



Welcome to the Time Electronics Catalogue

2008 marked Time Electronics' 41st year of business. During this time we have delivered accuracy and precision in the field of calibration to engineers worldwide. We are proud to be one of the leading international manufacturers of calibrators and test equipment. With experience and expertise we help our customers meet the objectives of their competitive industries.

Using Acrobat Reader you can navigate through our extensive range of products. Open the Bookmarks panel on the left hand side to view product categories. Follow the instructions below for simple navigation:

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- 0 - 1050 V AC
- 0 - 22 A AC/D
- 0 - 1GΩ resist
- Thermocouple

It is also possible to jump to a specific page by clicking the instrument name on the contents pages located at the beginning of each product section:

'Click' to jump to product page

Portable Test Instruments

Time Electronics design a complete line of Portable Test Equipment, built for a wide range of capabilities across various industries. These well-proven test instruments cover the requirements of both field and laboratory work. They are high performance, delivering precision, reliability, and ease of use for all test applications.

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1006 DC Millivolt Source

Time Electronics

Calibration, Test & Measurement

- **3 Ranges up to 1V**
- **0.02% Accuracy**
- **20 mA Output Current**
- **Short circuit and overload protected**
- **Portable**



The **1006** is an accurate low cost millivolt source suitable for voltage injection applications. Three output ranges are provided to give adjustable output values from 1 μ V to 1V with a basic 0.02% accuracy.

For signal injection, the operator needs to switch on, check the battery condition, select the range, and set the required voltage using the thumbwheel switches.

The 1006 uses a precision reference diode and low temperature co-efficient resistors to give a highly stable output.

Power is provided by 6 AA (penlight size) batteries. Battery life is several months, depending on usage. The battery condition is monitored by an indicator, which is mounted on the end of the unit.

The 1006 has up to 20 mA drive current and is short circuit and overload protected. An off/normal/reverse output polarity switch is provided.

As an accurate millivolt source, the 1006 can be used for many applications including thermocouple simulation (using appropriate lookup table), chart recorder calibration, A/D converter and DMM calibration, and as a stable voltage for backing off DC offsets.

Unit comes supplied with dry cell batteries and sturdy carry case.

1006 Technical Specifications

| | |
|----------------------------------|--|
| Output: | 0-999.9mV in 3 ranges 0-999.9mV in 0.1mV steps 0-99.99mV in 10 μ V steps 0-9.999mV in 1 μ V steps |
| Accuracy: | $\pm 0.02\%$ of setting + $\pm 0.02\%$ of range + $\pm 1\mu$ V. |
| Output Resistance: | Less than 0.2 Ω on 1 V and 100 mV ranges. 1 Ω on 10mV range. |
| Maximum Output Current: | 1V and 100mV ranges –20mA. 10mV range – Up to short circuit value although it should be noted that loads of less than 1k Ω will give greater than 0.1% error. |
| Output Voltage Stability: | Less than 60 ppm/ $^{\circ}$ C. Less than 100 ppm per 3 months. (Non-cumulative.) |
| Operative Temperature: | - 10 $^{\circ}$ C to + 60 $^{\circ}$ C. |
| Output Polarity: | Positive or negative switch selected. A centre 'off' position is also provided. |
| Output Noise Level: | Less than 30 ppm of f.s. |
| Reference Source: | Precision zener diode, selected for stability and low temperature co-efficient. |
| Maximum Overload: | The instrument can withstand continuous short circuit on the output for all ranges. |
| Power Supply: | 6-AA size (51x14mm) batteries. A battery condition display indicates when the batteries should be changed. An alternative power source is 6 NiCad cells of the same dimensions. These can be recharged via a socket on the side of the unit. The 6 rechargeable batteries and mains re-charger are available as an optional extra. |

General Specification

| | |
|---------------------------|---|
| Dimensions: | 200 x 107 x 74mm |
| Weight: | Packed: 1.5kg, net: 1.1kg |
| Optional Extras: | Rechargeable Battery Packs – 240V and 110V mains Calibration Certificates – traceable to N.P.L. and UKAS |
| Country of Origin: | UK |

Ordering Information

| Code | Description |
|------|--|
| 1006 | DC Millivolt Source Model (0.02% Accuracy) |
| 1008 | Rechargeable Battery Pack – (6 NiCad Cells + 240V Mains Charger) |
| 1009 | Rechargeable Battery Pack – (6 NiCad Cells + 110V Mains Charger) |
| 9150 | N.P.L. Traceable Calibration Certificate |
| 9100 | UKAS Calibration Certificate |

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



1007 DC Millivolt Potentiometer & Calibrator

Time Electronics

Calibration, Test & Measurement

- **3 Ranges up to 1V**
- **0.02% Accuracy**
- **20 mA Output Current**
- **Null Display**
- **Portable**



The **1007** can be used for potentiometric voltage measurement in addition to its operation as a millivolt source. The null zero and sensitivity are adjustable via front panel controls - maximum sensitivity enables null balance to resolve 3 microvolt.

The 1007 is particularly useful for calibration and simulation of thermocouples. Accurate voltages equivalent to the output from a thermocouple can easily be set on a 1007, enabling fast calibration of temperature measuring equipment. Alternatively, the 1007 can measure thermocouples output by operating as a potentiometer.

Power is provided by 6 AA (penlight size) batteries. Battery life is several months, depending on usage. The battery condition is monitored by an indicator, which is mounted on the end of the unit.

Unit comes supplied with dry cell batteries and sturdy carry case.

The source version without null measuring facility is also available from Time Electronics (1006 DC Millivolt Source).

1007 Technical Specifications

| | |
|------------------------------|--|
| Output: | 0 – 1V in 100uV steps, 0 – 100mV in 10uV steps, 0 – 10mV in 1uV steps. |
| Accuracy: | ± 0.02% of setting, ± 0.02% of range. ± 1uV. |
| Output Resistance: | Less than 0.2 ohm on 1V and 100 mV ranges. 1 ohm on 10 mV range. |
| Max Output Current: | 1V and 100mV ranges - 20mA. 10mV range - limited by 1ohm output resistance. |
| Output Stability: | Less than 60 ppm/°C. Less than 100 ppm per 3 months (Non cumulative). |
| Output Polarity: | Positive or negative switch selected. A centre 'off' position is also provided. |
| Output Noise Level: | Less than 30 ppm of range. |
| Reference Source: | Precision zener diode selected for stability and low temperature coefficient. |
| Power Supply: | Six AA size batteries. A battery condition indicator is provided. Rechargeable NiCad cells may be used and charged without removal from the case via the charging socket on the side of the instrument. Rechargeable batteries and mains charger are available as an optional extra. |
| Null Balance Display: | The null display is on a front panel meter, zero and sensitivity controls are provided. Maximum sensitivity: ± 20 uV f.s.d. (3uV resolution); Minimum sensitivity: ± 200 mV f.s.d.; Input resistance: Greater than 1 Mohm. |

General Specification

| | |
|---------------------------|--|
| Dimensions: | 195 x 75 x 85mm |
| Weight: | Packed: 1.6kg, net: 1.2kg |
| Optional Extras: | Rechargeable Battery Packs - 6 NiCad Cells plus mains charger. Calibration Certificates – traceable to NPL and UKAS |
| Country of Origin: | UK |

Ordering Information

| Code | Description |
|------|--|
| 1007 | DC Millivolt Potentiometer & Calibrator |
| 1006 | DC Millivolt Source |
| 1008 | Rechargeable Battery Pack – (6 NiCad Cells + 240V Mains Charger) |
| 1009 | Rechargeable Battery Pack – (6 NiCad Cells + 110V Mains Charger) |
| 9150 | N.P.L. Traceable Calibration Certificate |
| 9101 | UKAS Calibration Certificate |

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



1010 DC Millivolt Calibrator

Time Electronics

Calibration, Test & Measurement

- **0.01 μ V to 10V**
- **0.02% Accuracy**
- **Battery / Mains operation**
- **30mA Output Current**
- **10 ppm/hr Stability**



The **1010** is a solid state battery powered instrument suitable for applications requiring a precision voltage source of low internal resistance. It has five ranges up to 10V with a resolution up to 0.01 μ V. Its small size, robust construction and independence of mains power make it easily portable and convenient for laboratory, field and industrial use.

Voltage outputs are set by selecting the range switch and dialling up the desired value on the thumbwheel switch. Output polarity may be selected using the normal/off/reverse switch.

The calibrator's output resistance is typically 500m Ω on the top 3 ranges. The maximum output current that can be drawn on these ranges is limited to 30mA. This is to prevent damage to the internal circuitry in the event of accidental short circuit, etc. The lower ranges have an output resistance of 1 ohm and will supply current up to the short circuit value.

Operation is from battery or mains. When the calibrator is plugged into the mains supply, the internal batteries are automatically recharged. The internal batteries will operate the calibrator when unplugged from the mains. Battery condition can be monitored by the meter on the front panel.

A precision zener diode is used as a reference source that provides an input to a F.E.T. chopper amplifier system operating in a feedback stabilised mode. The gain value is determined by a set of precision metal film resistors, selected by the 5-decade thumbwheel switch on the front panel. The output voltage is variable from 0.01 μ V to 9.9999V in 5 ranges.

For complete reliability, the calibrator range switch employs two contacts in parallel for each position in case one contact fails, ensuring the calibrator will still function correctly.

Applications include calibration, linearity, and gains stability measurements on DC amplifiers, digital and electronic voltmeters, data loggers and chart recorders. It's high 10ppm per hour stability and very low noise levels are ideal for this type of application.

1010 Technical Specifications

| | |
|----------------------------------|--|
| Output: | 0 – 9.9999V in 5 ranges 0 – 9.9999V in 100 μ V steps 0 – 999.99mV in 10 μ V steps 0 – 99.999mV in 1 μ V steps 0 – 9.9999mV in 0.1 μ V steps 0 – 999.99 μ V in 0.01 μ V steps |
| Accuracy: | 10V & 1V ranges: $\pm 0.02\%$ of setting + $\pm 0.005\%$ of range. 100mV range: $\pm 0.05\%$ of setting + $\pm 0.005\%$ of range, $\pm 1 \mu$ V. 10mV & 1mV ranges: $\pm 0.05\%$ of setting + $\pm 0.005\%$ of range, $\pm 4 \mu$ V. |
| Output Resistance: | 10V, 1V, & 100mV ranges Less than 0.1 ohm (typically 0.05 ohms). 10mV & 1mV ranges 1 ohm. |
| Maximum Output Current: | 10V, 1V & 100mV ranges –30mA. 10mV & 1mV ranges – up to short circuit value although it should be noted that loads of greater than 1kohm will give greater than 0.1% error. |
| Maximum Overload: | The instrument can withstand continuous short circuit on the output for all ranges. The 10V, 1V and 100mV ranges have an automatic output current limit set at approximately 30 mA. |
| Output Voltage Stability: | Less than 30ppm per $^{\circ}$ C (0 to +50 $^{\circ}$ C). Less than 5ppm per V variation in supply voltage. Less than 75ppm per year. Less than 10ppm per hour at constant temperature. |
| Output Polarity: | Positive or negative switch selected. A centre 'off' position is provided. |
| Output Noise Level: | 10V, 1V 100mV ranges – less than 10ppm of setting $\pm 2 \mu$ V (0-10Hz). 10mV & 1mV ranges – less than $\pm 0.05\mu$ V (0-10 Hz). |
| Reference Sources: | Precision zener diode selected after a special ageing process for a temperature coefficient better than 5 ppm per $^{\circ}$ C and stability better than 10ppm per month, non cumulative. |
| Power Supply: | Time Electronics power unit type PU2 which is housed in the rear of the 1010. The PU2 will power the 1010 direct from the mains or an internal rechargeable battery. The battery is automatically charged when mains power is connected. Alternatively an optional battery unit taking ten 1.5V U2-size cells (60 x 33 mm dia) may be fitted in place of the PU2. Access to the battery compartment is from the instrument rear. |
| Battery Level Indicator: | A front panel display provides a continuous indication of the battery state. |

General Specification

| | |
|-------------------------|---|
| Dimensions: | 215 x 175 x 190 mm |
| Weight: | 3.3kg |
| Optional Extras: | Carrying Case Calibration Certificate traceable to N.P.L UKAS Calibration Certificate |

Ordering Information

| Code | Description |
|------|--|
| 1010 | DC Millivolt Calibrator |
| 9021 | Carrying Case |
| 9151 | N.P.L. Traceable Calibration Certificate |
| 9102 | UKAS Calibration Certificate |

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



1017 Multifunction DC V/I/R Calibrator

Time Electronics

Calibration, Test & Measurement

- DC Volts 10 nV to 100 V
- DC Current 100 nA to 100 mA
- Resistance 10 mohm to 10 Kohm
- 0.005% (50ppm) accuracy
- 1 ppm setting resolution
- Stability <5ppm/day <25ppm/yr
- Noise < 2ppm (0.1 to 1 Hz)



The **1017** is a high performance portable DC calibrator for use in the field or laboratory. It is constructed in a durable, compact plastic case with a tilt stand/carry handle.

Five DC voltage ranges from 10mV to 100V full scale are available, each with a 6-digit (1ppm) resolution. The DC current range is 100mA full scale with a 100nA (1ppm) resolution. Resistance from 0.01 R to 10 kR is available 0.01 R steps.

The voltage, current and resistance ranges make it suitable for calibrating a wide range of transducers, from thermocouples, 4-20mA and 0-10V transmitters, to Platinum Resistance Thermometers, all in the same instrument.

Power

Either mains or re-chargeable battery. Battery operation enables good performance where earth loop and noise pick-up occurs.

Stability v Temperature and Time

Outstanding performance is due to the use of special computer selected reference diodes and the latest in resistor technology. The special low-thermal emf terminals reduce errors when working with microvolt signals.

Digital Deviation Control

Allows the output to be increased/decreased in % terms from 0 to +/-0.999%. This provides a direct read-out of error and simplifies the recording results for calibration certificates. It enables the user to immediately see if the unit under test is within specification.

1017 Technical Specifications

| | |
|--------------------------------------|--|
| Voltage Ranges/Accuracy: | <p>0 - 9.99999mV in 10nV steps, $\pm 0.02\%$ of setting $\pm 0.005\%$ of range 0 - 99.9999mV in 100nV steps, $\pm 0.01\%$ of setting $\pm 0.004\%$ of range 0 - 999.999mV in 1μV steps, $\pm 0.005\%$ of setting $\pm 0.002\%$ of range 0 - 9.99999V in 10μV steps, $\pm 0.005\%$ of setting $\pm 0.002\%$ of range 0 - 99.9999V in 100μV steps, $\pm 0.01\%$ of setting $\pm 0.004\%$ of range</p> <p>The above accuracies are independent of thermal emfs which can be 2uV or more depending on the type of leads and connections used.</p> <p>Output resistance: 10mV & 100mV: 10R. 1V & 10V: <150mR. 100V: <1R Drive current max: 10&100mV: as 10R o/p resistance. 1V&10V: 150mA; 100V: 10mA.</p> |
| Current Range/Accuracy: | 0 - 99.9999mA in 0.1uA steps, $\pm 0.02\%$ of setting $\pm 0.004\%$ of range. Drive voltage max: 10V |
| Resistance Range/Accuracy: | 0 - 9.99999kR in 0.01R steps, $\pm 0.05\%$ of setting $\pm 0.003\%$ of range. Power rating: 0.25W per resistor End resistance: less than 200 milliohms |
| Deviation Control: | 0% to 0.999% in 0.001% steps. Deviation accuracy: V&I output, 0.5%. |
| Temperature Coefficient: | <5 ppm per °C |
| Long Term Stability: | <5ppm/day, <15ppm/90day, <25ppm/year |
| Short Term Stability – Noise: | 10mV range: <0.2uV/sec, <0.3uV/10sec, <0.4uV/min 100mV range: <0.2uV/sec, <0.4uV/10sec, <0.6uV/min 1V range: <0.2uV/sec, <0.5uV/10sec, <1.5uV/min 10V range: <1.0uV/sec, <2.0uV/10sec, <8.0uV/min 100V range: <40uV/sec, <100uV/10sec, <500uV/min 100mA range: <0.2uA/sec, <0.4uA/10sec, <1.0uA/min |
| Warm-up and Settling time: | Warm-up: <10 mins to full accuracy. Settling: < 0.5 secs, 100V range 5 secs. |
| Output Connections: | The output is via low thermal emf terminals (0.2uV/°C). A mains earth terminal is provided for screening purposes. Output polarity can be selected by a switch on the front panel. |
| Power Supply: | The 1017 can be powered continuously from a 230V 50/60 Hz (110V to order) mains supply, or from the internal rechargeable NiCad battery pack. A front panel indicator shows the state of charge at all times. |
| Operating temperature: | 0 to 50°C (32 to 120°F). 15 to 25°C for optimum performance. |
| Operating Humidity: | 10 to 90% non-condensing 25°C (77°F) |

General Specification

| | |
|-------------------------|--|
| Dimensions: | 290 x 250 x 110mm |
| Weight: | 2.4 kg (5.4 lb) |
| Optional Extras: | Calibration Certificate traceable to N.P.L UKAS Calibration Certificate |

Ordering Information

| Code | Description |
|------|--|
| 1017 | Multifunction DC V/I/R Calibrator |
| 9152 | N.P.L. Traceable Calibration Certificate |
| 9109 | UKAS Calibration Certificate |

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



1021 DC Current Source with Null Indicator

Time Electronics

Calibration, Test & Measurement

- **100mA output with overload protection**
- **0.02% Accuracy**
- **Wide range of applications**
- **Portable with rechargeable batteries**



The **1021** is a precision DC Current Source suitable for calibration and test applications from micro-amp levels up to 100mA.

The 100mA output with overload protection is based on the popular Time Electronics type 1007 millivolt source and incorporates many of the well-proven features. The instrument is overload protected and a front panel indicator shows when insufficient drive voltage is available. Maximum output voltage is adjustable between 14 volts and 40 volts, with a maximum output power of 2.4 watts.

The unique circuit design ensures that it stays well within specification for at least 12 months. Variation with temperature is better than 60 ppm per °C, and typically better than 20 ppm per hour at constant temperature. To improve the switch reliability, additional back-up contacts have been used – even if a contact fails, the 1021 will still operate correctly.

The accuracy and stability are such that a wide range of applications are possible. In the process industries it may be used to test and calibrate current sensitive transducers, and their associated indicating and recording instruments. The semiconductor industry requires constant current sources for parameter measurements. It may also be used to measure DC current accurately by using the null facility to back off the unknown current. Resolution of 1µA is possible.

The 1021 is housed in a robust metal case and a carrying case is supplied as standard. Rechargeable batteries give portable operation and a mains re-charger is supplied with the unit. Complete recharge time is 10-12 hours although sufficient charge for a few hours operation can be obtained with only 1/2 hours' charge. Overnight recharge is sufficient to fully charge the batteries, which give up to 10 hours of typical operation. The mains re-charger is supplied as standard with the 1021 and connects with a socket on the end panel.

1021 Applications

Transducers

The ability to source and measure current makes the 1021 ideal for testing and calibration of many types of current transducer and their associated measuring equipment.

Semiconductor Parameters

The 1021 covers many applications in a wide variety of semiconductor measurements including; forward voltage drops, zener diode characteristics and temperature coefficients, transistor gains (hfe) and saturation voltages. Characteristic curves of devices can be easily plotted by selecting suitable output currents on the 1021. It can also be used to drive Hall effect devices.

Resistance and Temperature Measurement

Low ohm and contact resistance of relays, switches, connectors, etc can be easily measured using the 1021 as the current source in a 4-terminal kelvin system where lead and probe resistance do not affect the accuracy of the reading. This method can also be used in thermometry for calibration and measurement of platinum-resistance thermometers and thermistors.

1021 Technical Specifications

| | |
|------------------------------|---|
| Output: | 0 - 99.99mA in 3 ranges: 0 - 99.99mA in 10 μ A steps 0 - 9.999mA in 1 μ A steps 0 - 999.9 μ A in 0.1 μ A steps |
| Accuracy: | +/- 0.02% of setting +/- 0.02% of range +/- 0.02 μ A |
| Voltage Capacity: | Adjustable between 14 and 40 volts. Maximum output power 2.4 watts. |
| Out of Limit Warning: | A front panel indicator provides indication of insufficient drive voltage. |
| Output Polarity: | Positive or negative switch selected. A centre 'off' position provides an open circuit on the output terminals. |
| Output Stability: | Better than 60 ppm per $^{\circ}$ C (-10 $^{\circ}$ C to +50 $^{\circ}$ C). Better than 25 ppm per hr (at constant temperature). |
| Output Noise: | Less than 15 ppm of full scale |
| Load Regulation: | Better than 20 ppm per volt change in output. |
| Null Sensitivity: | Adjustable from \pm 20mA to \pm 20 μ A FSD via front panel control. Maximum resolution is 1 μ A. |
| Power Supply: | NiCad rechargeable batteries with external mains re-charger. Standard mains voltage is 220-250 50/60 Hz. 100-125 V 50/60 Hz is available but should be specified on ordering. |

General Specification

| | |
|---------------------------|---|
| Dimensions: | 200 x 110 x 75mm |
| Weight: | 1kg |
| Optional Extras: | Calibration Certificates – traceable to N.P.L. and UKAS |
| Country of Origin: | UK |

Ordering Information

| Code | Description |
|------|--|
| 1021 | DC Current Source with Null Meter (mains charger and carrying case included) |
| 9153 | N.P.L. Traceable Calibration Certificate |
| 9105 | UKAS Calibration Certificate |

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



1024 DC Current Calibrator

Time Electronics

Calibration, Test & Measurement

- Up to 100mA output
- 0.02% accuracy
- 10 ppm/hr stability
- Null facility
- Portable
- Battery & mains operation



The **1024** is a precision DC Current Source suitable for calibration and test applications from nanoamp levels up to 100 mA.

