

Chapter 9 Specification

ACCURACY

The following apply to the Accuracy sections:
Limits of Error: expressed as \pm [% reading + digits]
apply after 2 hours warm-up
ac inputs > 1% 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 and is valid from 0 to 40°C.

VOLTAGE DC

SCALE LENGTH & SENSITIVITY

Nominal Range	6½ digits		5½ digits	
	Sensitivity	Full Scale	Sensitivity	Full Scale
200mV	100nV	235.0000mV	1µV	235.000mV
2V	1µV	2.350000V	10µV	2.35000V
20V	10µV	23.50000V	100µV	23.5000V
200V	100µV	235.0000V	1mV	235.000V
1000V	1mV	1000.000V	10mV	1000.00V

The full scale will vary with calibration, drift correct and null.

ACCURACY

Limits of Error, 5½ digit display, filter in. All ranges.

For 24 hrs at $T_c = 1^\circ\text{C}$	0.002 + 3
For 1 yr at $T_c \pm 5^\circ\text{C}$	0.008 + 3

Temperature coefficients

Limits of error:	<0.001%rdg/°C
Zero (Null not in use):	<0.2µV/°C

Range of Null:	>± 1mV
Input current:	<150pA
Input resistance:	10MΩ±1%

Overload protection

Autorange:		1.2kV peak
Commanded range:	20, 200 or 1000V: 200mV or 2V:	1.2kV peak 750V rms

BUS CONTROL

Commands select integration time

Scale Length	Integration Time	Tracking Speed*	Additional Error
6½	4s	1/s	2 digits + 1µV
5½ filter in	1.6s	0.6/s	—
5½ filter out	400ms	2/s	2 digits
4½	50ms	12/s	1 digit
4½	40ms	14/s	1 digit
3½	6.67ms	25/s	1 digit

*7151 is capable of these speeds: the rate of throughput depends on system configuration, particularly software overhead.

VOLTAGE AC

Measures true rms of ac component

SCALE LENGTH & SENSITIVITY

5½ digits

Nominal Range	Sensitivity	Full Scale
200mV	1µV	235.000mV
2V	10µV	2.35000V
20V	100µV	23.5000V
200V	1mV	235.000V
1000V	10mV	750.00V

The full scale will vary with calibration and drift correct.

ACCURACY

5½ digit display, all ranges.

Limits of Error for 24 hours at $T_c \pm 1^\circ\text{C}$

20Hz to 40Hz	40Hz to 10kHz	10kHz to 30kHz	30kHz to 100kHz
0.25 + 20	0.05 + 20	0.05 + 50	0.4 + 300

Limits of Error for 1 year at $T_c \pm 5^\circ\text{C}$

Add 0.04% reading to 24 hour figures

Frequency range 10Hz to 20Hz:	add ± 0.65% rdg
100kHz to 300kHz:	<1dB total
300kHz to 500kHz:	<3dB total
Temperature coefficient:	<0.008% rdg/°C

Non-sinusoidal inputs

Peak input must not exceed 5 × full scale, or 1.2kV peak.
Additional error for 10:1 crest factor: 1%rdg

Input impedance: 1MΩ, 100pF

Maximum ratings

Autorange:	< 1kHz:	750V rms or 1.2kV peak
	> 1kHz:	200V rms
Command range: 200mV, 2V,	< 1kHz:	500V rms
	> 1kHz:	120V rms
20, 200 or 1000V,	< 30kHz:	750V rms or 1.2kV peak
	> 30kHz:	2×10^7 VHz
DC content:		400V

BUS CONTROL

Commands select integration time

Scale Length	Integration Time	Tracking Speed*	Additional Error
5½ filter in	1.6s	0.6/s	—
5½ filter out	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			
Nominal Range	Sensitivity	Full Scale	Test Current
2kΩ	1mΩ	2.350000	100μA
20kΩ	10mΩ	23.50000	100μA
200kΩ	100mΩ	235.0000	10μA
2000kΩ	1Ω	2350.000	1μA
20000kΩ	10Ω	23500.00	100nA

The full scale will vary with calibration, drift correct and null.

ACCURACY

5½ digit display, filter in.

Nominal Range	For 24 hrs at $T_e \pm 1^\circ\text{C}$	For 1 year at $T_e \pm 5^\circ\text{C}$	Temp Coeff ppm/°C
2kΩ	0.002% + 3	0.02% + 3	20
20kΩ	0.002% + 3	0.02% + 3	20
200kΩ	0.003% + 3	0.03% + 3	30
2000kΩ	0.003% + 3	0.03% + 3	30
20000kΩ	0.03% + 20	0.08% + 20	100

Range of Null: $> \pm 10\Omega$
 Overload protection: 240V rms
 Open circuit voltage: $< 7\text{V}$

BUS CONTROL

Commands select integration time

Scale Length	Integration Time	Tracking Speed*	Additional Error
6½	4s	1/s	2 digits + 10mΩ
5½ filter in	1.6s	0.6/s	—
5½ filter out	400ms	2/s	2 digits
4½	50ms	12/s	1 digit
4½	40ms	14/s	1 digit
3½	6.67ms	25/s	1 digit

TEMPERATURE

Intended for use with platinum resistance thermometers to IEC 751. See Accessories, page 15.

Temperature range: -200 to +600°C
 Resolution: 0.01°C
 Error in conformance to IEC 751: $< 0.1^\circ\text{C}$
 Displayed units, selectable: °C, °F or K
 Resistance at 0°C: selectable

CURRENT DC

SCALE LENGTH & SENSITIVITY

6½ digits		5½ digits	
Nominal Range	Sensitivity	Full Scale	Full Scale
2000mA	1μA	2350.000	2350.00

The full scale will vary with calibration, drift correct and null.

