5025C

Extended Specifications

Time Electronics, Botany Industrial Estate,Tonbridge, Kent, TN9 1RH England
Tel: 44 (0)1732 355993 Fax: 44 (0) 1732 770312. E-mail: mail@timeelectronics.co.uk
www.timeelectronics.com

5025C Specifications

1. **Specifications are stated as ± (ppm or % of output + floor), unless otherwise indicated.**
2. **Specifications apply at 23°C ± 5°C**
3. **For temperatures outside this range add 0.2 x specification per °C.**
4. **Specifications include stability, linearity, and traceability of external standards used for calibration.**
5. **For operation outside specified range add 0.25 x specification.**

DC Voltage

Range	Resolution	Output Resistance	Max Burden	Specification
				1 Year
0 to 20mV	0.1µV	10Ω		15ppm + 3µV
20 to 200mV	1µV	10Ω		15ppm + 4µV
0.2 to 2V	1µV	0.1Ω	20mA	15ppm + 15µV
2 to 20V	10µV	0.1Ω	20mA	15ppm + 75µV
20 to 200V	100uV	<5Ω	20mA	25ppm + 3mV
100 to 1050V	1mV	<10Ω	10mA	40ppm + 30mV

Specifications are between 0.1Hz and 10Hz bandwidth. Maximum capacitance 1000pF.
Settling times for 200 and 1050V ranges < 10 seconds to full accuracy.
The output resistance of the 20mV & 200mV ranges is 10Ω. This must be taken into account when loads of 100kΩ or less are being driven.
A 100kΩ load will result in a 0.01% error.

DC Current

Range	Resolution	Compliance Voltage	Max Terminal Inductance	Specification
				1 Year
0 to 200µA	0.1nA	10V	50µH	80ppm + 15nA
0.2 to 2mA	1nA	10V	50µH	60ppm + 40nA
2 to 20mA	10nA	10V	50µH	60ppm + 200nA
20 to 200mA	100nA	10V	30µH	60ppm + 3µA
0.2 to 2A	1µA	5V	5.5µH	100ppm + 35µA
2 to 22A	10µA	4V	2.5µH	250ppm + 400µA

AC Voltage (Sine Wave)

Range	Frequency	Resolution	Output Resistance	Max Burden Current	Specification
					1 Year
1 to 20mV	20 to 45Hz	1µV	10Ω		0.08% + 50µV
	45Hz to 1kHz		10Ω		0.03% + 25µV
	1 to 10kHz		10Ω		0.05% + 30µV
	10 to 20kHz		10Ω		0.08% + 50µV
	20 to 100kHz		50Ω		0.05% + 500µV
20 to 200mV	20 to 45Hz	1µV	10Ω		0.08% + 50µV
	45Hz to 1kHz		10Ω		0.03% + 25µV
	1 to 10 kHz		10Ω		0.05% + 30µV
	10 to 20 kHz		10Ω		0.08% + 50µV
	20 to 100kHz		50Ω		0.05% + 500µV
0.2 to 2V	20 to 45Hz	10µV	<0.1Ω	20mA	0.08% + 200µV
	45Hz to 1kHz		<0.1Ω		0.02% + 80µV
	1 to 10kHz		<0.1Ω		0.03% + 120µV
	10 to 20kHz		<0.1Ω		0.05% + 350µV
	20 to 100kHz		<0.5Ω		0.09% + 900µV
2 to 20V	20 to 45Hz	100µV	<5Ω	20mA	0.08% + 3mV
	45Hz to 1kHz		<5Ω		0.02% + 1mV
	1 to 10kHz		<5Ω		0.03% + 1.5mV
	10 to 20kHz		<5Ω		0.05% + 1.5mV
	20 to 100kHz				0.15% + 15mV
20 to 200V	40Hz to 1kHz	1mV	<5Ω	20mA	0.03% + 15mV
200 to 1050V	40Hz to 1kHz	10mV	<10Ω	10mA	0.08% + 60mV

The frequency accuracy for AC ranges is 0.01%. The setting resolution is 1Hz.
The output resistance of the 20mV & 200mV ranges is 10Ω / 50Ω. This must be taken into account when loads of 100kΩ or less are being driven.
A 100kΩ load will result in a 0.01% error.