The 1024 is a solid state battery powered instrument which is easily portable and convenient for laboratory, field, or industrial use. It incorporates many of the well-proven circuit techniques of the Time Electronics Type 1010 DC Voltage Calibrator.

The null balance system enables the 1024 to be used for making accurate current measurement in addition to its basic function as a calibrator. Operation is by backing the current source output against the current to be measured, with the difference being displayed on a sensitive centre zone null meter. At the null point, there is no voltage drop across the 1024.

The 1024 employs a precision aged reference diode as a basic reference source. Excellent zero stability is ensured by the use of a high performance FET chopper amplifier system. Precision metal film resistors with temperature co-efficients of less than 10 ppm per °C are used to maintain the accuracy and stability of the initial calibration.

Operation is from battery or mains. A front panel indicator that also serves as a supply on-off display monitors the battery supply condition. A minimum line on the indicator shows when the batteries should be recharged. Charging is performed by its own internal charger/power supply. Simply plugging the 1024 into a mains supply will charge the batteries. Operation of the 1024 may be continued when plugged into the mains.

Applications include calibration and testing of current sensitive transducers; calibration and linearity tests on digital and electronic current meters; and semiconductor parameter measurements e.g. diode conduction voltages at specified current levels.

1024 Technical Specifications

| | | |
|------------------------------|--|--|
| Output: | 0 – 100 mA in 5 ranges: | 0 – 99.999 mA in 1 μ A steps 0 – 9.9999 mA in 100 nA steps 0 – 999.99 μ A in 10 nA steps 0 – 99.999 μ A in 1 nA steps 0 – 9.9999 μ A in 0.1 nA steps |
| Accuracy: | $\pm 0.02\%$ of setting + $\pm 0.005\%$ of range + ± 0.2 nA | |
| Voltage Capacity: | 15 V with new batteries or mains power (11 V with minimum allowable battery volts). | |
| Regulation: | Load: better than 5 ppm per volt. Supply: better than 5 ppm per volt. | |
| Output Polarity: | Positive or negative switch selected. A centre 'off' position provides an open circuit on the output terminals. | |
| Out of Limit Warning: | A front panel LED indicator provides warning of insufficient drive voltage. | |
| Output Stability: | Less than 30 ppm per $^{\circ}$ C (0 $^{\circ}$ C to + 50 $^{\circ}$ C) Less than 10 ppm per hour at constant temperature. Less than 75 ppm per 6 months. | |
| Output Noise: | 100mA, 10mA and 1mA ranges: less than 5 ppm of full scale. 100 μ A and 10 μ A ranges: less than 10 ppm of full scale ± 0.1 nA. | |
| Null Sensitivity: | Adjustable from ± 25 mA to ± 25 μ A FSD via front panel control. Maximum resolution is 0.5 μ A. | |
| Power Supply: | The power unit will power the 1024 direct from the mains or by the internal rechargeable battery pack. The batteries are automatically charged when mains power is connected. Alternatively an optional battery unit taking 10 off 1.5V 'D' cells may be fitted in place of the power unit. Access to the battery compartment is from the instrument rear. | |

General Specification

| | |
|-------------------------|---|
| Dimensions: | L 220mm x H 160mm x D 200mm |
| Weight: | 3.3 kg (including power unit) |
| Optional Extras: | Carry Case that houses the 1024 with a leather shoulder strap and leads compartment. The 1024 can be operated without removing it from the case. Calibration Certificates – traceable to N.P.L. and UKAS |

Ordering Information

| Code | Description |
|------|--|
| 1024 | DC Current Calibrator with null measuring facility |
| 9021 | Carrying Case |
| 9154 | N.P.L. Traceable Calibration Certificate |
| 9106 | UKAS Calibration Certificate |

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



1030 MicroCal Voltage & Current Source

Time Electronics

Calibration, Test & Measurement

- 10mV, 100mV, 1V ranges
- 10mA, 100mA ranges
- 0.1% accuracy
- 0 - 8V available
- Precision 10-turn dial
- Battery Powered 9V PP3
- Battery level indicator



The **1030** is a compact, low cost, portable voltage and current calibrator for general purpose signal injection. It is suitable for voltage and current loop signal simulation as well as thermocouple simulation. The precision 10-turn dial provides a conventional feel to setting the output with a setting resolution of 1 part in a 1000 (0.1%)

Three voltage ranges give an adjustable output from 10uV to 1V and two current ranges for 10uA to 100mA.

An additional 0 to 8V output can be obtained by using a precision 1Kohm resistor that is supplied with the unit. The resistor is connected across the output terminals and the 10mA current range selected. This allows the output to be set between 0 and +/- 8V with a 10mV resolution and an accuracy of 0.3% of full scale.

The 1030 is simple to operate and does not require any standardisation prior to use. The operator needs only to switch on, check the battery condition, and set the required range and output value.

The 1030 is supplied with a leatherette carry case.

1030 Technical Specifications

| | |
|---------------------------------|---|
| Voltage Ranges: | 0 – 1V (1mV resolution) 0 – 100mV (100uV resolution) 0 – 10mV (10uV resolution) 0 – 8V (10mV resolution), using external precision 1Kohm resistor (included) |
| Current Ranges: | 0 – 100mA (100uA resolution), 0 – 10mA (10uA resolution) |
| Accuracy: | 1V, 100mV ranges: 0.1% of fs, 10mV, current ranges: 0.2% of fs, 8V range: 0.3% fs |
| Linearity: | 0.15% |
| Temperature Coefficient: | 150ppm per °C |
| Noise: | 30ppm of full scale (1V range) |
| Battery: | PP3 size, 9V. Approx 60 hours life. An optional alternative power source is a NiCad or Ni-Mh rechargeable cell of the same type. This can be recharged via the socket on the top of the unit without removing the cell from the unit. |
| Battery Condition: | Monitored by front panel indicator. |
| Output Polarity: | Positive or negative, switch selected. A centre 'off' position is also provided. |
| Maximum o/p Current: | 1V, 100mV ranges: 20mA, 10mV, 8V ranges: Limited by output resistance. |
| Maximum o/p Voltage: | 8V (current ranges) |
| Output Resistance: | 0.2ohms on 1V and 100mV range 10ohms on 10mV range, 1Kohm on 8V range |
| Maximum Overload: | The 1030 can withstand continuous open circuit or short circuit on all ranges. |

General Specification

| | |
|-------------------------|---|
| Dimensions: | 115mm x 62mm x 55mm. Complete with zip pouch carrying case |
| Weight: | 0.5kg |
| Optional Extras: | Rechargeable Battery Pack: A mains re-charger and NiCad rechargeable battery are available. The battery can be recharged without being removed. Calibration Certificate traceable to N.P.L UKAS Calibration Certificate |

Ordering Information

| Code | Description |
|------|--|
| 1030 | MicroCal (Combined Voltage and Current Source) |
| 1031 | Rechargeable Battery Pack (NiCad Battery and 240V Mains Charger) |
| 1032 | Rechargeable Battery Pack (NiCad Battery and 110V Mains Charger) |
| 9155 | N.P.L. Traceable Calibration Certificate |
| 9110 | UKAS Calibration Certificate |

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



1044 Voltage and Current Calibrator

Time Electronics

Calibration, Test & Measurement

- **Source and Measure Current and Voltage**
- **3 Voltage Ranges: 0 – 20V**
- **3 Current Ranges: 0 – 20mA**
- **0.05% Accuracy**



The **1044** has been designed to offer solutions in many applications from the R&D lab to the process/service engineer. It is suitable for use anywhere an accurate, low cost calibrator is needed.

We have used our experience in designing instrumentation to bring you the most versatile and practical calibrator yet. The 1044 can source and measure voltage and current in one compact unit. The 0.05% accuracy is ideal for simulation and calibration in most engineering applications.

The 1044 combines the advantages of digital accuracy with analog controls. Progressing from the familiar functions of our popular 1030 calibrator, the 1044 offers more ranges, better accuracy and the ability to measure as well as source.

The large, easy to read LCD display shows the actual output, even when the connected load exceeds the specifications. This important feature eliminates the risk of large errors when connecting to unknown loads. The display even shows if the battery becomes low.

In the source mode, voltage up to 20V and current up to 20mA may be generated in three ranges. When in current source mode the 1044 has a high 24V compliance voltage which is ideal for powering process control loops.

In the measurement mode, the range and function can be easily selected with the measured input accurately shown on the LCD display, operating in a similar way to a multimeter.

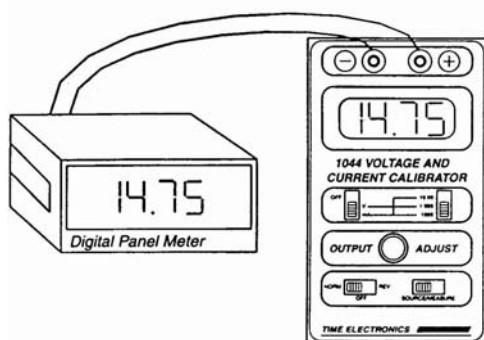
The 1044 is housed in a pocket sized, ABS case and comes with a leatherette carry case containing a compartment for storing test leads. Connections are by standard 4mm plugs or by simply clamping the wires under the terminals.

A single 9V battery powers the unit or an external 12V DC power supply may be used which disconnects the internal battery.

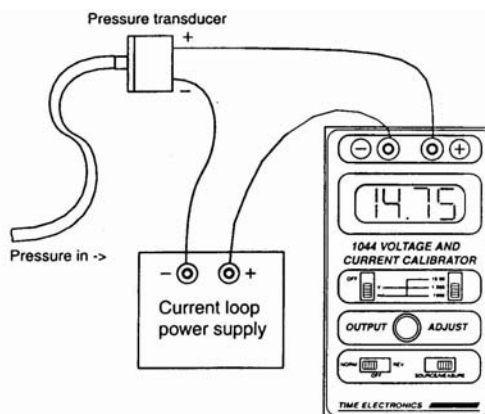
Calibration certificates traceable to UK national standards and UKAS are also available.

1044 Applications

In the **source mode**, the 1044 may be used to calibrate meters, thermocouple indicators, data loggers, for signal injection, semiconductor characterisation or as a backing off source.



In the **measure mode**, the 1044 may be used in the same way as a multimeter.



1044 Technical Specifications

| | |
|--|---|
| <p>VOLTAGE SOURCE</p> <p>Ranges: 0 – 200mV / 100uV resolution 0 – 2V / 1mV resolution 0 – 20V / 10mV resolution</p> <p>Accuracy: 0.05% of full scale + 2 Counts</p> <p>Output Curr: 20mA Max</p> <p>T / C & Noise: 150ppm/°C Noise <30ppm</p> | <p>VOLTAGE MEASURE</p> <p>Ranges: 0 – 200mV / 100uV resolution 0 – 2V / 1mV resolution 0 – 20V / 10mV resolution</p> <p>Accuracy: 0.05% of full scale + 2 Counts</p> |
| <p>CURRENT SOURCE</p> <p>Ranges: 0 – 200uA / 100nA resolution 0 – 2mA / 1uA resolution 0 – 20mA / 10uA resolution</p> <p>Accuracy: 0.05% of full scale + 3 Counts</p> <p>Output Volt: 24V Nominal</p> <p>T / C & Noise: 200ppm/°C Noise <50ppm</p> | <p>CURRENT MEASURE</p> <p>Ranges: 0 – 200uA / 100nA resolution 0 – 2mA / 1uA resolution 0 – 20mA / 10uA resolution</p> <p>Accuracy: 0.05% of full scale + 3 Counts</p> |

General Specification

| | |
|-------------------------|---|
| Dimensions: | 142mm (5.6") x 78mm (2.9") x 50mm (2.0") |
| Weight: | 0.28kg (0.6lbs) |
| Optional Extras: | External Power Unit: 230/240V 50/60Hz mains power supply Calibration Certificates – traceable to N.P.L. and UKAS |

Ordering Information

| Code | Description |
|------|--|
| 1044 | Voltage and Current Calibrator |
| 7643 | 230/240V AC 50/60Hz Mains Power Supply |
| 9156 | N.P.L. Traceable Calibration Certificate |
| 9133 | UKAS Calibration Certificate |

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



1048 Current - Voltage - Loop Calibrator

Time Electronics

Calibration, Test & Measurement

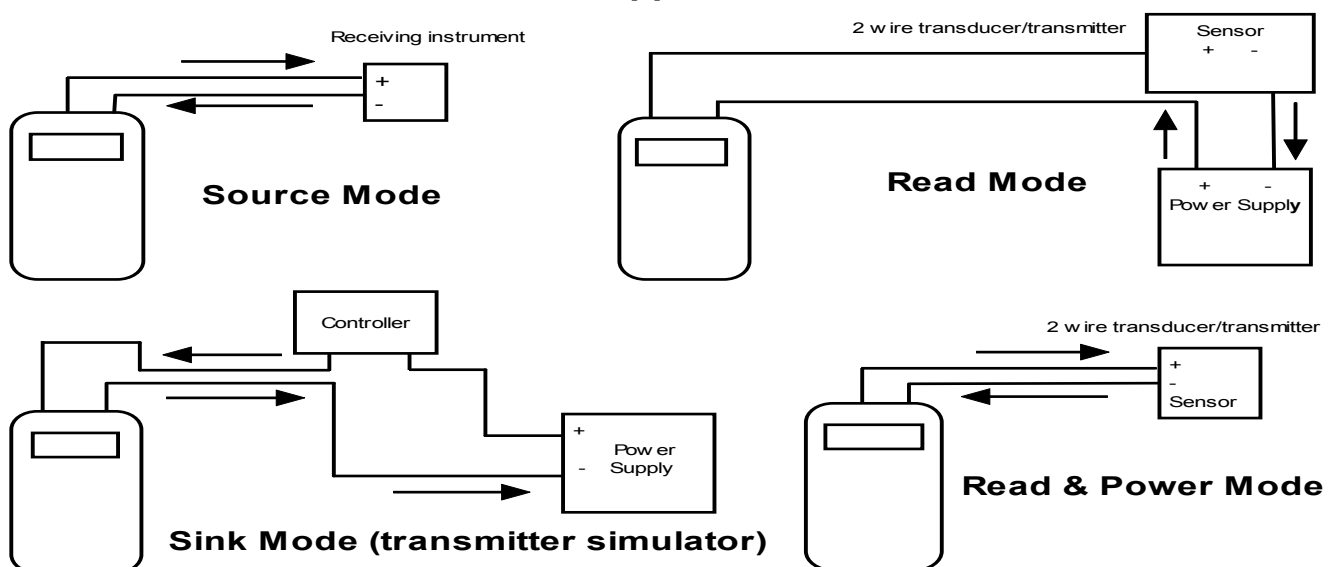
- **Source & Measure - Current & Voltage**
- **3 Source ranges 0 - 22mA & 0 - 22V**
- **3 Measure ranges 0 - 70mA & 0 - 50V**
- **Transmitter Simulator/Sink**
- **Output Steps and Ramps**
- **Fine adjustment (Inching)**
- **Accuracy 0.02% of span**



The **1048** is a current, voltage, and process loop calibrator that covers the needs of an R&D lab and process control engineer. Source and measure in three current and voltage ranges plus a transmitter simulator/sink function. It has 4.5 digit (0.005% of span) resolution.

Output functions include step, ramp and inching. There are no key press menus to learn, just switches and buttons. A multi-turn potentiometer controls the output with up/down incrementing buttons for fine control. The output can be reversed (+/-) and zeroed at the flick of a switch. The front panel features a large easy-to-read 4.5 Digit LCD display which auto-ranges. Manual reset of the ramp function is also provided for quick restore.

1048 Applications



1048 Technical Specifications

| DC CURRENT - Source and Measure | DC VOLTS - Source and Measure |
|--|---|
| Span: 0 - 22mA, over-range to 70mA for measure only | Span: 0 - 22V, over-range to 50V for measure only |
| Accuracy: 0.02% of span | Accuracy: 0.02% of span |
| Resolution: 1uA (0-19.999mA), 10uA (above 20mA) | Resolution: 1mV (0-19.999V), 10mV (above 20V) |
| Span: 0 - 2.2mA | Span: 0 - 2.2V |
| Accuracy: 0.02% of span | Accuracy: 0.02% of span |
| Resolution: 0.1uA (0-1.9999mA), 1uA (above 2mA) | Resolution: 100uV (0-1.9999V), 1mV (above 2V) |
| Span: 0 - 220uA | Span: 0 - 220mV |
| Accuracy: 0.05% of span | Accuracy: 0.05% of span |
| Resolution: 10nA (0-199.99uA), 0.1uA (above 200uA) | Resolution: 10uV (0-199.99mV), 0.1mV (above 200mV) |
| Max source load: 1.1Kohms @ 20mA. Max drive: 22V | Output res: Approx <2 ohms. Max current 50mA |
| Measure load: 1K, 110, 16 ohm for 0.22, 2.2, 22mA | Measure load: 1Mohm on all ranges |

SINK (TX SIM)

2 wire transmitter simulation: External excitation voltage, 3V min, 50V max. The current sink levels are adjustable, with accuracies as in the 3 source ranges shown above.

Note: Accuracies in all measure modes are +/-1 digit

OUTPUT STEPS

5 fixed 4mA steps for current output 4, 8, 12, 16 & 20 mA

11 fixed 1V steps for voltage output 0,1,2...10V

21 fixed steps 1V/1mA for V & I output 0,1,2.....20

Stepping can be done manually or automatically (Autostep) Stepping speed is adjustable (1-9 sec/step). Dwell time (top and bottom) is one step period. In step mode the accuracy is limited to 0.05% of span +/-1 digit.

OUTPUT RAMP

Current Ramp 4 to 20, or 0 to 20 on all ranges.

Voltage Ramp 0 to 10, or 0 to 20 on all ranges.

Ramp time 7sec. Dwell (top/bottom) 5sec. Manual restart.

Ramp operation is also available in Sink (TX SIM).

OUTPUT ADJUSTMENT

A ten turn potentiometer is provided for quick positioning with fine adjust using up/down incrementing buttons.

Power: A single internal 9V PP3 size battery or an optional external mains power supply. Battery life: Typically about 15hrs use. Continuous operation in current source mode will shorten the battery life. A 15 min inactivity auto-power down feature is also included to conserve the battery.

Operating temperature: -10 to 50 °C (14 to 120 °F)

Storage temperature: -30 to 70 °C (-22 to 160 °F)

Operating humidity: 10-90% non-condensing at 25 °C

General Specification

| | |
|-------------------------|---|
| Dimensions: | 142mm (5.6") x 78mm (2.9") x 50mm (2.0") |
| Weight: | 0.28kg (0.6lbs) |
| Housing: | A pocket sized hard ABS case in a leatherette carry case. Leads can be stored inside of the case. |
| Optional Extras: | External Power Unit: 230/240V 50/60Hz mains power supply Calibration Certificates – traceable to N.P.L. and UKAS |

Ordering Information

| Code | Description |
|------|--|
| 1048 | V - I - Loop Calibrator 0.02% |
| 7643 | 230/240V AC 50/60Hz Mains Power Supply |
| 9176 | N.P.L. Traceable Calibration Certificate |
| 9138 | UKAS Calibration Certificate |

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



1077 Milliamp Transducer/Simulator

Time Electronics

Calibration, Test & Measurement

- 3 Operating modes
- 100mA Source & Load
- 24V Line mode
- 0.02% Accuracy
- Portable
- Rechargeable cells



The **1077** is a hand held instrument designed for the testing and simulation of milliamp transducer system. Its rugged and compact construction makes it ideal for use in the field or laboratory.

Three operating modes are possible -

- 1) As an **adjustable current load** (simulating the transducer) on the line, the 1077 will draw up to 100mA from the line. The required current is set by the front panel controls.
- 2) As an **adjustable power supply** (14V to 40V) with accurate measurement and display of the current drawn from the circuit.
- 3) As a **precision current source** with 14V to 40V max. (adjustable) drive capacity. The 1077 will source the set current up to 100mA to the loop.

These facilities make the 1077 ideal for process control engineers.

