Input current (0 to 50°C):	<150pA
Input resistance:	10MΩ±1%
Overload protection, autorange:	1.2kV
Comanded range, 20, 200 or 1000V:	1.2kV
0.2 or 2V:	500V

### BUS CONTROL

Scale Length	Integ Time	Track Speed	Add Error
6½	400ms	1/s	10 digits
5½	400ms	2/s	—
4½	50ms	12/s	1 digit
4½	40ms	14/s	1 digit
3½	6.67ms	25/s	1 digit

## CURRENT DC

### SCALE LENGTH & SENSITIVITY

Range	6½ digits	5½ digits
2000mA	1µA	10µA

### ACCURACY 5½ digits at 1A.

Limits of Error	
For 24 hours at $T_e \pm 1^\circ\text{C}$ :	0.02 + 5
For 2 years at $T_e \pm 5^\circ\text{C}$ :	0.05 + 5

Temperature coefficient:	<0.005%rdg/°C
Range of Null:	>±1mA
Overload protection:	fused 2A/250V rms
Burden at full scale:	<0.8V

### BUS CONTROL

Scale Length	Integ Time	Track Speed	Add Error
6½	400ms	1/s	10 digits
5½	400ms	2/s	—
4½	50ms	12/s	1 digit
4½	40ms	14/s	1 digit
3½	6.67ms	25/s	1 digit

## VOLTAGE AC Trms of ac component.

Scale:	5½ digits			
Range:	2V	20V	200V	1000V
Sensitivity:	10µV	100µV	1mV	10mV

### ACCURACY 5½ digits.

Limits of Error	24hrs $T_e \pm 1^\circ\text{C}$	1 year $T_e \pm 5^\circ\text{C}$
20Hz to 40Hz	0.25+70	0.31+70
40Hz to 10kHz	0.1+70	0.16+70
10kHz to 30kHz	0.1+200	0.16+200
30kHz to 100kHz	0.3+700	0.36+700
30kHz to 100kHz, 1kV range	— add 300 digits —	

10Hz to 20Hz:	add ± 0.65% rdg
100kHz to 300kHz:	add ± 9% rdg ± 2000
Temperature coefficient:	<0.01% rdg/°C
Settling time, sample:	400ms
Input impedance:	1MΩ, 100pF
<b>Maximum ratings</b>	
Autorange: <1kHz:	750V or 1.2kV pk
>1kHz:	200V
Command range: 2V, <2kHz:	250V
>2kHz:	120V
20, 200 or 1000V, <30kHz:	750V
>30kHz:	2 × 10 <sup>7</sup> VHz
400V	

DC content:

### Non-sinusoidal inputs

Must not exceed 5 × full scale, or 1.2kV pk.

Additional error for 7:1 crest factor: 1%rdg

### BUS CONTROL

Scale Length	Integ Time	Track Speed	Add Error
5½	400ms	2/s	—
4½	50ms	12/s	1 digit
4½	40ms	14/s	1 digit
3½	6.67ms	25/s	1 digit

## CURRENT AC Trms of ac component.

Scale:	5½ digits
Range:	2000mA
Sensitivity:	10µA

### ACCURACY 5½ digits.

Limits of Error, 40Hz to 5kHz.	
For 24 hours at $T_e \pm 1^\circ\text{C}$ :	0.1 + 100
For 2 years at $T_e \pm 5^\circ\text{C}$ :	0.2 + 100

Temperature coefficient: <0.015%rdg/°C

### Non-sinusoidal inputs

Peak must not exceed 5 × full scale.

Additional error for 7:1 crest factor: 1% rdg

Overload protection: fused 2A/250V rms

Burden at full scale: <0.8V

### BUS CONTROL

Scale Length	Integ Time	Track Speed	Add Error
5½	400ms	2/s	—
4½	50ms	12/s	1 digit
4½	40ms	14/s	1 digit
3½	6.67ms	25/s	1 digit

## RESISTANCE

### SCALE LENGTH & SENSITIVITY

6½ digits, display:	19.99999
GPIB:	23.50000
5½ digits, display or GPIB:	23.5000
Range	20kΩ    200kΩ    2MΩ    20MΩ
5½ digits	100mΩ    1Ω    10Ω    100Ω
6½ digits	10mΩ    100mΩ    1Ω    10Ω
Current	100µA    10µA    1µA    100nA

### ACCURACY Limits of Error, 5½ digits.

Range	24hrs $T_e \pm 1^\circ\text{C}$	2 years $T_e \pm 5^\circ\text{C}$	TC ppm/°C	Settling Time
20kΩ	0.004+5	0.03+5	40	20ms
200kΩ	0.005+5	0.04+5	50	20ms
2MΩ	0.004+5	0.03+5	40	40ms
2MΩ	0.05+20	0.08+20	100	100ms

Range of Null: >±10Ω

Overload protection: 240V rms

Open circuit voltage: <7V

### BUS CONTROL

Scale Length	Integ Time	Track Speed	Add Error
6½	400ms	1/s	10 digits
5½	400ms	2/s	—
4½	50ms	12/s	1 digit
4½	40ms	14/s	1 digit
3½	6.67ms	25/s	1 digit

## INTERFERENCE REJECTION

Normal Mode, dc measurement

6½, 5½, 4½ digits, 50/60Hz ± 0.1%: >60dB

6½ digits, 50/60Hz ± 10%: >55dB

Effective Common Mode with 1kΩ imbalance

DC measurement: rejection of dc: >140dB

6½, 5½, 4½ digits, 50/60Hz ± 0.1%: >120dB

6½ digits, 50/60Hz ± 10%: >100dB

AC measurement: 50/60Hz ± 10%: >40dB

Max permitted common mode: 500V

## INTERFACE

Built in as standard

Protocol and connection: IEEE 488 (1978)

Provides full talker/listener facilities and

remote control of all 7150 functions.

## GENERAL

Power supply: 95 to 130V or 190 to 260V

Frequency: 50, 60 or 400Hz

Consumption: <25VA

Protection power supply: 240V: 100mA slo-blo

120V: 250mA slo-blo

Current measurement: fused 2A

Voltage measurement: spark gap 1.2kV min

## Environment:

Temperature, working: 0 to 50°C

storage: -20 to 70°C

Humidity (non-condensing): 70% at 35°C

Otherwise to Def. Std. 66/31 Issue 01 Cat III

Safety: designed to conform to IEC 348

## Dimensions:

Height: 88mm (3.46in)

Width (including handle): 228mm (8.98in)

Depth: 278mm (10.94in)

Weight: 3.0kg (6.6lbs)

## Rack Mounting Kit (71501)

The 7150 is a ½-rack width unit. Using the

71501 allows two 7150's to be mounted

side-by-side in one 19 inch width.