AC Current (Sine Wave)

Range	Frequency	Resolution	Compliance Voltage (rms)	Specification 1 Year
10 to 200µA	20Hz to 45Hz	10nA	8V	0.1% + 0.2µA
	45Hz to 1kHz			0.05% + 0.2µA
	1kHz to 5kHz			0.1% + 0.5µA
0.2 to 2mA	20Hz to 45Hz	10nA	8V	0.1% + 0.2µA
	45Hz to 1kHz			0.05% + 0.2µA
	1kHz to 5kHz			0.08% + 0.5µA
2 to 20mA	20Hz to 45Hz	100nA	8V	0.1% + 2µA
	45Hz to 1kHz			0.05% + 2µA
	1kHz to 5kHz			0.08% + 5µA
20 to 200mA	20Hz to 45Hz	1µA	8V	0.1% + 20µA
	45Hz to 1kHz			0.05% + 20µA
	1kHz to 5kHz			0.1% + 50uA
0.2 to 2A	20Hz to 500Hz	10µA	3.5V	0.1% + 300µA
2 to 22A	20Hz to 500Hz	100µA	3V	0.1% + 3mA

Decade Resistance

Value	Max Rating	Specification 1 Year
1Ω	0.1W	800ppm
10Ω	0.1W	70ppm
100Ω	0.1W	30ppm
1kΩ	0.1W	20ppm
10kΩ	0.1W	20ppm
100kΩ	0.1W	30ppm
1MΩ	200V	150ppm
10MΩ	200V	0.1%
100MΩ	200V	1%
1GΩ	200V	10%

Decade Conductance

Value	Max Rating	Specification 1 Year
1 S	0.1W	800ppm
100m S	0.1W	70ppm
10m S	0.1W	30ppm
1m S	0.1W	20ppm
100u S	0.1W	20ppm
10u S	0.1W	30ppm
1u S	200V	150ppm
100n S	200V	0.1%
10n S	200V	1%
1n S	200V	10%

After subtraction of lead resistance. All resistance specifications are ±5mΩ. Settling time < 10 seconds.

Capacitance

Value	Resolution	Max Rating	Specification 1Year
1nF	0.1pF	25V	0.2%
10nF	1pF	25V	0.2%
20nF	1pF	25V	0.2%
50nF	1pF	25V	0.2%

Value	Resolution	Max Rating	Specification 1Year
100nF	10pF	25V	0.2%
200nF	10pF	25V	0.2%
500nF	10pF	25V	0.2%
1uF	100pF	25V	0.2%

All values are ±10pF. Specifications apply to the displayed value, after subtraction of residual capacitance.
Specification at 1kHz, based on 4 wire sine wave measurement technique.

Thermocouples

Type	Range °C	Specification 1 Year
J	-210 to -50 -50 to 1200	±0.15°C ±0.09°C
K	-200 to -100 -100 to 480 480 to1372	±0.2°C ±0.1°C ±0.15°C
T	-200 to -100 -100 to 400	±0.2°C ±0.09°C
R	-50 to 20 20 to 250 250 to 1768	±0.9°C ±0.5°C ±0.35°C

Type	Range °C	Specification 1 Year
B	300 to 600 600 to 1820	±1.0°C ±0.6°C
N	-200 to 0 0 to 600 600 to 1300	±0.3°C ±0.1°C ±0.15°C
E	-200 to 0 0 to 280 280 to 1000	±0.1°C ±0.05°C ±0.05°C
S	-50 to 100 100 to 500 500 to 1768	±0.7°C ±0.4°C ±0.3°C

Resolution 0.1°C. Switchable automatic internal cold junction reference, accuracy ±0.5°C (applies to ambient changes of ±1°C)
°F and °K units also selectable. ITS-90.

Simulated Resistance

Range	Resolution*	Specification 1 Year
10Ω to 40Ω	0.01Ω	0.15% + 50mΩ
40Ω to 400Ω	0.01Ω	0.05% + 50mΩ
400Ω to 4kΩ	0.01Ω	0.02% + 1Ω
4kΩ to 40kΩ	0.01Ω / 1Ω	0.02% + 10Ω
40kΩ to 400kΩ	1Ω	0.02% + 100Ω
400kΩ to 4MΩ	1Ω / 1kΩ	0.02% + 1kΩ
4MΩ to 40MΩ	1kΩ	0.2% + 10kΩ

Maximum input current allowed is 20mA. Maximum output voltage is 2V. Suitable for DC currents only.
*Simulated Resistance is selectable from 10.00Ω to 9999.99Ω, 0.010kΩ to 999.999kΩ or 0.001MΩ to 40.000MΩ

Pt100

Range	Resolution	Specification 1 Year
-180 to 200°C	0.01°C	±0.2°C
200 to 850°C	0.01°C	0.03% + 0.15°C

Alpha = 0.00385. (ITS-90). IEC 60751

Digital Frequency

Range	Resolution	Specification 1 Year
0.1Hz to 1kHz	0.01Hz	20ppm
1kHz to 1MHz	1Hz	20ppm
1MHz to 10MHz	10Hz	20ppm

Square wave output. Amplitude ~2V peak to peak

Period

Range	Resolution	Specification 1 Year
100ns to 10s	Fixed Values 1,2,5 Steps	20ppm

