

# SECTION 6 SPECIFICATIONS

## General

### POWER SUPPLY

Voltage	: 205-255 or 105-127 Volts
Line Frequency	: 50Hz $\pm$ 2%, 60Hz $\pm$ 2%, 400Hz $\pm$ 2%
Consumption	: Approximately 30VA
Fuses	: 160mA or 500mA anti- surge (depends on voltage)

### MECHANICAL

Dimensions	: Height = 89mm, Width = 455mm, Depth = 420mm
Weight	: 10 kg.

### AUTORANGE

Range Up	: 200% of nominal range
Range Down	: 18.8% of nominal range

### SAFETY

The 1065 has been designed to meet BSI 4743, IEC 348, and UL 1244 specifications.

### MAXIMUM INPUTS

See Tables 2.1 & 2.2

### CLIMATE CONDITIONS

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

### OPERATING INDICATIONS

Scale length	: Normal	5½ digits i.e. 199,999
	Superfast	4½ digits i.e. 19,999
	1065A (DCV & k $\Omega$ )	6½ digits i.e. 1,999,999

Overload	: Err OL displayed
Indication	: Symbols lit on display and illuminated keys

### DIGITAL ERROR

Error read-out	: <1% of displayed error
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[1] Excessive temperature stress may affect calibration stability.

# 5½ Digit

## DC VOLTAGE

Full range Count (FR):  $\pm 100,000$   
Full Scale Count (FS):  $\pm 199,999$  on all ranges  
except 1000V range  
Superfast Mode Full Scale Count: 19,999 on all  
ranges except 1000V range.

### ACCURACY

<b>24 HOURS</b> ( $23^{\circ}\text{C} \pm 1^{\circ}\text{C}$ )	
0.1V range:	$\pm 20\text{ppm of reading} \pm 3 \text{ digits}$
1 and 10V ranges:	$\pm 15\text{ppm of reading} \pm 1 \text{ digit}$
100 and 1000V ranges:	$\pm 30\text{ppm of reading} \pm 1 \text{ digit}$
<b>90 DAYS</b> ( $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$ )	
0.1V range:	$\pm 60\text{ppm of reading} \pm 4 \text{ digits}$
1 and 10V ranges:	$\pm 40\text{ppm of reading} \pm 1 \text{ digit}$
100 and 1000V ranges:	$\pm 70\text{ppm of reading} \pm 1 \text{ digit}$
<b>1 YEAR</b> ( $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$ )	
0.1V range:	$\pm 80\text{ppm of reading} \pm 4 \text{ digits}$
1 and 10V ranges:	$\pm 60\text{ppm of reading} \pm 1 \text{ digit}$
100 and 1000V ranges:	$\pm 100\text{ppm of reading} \pm 1 \text{ digit}$

Superfast Mode (all ranges):  $\pm$  above ppm of reading  $\pm 2$  digits

**TEMPERATURE COEFFICIENT:** ( $10^{\circ}\text{C}$  to  $35^{\circ}\text{C}$ )  
1/10th of 90 DAY specification  $\pm 0.2 \mu\text{V}/^{\circ}\text{C}$

### READ RATE

Normal Mode  
All DC ranges: 3/second (internal trigger) with full scale input  
30/35 per second (external trigger) with full  
range input at 50/60Hz.

Superfast Mode  
All ranges: 200/220 per second (external trigger)  
with full range input at 50/60Hz.

**SETTLING TIME** (to 10ppm of step size,<sup>[1]</sup>)  
Filter out:  $< 5\text{mS}$   
Filter in:  $< 350\text{mS}$

### SERIES MODE REJECTION

Filter out: 66dB@line frequency  
Filter in: 100dB@line frequency

### COMMON MODE REJECTION

1k $\Omega$  source unbalance  
 $> 140\text{dB}$  at DC  
 $> 80\text{dB} +$  series mode at 1Hz to 60Hz

### AUTORANGE SPEED (No filter)

Typically 100mS per range between top and bottom  
ranges.

### INPUT RESISTANCE

0.1 to 10 Volt ranges ( $< 20$  volts):  $> 10,000 \text{ M}\Omega$   
100 and 1000 Volt ranges:  $10\text{M}\Omega \pm 0.1\%$ .

**INPUT ZERO STABILITY** (1 year)  
 $< 50\text{pA}, < 5 \mu\text{V}$ .

## RESISTANCE

Full Range Count: 100,000  
Full Scale Count: 199,999  
Superfast Mode Full Scale Count: 19,999

### ACCURACY

<b>24 HOURS</b> ( $23^{\circ} \pm 1^{\circ}\text{C}$ )	
100 $\Omega$ range:	$\pm 25\text{ppm of reading} \pm 4 \text{ digits}$
1k $\Omega$ , 10k $\Omega$ ranges:	$\pm 15\text{ppm of reading} \pm 1 \text{ digit}$
100k $\Omega$ range:	$\pm 20\text{ppm of reading} \pm 1 \text{ digit}$
1000k $\Omega$ range:	$\pm 100\text{ppm of reading} \pm 1 \text{ digit}$
10M $\Omega$ range:	$\pm 200\text{ppm of reading} \pm 1 \text{ digit}$
<b>90 DAYS</b> ( $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$ )	
100 $\Omega$ range:	$\pm 60\text{ppm of reading} \pm 4 \text{ digits}$
1k $\Omega$ , 10k $\Omega$ ranges:	$\pm 40\text{ppm of reading} \pm 1 \text{ digit}$
100k $\Omega$ range:	$\pm 50\text{ppm of reading} \pm 1 \text{ digit}$
1000k $\Omega$ range:	$\pm 150\text{ppm of reading} \pm 1 \text{ digit}$
10M $\Omega$ range:	$\pm 400\text{ppm of reading} \pm 1 \text{ digit}$
<b>1 YEAR</b> ( $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$ )	
100 $\Omega$ range:	$\pm 80\text{ppm of reading} \pm 4 \text{ digits}$
1k $\Omega$ , 10k $\Omega$ ranges:	$\pm 60\text{ppm of reading} \pm 1 \text{ digit}$
100k $\Omega$ range:	$\pm 70\text{ppm of reading} \pm 1 \text{ digit}$
1000k $\Omega$ range:	$\pm 250\text{ppm of reading} \pm 1 \text{ digit}$
10M $\Omega$ range:	$\pm 600\text{ppm of reading} \pm 1 \text{ digit}$

Superfast Mode: As DC Volts.