1077 Technical Specifications

CURRENT LOAD (TRANSDUCER SIMULATION)

| | |
|-------------------------------|---|
| Output: | 0 to 100 milliamps in 3 ranges – 0 – 99.99mA in 10 μ A steps 0 – 9.999mA in 1 μ A steps 0 – 999.9 μ A in 0.1 μ A steps |
| Accuracy: | $\pm 0.02\%$ of setting; $\pm 0.02\%$ of range; $\pm 0.02\mu$ A |
| Output Stability: | Better than 60 ppm per °C. Better than 25 ppm per hour at constant temp. |
| Input Voltage: | 30V maximum, 3V minimum |
| Voltage Limit Warning: | A front panel indicator provides indication of insufficient terminal voltage. |

24 VOLT LINE SIMULATION

| | |
|------------------------------|---|
| 24 V Line Simulation: | Adjustable 14V to 40V, 100mA current limit, Maximum output power 2.4 W. |
| Display: | A 3.5 digit (1999 max) LCD display indicating line current. |
| Measure Range: | 0 – 20 mA |
| Resolution: | 10 μ A |
| Accuracy: | 0.2% of reading + 1 count |

CURRENT SOURCE

| | |
|------------------------------|--|
| Output: | 0 to 100 mA in 3 ranges – 0 – 99.99mA in 10 μ A steps 0 – 9.999mA in 1 μ A steps 0 – 999.9 μ A in 0.1 μ A steps |
| Accuracy: | $\pm 0.05\%$ of setting, $\pm 0.02\%$ of range |
| Output Stability: | Better than 60 ppm per °C. Better than 25 ppm per hour at constant temp. |
| Output Noise: | Less than 15 ppm of full scale |
| Voltage Capability: | Adjustable 14V – 40V |
| Output Power: | 2.4 watts maximum |
| Output Limit Warning: | A front panel indicator provides indication of insufficient drive voltage. |
| Power Supply: | NiCad rechargeable batteries with external mains recharger. Recharge time approximately 10 hours. Operating time typically 10 hours. |

General Specification

| | |
|---|---|
| Dimensions: | 110 x 75 x 200 mm |
| Weight: | 2.4 kg (5.4 lb) |
| Optional Extras: | Calibration Certificates – traceable to N.P.L. and UKAS |
| The 1077 is supplied with carrying case, NiCad cells and 240V AC mains charger. Customer must specify when ordering if 110V – 120V A.C. charger is required. | |

Ordering Information

| Code | Description |
|------|--|
| 1077 | Transim (Milliamp Transducer/Line Simulator) |
| 9158 | N.P.L. Traceable Calibration Certificate |
| 9108 | UKAS Calibration Certificate |

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



1090 Temperature and mV/mA Indicator/Calibrator

Time Electronics

Calibration, Test & Measurement

- Measure/Simulate 8 thermocouples
- Measure/Simulate PT100
- ITS 90 standard
- Measure/Source (uV/mV/mA)
- Display in °C and °F
- Automatic CJC - selectable
- 10 point memory recall
- Inching and Step functions
- Mains/Battery + auto power down
- Process loops 4-20mA and 0-50mA
- 24V loop drive voltage



The **1090** is a portable high performance instrument that combines source and measurement functions for thermocouples, PT100s, uV, mV, and mA.

Thermocouple measurement and simulation

The unit can measure and simulate the temperature and mV characteristics of J, K, T, R, S, B, N and E thermocouples.

Cold junction compensation

The unit can be operated with or without internal cold junction compensation.

PT100 measurement and simulation

Based on 0.3850 alpha probe standard.

Range is $-200\text{ }^{\circ}\text{C}$ to $700\text{ }^{\circ}\text{C}$.

Measurement and Source (uV, mV, and mA)

Measurement ranges are 0 to $\pm 30\text{mV}$ and 0 to $\pm 60\text{mA}$.

Source ranges are 0 to $\pm 80\text{mV}$ and 0 to $\pm 80\text{mA}$.

Temperature units selection

The display can be easily changed from $^{\circ}\text{C}$ to $^{\circ}\text{F}$. The equivalent uV (thermocouples) and ohms (PT100) can also be shown.

24V Process Loop drive mode

A process loop can be driven at 24V and up to 60mA by selecting the 'Milliamp Source' mode and setting it at 60mA (or a lower level if required).

Inching (Incrementing/Decrementing)

The unit has a general-purpose inching function. This adjusts the output in fixed increments of temperature (thermocouples only) or voltage or current. The set-up menu gives the user a choice of three levels of increment i.e. 0.1, 1 or 10 for $^{\circ}\text{C}/^{\circ}\text{F}$, or 1, 10, or 100 uV/uA for voltage/current. The lowest of these represents the highest setting resolution and provides the most precise control of the output. This is especially useful for calibrating thermostat controllers that have tight specification on hysteresis.

Memory recall and step/auto-step functions

Up to 10 values can be stored in the unit's non-volatile memory and they can be recalled at any time. The user can also manually step through them in sequence using the step key. Continuous stepping (auto-step) is also available at any user selectable rate between 1 and 10 seconds/step.

Power is via an internal high capacity re-chargeable metal hydride battery that can be re-charged from an external mains charger (supplied as standard). The unit is supplied in a robust case with a carrying strap. A pocket for the instruction manual is provided.

1090 Technical Specifications

| MEASURE ACCURACY | | | SIMULATE ACCURACY | | |
|--------------------------|-----------------------------|-------------|--------------------------|-----------------------------|-------------|
| THERMOCOUPLE TYPE | TEMPERATURE RANGE °C | ACCURACY °C | THERMOCOUPLE TYPE | TEMPERATURE RANGE °C | ACCURACY °C |
| J | -200 to 580 | 0.7 | J | -210 to 150 150 to 1200 | 0.15 0.3 |
| K | -200 to -150 -150 to 750 | 2.5 0.5 | K | -270 to 190 190 to 1250 | 0.5 0.4 |
| T | -200 to 0 0 to 400 | 1.5 0.4 | T | -200 to 150 150 to 400 | 0.4 0.5 |
| R | -50 to 400 400 to 1750 | 3.0 1.5 | R | -50 to 800 800 to 1750 | 0.8 2.0 |
| S | -50 to 100 100 to 1750 | 3.0 1.5 | S | -50 to 850 850 to 1750 | 0.9 2.0 |
| B | 110 to 1000 1000 to 1800 | 3.5 1.5 | B | 100 to 1200 1200 to 1800 | 2.0 3.0 |
| N | -100 to 890 | 0.6 | N | -270 to 260 260 to 1300 | 0.5 1.0 |
| E | -50 to 400 | 0.4 | E | -50 to 1000 | 0.3 |
| Resolution: 0.1 °C or °F | | | Resolution: 0.1 °C or °F | | |

An additional correction representing the equivalent 1µV should be allowed for stray thermal emf effects.

Cold Junction Compensation: Accuracy 0.2 °C. Resolution 0.1 °C.
Operating Temperature: -10 to 40 °C (15 to 105 °F)
Connections: Industry standard 4mm screw terminals.
Power: A metal hydride rechargeable battery pack gives approximately 60 hours continuous operation. The mains re-charger supplied allows full recharge in 20 hours, or alternatively the unit may be recharged from 12-volt car cigar lighter. To conserve battery life, a user inactivity power-down feature is included.

Millivolt Measure 0 to +/- 30mV
Resolution: 10µV
Accuracy: 0.05% of f.s. ±1 digit
Input resistance: 100K Ohms
Milliamp Measure 0 to +/- 60mA
Resolution: 20µA
Accuracy: 0.05% of f.s. ±1 digit
Input resistance: 0.5 ohms

Millivolt Source 0 to +/- 80mV
Accuracy (8 to 80mV): 0.02% of f.s.
Resolution (8 to 80mV): 5µV
Accuracy (0 to 8mV): +/-4µV
Resolution (0 to 8mV): 0.5µV
Output resistance: 10 ohm
Milliamp Source 0 to +80mA
Accuracy (8 to 80mA): 0.02% of f.s.
Resolution: 5µA
Accuracy (0 to 8mA): +/-10µA
Resolution: 0.5µA
Max load (24V drive): 300R/80mA ,480R/50mA ,1.2K/20mA

PT100 Simulation
14 set temp. points: -100, -50, -20, 0, 20, 50, 100, 200, 300, 400, 500, 600, 700, 800 °C
Accuracy: 0.1% of resistance value (typically 0.5 °C)

PT100 Measure (0.2 °C or °F resolution)
Range: -200 to 700 °C, 2 wire.
Accuracy: 0.2% of resistance value (typically 0.7 °C)

Memory recall and step functions
10 memory locations for non-volatile storage of values.
Manual and Auto-Step, rate adjustable from 1 to 10 sec/step

Inching
Three levels of increment, 0.1, 1 or 10 for °C/°F, and 1, 10, or 100 uV/ uA for voltage/current. The lowest of these represents the highest setting resolution and provides the most precise control of the output.
24V Process Loop drive mode
A process loop can be driven at 24V and up to 60mA by selecting the 'Milliamp Source' mode and setting it at 60mA (or a lower level if required).

General Specification

Dimensions: 235 x 150 x 75 mm (9.25 x 6 x 3"). **Weight:** 1.25 Kg (2.8lb)
Optional Extras: Calibration Certificates – traceable to N.P.L. and UKAS

Ordering Information

| Code | Description |
|------|---|
| 1090 | Temperature and mV/mA Indicator/Calibrator (including batteries, charger and carrying case) |
| 9177 | N.P.L. Traceable Calibration Certificate |
| 9139 | UKAS Calibration Certificate |

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



5068 INSCAL Insulation Tester Calibration System

Time Electronics

Calibration, Test & Measurement

- Insulation resistance from 100K Ω to 10G Ω
- Low ohm verification at 1R, 10R, 100R, 1K
- Basic accuracy 1%
- 2.5kV max
- Battery operation
- Continuous connection - no arcing
- Fully shrouded safety connectors
- Display of open circuit voltage (0 – 1.999kV or 0 – 2.50kV)
- Display of short circuit current (0 - 2mA or 0 - 20mA)



The **5068** is a precision instrument suitable for calibrating and testing general purpose insulation testers with test voltages up to 2.5kV.

It is constructed in a high strength co-polymer plastic case and is powered by a rechargeable battery. This ensures full isolation from the mains and prevents stray leakage. The insulation tester being calibrated can be tested for open circuit voltage and short circuit current. These are displayed on the digital meter mounted on the front panel. Seven selectable precision resistors provide the insulation resistance test. A separate continuity test is provided. Also fitted are 4 fixed low resistance values for verification of the low ohm ranges.

Also available is the 5069, 10kV version, see separate data sheet.

5068 Technical Specifications

| | |
|---------------------------------------|--|
| Resistance (Insulation): | 10G, 1G, 100M, 10M, 1M, 500K, or 100K |
| Resistance (Low ohm): | 1R, 10R, 100R, or 1K |
| Resistance accuracy: | Low Ohm 1%, Insulation resistance: 100K - 1G, 1%. 10G, 5% |
| Resistance temp coeff: | < than 250ppm per °C insulation resistance, < 50ppm low resistance |
| Continuity: | Selectable 5 Ω |
| Open circuit voltage measure: | 0 to 2kV range, 0 to 2.5kV range, both ranges 1% of f/s accuracy |
| Voltage display: | 1.999kV full scale, and 2.50kV full scale |
| Voltage temp coeff: | < than 300ppm per °C |
| Short circuit current measure: | 0 to 2mA range, 0 to 20mA range, both ranges 1% of f/s accuracy |
| Current display: | 1.999mA full scale, and 19.99mA full scale |
| Current temp coeff: | < than 450ppm per °C |
| Power: | Internal battery, 6V re-chargeable NiCad, >500hrs between charges |

General Specification

| | |
|---------------------|--|
| Dimensions: | 270W x 246D x 175H mm |
| Weight: | 2.1Kg |
| Accessories: | Safety connection leads to allow custom 4mm connectors Mains battery re-charger (230V 50Hz) |

Ordering Information

| Code | Description |
|------|---|
| 5068 | INSCAL Insulation Tester Calibration System |
| 9189 | N.P.L. Traceable Calibration Certificate |
| 9112 | UKAS Calibration Certificate |

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



5069 INSCAL Insulation Tester Calibration System

Time Electronics

Calibration, Test & Measurement

- Insulation resistance from 100K Ω to 100G Ω
- Basic accuracy 1%
- 10kV max
- Battery operation
- Continuous connection - no arcing
- Fully shrouded safety connectors
- Display of open circuit voltage (0 – 2kV or 0 – 10kV)
- Display of short circuit current (0 - 2mA or 0 - 20mA)



The **5069** is a precision instrument suitable for calibrating and testing general purpose insulation testers with test voltages up to 10kV.

It is constructed in a high strength co-polymer plastic case and is powered by a rechargeable battery. This ensures full isolation from the mains and prevents stray leakage. The insulation tester being calibrated can be tested for open circuit voltage and short circuit current. These are displayed on the digital meter mounted on the front panel. The insulation resistance is provided by a precision 4 dial decade resistance bank which can be set to a maximum of 99.99G Ω with additional resistance values of 100K Ω , 200K Ω , 500K Ω , 1M Ω , 2M Ω and 5M Ω which can be switched in as required.

The 5069 is constructed in the same style as Time Electronics' well established 5080 PatCal but is suitable for use up to 10kV.

5069 Technical Specifications

| | |
|---------------------------------------|--|
| Resistance (Ohms): | 9x10G, 9x1G, 9x100M, 9x10M plus 5M, 2M, 1M, 500K, 200K, 100K |
| Resistance accuracy: | 100K - 5M, 1%, 10M to 10G, 1%. 10G to 100G, 5% |
| Resistance temp coeff: | Less than 250ppm per °C |
| Open circuit voltage measure: | 0 to 2kV range, accuracy 1% of FS 0 to 10kV range, accuracy 2% of FS. |
| Voltage display: | 1.999kV full scale, and 10.00kV full scale |
| Short circuit current measure: | 0 to 2mA range, 0 to 20mA range, both ranges 1% of f/s accuracy |
| Current display: | 1.999mA full scale, and 19.99mA full scale |
| Power: | Internal battery, 6V re-chargeable NiCad, >500hrs between charges |

General Specification

| | |
|---------------------|--|
| Dimensions: | 406W x 330D x 175H mm |
| Weight: | 4.4Kg |
| Accessories: | Safety connection plugs/leads with bare ends to allow custom fitted connectors Mains battery re-charger (230V 50Hz) |

Ordering Information

| Code | Description |
|------|---|
| 5069 | INSCAL Insulation Tester Calibration System |
| 9189 | N.P.L. Traceable Calibration Certificate |
| 9112 | UKAS Calibration Certificate |

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



5070 DuctorCal

Time Electronics

Calibration, Test & Measurement

- Calibrate Ductor Testers and Micro-Ohm meters
- 0.2, 2, 20, 200, 2000 milli-ohms
- 5 point calibration 0, 25, 50, 75, 100%
- Gold plated terminals
- Low thermal emf connection
- Portable robust carrying case



The **5070 DuctorCal** is a portable instrument suitable for calibrating high current Ductor Testers and Micro-Ohm meters. It contains 5 sets of high current standard resistors that are used for the calibration.

It has full 4 terminal capabilities with extra large terminals for the current connection. Gold plated terminals are used throughout to reduce contact resistance and thermal emfs.

It has a substantial maximum continuous current rating, but can also be used with much higher transient/pulse test currents.

5070 Technical Specifications

| Range | Current | Accuracy |
|-------------------------|---------|----------|
| 50, 100, 150, 200 uohms | 200A | 0.8% |
| 0.5, 1, 1.5, 2 mohms | 100A | 0.5% |
| 5, 10, 15, 20 mohms | 30A | 0.2% |
| 50, 100, 150, 200 mohms | 10A | 0.1% |
| 0.5, 1, 1.5, 2 ohms | 3A | 0.1% |

The currents shown are the continuous rated currents for both AC and DC. Higher currents (as generated by pulse driven instruments) can be used, and with an ON to OFF time ratio of 1:10 or less the allowed peak currents are 10 times those specified above, with an upper limit of 1000A. However, in this case it is important to ensure there are adequate low resistance connections to the DuctorCal's current terminals.

General Specification

| | |
|---------------------|---|
| Dimensions: | 54 x 41 x 21cm |
| Weight: | 11Kg |
| Accessories: | Calibration Certificates – traceable to N.P.L. and UKAS |

Ordering Information

| Code | Description |
|------|--|
| 5070 | DuctorCal |
| 9146 | N.P.L. Traceable Calibration Certificate |
| 9107 | UKAS Calibration Certificate |

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



5080 PatCal 2 - Calibrator for PATs

Time Electronics

Calibration, Test & Measurement



PAT-Cal2 is designed to provide rapid high accuracy calibration of PATs (Portable Appliance Testers) and Insulation / Continuity Testers. All in one unit, it contains calibration functions for Earth Bond, Insulation, Leakage, Touch Leakage and Load Test.

- Suitable for traceable calibration of PATs and VDE 0701 testers
- Impact resistant case to IEC1010
- Battery powered – ensures isolation and prevents inaccuracies due to stray leakage
- Voltage and current displayed on integral LCD digital meter
- Safety interlock prevents contact with Earth Bond studs during Insulation and Leakage tests
- Earth Bond currents up to 50A AC can be accurately measured
- Load Test currents up to 13A AC can be accurately measured

5080 Technical Specifications

EARTH BOND - Calibrated low value resistive loads

20mR, 5%. 190mR, 210mR, 950mR, 1.050mR, 1.08R, 2R, 10R, 18R, 1%
 Open circuit voltage measurement: range 0 – 20V accuracy 0.25% of full scale
 High current AC measurement: range 0 – 50A AC accuracy 0.5% of reading +/- 0.2A
 Low current AC measurement: range 0 – 2A AC accuracy 0.5% of reading +/- 2mA
 Low current DC measurement: range 0 – 2A DC accuracy 1% of reading +/- 2mA

INSULATION - Calibrated high value resistive loads

95K, 105K, 500K, 950K, 1.05M, 5M, 10M accuracy 0.1%. 20M, 50M, 100M accuracy 1.0%
 Open circuit voltage measurement: range 0 – 1kV DC accuracy 0.25% of full scale
 Current measurement: range 0 – 20mA DC accuracy 0.25% of full scale

LEAKAGE - Resistive loads for leakage current

Nominal leakage currents at 230V AC of 0.5, 1, 2, 5, 10, 15mA
 Mains voltage measurement: range 0 – 500V AC accuracy 0.25% of full scale
 Leakage current measurement: range 0 – 20mA AC accuracy 0.25% of full scale

TOUCH LEAKAGE - Constant current source for touch leakage meters

Current: 1.9mA AC 50 +/-5 Hz, into 2K2 maximum load resistance
 Current measurement: 0 – 2mA AC, accuracy 0.25% of full scale

LOAD TEST - Connection of external load via a IEC connector

Mains voltage measurement: range 0 – 500V AC accuracy 0.25% of full scale
 Load current measurement: range 0 – 13A AC accuracy 0.5% of full scale

General Specification

Dimensions: 406W x 175H x 330D mm. **Weight:** 5.5Kg
Power: Internal battery 6V re-chargeable NiCad, >200 hrs between charges.

Ordering Information

| Code | Description |
|------|--|
| 5080 | PatCal 2 - Calibrator for PATs |
| 9188 | N.P.L. Traceable Calibration Certificate |
| 9135 | UKAS Calibration Certificate |

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



7006/7007 Loop-Mates 1 and 2

Time Electronics

Calibration, Test & Measurement

- Pocket sized 140 x 66 x 27 mm
- 4 - 20mA or 0 - 10V loops
- 7 calibration set-points
- TxSim and RxTest (Loop-Mate1)
- RxSim and TxTest (Loop-Mate2)
- Auto-Step output - adjustable rate
- Battery powered PP3
- Internal loop drive supply



The Loop-Mates are single function low-cost pocket sized units, designed for test and calibration of process loops. Simplicity of operation is their key - no keypads or complicated selections. Engineers will be able to pick them up and get to work immediately. Just select 4 - 20mA, or 10V loop, and TxSim, RxTest, RxSim or TxTest. Both have internal loop drive supplies, which can be used to power the loop if required.

Loop-Mate1 is the simulator and acts as a source to provide the loop signals, 4 - 20mA or 0 - 10V. No complicated selection of the output, just operate up/down buttons to increase or decrease the signal. There are 7 set-points, 0%, 10%, 25%, 50%, 75%, 90%, 100%. Each is indicated on a high brightness LED and an audible beep sounds as you step between them. Auto-stepping mode (adjustable rate) allows Loop-Mate1 to be left connected stepping up and down. The engineer can then move to another location to check (using Loop-Mate2) that the signal is arriving correctly and is within specification.

Loop-Mate2 is a dedicated loop signal indicator, just as easy to operate. Once again select the loop type, 4 - 20mA, or 0 - 10V, and whether you want the display in direct units, or % of span. The LCD display shows the signal to an accuracy of 0.05% either in mA, V, or % of span.

Both units are powered by a single standard PP3 battery that gives up to 40hrs continuous use.