Enhanced Performance Pack (Option 9701)

Extended Capacitance

Value	Resolution	Frequency	Max Voltage	Specification
				1 Year
1nF	0.1pF	1kHz	25V	0.2%
10nF	1pF	1kHz	25V	0.2%
20nF	1pF	1kHz	25V	0.2%
50nF	1pF	1kHz	25V	0.2%
100nF	10pF	1kHz	25V	0.2%
200nF	10pF	1kHz	25V	0.2%
500nF	10pF	1kHz	25V	0.2%
1µF	100pF	1kHz	25V	0.2%
10µF	1nF	1kHz	25V	0.5%
20µF	1nF	1kHz	25V	0.5%
50µF	1nF	1kHz	25V	0.5%
100µF	10nF	100Hz	25V	0.5%

All values are ±10pF. Specifications apply to the displayed value, after subtraction of residual capacitance.
Specification based on 4 wire sine wave measurement technique.

Inductance

Value	Frequency	Max Current	Specification
			1 Year
1mH	1kHz	10mA	0.1%
1.9mH	1kHz	10mA	0.1%
5mH	1kHz	10mA	0.1%
10mH	1kHz	10mA	0.1%
19mH	1kHz	10mA	0.1%
50mH	1kHz	10mA	0.1%
100mH	1kHz	10mA	0.1%
190mH	1kHz	10mA	0.1%
500mH	1kHz	10mA	0.1%
1H	1kHz	10mA	0.1%
10H	100Hz	10mA	0.1%

Specifications apply to the displayed value, after subtraction of residual inductance.
Specification based on 4 wire sine wave measurement technique.

Enhanced DC High Voltage (DCHV+)

Range	Resolution	Output Resistance	Max Burden	Specification
				1 Year
20 to 200V	100µV	0.25Ω	10mA	15ppm + 800µV
100 to 1020V	1mV	1Ω	1mA	25ppm + 1500µV

These ranges are in addition to the standard ranges and selectable from front panel or remote command. (DCHV+)
Minimum load 20kΩ 200V Range / 1MΩ 1kV range.

Extended AC Voltage Frequency

Range	Frequency	Resolution	Output Resistance	Specification
				1 Year
1 to 20mV	100 to 300kHz	1µV	50Ω	0.05% + 1000µV
20 to 200mV	100 to 300kHz	1µV	50Ω	0.05% + 1000µV
0.2 to 2V	100 to 300kHz	10µV	<0.5Ω	0.1% + 5mV
	300kHz to 1MHz	10µV	<0.5Ω	1% + 10mV

Full Range Resistance

Resistance

Range	Resolution	Max Rating	Specification
			1 Year
1Ω – 20Ω	1Ω	0.1W	100ppm + 7mΩ
20Ω – 99.999Ω	1mΩ /5mΩ*	0.1W	100ppm + 7mΩ
100Ω – 999.999Ω	1mΩ	0.1W	100ppm + 5mΩ
1kΩ – 9.999kΩ	1Ω	0.1W	200ppm + 20mΩ
10kΩ – 99.999kΩ	1Ω	0.1W	100ppm + 1Ω
100kΩ – 999.99kΩ	10Ω	0.1W	100ppm + 10Ω
1MΩ – 9.9999MΩ	100Ω	0.1W	200ppm + 100Ω
10MΩ – 120.000MΩ	1kΩ	0.1W	0.1% + 1kΩ

RTD

Range	Resolution	Specification
		1 Year
Pt100		
-180 to 200°C	0.01°C	±0.07°C
200 to 850°C	0.01°C	±0.15°C
Pt200		
-180 to 0°C	0.01°C	±0.03°C
0 to 850°C	0.01°C	0.02% + 0.03°C
Pt500		
-180 to 200°C	0.01°C	0.02% + 0.03°C
200 to 850°C	0.01°C	0.1% + 0.3°C
Pt1000		
-180 to 0°C	0.01°C	±0.03°C
0 to 850°C	0.01°C	0.1% + 0.3°C

After subtraction of lead resistance. Add ±2.5mΩ for end resistance variation. * Output resolution is 5mΩ below 50Ω
The Full Range Resistance option uses real resistors. There is no limitation on excitation currents, and replaces the Simulated Resistance function.
RTD Function: Alpha = 0.00385. (ITS-90). IEC 60751.