**TEMPERATURE COEFFICIENT:** ( $10^{\circ}\text{C}$  to  $35^{\circ}\text{C}$ )  
1/10th of 90 DAY specification  $\pm 600 \mu\Omega/^{\circ}\text{C}$

### READ RATE

Normal Mode  
All ranges: As DC Volts.  
Superfast Mode: As DC Volts.

### TYPE

True 4-wire with active guard (automatic 2-wire  
on the front panel).  
Measurement technique is independent of the internal  
reference voltage.

### OPEN CIRCUIT VOLTAGE

$< 10$  volts on all ranges

### LEAD RESISTANCE

Up to 10 $\Omega$  may be tolerated in any or all leads on any  
range. (Rejection of lead resistance is 80dB on any range).

### RESPONSE TIME

Depends on external capacitance and guarding/shielding  
techniques used.  
Generally up to 10k $\Omega$  response as DC Volts.  
Higher resistances take longer to settle.  
OHMS GUARD may be used to guard out stray  
capacitance

### CURRENT THROUGH UNKNOWN ( $\pm 1\%$ )

0.1k $\Omega$  ranges: 1mA  
1k $\Omega$  range: 1mA  
10k $\Omega$  range: 100  $\mu\text{A}$   
100k $\Omega$  range: 10  $\mu\text{A}$   
1000k $\Omega$  range: 1  $\mu\text{A}$   
10M $\Omega$  range: 100nA

### OHMS GUARD (rear input only)

Drive Capability: I+ or I- to OHMS GUARD.  
500 $\Omega$  minimum (up to 10 $\Omega$  lead resistance)  
Guarding Accuracy: See Section 2 - 'Resistance measurement'.

**INPUT ZERO STABILITY** (1 year)  
 $< 10\text{m}\Omega$

[1] Or  $< 3$  digits following a range change.

NOTE: SUPERFAST selected by IEEE digital interface only.

## AC VOLTAGE (TRUE RMS)

Full Range Count: 100,000

Full Scale Count: 199,999 on all ranges except 1000V range.

**ACCURACY** (Signals  $< 10^7$  Volt Hz  $> 1.0\%$  Full Scale)

	45Hz <sup>[1]</sup> to 30kHz	30kHz to 100kHz <sup>[2]</sup>	100kHz to 1MHz <sup>[2]</sup>
<b>24 HOURS (23°C ± 1°C)</b> 1V to 1000V ranges:	± 0.04% of reading ± 50 digits	± 0.2% of reading ± 200 digits	± 5% of reading ± 2000 digits
<b>90 DAYS (23°C ± 5°C)</b> 1V to 1000V ranges:	± 0.06% of reading ± 50 digits	± 0.4% of reading ± 200 digits	± 6% of reading ± 2000 digits
<b>1 YEAR (23°C ± 5°C)</b> 1V to 1000V ranges:	± 0.1% of reading ± 50 digits	± 0.6% of reading ± 200 digits	± 7% of reading ± 2000 digits

DC coupled AC total accuracy specifications are x 1.5

**LF ACCURACY add**

Filter out, at line frequency: ± 0.6% of reading

Filter in, 10Hz: ± 2.0% of reading

**CREST FACTOR**

5:1 typically, at full range

**TEMPERATURE COEFFICIENT (10–35°C)**

<1/10th of 90 DAY specification/°C

**COMMON MODE REJECTION**

1K $\Omega$  unbalanced > 90dB@DC - 60Hz

**READ RATE** (as DC voltage)

**INPUT IMPEDANCE**

1M $\Omega$  shunted by 150pF

**CONVERSION TYPE**

True r.m.s. AC coupled (measures AC component with up to 1000V DC bias on any range) or DC coupled

(measures  $\sqrt{AC^2 + DC^2}$ )

**SETTLING TIME (DC coupled)**

(i) To 0.1% of step size

Filter out < 150mS

Filter in < 500mS

(iii) From DC bias input (AC coupled) or severe overload:

Depends on change of DC bias

(Time constant 2.2 seconds)

[1] Read 360Hz instead of 45Hz if 'Filter' not selected.

[2] Error readout invalid above 30kHz.

## Standard internal delays

Between the receipt of any trigger pulse and the commencement of a measured cycle, an internal time delay is introduced.

This permits the application of the signal to the input terminals to be coincident with the trigger and ensures that the input circuitry has settled before the commencement of the reading cycle.

The standard internal delays differ for each range and function in order to ensure maximum read-rate and adequate settling. The delays are shown in the following table.

Additional to all the delays shown is 25mS when changing range between 10V and 100V ranges and 100mS before the first reading following a function change.

Function	Range	FILTER OUT (ms)	FILTER IN (ms)
DCV	all	5	500
ACV DC + ACV	all	225	750
k $\Omega$	100 $\Omega$ -100k $\Omega$	5	500
	1M $\Omega$	15	600
	10M $\Omega$	150	1250