7006 & 7007 Technical Specifications

| 7006 Loop-Mate1 | | 7007 Loop-Mate2 | |
|---------------------|--|---------------------|------------------------------------|
| Range: | 4 - 20mA, or 0 - 10V | Range: | 4 - 20mA, 0 - 10V, 0 - 50V |
| Set-Points: | 0, 10, 25, 50, 75, 90, 100% of span | Display: | LCD 4 digits, mA, V, or % of span |
| Accuracy: | 0.1% | Accuracy: | 0.05% |
| Modes: | TxSim, or RxTest | Modes: | RxSim, TxTest, or 50mA/50V measure |
| Loop Supply: | Internal, 25mA max | Loop supply: | Internal, 25mA max |
| Auto-Step: | Up/Down/Up, 0.5, 1, 2, 4, or 8sec/step | | |

General Specification (Applies to both units unless stated)

| | |
|--|---|
| Power: | PP3 battery, typical life 40hrs |
| Dimensions: | L 140mm x W 65mm x D 30mm |
| Weight: | 7006: 180g, 7007: 200g |
| Optional Extras: | Calibration Certificates – traceable to N.P.L. and UKAS |
| <i>Loop-Mates are supplied with a carrying case, leads and technical manual.</i> | |

Ordering Information

| Code | Description |
|------|--|
| 7006 | Loop-Mate 1 |
| 7007 | Loop-Mate 2 |
| 9145 | N.P.L. Traceable Calibration Certificate (7006 and 7007) |
| 9144 | UKAS Calibration Certificate (7006 and 7007) |

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



Decade Boxes

Time Electronics manufacture a complete range of Decade Boxes, designed for resistance, capacitance, and inductance. These well-proven portable test instruments cover the requirements of both field and laboratory work. They are high performance, delivering accuracy, stability, and ease of use for any application.

| | |
|--|----------------|
| 1040 Resistance Box (1 Ohm - 100M Ohm) | Page 32 |
| 1041 Resistance Box Low Ohm (0.01 Ohm - 1K Ohm) | Page 33 |
| 1049 PT100 Simulator Handheld (Class A °C) | Page 34 |
| 1051 Resistance Box Low Ohm (0.01 Ohm - 1M Ohm) | Page 35 |
| 1053 Inductance Box (1mH - 10H) | Page 36 |
| 1061 Resistance Box Low Cost (1 Ohm - 1.2Mohm) | Page 37 |
| 1065 Resistance Box - Power 10W (0.1 Ohm - 100 kOhm) | Page 38 |
| 1067 Resistance Box Precision Low Ohm (10 mOhm - 12K Ohm) | Page 39 |
| 1068 Precision Fixed Resistance Box | Page 40 |
| 1070 Capacitance Box (100pF - 10uF) | Page 41 |
| 1071 Capacitance Box (10pF - 100uF) | Page 42 |



1040 Decade Resistance Box

Time Electronics

Calibration, Test & Measurement

- 1 Ω – 100 M Ω
- High accuracy
- Clear visual indication
- High stability
- Low temperature coefficient
- Compact and robust



The **1040** is an accurate hand held decade resistance box designed to meet the needs of industry and education. Housed in a robust metal case the compact construction makes it easily portable.

Excellent accuracy is achieved by using high stability metal film resistors. Mid-scale accuracy is 0.1%. The 8-digit thumbwheel switch enables precise setting with a clear unambiguous indication of the resistance value.

The temperature coefficient is better than 50 ppm per °C. Each resistor has a power rating of 1 watt.

To prevent misreading, the 1040 incorporates a colour coding system to divide the display into 3 groups to indicate ohms, Kilohms, and Megohms.

Special attention has been given to reliability. A special multiple gold contact switch arrangement ensures that back-up contacts are always available to take over should a contact fail.

1040 Technical Specifications

Range: 1 Ω to 100M Ω in 1 Ω steps

| | | | | | | | | |
|---------------------|---------|-----------|-----------|-----------|-----------|------------|-----------|----------|
| Decade (Ω) | 1 – 9 | 10 – 90 | 100 – 900 | 1 – 9k | 10 – 90k | 100 – 900k | 1 – 9M | 10 – 90M |
| Acc. % | ± 1 | ± 0.5 | ± 0.1 | ± 0.1 | ± 0.1 | ± 0.1 | ± 0.1 | ± 1 |
| Max Current (A) | 0.5 | 0.3 | 100m | 30m | 3m | 0.3 | 30u | 3u |

Power Rating: 1 watt per resistor. Metal film resistors.

Voltage Rating: Max 300V.

Zero Residual: Less than 250 m Ω .

Temp Coefficient: Less than 50 ppm per °C.

Connections: 4mm insulated terminal & binding post.

General Specification

Dimensions: 110 x 75 x 200 mm

Weight: 0.6kg

Optional Extras: Carry Case

Calibration Certificates – traceable to N.P.L. and UKAS

Ordering Information

| Code | Description |
|------|--|
| 1040 | Decade Resistance Box |
| 9026 | Carrying Case |
| 9161 | N.P.L. Traceable Calibration Certificate |
| 9114 | UKAS Calibration Certificate |

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



1041 Low Ohm Resistance Box

Time Electronics

Calibration, Test & Measurement

- 0.01Ω to 1kΩ
- 10mΩ resolution
- High stability
- Low temperature coefficient
- Ideal for Platinum Resistance Thermometer simulation



The **1041** is a compact, robust, and accurate decade resistance box designed for applications in both industry and education. With its low resistance ranges the 1041 is particularly suitable for simulation of platinum resistance thermometers.

Switch Contacts

Special attention has been given to the problem of reliability of operation. A special multiple gold contact arrangement ensures low contact resistance and continued operation even if a contact should fail.

1041 Technical Specifications

| 1041 Technical Specifications | | | | | |
|---|---|-----|-----|-------|-------|
| Range: 0.01Ω to 1kΩ in 0.01Ω steps | | | | | |
| Decade (Ω) | 0.01 | 0.1 | 1 | 10 | 100 |
| Acc. % | ± 10 | ± 5 | ± 1 | ± 0.5 | ± 0.1 |
| Zero Residual Resistance: | 60mΩ maximum | | | | |
| Residual Resistance Stability: | less than 3 mΩ | | | | |
| Power Rating: | 1 watt per resistor | | | | |
| Maximum Working Voltage: | 100 volts DC, 70 volts AC (RMS) | | | | |
| Maximum Current: | 1 amp DC, 0.7 amp AC (RMS) | | | | |
| Connection: | 4mm terminals. A third terminal is provided to enable the case to be earthed or connected to either terminal. | | | | |
| Temperature Coefficient: | 100 ppm per °C | | | | |
| General Specification | | | | | |
| Dimensions: | 110 x 75 x 200 mm | | | | |
| Weight: | 0.6kg | | | | |
| Optional Extras: | Carry Case Calibration Certificates – traceable to N.P.L. and UKAS | | | | |
| Ordering Information | | | | | |
| Code | Description | | | | |
| 1041 | Low Ohm Resistance Box | | | | |
| 9026 | Carrying Case | | | | |
| 9161 | N.P.L. Traceable Calibration Certificate | | | | |
| 9114 | UKAS Calibration Certificate | | | | |

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



1049 Class A °C PT100 Simulator

Time Electronics

Calibration, Test & Measurement

- -200°C to + 800°C
- ± 0.3°C accuracy
- Based on ITS 90 EN60751
- 23 set points
- Exceeds Class A
- Good temperature stability
- Passive resistance source



The **1049** is a precision simulator for PT100 0.3850 platinum resistance elements used for accurate temperature measurement.

It follows the PT100 scale from -200°C to +800°C with 23 set points. High performance metal film resistors are used throughout which ensures a good temperature coefficient and long term stability.

The specification is in accordance with DIN EN 60751 (ITS 90). Offering high accuracy across the full operating range of PT100 devices it exceeds the performance of Class A & B. The 1049 will be of particular interest to those operating in the -60 to +60 °C range where a performance exceeding Class A (e.g. better than +/- 0.15 °C at 0 °C), is required.

Since the 1049's output is a purely passive resistance it will operate with all types of PT100 measuring equipment including the live systems using pulsed or interrupted excitation current.

1049 Technical Specifications

| | |
|--------------------------|---|
| Set points °C: | -200, -100, -50, -20, -10, 0, 10, 20, 30, 40, 50, 60, 80, 100, 150, 200, 250, 300, 400, 500, 600, 700, 800. |
| Accuracy: | -200 to -100°C ± 0.3°C -50 to +60°C ± 0.15°C +80 to +200°C ± 0.3°C +250 to +500°C +/- 0.5°C +600 to +800°C +/- 0.65°C |
| Temp Coefficient: | Less than 30 ppm per °C |
| Maximum Current: | 50 mA |

General Specification

| | |
|-------------------------|---|
| Dimensions: | 61 x 112 x 55 mm (2.4 x 5 x 2.2 ") |
| Weight: | 170 gm (6oz) |
| Optional Extras: | Calibration Certificates – traceable to N.P.L. and UKAS |

Ordering Information

| Code | Description |
|------|--|
| 1049 | Handheld PT100 °C Simulator |
| 9161 | N.P.L. Traceable Calibration Certificate |
| 9114 | UKAS Calibration Certificate |

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

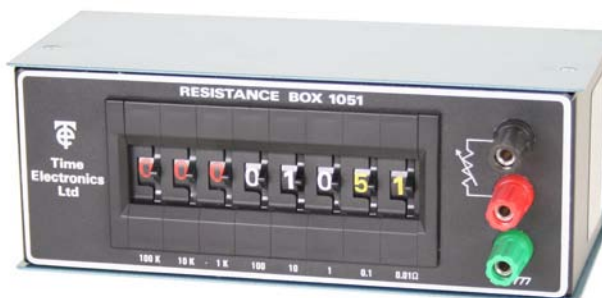


1051 Low Ohm Resistance Box

Time Electronics

Calibration, Test & Measurement

- 0.01 Ω – 1 M Ω
- High accuracy
- Clear visual indication
- High stability
- Low temperature coefficient
- Ideal for Platinum Resistance Thermometer simulation



The 1051 is a wide range low ohm resistance box designed for general laboratory work including platinum resistance thermometry.

Switch Contacts

Special attention has been given to the reliability of operation. A special multiple gold contact arrangement ensures low contact resistance and continued operation even if a contact fails.

To enhance reading the setting, the 1051 has colour coded digits as shown in the above image; Kohms (red), ohms (white), and 0.1 ohms (yellow).

1051 Technical Specifications

| Range: 0.01 Ω to 1M Ω in 0.01 Ω steps | | | | | | | | |
|--|----------------------------------|---------|---------|-----------|-----------|-----------|-----------|-----------|
| Decade (Ω) | 0.01 | 0.1 | 1 | 10 | 100 | 1k | 10k | 100k |
| Acc. % | ± 10 | ± 5 | ± 1 | ± 0.5 | ± 0.1 | ± 0.1 | ± 0.1 | ± 0.1 |
| Max Current (A) | 1 | 1 | 1 | 0.3 | 0.1 | 33m | 10m | 3m |
| Zero Residual Resistance: | Less than 90m Ω | | | | | | | |
| Residual Resistance Stability: | Less than 3 m Ω | | | | | | | |
| Maximum Voltage: | 250V DC | | | | | | | |
| Power Rating: | 1 watt per resistor | | | | | | | |
| Temperature Coefficient: | < 100 ppm per $^{\circ}\text{C}$ | | | | | | | |

General Specification

| | |
|-------------------------|---|
| Dimensions: | 110 x 75 x 200 mm |
| Weight: | 0.6kg |
| Optional Extras: | Carry Case Calibration Certificates – traceable to N.P.L. and UKAS |

Ordering Information

| Code | Description |
|------|--|
| 1051 | Low Ohm Resistance Box |
| 9026 | Carrying Case |
| 9161 | N.P.L. Traceable Calibration Certificate |
| 9114 | UKAS Calibration Certificate |

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



1053 Decade Inductance Box

Time Electronics

Calibration, Test & Measurement

- 1 mH to 10 H
- In-line read-out
- 3% Accuracy
- High stability
- Compact: 25 x 6 x 10 cm
- Fully Screened



The **1053** is a compact, robust and accurate decade inductance box suitable for filter design, experimental, general purpose substitution, and DC to DC converter design.

Inductance is set by four easy-to-read dials that are divided into 4 decades, and provide 1mH, 10mH, 100mH, and 1H steps. The maximum setting is 11.11 H.

Its custom wound, high permeability ferrite cores ensure insignificant influence from external magnetic fields and maximum stability.

The 1053 is housed in a fully screened metal case, finished in two tone blue and black. Connection is by industry standard 4mm terminals and includes a case connection.

1053 Technical Specifications

| | |
|-------------------------------------|--|
| Inductance Range: | 1mH to 10H (4 decades) |
| Accuracy at 1kHz: | 3% of setting |
| End Resistance: | Less than 0.2Ω |
| End Inductance: | Less than 1uH |
| Max current per decade: | 30mA (1mH), 70mA (10mH), 100mA (100mH), 150mA (1H) |
| Average resistance per step: | 0.1Ω (1mH), 0.5Ω (10mH), 3.4Ω (100mH), 20.5Ω (1H) |
| Typical Q Factor at 1kHz: | 75 (1mH), 175 (10mH), 280 (100mH), 250 (1H) |
| Max. Voltage: | 30V AC rms (non switching). Subject to max current rating. |

General Specification

| | |
|-------------------------|---|
| Dimensions: | 245 x 62 x 100 mm |
| Weight: | 0.8kg |
| Optional Extras: | Calibration Certificates – traceable to N.P.L. and UKAS |

Ordering Information

| Code | Description |
|------|--|
| 1053 | Decade Inductance Box |
| 9170 | N.P.L. Traceable Calibration Certificate |
| 9114 | UKAS Calibration Certificate |

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



1061 Low Cost Resistance Box

Time Electronics

Calibration, Test & Measurement

- 1Ω to 1.2MΩ
- In-line read-out
- Stable metal film resistors
- Mechanically and electrically robust
- Fully Screened



The **1061** Decade Resistance Box is designed to meet the standard required in both educational and industrial applications. Metal film resistors, with the advantages of stability and low temperature coefficient, are used throughout. The case provides complete electrostatic screening.

Six large switches with a clear numerical readout make the resistance boxes easy to use in educational establishments or in other applications where robustness is a price consideration. The slim line design uses minimum bench space, while the 1% accuracy and wide range makes it ideal for production or select-on-test uses.

The 1061 is housed in an all-metal case, finished in two-tone blue and black. Three 4 mm terminals are provided for connection, the case being available for screening purposes.

1061 Technical Specifications

| | |
|-----------------------------|---|
| Resistance Range: | 1Ω to 1.2MΩ |
| Number of Decades: | 6 |
| Increment: | 1Ω steps |
| Accuracy: | ± 1% |
| Rating: | All resistors rated 0.75W |
| Terminations: | Resistance – 4 mm red & black Chassis – 4 mm Green |
| Residual Resistance: | Less than 150 mΩ |

General Specification

| | |
|-------------------------|---|
| Dimensions: | 80 x 63 x 355 mm |
| Weight: | 0.75kg |
| Optional Extras: | Calibration Certificates – traceable to N.P.L. and UKAS |

Ordering Information

| Code | Description |
|------|--|
| 1061 | Low Cost Resistance Box |
| 9161 | N.P.L. Traceable Calibration Certificate |
| 9114 | UKAS Calibration Certificate |

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



1065 Precision Power Resistance Box

Time Electronics

Calibration, Test & Measurement

- 0.1Ω to 120kΩ
- 1% Accuracy
- 10W per resistor dissipation
- In-line read-out
- Mechanically and electrically robust
- Fully Screened



The **1065** Power Decade Resistance Box is designed to meet the standard for educational, industrial and research & design applications. Housed in a well ventilated metal case its compact construction makes it easily transportable, and when in use it takes up a minimum of bench space.

Resistance ranges from 0.1Ω to 120kΩ with a 1% accuracy. Each resistor has a power rating of 10W and the maximum working voltage is 500V.

Switch contact resistance has been kept to a minimum by the use of multi-wafer switches, each with four parallel, silver-plated, self-wiping contacts. The six in-line dials give a clear numerical readout of the selected resistance.

1065 Technical Specifications

| | |
|---------------------------------|--|
| Resistance Range: | 0.1Ω to 120 kΩ |
| No. Of Decades: | 6 |
| Increment: | 0.1Ω steps |
| Accuracy: | 0.1Ω decade, ±5% 1Ω –120kΩ decades, ±1% |
| Rating: | Each resistor 10W |
| Temperature Coefficient: | <100 ppm per °C |
| Maximum Voltage: | 500 V AC/DC |
| Residual Resistance: | <20mΩ |

General Specification

| | |
|-------------------------|---|
| Dimensions: | 390 x 60 x 150 mm |
| Weight: | 2kg |
| Optional Extras: | Calibration Certificates – traceable to N.P.L. and UKAS |

Ordering Information

| Code | Description |
|------|--|
| 1065 | Power Resistance Box |
| 9161 | N.P.L. Traceable Calibration Certificate |
| 9114 | UKAS Calibration Certificate |

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



1067 Precision Decade Resistance Box

Time Electronics

Calibration, Test & Measurement

- Precision PT100 Simulation
- 0.01% Accuracy
- 10 milliohms – 12K ohms
- 6 Digit Resolution
- Better than 20ppm/year stability



The **1067** precision decade resistance box is suitable for a wide range of simulation work. It is particularly suitable for simulating and calibrating precision PT100 sensors and temperature indicators/meters that use resistive sensors.

Special care has been taken in the construction of the 1067 to ensure that the residual end resistance is as low and as stable as possible. Multiple self-wiping silver alloy contacts are used for each position to ensure outstanding performance and long life.

Housed in a robust metal case the 1067 is fully screened and low thermal emf terminals are used. The switch dials have clear markings and in an easy to read in-line format. Each decade is scaled from 0 to 11 and therefore allows convenient overlap of the set values. The maximum value settable is 12,222.21 ohms.

1067 Technical Specifications

| | |
|---------------------------|---|
| Resistance range: | 10 milliohms to 12K ohms |
| Number of decades: | 6, each decade settable from 0 – 11 |
| Increments: | 10 milliohms steps |
| Accuracy: | At calibration temperature of 22 °C. +/- 0.01% of setting +/- 2 milliohms, after deduction of residual end resistance +/- 1mR for residual variation. |
| Current rating: | 10mR range: 3A, 100mR range: 2A, 1R range: 600mA 10R range: 200mA, 100R range: 60mA, 1K range: 20mA |
| Residual end res: | Less than 10 milliohms. Less than 1 milliohm variation |
| Temperature coeff: | Less than 10 ppm per °C (> 1 ohm). Less than 20 ppm per °C (< 1 ohm) |
| Maximum voltage: | 200V at maximum resistance setting |
| Insulation: | Case to resistance terminals 2kV / 50Hz max |
| Operating torque: | Less than 0.1 Nm |
| Stability: | Better than 20 ppm per year (>1ohm) Better than 100 ppm per year (<1 ohm) |
| Contacts: | Make before break – Silver alloy |

General Specification

| | |
|-------------------------|---|
| Dimensions: | 87mm x 63mm x 355mm |
| Weight: | 1.1kg |
| Optional Extras: | 19" rack mount case, 2U height Calibration Certificates – traceable to N.P.L. and UKAS |

Ordering Information

| Code | Description |
|------|--|
| 1067 | Precision Decade Resistance Box |
| 9161 | N.P.L. Traceable Calibration Certificate |
| 9114 | UKAS Calibration Certificate |

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



1068 Precision Fixed Resistance Box

Time Electronics

Calibration, Test & Measurement

- **5 Fixed Resistance Ranges**
- **High Accuracy**
- **Clear visual indication**
- **Small, portable**



The **1068** is a portable 5 fixed resistance box, housed in a robust metal case and designed for industrial, laboratory and education requirements.

The high accuracy obtained in the 1068 is achieved by the use of accurate, precision resistors.

To select a value simply connect test leads to one of the fixed value resistors i.e. 1R, 10R, 100R, 1K or 10K.

Connection to the box is via 4mm binding posts.

1068 Technical Specifications

5 Fixed Resistance Ranges: 1R, 10R, 100R, 1K, 10K

Accuracy:
 1R \pm 1mR
 10R \pm 5mR
 100R \pm 10mR
 1K \pm 100mR
 10K \pm 1R

Maximum Operating Voltage: 250v DC

General Specification

Dimensions: 115 x 65 x 86mm (Including terminals)

Weight: 0.29kg

Optional Extras: Calibration Certificates – traceable to N.P.L. and UKAS

Ordering Information

| Code | Description |
|------|--|
| 1068 | Precision Fixed Resistance Box |
| 9164 | N.P.L. Traceable Calibration Certificate |
| 9114 | UKAS Calibration Certificate |

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



1070 Decade Capacitance Box

Time Electronics

Calibration, Test & Measurement

- 100 pF to 10 μ F
- 1% Accuracy
- In-line read-out
- Colour coded digits
- Bi-polar working
- Compact



High accuracy and wide range makes the **1070** a very useful capacitance box for many applications in industry and education.

Connection is by 4mm binding posts and a third terminal to enable the case to be connected to either output or earth. The case is metal construction to provide complete screening and the residual capacitance is approximately 40pF.