ACCURACY

Limits of Error, 5½ digit display, filter in.

For 24 hours at $T_e \pm 1^\circ\text{C}$:	0.02 + 3
For 1 year at $T_e \pm 5^\circ\text{C}$:	0.04 + 3
Temperature coefficient	$< 0.005\% \text{ rdg}/^\circ\text{C}$
Range of Null:	$> \pm 1\text{mA}$
Overload protection:	fused 2A/250V rms
Burden at full scale:	$< 0.8\text{V}$

BUS CONTROL

Commands select integration time

Scale Length	Integration Time	Tracking Speed*	Additional Error
6½	4s	1/s	2 digits + 10μA
5½ filter in	1.6s	0.6/s	—
5½ filter out	400ms	2/s	2 digits
4½	50ms	12/s	1 digit
4½	40ms	14/s	1 digit
3½	6.67ms	25/s	1 digit

CURRENT AC

Measures true rms of ac component

SCALE LENGTH & SENSITIVITY

5½ digits		
Nominal Range	Sensitivity	Full Scale
2000mA	10μA	2350.00

The full scale will vary with calibration and drift correct.

ACCURACY

Limits of Error, 40Hz to 440Hz, 5½ digit display, filter in.

For 24 hours at $T_e \pm 1^\circ\text{C}$:	0.05 + 20
For 1 year at $T_e \pm 5^\circ\text{C}$:	0.2 + 20
Temperature coefficient:	$< 0.01\% \text{ rdg}/^\circ\text{C}$

Non-sinusoidal inputs

Peak input must not exceed 5 × full scale.
 Additional error for 10:1 crest factor: 1% rdg

Overload protection: fused 2A/250V rms
 Burden at full scale: $< 0.8\text{V}$

BUS CONTROL

Commands select integration time

Scale Length	Integration Time	Tracking Speed*	Additional Error
5½ filter in	1.6s	0.6/s	—
5½ filter out	400ms	2/s	—
4½	50ms	12/s	1 digit
4½	40ms	14/s	1 digit
3½	6.67ms	25/s	1 digit

*7151 is capable of these speeds; the rate of throughput depends upon system configuration, particularly software overhead.

INTERFERENCE REJECTION

Normal Mode, dc measurement
6½, 5½, 4½ digits, 50/60 Hz ± 0.1%: >60dB
6½ digits, 50/60 Hz ± 10%: >55dB

Effective Common Mode with 1kΩ imbalance
DC measurement: rejection of dc: >140dB
6½, 5½, 4½ digits, 50/60 Hz ± 0.1%: >120dB
6½ digits, 50/60 Hz ± 10%: >100dB
AC measurement: 50/60 Hz ± 10%: > +40dB

Maximum permitted common mode: 500V dc or peak

INTERFACES

Built in as standard
IEEE 488 (1978)
Provides full talker/listener facilities and remote control of all 7151 functions.
Subset: SH1, AH1, T5, TE0, L3, LE0, E1, SR1, RL1, DC1, C0, DT1, and parallel poll.
RS232C
T_r data, R_r data, CTS, RTS, DTR.
Speed: 50 to 9600 baud
Parity: switch selected
Stop bits: 1 or 2

BATTERY

Charge time (when fully discharged): 20 hrs
Hold-up time: 12 days min.
24 days typ.
Life: >5 years
Data retention: RESUME conditions,
History File, etc.

GENERAL

Power supply:
Voltage (switch selected): 92 to 127V
or 188 to 265V
50, 60 or 400Hz
Consumption: < 25VA

Protection:
Power supply, fused Line and Neutral: 240V: 100mA slo-blo
120V: 250mA slo-blo
fused 2A

Current measurement:
Voltage measurement: spark gap 1.2kV min

Environment:
Temperature, working: RH <30%: 0 to 50°C
RH 90%: 0 to 40°C
Temperature, storage: -30 to 70°C
Maximum operating humidity: 90%
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)

ACCESSORIES

Temperature Probe (71517A)

100Ω platinum resistance sensor to IEC 751 Grade A. Complete with connecting leads for 4-terminal measurement.
Temperature range: -50 to +250°C
Error: <0.7°C

Radio Frequency Probe (70457F)

Peak-sensing, the probe provides dc voltage to the multimeter, which displays the rms value. Complete with fittings and adaptors.
Limits of Error: 1V rms sine wave
100kHz to 500MHz: ±1dB
100kHz to 750MHz: ±3dB
100mV to 40V
DC Isolation: 200V
Working Temperature: 0 to +50°C
Lead Length: 1m

High Voltage Probe (70457E)

Extends measurement of dc voltage to 40kV. Complete with fittings and adaptors.
Voltage Range: 1kV to 40kV
Division Ratio at 20kV, 23°C: (1000 : 1) ±0.5%
Limits of Error 1kV to 40kV, 23°C: ±3%
Temperature Coefficient: <200ppm/°C
Working Temperature: 0 to +50°C
Lead Length: 1.8m

Current Shunt, 10A (70457X)

Extends the current measuring capacity to 10A. Simple plug-in unit.
Shunt Value: 1mV/A
Accuracy: ±0.9% fs
Range: 1 to 10A
Temperature Coefficient: ±250ppm/°C
Maximum Voltage Burden: 100mV at 10A
Absolute Max. Current: 12A

NATO Connection Set (71517C)

Two input leads with interchangeable alligator clips, spades, hooks and probes. NATO Stock No. 6625-99-744-2794.

Rack Mounting Kit (71501)

The 7151 is a ½-rack width unit. Using the 71501 allows two 7151's to be mounted side-by-side in one 19 inch width.