Extended Thermocouples

Type	Range °C	Specification
		1 Year
U	-200 to -100	±0.15°C
	380 to 600	±0.1°C
L	-200 to 900	±0.1°C

Type	Range °C	Specification
		1 Year
C	0 to 1100	±0.2°C
	1100 to 1900	±0.35°C
	1900 to 2315	±0.5°C

Cold Junction Compensation ±0.5°C (applies to ambient changes of ±1°C). °F and °K units also selectable.
Type U & L based on tables published in DIN 43710 (ITPS68). Type C based on tables published in ASTM E230/E230M – 12 (ITS-90)

Oscilloscope Calibration (Option 9770)

Amplitude

Range	Resolution	Specification
		1 Year
2 to 200mV	10µV	0.20% + 10µV
0.2 to 20V	1mV	0.05% + 25µV
1 to 200V	10mV	0.05% + 100µV
1mV to 200mV (50Ω)	100µV	0.25% + 20µV
0.2 to 2V (50Ω)	1mV	0.25% + 20µV

1kHz Squarewave

Frequency

Range	Resolution	Specification
		1 Year
0.1Hz to 10MHz	Fixed values	0.1ppm*
20, 50, 100MHz	1,2,5 sequence	20ppm

Deviation function is not available.
* Fitted with Oven-Controlled Frequency Reference. Otherwise - 20ppm.
1.5V pk-pk - 0.1Hz to 100kHz. 1V pk-pk - 100kHz to 100MHz (sine wave at 100MHz)

Period

Range	Resolution	Specification
		1 Year
100ns to 10s	Fixed values	0.1ppm*
50, 20, 10ns	1,2,5 sequence	20ppm

Duty Cycle

3 frequencies, 100Hz, 1kHz, 10kHz.
Duty cycle settable from 0 to 100%
Setting resolution 0.01% at 100Hz, 0.1% at 1kHz, 1% at 10kHz
Deviation function is not available.

Fast Rise

Into 50Ω Load	Specification
	1 Year
400ps	±150ps

Oscilloscope 2.2 GHz Levelled Sine (Option 9769)

Range	Resolution	Amplitude	Specification
			1 Year
50 MHz to 199.9 MHz	0.1 MHz	0.5V, 1V, 1.5V	1%
200 MHz to 499.9 MHz	0.1 MHz		2%
500 MHz to 999.9 GHz	0.1 MHz		4%
1 GHz to 2.2 GHz	0.1 MHz		6%

Sine-Wave, 50 Ω Output. From 50 to 499.9 MHz an additional error of 0.5% of range applies. Frequency Accuracy 50ppm.

Power (Option 9797)

DC Current	Specification 1 Year	Compliance	Resolution	AC Current (45 to 400Hz)	Specification 1 Year	Compliance	Resolution
0.02 to 2A	0.03% + 500uA	5V	100uA	0.1 to 2A	0.1% + 2mA	3.5V	100uA
2 to 22A	0.05% + 6mA	4V	1mA	2 to 22A	0.1% + 20mA	3V	1mA
DC Voltage	**Specification 1 Year**	**Output Current**	**Resolution**	**AC Voltage (45 to 400Hz)**	**Specification 1 Year**	**Output Current**	**Resolution**
0.1 to 20V	0.01% + 500uV	20mA	100uV	0.1 to 20V	0.03% + 2mV	20mA	100uV
20 to 200V	0.02% + 30mV	20mA	1mV	20 to 200V	0.06% + 30mV	20mA	1mV
200 to 1050V	0.05% + 50mV	10mA	10mV	200 to 1050V	0.08% + 90mV	10mA	10mV
Phase	**Specification 1 Year**	**Range**	**Resolution**	**Power Factor**		**Range**	**Resolution**
45 to 99Hz	0.25 °	±90 °	0.1 °	45 to 99Hz		0.00 to 1.00	0.001
100Hz to 400Hz	1.0 °	±90 °	0.1 °	100Hz to 400Hz		0.00 to 1.00	0.001

The accuracy of the power is complex and is determined by using a formula, which combines the errors due to Voltage, Current, and Phase.
Power Specification (%) = $\sqrt{(V_{spec}^2 + I_{spec}^2 + \text{Phase Correction}^2)}$. Where Phase Correction (%) = 100 x (1 - Cos(Phase + Phase_{spec})/Cos Phase).
The current and voltage terminals must be isolated. A current transformer or clamp meter adaptor must be used if instrument under test has a common negative.
Settling time < 15 seconds.

General Specifications

Power supply	
Mains Voltage	100 to 260V AC 50/60 Hz.
Fuse Ratings	3.15A anti-surge
Power Consumption	120W typical, 200W Max.
Operating Temperature	10 to 40°C.
Storage Temperature	-10°C to 50°C
Operating Humidity	Operating less than 80%
Altitude	0 to 3km. Non-operating 3km to 12km
Warm Up Time	30 minutes to full accuracy
Settling Time	< 5 seconds for all functions, unless otherwise stated.
Dimensions	Width 447mm, Height 152, Depth 470mm
Weight	16.5kg
Interfaces	RS232, USB and GPIB
Command Set	Standard SCPI

Due to continuous development Time Electronics reserves the right to change specifications without prior notice.