1070 Technical Specifications

| RANGE | TYPE | ACCURACY @ 1kHz | MAX VOLTAGE | TEMP COEFF ppm/ $^{\circ}$ C max | POWER FACTOR @ 1kHz | INSULATION RESISTANCE |
|---------------|---------------|-----------------|-----------------|----------------------------------|---------------------|-----------------------|
| 9 x 100pF | Silver mica | 1% \pm 5pF | 300V dc 200V ac | 200 | < 0.0015 | > 50G ohms |
| 9 x 1nF | Silver mica | 1% \pm 5pF | 300V dc 200V ac | 50 | < 0.002 | > 50G ohms |
| 9 x 10nF | Silver mica | 1% | 100V dc 72V ac | 50 | < 0.01 | > 30G ohms |
| 9 x 100nF | Polycarbonate | 1% | 100V dc 72V ac | 75 | < 0.01 | > 30G ohms |
| 9 x 1 μ F | Polycarbonate | 1% | 100V dc 115V ac | 75 | < 0.01 | > 30G ohms |

General Specification

| | |
|-------------------------|---|
| Dimensions: | 110 x 75 x 200 mm |
| Weight: | 0.5kg |
| Optional Extras: | Carry Case Calibration Certificates – traceable to N.P.L. and UKAS |

Ordering Information

| Code | Description |
|------|--|
| 1070 | Decade Capacitance Box |
| 9026 | Carrying Case |
| 9161 | N.P.L. Traceable Calibration Certificate |
| 9114 | UKAS Calibration Certificate |

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



1071 Decade Capacitance Box

Time Electronics

Calibration, Test & Measurement

- 10 pF to 100 μ F
- 1% Accuracy
- In-line read-out
- Colour coded digits
- Bi-polar working
- Compact



High accuracy and wide range makes the **1071** a very useful capacitance box for many applications in industry and education.

Connection is by 4mm binding posts and a third terminal to enable the case to be earthed or connected to either output or earth. The case is metal construction to provide complete screening and the residual capacitance is approximately 55pF.

1071 Technical Specifications

| RANGE | TYPE | ACCURACY @ 1kHz | MAX VOLTAGE | TEMP COEFF ppm/°C max | POWER FACTOR @ 1kHz | INSULATION RESISTANCE |
|----------------|---------------|-----------------|-----------------|-----------------------|---------------------|-----------------------|
| 9 x 10pF | Silver mica | 1% \pm 5pF | 300V dc 200V ac | 200 | < 0.0025 | > 50G ohms |
| 9 x 100pF | Silver mica | 1% \pm 5pF | 300V dc 200V ac | 200 | < 0.0015 | > 50G ohms |
| 9 x 1nF | Silver mica | 1% \pm 5pF | 300V dc 200V ac | 50 | < 0.002 | > 50G ohms |
| 9 x 10nF | Silver mica | 1% | 100V dc 72V ac | 50 | < 0.01 | > 30G ohms |
| 9 x 100nF | Polycarbonate | 1% | 100V dc 72V ac | 75 | < 0.01 | > 30G ohms |
| 9 x 1 μ F | Polycarbonate | 1% | 100V dc 115V ac | 75 | < 0.01 | > 30G ohms |
| 9 x 10 μ F | Polyester | 5% | 63V dc 50V ac | 300 | < 0.01 | > 30G ohms |

General Specification

| | |
|-------------------------|---|
| Dimensions: | 110 x 75 x 200 mm |
| Weight: | 0.6kg |
| Optional Extras: | Carry Case Calibration Certificates – traceable to N.P.L. and UKAS |

Ordering Information

| Code | Description |
|------|--|
| 1071 | Decade Capacitance Box |
| 9026 | Carrying Case |
| 9161 | N.P.L. Traceable Calibration Certificate |
| 9114 | UKAS Calibration Certificate |

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



Programmable Test Instruments

Time Electronics manufacture a comprehensive range of Programmable Instruments that can be controlled via GPIB, RS232, and USB. Each instrument delivers accuracy and reliability in industrial test applications. In addition our PC based EasyCal calibration software is ideal to automate the calibration process, increase speed of calibration and consistency of results. It produces calibration certificates and reports to ISO9001 quality standards.

| | |
|--|----------------|
| 5011 Resistance/Temperature Calibrator | Page 44 |
| 5018 Programmable DC/AC Voltage/Current Calibrator | Page 46 |
| 5033 Programmable Precision DC Power Source - 3 Channel | Page 48 |
| 5075 Precision Digital Multimeter | Page 50 |
| 5077 PowerCal - AC/DC Programmable Power Calibrator | Page 54 |
| 9820 Programmable Resistance Low Ohm | Page 56 |



5011 Resistance / Temperature Calibrator

Time Electronics

Calibration, Test & Measurement

- 1 Ω to 120 M Ω
- RTD Simulation
- Thermocouple Simulation
- DCV & DCI Options
- RS232/GPIB/USB
- Front Panel Operation



EasyCal
Software Compatible

The **5011** is primarily a programmable resistance / RTD source. With the ability to add DC Voltage, Thermocouple Simulation and DC Current the 5011 is truly a versatile temperature calibrator.

High performance resistance of is offered as standard with an accuracy of 0.01% and 1m Ω resolution from 50 Ω to 1k Ω .

Simple front panel operation allows the user to quickly set the function and output required.

Using the jog / shuttle dial deviation the user can finely adjust the output value as a percentage (+/- 9.99%). All this information is shown on a clear, easy to read LED display.

As standard the 5011 uses a SCPI command structure for programming. The 5011 also supports the older 9811/19/20 command set making it an ideal replacement for these models.

The DCV / Thermocouple option provides a DC voltage source (+/- 20V) and simulates thermocouple types K, J, T, R, S, N, E and B.

A DC Current option is also available which sources up to 220mA. This makes the 5011 ideal for accurate process control calibration.

Calibration Made Easy

Connect the 5011 to a PC/Laptop (via RS232, GPIB or USB) installed with Time Electronics EasyCal and automate the calibration process. Increase speed of calibration and consistency of results; produce calibration certificates and reports to ISO 9001 quality standards.

5011 Technical Specifications

Accuracies quoted are for 1 year.

RESISTANCE

| Range | Accuracy | Resolution |
|------------------|----------------|------------|
| 1Ω – 20Ω | 0.01% +/- 5mΩ | 1Ω |
| 20Ω – 99.999Ω | 0.01% +/- 5mΩ | 1mΩ/5mΩ* |
| 100Ω – 999.999Ω | 0.01% +/- 5mΩ | 1mΩ |
| 1kΩ – 9.999kΩ | 0.02% +/- 20mΩ | 1Ω |
| 10kΩ – 99.999kΩ | 0.01% +/- 1Ω | 1Ω |
| 100kΩ – 999.99kΩ | 0.01% +/- 10Ω | 10Ω |
| 1MΩ – 9.9999MΩ | 0.02% +/- 100Ω | 100Ω |
| 10MΩ – 120MΩ | 0.1% +/- 1kΩ | 1kΩ |

Temp Coefficient: less than 50 ppm per °C
Power Rating: 0.1 Watt per resistor
Maximum Voltage: 250 V
Resistance Switch Time: < 250us
Operation Time: < 300ms
End Resistance Variation: < 2.5mΩ

*Output Setting Resolution below 50Ω is 5mΩ

PRT SIMULATION

| RTD Type | Alpha Coeff | Range | Accuracy |
|----------|-------------|----------------|----------|
| Pt100 | 0.003850 | -180 to -100°C | 0.1°C |
| Pt100 | 0.003850 | -100 to 850°C | 0.05°C |

It should be noted that the accuracy of the PRT simulation is determined by the accuracy of the PRT tables (BS EN 60751) published by the British Standards Institute. The 5011 uses precise digital interpretation of the tables to output resistance values that are within the accuracies specified in the table.

THERMOCOUPLE SIMULATION

| Type | Range °C | Acc. °C |
|------|----------------------------|------------|
| J | -210 to 150 / 150 to 1200 | 0.15 / 0.3 |
| K | -270 to 190 / 190 to 1250 | 0.5 / 0.6 |
| T | -200 to 150 / 150 to 400 | 0.4 / 0.5 |
| R | -50 to 800 / 800 to 1750 | 0.8 / 2.0 |
| S | -50 to 850 / 850 to 1750 | 0.9 / 2.0 |
| B | 100 to 1200 / 1200 to 1800 | 1.0 / 2.0 |
| N | -270 to 260 / 260 to 1300 | 0.5 / 0.4 |
| E | -50 to 1000 | 0.3 |

Cold Junction Compensation +/- 0.5°C (applies to ambient changes of less than +/- 1°C at 23 °C)

The accuracy of the thermocouple simulation is determined by the accuracy of the 5011's DC Voltage function and the accuracy of the standard thermocouple tables (BS EN 60584-1) published by the British Standards Institute.

The 5011 uses precise digital interpretation of the tables to output voltage levels that are within the accuracies specified in the table.

DC VOLTAGE

| Range | Accuracy | Resolution |
|-------|---------------|------------|
| 20mV | 100ppm + 4uV | 100nV |
| 200mV | 30ppm + 6uV | 1uV |
| 2V | 25ppm + 20uV | 1uV |
| 20V | 25ppm + 100uV | 10uV |

DC CURRENT (Compliance Voltage: 11V)

| Range | Accuracy | Resolution |
|-------|---------------|------------|
| 220uA | 150ppm + 15nA | 1 nA |
| 2.2mA | 100ppm + 40nA | 10 nA |
| 22mA | 80ppm + 200nA | 10 nA |
| 220mA | 80ppm + 3uA | 100 nA |

General Specification

Power: 110 V to 240 V AC 50/60 Hz. 30 VA
Operating Temperatures: 0-45 °C. 22 °C +/- 3 °C for full specification.
Dimensions: W 430 x D 275 x H 155mm (17x15x6 ins)
Weight: 7 Kg
Optional Extras: DC Voltage and Thermocouple Simulation, DC Current
 N.P.L. or UKAS Calibration Certificates
 Rack Mount Kit

Ordering Information

| Code | Description |
|------|--|
| 5011 | Resistance / Temperature Calibrator |
| 9711 | DC Voltage and Thermocouple Simulation |
| 9718 | DC Current 220mA (Only available if 9711 DC Voltage option fitted) |
| 9724 | Rack Mount Kit |
| 9120 | UKAS Calibration Certificate |
| 9163 | NPL Calibration Certificate |
| 9747 | EasyCal Software |

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



5018 Programmable DC-AC V-I Calibrator

Time Electronics

Calibration, Test & Measurement

- 15 ppm accuracy/0.5ppm resolution
- 1999999 full scale +10% over-range
- 20mV-200mV-2V-20V DC voltage
- Deviation control -9.999% to +9.999%
- GPIB & RS232 Interface
- Ideal for ATE applications



EasyCal
Software Compatible

Better than 15ppm/year Accuracy

The outstanding accuracy and stability of the **5018** is achieved by the use of a patented circuit. It incorporates a dedicated micro-processor to continually monitor the state of a bank of precision voltage references. The basic digital to analogue converter has 22 bit (0.25ppm) resolution. Linearity and temperature coefficient are compensated in software to better than 0.1ppm of full scale per degC. For the DC 2V/20V ranges noise is <1ppm (<1Hz) and short term stability <0.5ppm/day and <2ppm/month. An external 1000:1 screened attenuator is available as an option for very low noise AC output.

Display

Eight bright 7 segment LEDs are used to display the output with a bank of dot matrix LEDs to show units and other information.

GPIB & RS232

These interfaces allow the 5018 to be connected to a PC and controlled by an external program such as Time Electronics' EasyCal calibration software.

EasyCal ATE Control Software

A suite of programs that simplify and speed up automatic control of the 5018. If you have equipment or systems that need testing or setting up against specification, and the results stored and printed, **EasyCal** is the answer.

Automating the process brings important benefits and provides increased speed and consistent results. Test reports are produced easily to ISO 9001 quality standards. EasyCal has the ability to control a wide range of GPIB & RS232 programmable instruments and comprehensive ATE systems can be configured to control a wide variety of applications. It has full read back capability and therefore can perform closed loop testing. Conditional tests can be configured to allow decision making to further enhance the usefulness. See the EasyCal data sheet for more information.

5018 Technical Specifications

Accuracy specifications are shown as ppm (or %) of output + floor and apply for settings between 10% and 100% of range. Specifications apply at an ambient temp of 22°C +/- 3°C after the calibrator has warmed up for at least 1 hour. All values are relative to calibration standards. Full specification details available on request.

DC VOLTAGE (+/- 2uV for thermal emf effects)

Temperature coefficient is better than 0.1ppm of full scale per °C
For the DC 2V and 20V ranges noise is <1ppm (<1Hz), short term stability <0.5ppm/day, and <2ppm/month

| Range | Accuracy ppm/yr | Output Resistance | Max Output Current | Resolution |
|-------|-----------------|-------------------|--------------------|------------|
| 20mV | 100 + 4uV | 10 ohm | - | 100nV |
| 200mV | 30 + 6uV | 10 ohm | - | 1uV |
| 2V | 15 + 20uV | < 0.15 ohm | 20mA | 1uV |
| 20V | 15 + 150uV | < 0.15 ohm | 20mA | 10uV |

CURRENT OPTION 9718

| Range | Accuracy ppm/yr | Compliance Voltage | Resolution |
|-------|-----------------|--------------------|------------|
| 200uA | 150 + 15nA | 11V | 1nA |
| 2mA | 100 + 40nA | 11V | 10nA |
| 20mA | 80 + 200nA | 11V | 10nA |
| 200mA | 80 + 3uA | 11V | 100nA |

AC V OPTION 9719 10Hz - 20kHz Sine 0.01% crystal controlled

| Range RMS | Accuracy % 1yr 10Hz - 1kHz | Accuracy % 1yr 1kHz - 10kHz | Accuracy % 1yr 10kHz - 20kHz | Output Res | Max Output Current | Resolution |
|-----------|-------------------------------|--------------------------------|---------------------------------|------------|--------------------|------------|
| 20mV | 0.05 + 100uV | 0.05 + 150uV | 0.05 + 250uV | 10ohm | - | 1uV |
| 200mV | 0.04 + 100uV | 0.04 + 150uV | 0.04 + 250uV | 10ohm | - | 1uV |
| 2V | 0.03 + 170uV | 0.03 + 250uV | 0.03 + 300uV | <0.15 | 20mA | 10uV |
| 20V | 0.03 + 2.0mV | 0.03 + 3.0mV | 0.03 + 4.0mV | <0.15 | 20mA | 100uV |

AC CURRENT 20Hz - 1kHz (Sine) (available if CURRENT & AC OPTIONS are fitted)

| Range RMS | Accuracy (%)1/yr | Compliance Voltage RMS | Resolution |
|-----------|------------------|------------------------|------------|
| 200uA | 0.07 + 300nA | 8V | 10nA |
| 2mA | 0.05 + 300nA | 8V | 10nA |
| 20mA | 0.05 + 3uA | 8V | 100nA |
| 200mA | 0.05 + 30uA | 8V | 1uA |

HIGH VOLTAGE OPTION 9720

| Range | Accuracy/year | Output Resistance | Max Output Current | Resolution |
|---------|---------------|-------------------|--------------------|------------|
| DC 200V | 30ppm + 6mV | < 5 ohm | 20mA | 100uV |
| DC 1kV | 50ppm + 30mV | < 10 ohm | 10mA | 1mV |

If AC OPTION fitted

| | | | | |
|------------------|--------------|----------|------|------|
| AC 200V 1kHz max | 0.06% + 20mV | <5 ohm | 20mA | 1mV |
| AC 1kV 1kHz max | 0.08% + 90mV | < 10 ohm | 10mA | 10mV |

General Specification

Power: 100V to 250V AC (+/-5%) 50/60Hz, less than 100 W
Dimensions: W 430 x D 275 x H 155 mm (17x15x6 ins). **Weight:** 8.2Kg (18lbs)
With 9720 High Voltage Option fitted: W 430 x D 360 x H 155 mm (17x15x6 ins). **Weight:** 16Kg (36lbs)

Ordering Information

| Code | Description | Code | Description |
|------|-----------------------------------|------|--|
| 5018 | Programmable DC/AC V/I Calibrator | 9142 | NPL Traceable Calibration Certificate |
| 9718 | Current Option | 9747 | EasyCal Software - see separate datasheet |
| 9719 | AC Option | 9743 | PCI to GPIB Interface Card (Fitted in PC to control 5018 via GPIB) |
| 9720 | High Voltage Option | 9794 | USB to GPIB Interface (External unit PC USB for control via GPIB) |
| 9766 | 1000:1 Low Noise Attenuator | 9597 | GPIB Interface Cable (2m length for connection of GPIB to 5018) |
| 9104 | UKAS Calibration Certificate | 9724 | 19" Rack Mount Kit |

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



5033 - 3 Channel High Precision Programmable DC Power Source

Time Electronics

Calibration, Test & Measurement

- 3 Channel Precision Power Source 0 - 20V DC 2A drive capability
- 22-bit voltage settable resolution (0.25ppm)
- 18-bit current read back resolution (4ppm)
- Programmable via GPIB (IEEE488) interface
- SCPI-compatible command language
- 40 watts max per channel
- Front-panel LEDs show status of each channel
- Stability: < 2ppm/24 hours, < 5ppm/month,
< 15ppm/year, at full load
- Noise < 1ppm, Temperature Coefficient < 1ppm/°C uncompensated
- 4 terminal output, Compatible with EasyCal control software



The **5033** provides 3 independent channels of 0 to 20V DC, settable in 10uV steps. A 2A drive capability allows up to 40W per channel to be output. A precision current shunt is incorporated in each channel and allows read-back of the current supplied. The high resolution on the voltage and current make this power source ideal for calorimetry and other applications requiring very accurate control of DC power input. Power can be controlled to better than a few ppm.

The excellent resolutions for the voltage output and current readback are matched by stability performance that allows test runs of 24hrs or more and still maintain precision. The voltage output is stable to better than **2ppm per 24hrs at full load** and the basic temperature coefficient (TC) is better than 1ppm/°C and this can be enhanced to better than **0.1ppm per °C** using software compensation.

Measurement of the current is done very accurately using a precision shunt. Again the ambient and self-heating temperature effects can be compensated in software to give better than 1ppm per °C performance for the current measurement.

Low thermal emf output terminals are used and full 4 terminal operation is provided to compensate for volt drops in connection leads. Software compensation factors are also settable to further reduce the output resistance into the micro ohm region.

Fully automated control and measurement can be achieved by driving the 5033 with Time Electronics' EasyCal calibration software. EasyCal allows full control of the power output by continually monitoring the current and adjusting the voltage to keep the power level constant. It can also monitor, on another channel, temperature differences and log the power difference between channels when a thermal balance is reached.

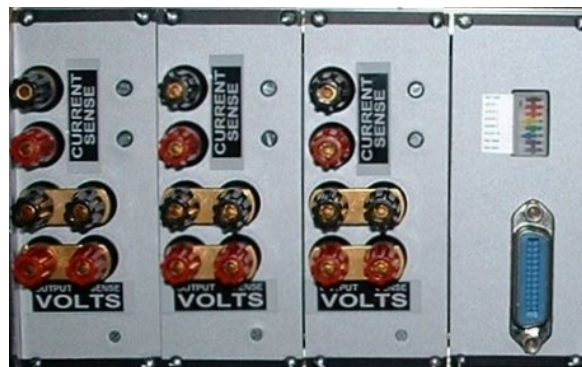
Front panel indicators provide the user with clear indications of data transfer and also show when errors have occurred or invalid commands have been issued. The unit is constructed in a standard 19" Euro case and is suitable for rack or bench use. All connections are at the rear of the unit. For ease of service and repair the whole unit is constructed on standard sized Euro boards and this allows fast plug-in replacement in the event of failure or mal-function.

5033 Technical Specifications

| | |
|---------------------------|--|
| No. of Channels: | 3 - fully floating |
| Output Voltage: | 0 - 20V DC |
| Output Current: | 2A max. Programmable limit, 10mA to 2A in 10mA steps |
| Output Power: | 40W max per channel |
| Output Terminals: | 2 wire or 4 wire. low thermal emf construction |
| Setting Resolution: | 22 bits (0.25ppm) |
| Accuracy: | 20ppm of f.s. |
| Linearity: | < 10ppm of f.s. |
| Output Resistance: | < 1millionhm without software compensation |
| Stability: | < 2ppm/24hrs, < 5ppm/month, < 15ppm/year |
| Noise level: | < 1ppm at 1Hz and lower |
| Temp Coeff: | < 1ppm/°C without software compensation |
| Front Panel display: | For each channel, 'Error', 'Data transfer', 'Power' |
| Fuses: | Mains input power, Channel input power 3 x 3A slow blow |
| Current read-back: | 0.1 ohm internal precision shunt with temp sensor. GPIB readback of current and shunt temperature. |



Channel output indicators



Channel outputs, current sense, and GPIB

General Specification

| | |
|----------------------|--|
| Interface: | GPIB |
| Protocol: | SCPI command language |
| EasyCal: | Fully compatible with Time Electronics' EasyCal software |
| Mains Power: | 115V/230V (+/-5%), 50/60Hz |
| Construction: | 19" 3U Rack mount frame. Standard Euro card modules |
| Dimensions: | 19" (483mm) 12.9" (331mm) 5.25" (134mm) |
| Weight: | 14 Kg (32 lb) |

Ordering Information

| Code | Description |
|------|---|
| 5033 | 3 Channel High Precision Programmable DC Power Source |

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



5075 Precision Digital Multimeter

Time Electronics

Calibration, Test & Measurement

- **7 Digit Resolution**
- **AC/DC Voltage & Current**
- **Resistance**
- **Capacitance & Frequency**
- **18ppm / Year accuracy**



The Time Electronics **5075 Digital Multimeter** makes a major breakthrough in multimeter technology. For the first time has the full range of measurements been provided on a precision DMM.

With speed and precision, the 5075 easily measures from nanovolts to 10kV, from picoamps to 30 Amps, from micro-ohms up to 1GΩ, from picofarads to 300uF, with up to 7½ digit accuracy and a price that is less than many 6½ digit multimeters.

The low level voltage, current and resistance ranges enables the 5075 to make measurements of small signals without using the 6½ or 7½ digit resolution mode, which is often slow, noisy and inaccurate. For example, with the 30mΩ range a 100nΩ resistance can be resolved using the 6½ digit resolution mode.

The Auto Dynamic Filter (ADF) mode allows the 5075 to automatically select the most suitable filter. For a fast changing signal or for when the signal is first connected the reading is displayed almost immediately, but if the input remains constant, the filter time is increased to provide a more stable accurate reading. If the input were disconnected the filter would immediately return to the fastest. No more waiting to find that the input is not connected!

Operation is simple, all major functions from range selection to null require just one key press. The large 24 digit, custom vacuum fluorescent display shows clearly the range and reading and can even show the time to the next sample if required. Other functions can be easily selected from a scrolled menu.

Functions for diode/zener tests, max/min, peak hold and continuity checks are available and also various audible warnings can be selected.

A bar graph function allows the user to program high and low pass/fail limits and switch to the bar display mode. This will give an audible and visual indication to the user of the components specification. Ideal for component selection at goods in!

A low thermal, 10-channel scanner option, allows multiple inputs to be displayed or compared without the additional cost and inconvenience of a separate switching arrangement.

Also available to complement the 5075 Precision DMM is EasyCal software. This will enable the user to automate the calibration of voltage sources, current sources, decade boxes and frequency sources.

5075 Technical Specifications

Accuracy Specifications

Accuracy specified as \pm ppm reading + \pm Floor at default resolution (shown in brackets), relative to calibration standards.
 $T_{CAL} = 20^{\circ}C$

| DC Voltage (All specifications $\pm 0.4\mu V$) | | | | DC Current | | | |
|---|---|-------------------------------|----------------------------|------------|---|-------------------------------|----------------------------|
| RANGE | RESOLUTION Resolution at default In brackets | 90 DAY \pm 5 $^{\circ}C$ | 1 YEAR \pm 5 $^{\circ}C$ | RANGE | RESOLUTION Resolution at default In brackets | 90 DAY \pm 5 $^{\circ}C$ | 1 YEAR \pm 5 $^{\circ}C$ |
| 0 - 3mV | 10nV (10nV) | 22 + 80nV | 30 + 80nV | 0 - 3uA | 10pA (10pA) | 150 + 200pA | 200 + 250pA |
| 0 - 10mV | | | | 0 - 10uA | | | |
| 0 - 30mV | 10nV (100nV) | 22 + 800nV | 30 + 800nV | 0 - 30uA | 100pA (100pA) | 75 + 1nA | 100 + 1nA |
| 0 - 100mV | | | | 0 - 100uA | | | |
| 0 - 300mV | 100nV (1uV) | 22 + 8uV | 30 + 8uV | 0 - 300uA | 100pA (1nA) | 75 + 10nA | 100 + 10nA |
| 0 - 1V | | 12 + 6uV | 18 + 6uV | 0 - 1mA | | | |
| 0 - 3V | 1 μ V (10uV) | 12 + 60uV | 18 + 60uV | 0 - 3mA | 1nA (10nA) | 75 + 100nA | 100 + 100nA |
| 0 - 10V | | | | 0 - 10mA | | | |
| 0 - 30V | 10 μ V (100uV) | 20 + 600uV | 30 + 600uV | 0 - 30mA | 10nA (100nA) | 75 + 1uA | 100 + 1uA |
| 0 - 100V | | | | 0 - 100mA | | | |
| 0 - 300V | 100 μ V (1mV) | 22 + 8mV | 30 + 8mV | 0 - 300mA | 100nA (1uA) | 150 + 10uA | 200 + 10uA |
| 0 - 1kV | | | | 0 - 1A | | | |
| 0 - 3kV | 1mV (10mV) | 250 + 1V | 350 + 1.2V | 0 - 3A | 10uA (10uA) | 500 + 200uA | 750 + 200uA |
| 0 - 10kV | | | | 0 - 10A | | | |
| | | | | 0 - 30A | 100uA(100uA) | 500 + 2mA | 750 + 2mA |

Resistance

Two wire ranges begin at 300m Ω
 Accuracy applies to 2 and 4 wire resistances.

| RANGE | RESOLUTION Resolution at default In brackets | 90 DAY \pm 5 $^{\circ}C$ | 1 YEAR \pm 5 $^{\circ}C$ | RANGE | RESOLUTION Resolution at default In brackets | 90 DAY \pm 5 $^{\circ}C$ | 1 YEAR \pm 5 $^{\circ}C$ |
|-------------------|---|-------------------------------|----------------------------|-------------------|---|-------------------------------|-------------------------------|
| 0 - 30m Ω | 10n Ω (100n Ω) | 70 + 2u Ω | 100 + 2.5u Ω | 0 - .30k Ω | 10m Ω (100m Ω) | 30 + 600m Ω | 45 + 800m Ω |
| 0 - 100m Ω | | | | 0 - 100k Ω | | | |
| 0 - 300m Ω | 100n Ω (1u Ω) | 40 + 10u Ω | 60 + 15u Ω | 0 - 300k Ω | 100m Ω (1 Ω) | 60 + 8 Ω | 90 + 10 Ω |
| 0 - 1 Ω | | | | 0 - 1M Ω | | | |
| 0 - 3 Ω | 1u Ω (10u Ω) | 30 + 80u Ω | 40 + 100u Ω | 0 - 3M Ω | 1 Ω (10 Ω) | 100 + 100 Ω | 150 + 120 Ω |
| 0 - 10 Ω | | | | 0 - 10M Ω | | | |
| 0 - 30 Ω | 10u Ω (100u Ω) | 20 + 600u Ω | 30 + 800u Ω | 0 - 30M Ω | 100 Ω (100 Ω) | 750 + 10k Ω | 1000 + 10k Ω |
| 0 - 100 Ω | | | | 0 - 100M Ω | | | |
| 0 - 300 Ω | 100u Ω (1m Ω) | 20 + 6m Ω | 30 + 8m Ω | 0 - 300M Ω | 10k Ω (10k Ω) | 0.5% + 1M Ω | 0.75% + 1M Ω |
| 0 - 1k Ω | | | | 0 - 1G Ω | | | |
| 0 - 3k Ω | 1m Ω (10m Ω) | 20 + 60m Ω | 30 + 80m Ω | | | | |
| 0 - 10k Ω | | | | | | | |

| AC Voltage (All AC Voltages $\pm 50\mu\text{V}$) | | | | AC Current (All AC Current $\pm 50\text{nA}$) | | | |
|---|------------------------|------------------------------|------------------------------|---|-------------------------|------------------------------|------------------------------|
| RANGE | RESOLUTION * | 90 DAY $\pm 5^\circ\text{C}$ | 1 YEAR $\pm 5^\circ\text{C}$ | RANGE | RESOLUTION * | 90 DAY $\pm 5^\circ\text{C}$ | 1 YEAR $\pm 5^\circ\text{C}$ |
| 0 - 30mV | 1 μV | 0.05% + 4 μV | 0.06% + 4 μV | 0-30 μA | 1nA | 0.1% + 8nA | 0.2% + 10nA |
| 0 - 300mV | 10 μV | 0.05% + 40 μV | 0.06% + 40 μV | 0-300 μA | 10nA | 0.1% + 80nA | 0.2% + 100nA |
| 0 - 3V | 100 μV | 0.05% + 400 μV | 0.06% + 400 μV | 0-3mA | 100nA | 0.1% + 800nA | 0.2% + 1 μA |
| 0 - 30V | 1mV | 0.05% + 4mV | 0.06% + 4mV | 0-30mA | 1 μA | 0.1% + 8 μA | 0.2% + 10 μA |
| 0 - 300V | 10mV | 0.15% + 0.1V | 0.2% + 0.12V | 0-300ma | 10 μA | 0.1% + 80 μA | 0.2% + 100 μA |
| 0 - 3kV | 100mV | 0.15% + 1V | 0.2% + 1.2V | 0-3A | 100 μA | 0.15% + 1mA | 0.2% + 1mA |
| | | | | 0-30A | 1mA | 0.15% + 10mA | 0.2% + 10mA |
| Voltage AC + DC / Current AC + DC Total measurement error will not exceed the sum of the separate AC + DC accuracy spec, plus one display digit. | | | | | | | |
| PRT (PT100) Temperature | | | | Capacitance (All Capacitances $\pm 1\text{pF}$) | | | |
| RANGE | RESOLUTION | 90 DAY $\pm 5^\circ\text{C}$ | 1 YEAR $\pm 5^\circ\text{C}$ | RANGE | RESOLUTION (5 Digit) | 90 DAY $\pm 5^\circ\text{C}$ | 1 YEAR $\pm 5^\circ\text{C}$ |
| -200 $^\circ\text{C}$ to +600 $^\circ\text{C}$ | 0.001 $^\circ\text{C}$ | 0.05 $^\circ\text{C}$ | 0.06 $^\circ\text{C}$ | 0-30nF | 1pF | 0.2% + 20pF | 0.25% + 20pF |
| NOTES: Only available in four terminal mode on the 300 Ω range. Frequency Frequency may be measured on either voltage or current inputs if the AC option has been fitted. | | | | 0-300nF | 10pF | 0.2% + 200pF | 0.25% + 200pF |
| | | | | 0-3 μF | 100pF | 0.2% + 2nF | 0.25% + 2nF |
| | | | | 0-30 μF | 1nF | 0.2% + 20nF | 0.25% + 20nF |
| | | | | 0-300 μF | 10nF | 0.2% + 200nF | 0.25% + 200nF |
| FREQUENCY RANGE | RESOLUTION | 90 DAY $\pm 5^\circ\text{C}$ | 1 YEAR $\pm 5^\circ\text{C}$ | | | | |
| 0-100kHz | 1Hz | 10 + 1 | 12 + 1 | | | | |
| Accuracy stated as 90 day and 1 year specification for all ranges $\pm 5^\circ\text{C}$ in 6 digit mode for DC and 6 digit mode for AC. | | | | | | | |
| Operation Specification N Digits Changes the reading resolution, which can be changed from 4 up to 7 digits, (depending on the scale selected). Null Null facility is available on all D.C. ranges, Ohms and Capacitance. Null is not available on A.C. or frequency. When this key is pressed, the DMM will accept the measured present value as the zero value for the range selected. If auto-range is on, the unit will null each range. This is useful for cancelling an offset voltage or for zeroing the value of the test leads on resistance. | | | | Auto Ranging Auto-range (AUTO) will select the optimum range for the measurement. This will introduce very little delay for the operator. The indicator above the keypad will show when the D.M.M is in auto-range mode. Filter The filter alters the integration time of the reading. Filter times are 150ms, 250ms, 500ms, 1s, 2s, 4s, 8s, 16s, 32s and off. Internal Temperature Internal Temperature controlled at 35 $^\circ\text{C}$ \pm 2 $^\circ\text{C}$ with an ambient temperature of 20 - 28 $^\circ\text{C}$ | | | |

| | |
|--|--|
| <p>Ohms Compensation Cancels the effects of any offset voltages by first measuring the input voltage with the current source on and the measuring the voltage with the current source off. The induced voltage is the difference between the two voltages, thus giving a more accurate reading.</p> <p>Can be used in 2 and 4 wire mode for measurements up to 100KΩ. Ohms compensation doesn't work on ranges above 100 KΩ.</p> <p>Diode / Zener Diode Test The diode test function will pass a current of 1mA through the diode under test and displays the diode forward voltage. May be used for zener diodes up to 10V</p> <p>Self Test Reset The instrument can perform a self-test of all its digital circuits including the IEEE and RAM.</p> <p>Max – Min This function displays the maximum and minimum readings of the input. By using the up and down keys the Maximum, Minimum or Present value input may be displayed.</p> <p>Peak Hold This function will display the peak value measured. By using the up and down keys the Peak value or Present input may be displayed.</p> <p>Component Test Used for component selection. If a component to be tested must fall between a high and low value, component test can be used to make the selection process quicker. It provides a visual display which moves a pointer between the high and low values input, and also indicates whether the component is higher or lower in value than the high and low points if it doesn't fall between them.</p> <p>PRT Temp PT100 elements can be measured and displayed in °C using this function.</p> <p>Dual Display Display Voltage and frequency of the input or the current and frequency (if the AC module has been installed), for A.C. inputs.</p> <p>Analogue Filter The analogue filter can be switched into the input circuit to remove any high frequency noise that may be present on the input.</p> | <p>Auto dynamic filter The Auto Dynamic filter automatically selects the most appropriate filter period. The auto dynamic filter will increase or decrease the filter period (up to the maximum set using the filter key) depending upon the stability of the input signal.</p> <p>Continuity / Sample beep Continuity tests can be performed by selecting this option when in resistance mode. Any value below 30% of the full range will produce the continuity beep. Sample beep alerts the operator to a new reading being displayed.</p> <p>Internal Date / Time The Date and Time can be displayed or entered using this option.</p> <p>Internal Temp The internal temperature of the 5075 can be displayed and is updated approximately every 5 minutes. The internal temperature is used to perform an internal calibration when the temperature varies by 1°C, thus insuring the temperature co-efficient of the unit remains negligible.</p> <p>Remote control This instrument implements the requirements of the IEEE - 488/1978 standard. The IEEE - 488 interface, sometimes called GPIB (General Purpose Interface Bus) or the HPIB (Hewlett Packard Interface Bus) allows remote control of the instrument by a suitable computer or controller. Repetitive calibration work can be speedily and accurately carried out, giving printed results if required. The main limitations of the IEEE are :- 1) A maximum of 15 devices on the bus. 2) The maximum bus length should not be greater than 20m or number of devices x 2, whichever is the shorter.</p> <p>Scanner (option) The scanner option for the 5075 DMM consists of an internally fitted relay board. This board provides 10 input channels. Up to two boards may be fitted giving up to 20 channels. The relays switch all 4 input terminals: V+, V-, I+, I- to one of 10/20 inputs via the 25 way 'D' connectors. The scanner card may be used for voltage, current, resistance, capacitance, frequency, and PT 100.</p> <p>Scanner Specifications Maximum voltage : 200V DC / 150V AC Maximum current : 1A DC / 1A AC Thermal EMF : Less than 2uV per contact Contact resistance : Less than 150mΩ Operating life : Up to 200 million operations Operating time : 20ms</p> |
|--|--|

5075 General Specification

| | |
|-------------------------------|---|
| Power: | 110/220/240V A.C. – 50/60Hz |
| Dimensions (in mm): | 423w x 89h x 393d (415w inc. terminals, 108h inc feet) |
| Weight: | 8.5 Kg |
| Operating Temperature: | 0 – 50°C |
| Optional Extras: | Low Thermal 10 Channel Scanner 19" Rack Mount Kit Calibration Certificates – traceable to N.P.L. and UKAS |

Ordering Information

| Code | Description |
|------|--|
| 5075 | 7 Digit Precision Digital Multimeter |
| 9726 | Low Thermal 10 Channel Scanner |
| 9728 | 19" Rack Mount Kit |
| 9162 | N.P.L. Traceable Calibration Certificate |
| 9130 | UKAS Calibration Certificate |

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



5077 Power Calibrator

Time Electronics

Calibration, Test & Measurement

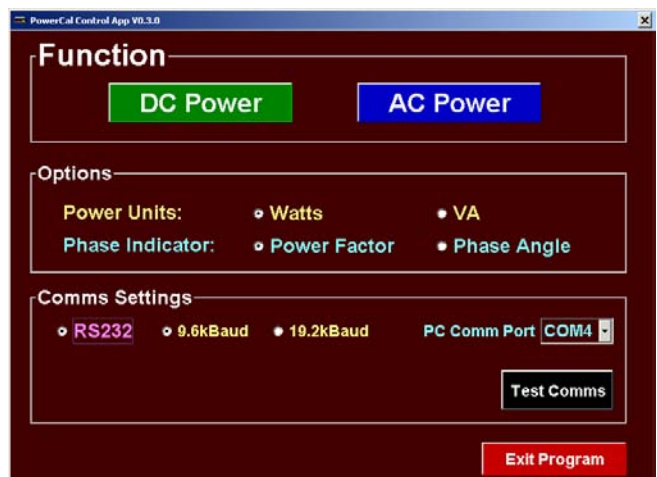
- Up to 20kW
- Up to 1050V AC/DC
- Up to 22A AC/DC
- +90.0 deg to -90.0 deg
- 0.00 to 1.00 Lead/Lag
- 45 to 400 Hz in 0.1Hz steps
- RS232 / GPIB / USB Interface
- 100A AC current transformer option



The **5077** is controlled remotely from a standard PC via the RS232 (or USB) interface, or directly from Time Electronics' 5051 Calibration System.

A user-friendly virtual front panel allows the four parameters to be set individually. Frequency can be set in 0.1Hz steps from 45 to 400Hz, and phase in 0.1-degree steps. Alternatively power factor (PF) can be set in 0.01 steps.

The output can be displayed as VA or Watts.



5077 Technical Specifications

Accuracy specifications are shown as ppm or % of output + floor. They apply for settings of between 10% to 100% of range full scale. Specifications apply at any ambient temp of 22°C +/- 3°C after the calibrator has warmed up for at least 2 hours. All values are relative to calibration standards. Full specification details available on request.

DC VOLTAGE

| Range | Accuracy %/yr | Output Resistance | Max Output Current | Resolution |
|-------|---------------|-------------------|--------------------|------------|
| *2V | 0.01 + 500uV | < 0.5 ohm | 20mA | 1uV |
| *20V | 0.01 + 500uV | < 0.5 ohm | 20mA | 10uV |
| 300V | 0.02 + 30mV | < 5 ohm | 20mA | 100uV |
| 1kV | 0.05 + 50mV | < 10 ohm | 10mA | 1mV |

*Accuracy is specified at minimum current output.

DC CURRENT

| Range | Accuracy %/yr | Compliance Voltage | Resolution |
|-------|---------------|--------------------|------------|
| 2A | 0.03 + 500uA | 5V | 100uA |
| 20A | 0.05 + 6mA | 4V | 1mA |

AC VOLTAGE (45Hz to 400Hz 0.02% Accuracy)

| Range | Accuracy %/yr | Output Resistance | Max Output Current | Resolution |
|--------|---------------|-------------------|--------------------|------------|
| *2V | 0.03% + 500uV | < 0.5 ohm | 20mA | 100uV |
| *20V | 0.03% + 2mV | < 1 ohm | 20mA | 1mV |
| **300V | 0.06% + 30mV | < 5 ohm | 20mA | 10mV |
| **1kV | 0.08% + 90mV | < 10 ohm | 10mA | 100mV |

*Accuracy is specified at minimum current output.

**Accuracy is specified at 100Hz for current outputs less than 5A

AC CURRENT (45Hz to 400Hz 0.02% Accuracy)

| Range | Accuracy %/yr | Compliance Voltage | Resolution |
|-------|---------------|--------------------|------------|
| 2A | 0.1% + 2mA | 3.5V | 100uA |
| 20A | 0.1% + 20mA | 3V | 1mA |

PHASE ANGLE (Applies to outputs above 22 Volts)

| Frequency | Range | Accuracy %/yr | Resolution |
|----------------|--------------------|---------------|------------|
| 45 to 99Hz | -90.0 to +90.0 deg | 0.3 deg | 0.1 deg |
| 100Hz to 400Hz | -90.0 to +90.0 deg | 1 deg | 0.1 deg |

POWER FACTOR

| Frequency | Range | Resolution |
|-------------|--------------|------------|
| 45 to 400Hz | 0.00 to 1.00 | 0.01 |

The accuracy of the power is complex and is determined by using a formula, which combines the errors due to Voltage, Current, and Phase.
 $\text{Power Acc (\%)} = \text{SqrRt} (\text{Vacc}^2 + \text{Iacc}^2 + \text{Phase Correction}^2)$
 Where Phase Correction (%) = $100 \times (1 - \text{Cos}(\text{Phase} + \text{PhaseAcc}) / \text{Cos}(\text{Phase}))$

General Specification

Power: 100 - 230V AC 50/60 Hz
Dimensions: W 440mm x H 198mm x D 580mm (17.6" x 7.8" x 32.8")
Weight: 25kg
Optional Extras: 100 Amp AC Current Transformer
 Test Lead Set

Ordering Information

| Code | Description |
|------|--|
| 5077 | PowerCal - AC/DC Programmable Power Calibrator |
| 9790 | 100 Amp AC Current Transformer Option |
| 9735 | Test Lead Set |
| 9160 | N.P.L. Traceable Calibration Certificate |
| 9124 | UKAS Calibration Certificate |

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



9820 Programmable Low Ohm Resistance

Time Electronics

Calibration, Test & Measurement

- **0.1 ohm to 100K ohm**
- **0.01% Basic Accuracy**
- **Platinum Resistance Thermometer Simulation**
- **GPIB/SERIAL interface**



The **9820** has been designed for applications where programmable low value resistance is required, e.g. platinum resistance thermometry.

Each decade is brought out on separate terminals allowing the resistance to be separated into decades and can be used independently if required and precision ratio dividers set up.

The full local control is particularly useful at system design stage and for checking and troubleshooting.

Construction is standard 19" 3U Euro-frame with plug-in modules which allow easy access and improved servicing/maintenance. The unit can be rack mounted or housed in a free standing case.

Programming

The resistance value is set by sending up to 6 numeric digits via the remote interface, either GPIB or RS232 Serial. The least significant digit sets the lowest decade and the most significant digit sets the highest decade. Less than 6 digits can be sent if it is not required to set all decades.

The unit can be sent into local control mode via the remote interface. The setting of the front panel digits switches can then be read back over the bus. The Group Execute Trigger Command (GET) is also supported.

9820 Technical Specifications

RESISTANCE SPECIFICATION

| | | |
|--------------------------|--|---------|
| Resistance Range: | 0.1 ohm to 100K ohm | |
| Resistance Output | Output is on 6 pairs of rear panel 4 mm terminals which divide the resistance into 6 independent decades | |
| Accuracy: | 0.1 ohm | ± 5% |
| | 1 ohm | ± 0.5% |
| | 10 ohm | ±0.05% |
| | 100 ohm | ± 0.01% |
| | 1K ohm | ± 0.01% |
| | 10K ohms | ± 0.01% |

General Specification

| | | | |
|-----------------------------|---|-------------------------------|---|
| Residual Resistance: | < 10 milliohm / decade | Relay Contacts: | Special attention has been given to the problem of reliability. Double pole gold contacts have been used. |
| Temp. Coefficient: | less than 50 ppm/°C | Remote Interface: | GPIB (IEEE488) or RS232 |
| Power Rating: | 1 watt max per decade | Device Address: | Rear panel switch 0 – 31 |
| Maximum Current: | 1 Amp (1 watt max) | Bus Connection: | Standard 24 pin GPIB connector and standard serial 9 pin DIN. |
| Maximum Voltage: | 100 Volts | Power: | 110V/120V/220V/240V AC 50/60 Hz |
| Operation Time: | 50 ms | Operating Temperature: | 0 – 40 °C |
| Operating Life: | 30 million operations | | |
| Thermal Emfs: | <2uV. The internally generated emfs have been kept to a minimum using special techniques. | | |
| Dimensions: | 480 x 374 x 154 mm Rack Mount Version 520 x 170 x 315 mm Bench Version | | |
| Weight: | 6 kg Rack Mount Version 11 kg Bench Version | | |
| Optional Extras: | Bench Case N.P.L. Traceable Calibration Certificate UKAS Calibration Certificate | | |

Ordering Information

| Code | Description |
|------|--|
| 9820 | Low Ohm Resistance 0.1 ohm to 100K ohm |
| 9047 | Bench Case |
| 9163 | N.P.L. Traceable Calibration Certificate |
| 9120 | UKAS Calibration Certificate |

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



Multifunction Calibrators

Time Electronics' range of multifunction calibrators have the ability to calibrate both new and traditional equipment. Each calibrator encompasses a wide range of capabilities to cover multiple functions. In addition our PC based EasyCal calibration software is ideal to automate the calibration process, increase speed of calibration and consistency of results. It produces calibration certificates and reports to ISO9001 quality standards.

| | |
|--|----------------|
| 5025 Multifunction Calibrator | Page 59 |
| 5041 Scope & Timer / Counter Calibrator | Page 67 |
| 5051 Multifunction Calibration System | Page 69 |
| 9780 Clamp Meter Adaptor | Page 79 |
| 9773 Optical Tacho Adaptor | Page 81 |
| 7042 Remote Pressure Module | Page 82 |
| 9840 Series Power Calibrators | Page 83 |



5025 Multi Function Calibrator

Time Electronics

Calibration, Test & Measurement

- 0 - 1050 V AC/DC voltage
- 0 - 22 A AC/DC current
- 0 - 1GΩ resistance
- Thermocouple simulation
- Digital Frequency
- Oscilloscope Calibration
- PT100 simulation
- Capacitance & Inductance
- Power Calibration
- Clamp Meter Calibration
- GPIB, RS232 & USB Interface
- Calibrate up to 4.5 digit DMM's



Multi Instrument Calibration

A calibrator with a wide range of capabilities to cover multiple functions is a modern day necessity. The 5025 is the ultimate multi-product calibrator, designed for both traditional and new measurement equipment.

The 5025 can calibrate, bench and handheld multi-meters, frequency meters, ohm meters, ac/dc millivoltmeters, thermocouple indicators, clamp meters, temperature indicators, timer counters, oscilloscopes and many other measurement devices.

Simple Operation

Functions and ranges are easily accessed from the front panel. Increase and decrease keys per digit, are used to quickly set the output value. Deviation control then enables the user to finely adjust the output value as a percentage (+/-9.999%). All this information is shown on a clear, easy to read LED display.

Flexible Options

The 5025 can be equipped to specific requirements. The standard unit is fitted with AC/DC voltage to 1050kV, AC/DC current to 22A, digital frequency to 10MHz, decade resistance to 1G ohms, conductance and thermocouple simulation.

Individual options include; capacitance and inductance, full range resistance (incorporating PT100 simulation), and oscilloscope calibration. These options can be specified at time of order or fitted at a later date by an authorised service agent.

In addition external adaptors are available for clamp meter calibration (up to 1000A), optical tachometer calibration and low noise attenuation.

Calibration Made Easy

Connect the 5025 to a PC/Laptop (via RS233, GPIB or USB) installed with Time Electronics EasyCal and automate the calibration process. Increase speed of calibration and consistency of results, produce calibration certificates and reports to ISO 9001 quality standards.

5025 Technical Specifications

| | | |
|--------------------------------|--------------------------------------|--|
| Voltage DC | Range: Best 1 Year Specification: | 0 to \pm 1050V \pm 15ppm of setting |
| Current DC | Range: Best 1 Year Specification: | 0 to \pm 22A. 1100A with Clamp Meter Adaptor \pm 80ppm of setting |
| Voltage AC | Range: Best 1 Year Specification: | 1mV to 1050V (10Hz to 20kHz, Sine-wave) \pm 300ppm of setting |
| Current AC | Range: Best 1 Year Specification: | 10uA to 22A (20Hz to 1kHz, Sine-wave) 100A AC with CT. 1100A with Clamp Meter Adaptor \pm 0.05% of setting |
| Resistance | Range: Best 1 Year Specification: | 0 to 1G ohms (Fixed Values, decade steps) \pm 20ppm of setting |
| Conductance | Range: Best 1 Year Specification: | 1 S to 1n S (Fixed Values, decade steps) \pm 20ppm of setting |
| Thermocouple Simulation | Range: Best 1 Year Specification: | -270 to 1800°C (Type J,K,R,T,S,B,E,N) \pm 0.3 °C |
| 10MHz Digital Frequency/Period | Range: Best 1 Year Specification: | 0.1Hz to 10MHz / 100nS to 10S \pm 20ppm of setting |

Options

| | | |
|-------------------------------|---|--|
| Hi Frequency AC V | Range/Max Freq: Best 1 Year Specification: | 20 to 200mV/300kHz. 0.2 to 2V/1MHz. 2 to 20V/100kHz 0.05% + 0.1mV |
| Capacitance | Values: Best 1 Year Specification: | 1nF, 10nF, 100nF, 1uF, 10uF & 100uF (100V Max) \pm 0.25% |
| Inductance | Values: Best 1 Year Specification: | 1, 1.9, 5, 10, 19, 50, 100, 190, 500mH - 1H & 10H \pm 0.1% |
| Full Range Resistance | Range: Best 1 Year Specification: | 1 ohm to 120M ohms (Variable) \pm 0.01% of setting |
| PT100 | Range: Best 1 Year Specification: | -200 to 850°C \pm 0.1°C |
| Power Calibration | Range: Best 1 Year Specification: | 22A, 1050V. Phase \pm 90° 100A AC with CT. 1100A with Clamp Meter Adaptor ACV: 0.03%, DCV: 0.01%. ACI: 0.1%, ACV: 0.03% Phase: 0.3° |
| Oscilloscope Frequency/Period | Range: Best 1 Year Specification: | 0.1Hz to 100MHz / 100ns to 10s \pm 0.1ppm of setting |
| Oscilloscope Duty Cycle | Values: | 3 frequencies, 100Hz, 1kHz, 10kHz. Settable from 0 to 100% |
| Oscilloscope Amplitude | Range: Best 1 Year Specification: | 0mV to 200V & 0mV to 2V 50 ohms (Square-wave) \pm 0.05% |
| Oscilloscope Fast-Rise | Values: | < 300ps. Bandwidth Checking up to 600 MHz |
| 2.2 GHz Sweep | Range: Best 1 Year Specification: | 10MHz - 2.2GHz levelled sine-wave (0.5, 1, 1.5V pk-pk). Amplitude \pm 1%, Frequency \pm 20ppm. |

General Specification

| | |
|-----------------------|--|
| Warm up | 1 Hour to full accuracy |
| Settling Time | Less than 5 seconds |
| Standard Interfaces | GPIB (IEEE-488), RS-232, USB |
| Operation Environment | Temperature: Operating: 15 - 25 °C, Full Spec: 22 °C +/- 3°C, Storage: -10 °C to 50 °C Humidity: Operating < 80% non condensing. Altitude 0 - 3km. Non Operating 3Km - 12km |
| Line Power | 100 - 230V AC 50/60 Hz. Power Consumption 200W max |
| Dimensions | W 430mm, D 480mm, H 155mm, (17x18x6") 16.5Kg (36.4lbs) |

Ordering Information

| Code | Description | Code | Description |
|------|--|------|---------------------------------------|
| 9798 | Capacitance and Inductance | 9771 | High Frequency AC Voltage |
| 9787 | Simulated Resistance (10 ohm - 40 Mohm) | 9747 | EasyCal Software |
| 9774 | Full Range Resistance (1 ohm - 120 Mohm) | 9743 | PCI GPIB Interface Card |
| 9770 | Oscilloscope Calibration | 9794 | USB to GPIB Interface |
| 9761 | 2.2 GHz Sweep | 9765 | USB Interface |
| 9790 | 100A Current Option | 9597 | GPIB Interface Cable |
| 9780 | Clamp Meter Adaptor 1 and 50 Turns | 9728 | 19" Rack Mount Kit |
| 9773 | Optical Tachometer Calibration Adaptor | 9796 | Test Lead Set |
| 9767 | External Low Noise Attenuator 100:1 | 9159 | NPL Traceable Calibration Certificate |
| 9766 | External Low Noise Attenuator 1000:1 | 9103 | UKAS Calibration Certificate |
| 9797 | Power Calibration (0-20KW AC and DC) | 9085 | Carry Case |

Full specifications are available on request. Due to continuous development Time Electronics reserves the right to change specifications without prior notice.

SPECIFICATIONS DETAILS

1. Accuracies are shown as ppm or % of output + floor.
2. Specifications apply for settings between 10% and 100% of range.
3. Specifications apply at ambient temp of 22°C +/- 3°C
4. For temperatures outside the above range apply 0.2 x specification per °C
5. Calibrator warm up time at least 1 hour.
6. All values are relative to calibration standards.
7. Accuracies quoted are for 1 year.

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

| DC VOLTAGE | | | | |
|--------------------|---------------------|--------------------------|---------------------------|-------------------|
| Range | Accuracy ppm | Output Resistance | Max Output Current | Resolution |
| 20mV ¹ | 100 + 4uV | 10 Ω | - | 100nV |
| 200mV ¹ | 30 + 6uV | 10 Ω | - | 1uV |
| 2V ¹ | 15 + 20uV | < 0.1 Ω | 20mA | 1uV |
| 20V ¹ | 15 + 150uV | < 0.1 Ω | 20mA | 10uV |
| 200V ¹ | 30 + 6mV | < 5 Ω | 20mA | 1mV |
| 1050V | 50 + 30mV | < 10 Ω | 10mA | 1mV |

1. Over-Range 10%.

| AC VOLTAGE (sine-wave). | | | | | |
|--|-------------------------------|-------------------|--------------------------|---------------------------|-------------------|
| (* 9771 AC Hi Frequency Option Required) | | | | | |
| Range RMS | Frequency ² | Accuracy % | Output Resistance | Max Output Current | Resolution |
| 20mV ¹ | 10Hz-45Hz | 0.05 + 250uV | 10 Ω ³ | | 1uV |
| | 45Hz-1kHz | 0.05 + 100uV | 10 Ω ³ | | |
| | 1kHz-10kHz | 0.05 + 150uV | 10 Ω ³ | | |
| | 10kHz-20kHz | 0.05 + 250uV | 10 Ω ³ | | |
| | * 20kHz-100kHz | 0.05% + 0.1mV | 50 Ω | | |
| * 100kHz-300kHz | 0.1% + 0.5mV | 50 Ω | | | |
| 200mV ¹ | 10Hz-45Hz | 0.05 + 250uV | 10 Ω | | 1uV |
| | 45Hz-1kHz | 0.04 + 100uV | 10 Ω | | |
| | 1kHz-10kHz | 0.04 + 150uV | 10 Ω | | |
| | 10kHz-20kHz | 0.05 + 250uV | 10 Ω | | |
| | * 20kHz-100kHz | 0.1% + 0.5mV | 50 Ω | | |
| * 100kHz-300kHz | 0.1% + 1mV | 50 Ω | | | |
| 2V ¹ | 10Hz-45Hz | 0.08 + 500uV | < 0.1 Ω | 20mA | 10uV |
| | 45Hz-1kHz | 0.03 + 170uV | < 0.1 Ω | | |
| | 1kHz-10kHz | 0.03 + 250uV | < 0.1 Ω | | |
| | 10kHz-20kHz | 0.08 + 500uV | < 0.1 Ω | | |
| | * 20kHz-100kHz | 0.05% + 1mV | < 0.5 Ω | | |
| * 100kHz-300kHz | 0.1% + 5mV | < 0.5 Ω | | | |
| * 300kHz-1MHz | 1% + 10mV | < 0.5 Ω | | | |
| 20V ¹ | 10Hz-45Hz | 0.08 + 4mV | < 5 Ω | 20mA | 100uV |
| | 45Hz-1kHz | 0.03 + 2mV | < 5 Ω | | |
| | 1kHz-10kHz | 0.03 + 3mV | < 5 Ω | | |
| | 10kHz-20kHz | 0.08 + 4mV | < 5 Ω | | |
| | * 20kHz-100kHz | 0.1% + 10mV | | | |
| 200V ¹ | 40Hz-1kHz | 0.06 + 20mV | < 5Ω | 20mA | 1mV |
| 1050V | 40Hz-1kHz | 0.08 + 90mV | < 10 Ω | 10mA | 10mV |

1. Over-Range 10%

2. The frequency accuracy for AC ranges is 0.01% and is crystal controlled. The setting resolution is 1Hz.

3. The output resistance on the 20mV and 200mV ranges is 10 ohms. This must be taken into account when loads of 100K ohms or less are being driven. A 100K load will result in a 0.01% error.

All AC outputs exclude the DC component. Less than 0.1% THD.

It is recommended that for very high accuracy low level AC calibration a precision attenuator with known characteristics is used. This can be driven from the 5025's 2V or 20V ranges and with proper screening of the attenuator the signal to noise ratio of the resulting output can be improved significantly. A 1000:1 screened precision attenuator is available from Time Electronics.

| DC CURRENT | | | |
|--------------------|--------------|--------------------|------------|
| Range | Accuracy ppm | Compliance Voltage | Resolution |
| 200uA ¹ | 150 + 15nA | 11V | 1 nA |
| 2mA ¹ | 100 + 40nA | 11V | 10 nA |
| 20mA ¹ | 80 + 200nA | 11V | 10 nA |
| 200mA ¹ | 80 + 3uA | 11V | 100 nA |
| 2A ¹ | 250 + 40uA | 5V | 1 uA |
| 20A ¹ | 600 + 2mA | 4V | 10 uA |

1. Over-Range 10%.

| AC CURRENT (sine-wave) | | | | |
|------------------------|--------------|--------------|------------------------|------------|
| Range | Frequency | Accuracy % | Compliance Voltage rms | Resolution |
| 200uA ¹ | 20Hz – 1kHz | 0.07 + 300nA | 8V | 10nA |
| 2mA ¹ | 20Hz – 1kHz | 0.05 + 300nA | 8V | 10nA |
| 20mA ¹ | 20Hz – 1kHz | 0.05 + 3uA | 8V | 100nA |
| 200mA ¹ | 20Hz – 1kHz | 0.05 + 30uA | 8V | 1uA |
| 2A ¹ | 20Hz – 500Hz | 0.1 + 0.5mA | 3.5V | 10uA |
| 20A ¹ | 20Hz – 500Hz | 0.2 + 5mA | 3V | 100uA |

1. Over-Range 10%.

| THERMOCOUPLE SIMULATION | | |
|-------------------------|----------------------|-------------|
| Thermocouple Type | Temperature Range °C | Accuracy °C |
| J | -210 to -50 | 0.3 |
| | -50 to 1200 | 0.18 |
| K | -200 to -150 | 0.3 |
| | -150 to 1250 | 0.2 |
| T | -200 to -150 | 0.4 |
| | -150 to 0 | 0.3 |
| | 0 to 400 | 0.2 |
| R | -50 to 50 | 1.5 |
| | 50 to 250 | 0.8 |
| | 250 to 1750 | 0.6 |
| S | -50 to 300 | 1.5 |
| | 300 to 1750 | 0.8 |
| B | 100 to 800 | 1.8 |
| | 800 to 1800 | 0.8 |
| N | -200 to -100 | 0.8 |
| | -100 to 500 | 0.3 |
| | 500 to 1300 | 0.2 |
| E | -200 to -100 | 0.5 |
| | -100 to 0 | 0.2 |
| | 0 to 1000 | 0.15 |

Cold Junction Compensation +/- 0.5°C (applies to ambient changes of +/- 1°C)

The accuracy of the thermocouple simulation is determined by the accuracy of the 5025's DC Voltage function and the accuracy of the standard thermocouple tables (BS EN 60584-1) published by the British Standards Institute.

The 5025 uses precise digital interpretation of the tables to output voltage levels that are within the accuracies specified in the table above.

| DECADE RESISTANCE ¹ | | |
|---------------------------------------|-----------------|-------------------|
| Value | Accuracy | Max Rating |
| 1 Ω | 800 ppm | 0.1W |
| 10 Ω | 70 ppm | 0.1W |
| 100 Ω | 30 ppm | 0.1W |
| 1K Ω | 20 ppm | 0.1W |
| 10K Ω | 20 ppm | 0.1W |
| 100k Ω | 30 ppm | 0.1W |
| 1M Ω | 150 ppm | 200V |
| 10M Ω | 0.1% | 200V |
| 100M Ω | 1% | 200V |
| 1G Ω | 10% | 200V |

1. Resistance specifications are +/- 1m Ω .

| CONDUCTANCE | | |
|--------------------|-----------------|-------------------|
| Value | Accuracy | Max Rating |
| 1 S | 800 ppm | 0.1W |
| 100m S | 70 ppm | 0.1W |
| 10m S | 30 ppm | 0.1W |
| 1m S | 20 ppm | 0.1W |
| 100u S | 20 ppm | 0.1W |
| 10u S | 30 ppm | 0.1W |
| 1u S | 150 ppm | 200V |
| 100n S | 0.1% | 200V |
| 10n S | 1% | 200V |
| 1n S | 10% | 200V |

1. Conductance specifications are +/- 1m Ω .

| 10MHz DIGITAL FREQUENCY |
|---|
| Variable Values 0.1Hz to 10MHz, ~2V pk-pk square wave. Accuracy 20ppm |

| PERIOD |
|---|
| Variable Values 100nS to 10S, ~2V pk-pk square wave. Accuracy 20ppm |

OPTIONS

| CAPACITANCE ¹ | | | |
|--------------------------|-----------|-------------|-----------|
| Value | Frequency | Accuracy % | Max volts |
| 1 nF | 1kHz | 0.5 +/-10pf | 100V |
| 10 nF | 1kHz | 0.5 +/-10pf | |
| 100 nF | 1kHz | 0.5 | |
| 1 uF | 1kHz | 0.25 | |
| 10 uF | 1kHz | 0.5 | |
| 100 uF | 100Hz | 0.5 | |

1. After Subtraction of residual capacitance.

| INDUCTANCE ^{1 2} | | | |
|---------------------------|-----------|------------------------------------|-------------|
| Value | Frequency | Accuracy | Max current |
| 1 mH | 1kHz | 1% of nominal | 10mA |
| 1.9 mH | 1kHz | | |
| 5 mH | 1kHz | | |
| 10 mH | 1kHz | OR | |
| 19 mH | 1kHz | | |
| 50 mH | 1kHz | 0.1% of previous calibration value | |
| 100 mH | 1kHz | | |
| 190 mH | 1kHz | | |
| 500 mH | 1kHz | | |
| 1H | 1kHz | | |
| 10H | 100Hz | | |

1. After Subtraction of residual inductance.

2. Specification based on 4 wire sinewave measurement technique.

| OSCILLOSCOPE 100MHz | |
|---|---|
| FREQUENCY 0.1Hz to 10MHz accuracy 0.1ppm* 20, 50, 100MHz accuracy 20ppm | PERIOD 100nS to 10S accuracy 0.1ppm* 50, 20, & 10nS accuracy 20ppm |
| * 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) Fixed outputs, deviation function is not available. | |
| DUTY CYCLE 3 frequencies, 100Hz, 1kHz, 10kHz. Duty cycle settable from 0 to 100% Setting resolution 0.01% at 100Hz, 0.1% at 1 kHz, 1% at 10 kHz Deviation function is not available. | |
| OSCILLOSCOPE AMPLITUDE 1kHz square-wave | |
| Range | Accuracy |
| 200mV | 0.2% |
| 200mV 50Ω | 0.25% |
| 2V 50Ω | 0.25% |
| 20V | 0.05% |
| 200V | 0.05% |
| OSCILLOSCOPE FAST RISE | < 300ps. Bandwidth Checking up to 600 MHz |

| 2.2GHz-LEVELLED SWEEP ¹ 0.5V, 1V, 1.5V pk-pk Sine-Wave, 50Ω Output. | | |
|--|--------------------|--------------------|
| Range | Amplitude Accuracy | Frequency Accuracy |
| 10 MHz to 200 MHz | 1% | 20ppm |
| 200 MHz to 500 MHz | 4% | 20ppm |
| 500 MHz to 1 GHz | 10% | 20ppm |
| 2.2 GHz to 2.2 GHz | 20% | 20ppm |

1. Max frequency at 1.5V is 2GHz

OPTIONS (continued)

| FULL RANGE RESISTANCE | | | |
|-----------------------|-----------------------|------------|------------|
| Range | Accuracy ¹ | Resolution | Max Rating |
| 1Ω – 20Ω | 0.01% +/- 7mΩ | 1Ω | 0.1W |
| 20Ω – 99.999Ω | 0.01% +/- 7mΩ | 1mΩ /5mΩ* | 0.1W |
| 100Ω – 999.999Ω | 0.01% +/- 5mΩ | 1mΩ | 0.1W |
| 1kΩ – 9.999kΩ | 0.02% +/- 20mΩ | 1Ω | 0.1W |
| 10kΩ – 99.999kΩ | 0.01% +/- 1Ω | 1Ω | 0.1W |
| 100kΩ – 999.99kΩ | 0.01% +/- 10Ω | 10Ω | 0.1W |
| 1MΩ – 9.9999MΩ | 0.02% +/- 100Ω | 100Ω | 0.1W |
| 10MΩ – 120MΩ | 0.1% +/- 1kΩ | 1kΩ | 0.1W |

1. After subtraction of lead resistance. Add end resistance variation +/- 2.5mΩ

* Output resolution is 5mΩ below 50Ω

| PRT SIMULATION (Uses Full Range Resistance option) | | | |
|--|----------------------|---------------------|----------------|
| Pt100 DIN | Alpha Coeff 0.003850 | Range -180 to 850°C | Accuracy 0.1°C |

It should be noted that the accuracy of the PRT simulation is determined by the accuracy of the PRT tables (BS EN 60751) published by the British Standards Institute. The 5025 uses precise digital interpretation of the tables to output resistance values that are within the accuracies specified in the table above.

| SIMULATED RESISTANCE | |
|---------------------------|-------------------------------------|
| RANGE | ACCURACY |
| 2 Wire¹ | |
| 40 ohms (min 10 ohms) | 0.15% of setting +/- 20 milliohms |
| 400 ohms | 0.05% of setting +/- 0.05% of range |
| 4K ohms | 0.02% of setting +/- 0.05% of range |
| 40K ohms | 0.02% of setting +/- 0.05% of range |
| 400K ohms | 0.02% of setting +/- 0.05% of range |
| 4M ohms | 0.05% of setting +/- 0.05% of range |
| 40M ohms | 0.2% of setting +/- 0.05% of range |

1. After subtraction of lead resistance.

Maximum measure current allowed in simulated resistance mode is 20mA. Simulated resistance mode is suitable for DC only, i.e. only DC current may be passed through the active resistance.

Simulated resistance limitations

It should be noted that the 5025's simulated resistance circuitry has a 2V voltage compliance. This means that the simulation is only valid if the measure current multiplied by required resistance is less than 2V. For example, if the measure current is 1mA, the maximum simulated resistance will be 2K ohms. The user should be aware of the measure currents being used by the instrument being calibrated in order to prevent incorrect simulated resistance being output by the 5025.

It should also be noted that some DMMs use measuring currents which are outside the 5025 simulated resistance limits. If in doubt over the validity of the 5025's output it is recommended that the voltage across the output terminals is checked – it should be less than 2V for correct operation.

| PRT SIMULATION (Uses Simulated Resistance option) | | | |
|---|----------------------|---------------------|----------------|
| Pt100 DIN | Alpha Coeff 0.003850 | Range -180 to 850°C | Accuracy 0.1°C |

It should be noted that the accuracy of the PRT simulation is determined by the accuracy of the 5025's simulated (active) resistance function and the accuracy of the PRT tables (BS EN 60751) published by the British Standards Institute. The 5025 uses precise digital interpretation of the tables to output resistance values that are within the accuracies specified in the table above.

| POWER CALIBRATION | | | | | | | |
|-------------------|--------------|----------------|------------|---------------------|--------------|----------------|------------|
| DC Current | Accuracy | Compliance | Resolution | AC Current 45-400Hz | Accuracy | Compliance | Resolution |
| 0.2 – 2.2A | 0.03 + 500uA | 5V | 100uA | 0.2 – 2.2A | 0.1% + 2mA | 3.5V | 100uA |
| 2.2 - 22A | 0.05 + 6mA | 4V | 1mA | 2.2 - 22A | 0.1% + 20mA | 3V | 1mA |
| DC Voltage | Accuracy | Output Current | Resolution | AC Voltage 45-400Hz | Accuracy | Output Current | Resolution |
| 1- 22V | 0.01 + 500uV | 20mA | 100uV | 1 - 22V | 0.03% + 2mV | 20mA | 100uV |
| 22 – 220V | 0.02 + 30mV | 20mA | 1mV | 22 – 220V | 0.06% + 30mV | 20mA | 1mV |
| 220 – 1050V | 0.05 + 50mV | 10mA | 10mV | 220 – 1050V | 0.08% + 90mV | 10mA | 10mV |
| Phase | Accuracy | Range | Resolution | Power Factor | Range | Resolution | |
| 45 to 99Hz | 0.3 deg | +/-90deg | 0.1 deg | 45 to 99Hz | 0.00 – 1.00 | 0.001 | |
| 100Hz to 400Hz | 1.0 deg | +/-90deg | 0.1 deg | 100Hz to 400Hz | 0.00 – 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 Acc (%) = $\text{SqrRt}(V_{\text{acc}}^2 + I_{\text{acc}}^2 + \text{Phase Correction}^2)$

Where Phase Correction (%) = $100 \times (1 - \text{Cos}(\text{Phase} + \text{PhaseAcc}) / \text{Cos Phase})$.

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.

GENERAL

| | |
|--|---------------------------------------|
| POWER SUPPLY | |
| Mains Voltage | 100 - 230V AC 50/60 Hz. |
| Fuse Ratings | 3.15A anti-surge |
| Connector | IEC Plug |
| Power Consumption | 120W typical, 200W Max. |
| MAXIMUM ALLOWABLE VOLTAGE BETWEEN TERMINALS | |
| Between V+ and V- terminals | < 1500V Peak |
| Between V- and Earth | < 75V Peak |
| Between Main, Aux and Earth | < 75V |
| ENVIRONMENTAL | |
| Operating Temperature | 15 - 25 °C, Full Spec: 22 °C +/- 3°C. |
| Storage Temperature | -10 °C to 50 °C |
| Humidity | Operating < 80% |
| Altitude | 0 - 3km. Non Operating 3Km - 12km |
| Warm Up Time | 1 hour to full accuracy |
| MECHANICAL | |
| Dimensions | Width 447mm, Height 152, Depth 470mm |
| Weight | 16.5kg |
| | 19" Rack Mounting Kit Available |
| REMOTE OPERATION | |
| Interfaces | GPIB, RS232 and optional USB |
| Command Set | Standard SCPI |



5041 Oscilloscope / Timer Calibrator

Time Electronics

Calibration, Test & Measurement

- PC controlled
- Amplitude 1mV to 200V
- Frequency 0.1Hz to 100MHz
- Time Marker/Period 15s to 10ns
- Bandwidth check up to 600MHz
- Optional 2.2GHz levelled Sweep



High specification oscilloscope/timer calibrator at an affordable price

The 5041 is a versatile, high accuracy calibrator capable of calibrating a wide range of oscilloscopes and timer/counters to 2.2GHz. It provides a wide range of outputs for amplitude, frequency, period and bandwidth. Amplitude calibration is achieved by a DC signal or 1kHz square-wave, ranging from 1mV to 200V (2V max for 50 ohm loads). Deviation up to $\pm 9.99\%$ allows fine adjustment of amplitude and direct read-out of error.

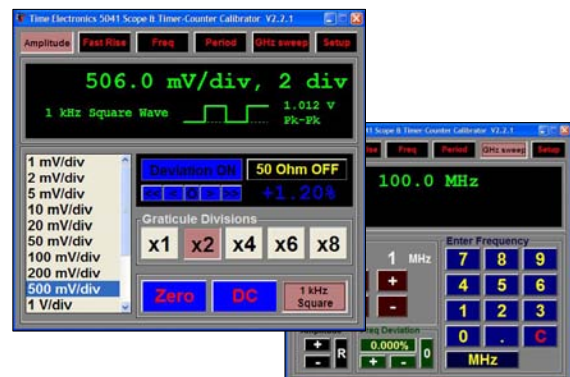
Accurate frequencies are generated from a temperature controlled quartz crystal oscillator. Timing accuracy of 0.1ppm is suitable for most oscilloscopes and timer counters. A precise square-wave output provides a fast rise time of less than 300ps, which allows bandwidth testing up to 600MHz.

Virtual front panel

The 5041 follows the modern trend of instrumentation that is PC controlled. The Windows based 'Virtual Front Panel' is quick and easy to use.

Communication with the unit is via RS232 (serial) or GPIB, which allows simple integration with Time Electronics EasyCal Software. This also provides the perfect solution for ATE systems.

The 16-character front panel display shows functions and settings for user convenience.



2.2GHz Levelled sine-wave option

For precise bandwidth determination and frequency response analysis the 2.2GHz option is available. The ability to sweep the frequency output from 10MHz to 2.2GHz and adjust the amplitude from 400mV to 1.1V pk-pk ensures accurate analysis of oscilloscope input amplifiers.

Current probe calibration

For calibration of oscilloscope current probes an external adaptor is available. This converts the 5041's amplitude output to current and covers the range 0.1mA to 100mA pk-pk, 0.2% accuracy, DC or 1kHz.

Rubidium frequency reference

Enhanced timing performance is also available by specifying the rubidium frequency reference option (9762). This option achieves timing accuracies required to calibrate high performance Timer/Counters to 1 part in 10^{10} .

Calibration made easy

To automate the oscilloscope calibration process the 5041 can be controlled using Time Electronics' EasyCal calibration software. This reduces calibration times, ensures consistent results and produces certificates to international quality standards.

| Technical Specifications (Apply for 1 year) | |
|--|--|
| AMPLITUDE CALIBRATION | |
| Output per div | 1mV to 50V in 1, 2, 5 sequence, 1kHz square-wave or DC. |
| Graticule divisions | x1, x2, x4, x6, x8. Max output: 200V pk-pk into >500kohm/100pF, or 2V into 50Ω. |
| Accuracy | 1mV-200mV: 0.2%+/-4uV. >300mV: 0.05%. Into 50Ω: 0.25%+/-4uV. |
| FREQUENCY (TIME BASE) CALIBRATION | |
| Low Range | 0.1Hz to 170kHz (settable in steps equivalent to 1μs intervals). Output: 2Vpk-pk (1Vpp into 50Ω). |
| High Range | 200, 500kHz, 1, 2, 5, 10, 20, 50, 100MHz. Output: 0.8Vpk-pk (0.4Vpk-pk into 50Ω). |
| Accuracy | 10MHz & below: 0.1ppm. 20/50/100MHz: 20ppm. |
| PERIOD CALIBRATION | |
| Low Frequency Mode | 6μs to 15s (settable in 1μs steps). Output: 2Vpk-pk (1Vpp into 50Ω). |
| High Frequency Mode | 10, 20, 50, 100, 200, 500ns, 1, 2, 5us. Output: 0.8V (0.4V into 50Ω). |
| Accuracy | 100ns - 15s: 0.02ppm +/- 30ps, <0.1ppm. 10/20/50 ns: +/- 50ps jitter, <0.1ppm. |
| Duty Cycle | |
| Range | 0.01% to 99.99% for periods >20ms. For periods <20ms the % duty cycle resolution is determined by a minimum 2us step. Output level: As Frequency Calibration. |
| FAST RISE | |
| Fast Rise Time | Less than 300ps. Allows bandwidth checking up to 600MHz. O/p: 0.4Vpk-pk into 50Ω. |
| Options | |
| 2.2 GHz sweep | 10MHz - 2.2GHz levelled sine wave output. 400mV to 1Vpk-pk, 50Ω output, driving 50Ω load. Frequency Accuracy: 20ppm. Amplitude Accuracy: 10 to 200MHz 1%, 200 to 500MHz 4% 500MHz to 1GHz 10%, 1 to 2.2GHz 20%. |
| Rubidium reference | Rubidium atomic clock frequency reference. Increases accuracy to 1 part in 10 ¹⁰ . |
| Current probe adapter | Battery powered external adapter for checking current probes. 0.1 - 100mA, 0.2% accuracy. |
| General Specification | |
| SOFTWARE | |
| PC Program | An easy-to-use program allows full control of the calibrator from an external PC. |
| PC Requirement | PC running Windows 98, ME, 2000, or XP. RS232 serial or GPIB interface. |
| EasyCal | The 5041 is fully compatible with Time Electronics' EasyCal software which includes an in-built driver to allow speedy automatic calibration runs. |
| PROGRAMMABLE OPERATION | |
| Interfaces | SERIAL (RS232) and GPIB (IEEE-488). |
| Commands | A full command set allows complete control of all functions by an external computer. |
| GENERAL | |
| Power | 100 - 230V AC 50 or 60Hz less than 100W. |
| Dimensions | 43cm wide x 25cm deep x 15cm high (17 x 10 x 6 ins) 7Kg (15 lbs). |
| Display | 16-character, high brightness led, shows function/setting/errors. |
| Warm up time | 30 minutes to full specification |
| Ordering Information | |
| Code | Description |
| 5041 | Scope and Timer/Counter Calibrator for use with external PC |
| 9769 | 2.2 GHz sweep |
| 9762 | Rubidium frequency reference |
| 9764 | Current probe calibration adapter |
| 9728 | Rack mount kit (standard 19") |
| 9747 | EasyCal Software |

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



5051 Calibration System

Time Electronics

Calibration, Test & Measurement

- 0 - 1050 V AC/DC voltage
- 0 - 22 A AC/DC current
- Internal 6.5 Digit DMM
- 0 - 1GΩ resistance
- Thermocouple simulation
- Digital Frequency
- Oscilloscope Calibration
- Capacitance & Inductance
- Clamp Meter Calibration



The 5051 is a high performance calibrator combining both source and measure functions.

It's outstanding performance is based on Time Electronics own 22 bit Digital to Analogue converter which provides 0.25ppm resolution. The linearity and temperature coefficients are compensated by patented software techniques to provide better than 0.05ppm/°C.

The control software allows a wide range of functions to be selected using mouse, keyboard, or touch screen.

Precise calibration is possible using the deviation function - this provides a direct error readout for the instrument being calibrated.

The standard 5051 can calibrate, bench and handheld multi-meters, frequency meters, ohm meters, ac/dc millivoltmeters, thermocouple indicators etc. With 5051 options added, resistance boxes, clamp meters, temperature indicators/sensors, RTDs, power supplies, signal generators, ac/dc signal sources, timer counters, oscilloscopes.

The **5051Plus** includes a comprehensive package of options and provides a lab ready solution. It comes equipped with every item required for a complete calibration station:

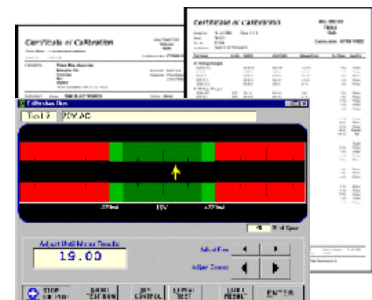
DMM; Scope Calibration; Capacitance and Inductance; Simulated Resistance; Clamp Meter Adaptor; Touch Screen; Test Lead Set; EasyCal; Crystal Reports; NPL Certificate; Carry Case; Printer and Connectivity Kit (As Shown).



EasyCal

A suite of calibration programs that simplify and speed up calibration. If you have an instrument that needs calibrating against specification and the results stored and printed, **EasyCal** is the answer.

CalMan provides the overall administration function for a modern cal lab. Providing calibration reminders, job control, site and pre-cal documentation



5051 Technical Specifications

| | | |
|--------------------------------|--------------------------------------|---|
| Voltage DC | Range: Best 1 Year Specification: | 0 to \pm 1050V \pm 15ppm of setting |
| Current DC | Range: Best 1 Year Specification: | 0 to \pm 22A \pm 80ppm of setting |
| Voltage AC | Range: Best 1 Year Specification: | 1mV to 1050V (10Hz to 20kHz, Sine-wave) \pm 300ppm of setting |
| Current AC | Range: Best 1 Year Specification: | 10uA to 22A (20Hz to 1kHz, Sine-wave) \pm 0.05% of setting |
| Resistance | Range: Best 1 Year Specification: | 1 ohm to 1G ohms (Fixed Values, decade steps) \pm 20ppm of setting |
| Conductance | Range: Best 1 Year Specification: | 1 S to 1n S (Fixed Values, decade steps) \pm 20ppm of setting |
| Thermocouple Simulation | Range: Best 1 Year Specification: | -270 to 1800°C (Type J,K,R,T,S,B,E,N) \pm 0.15 °C |
| 10MHz Digital Frequency/Period | Range: Best 1 Year Specification: | 0.1Hz to 10MHz / 100nS to 10S \pm 20ppm of setting |

Options

| | | |
|-------------------------------|---|---|
| Hi Frequency AC V | Range/Max Freq: Best 1 Year Specification: | 20 to 200mV/300kHz. 0.2 to 2V/1MHz. 2 to 20V/100kHz 0.05% + 0.1mV |
| Capacitance | Values: Best 1 Year Specification: | 1nF,10nF,100nF,1uF,10uF & 100uF (100V Max) \pm 0.25% |
| Inductance | Values: Best 1 Year Specification: | 1, 1.9, 5, 10, 19, 50, 100, 190, 500mH - 1H & 10H \pm 0.1% |
| Full Range Resistance | Range: Best 1 Year Specification: | 1 to 120M ohms (Variable) \pm 100ppm of setting |
| PT100 | Range: Best 1 Year Specification: | -200 to 850°C \pm 0.2 °C |
| Oscilloscope Frequency/Period | Range: Best 1 Year Specification: | 0.1Hz to 100MHz / 100ns to 10s \pm 0.1ppm of setting |
| Oscilloscope Duty Cycle | Values: | 3 frequencies, 100Hz, 1kHz, 10kHz. Settable from 0 to 100% |
| Oscilloscope Amplitude | Range: Best 1 Year Specification: | 0mV to 200V & 0mV to 2V 50 ohms (Square-wave) \pm 0.05% |
| Oscilloscope Fast-Rise | Values: | < 300ps. Bandwidth Checking up to 600 MHz |
| 2.2 GHz Sweep | Range: Best 1 Year Specification: | 10MHz - 2.2GHz levelled sine-wave (0.5, 1, 1Vpk-pk). Amplitude \pm 1%, Frequency \pm 20ppm. |
| DMM 6.5 Digit | AC Volts: 0 - 750V DC Volts: 0 - 1kV AC Current: 0 - 3A DC Current: 0 - 3A. Resistance: 0 - 100M Ω Frequency: 3Hz to 300kHz | Best 1 year spec: 0.06% of rdg + 0.04% of rng Best 1 year spec: 35ppm of rdg + 6ppm of rng Best 1 year spec: 0.1% of rdg + 0.04% of rng Best 1 year spec: 500ppm of rdg + 50ppm of rng Best 1 year spec: 100ppm of rdg + 50ppm of rng Best 1 year spec: 0.01% of rdg |

General Specification

Warm up:1 Hour to full accuracy. Settling Time: Less than 5 seconds. Interfaces: 4 x USB. Display: 10.5" Colour LCD.

Operating Temperature: 15 - 25 °C, Full Spec: 22 °C +/- 3°C, Storage: -10 °C to 50 °C

Operating Humidity: < 80% non condensing. Altitude 0 - 3km. Non Operating 3Km - 12km

Line Power: 100 - 230V AC 50/60 Hz. 200W max. Dimensions: W 430mm, D 538mm, H 202mm, Weight: 23Kg

Ordering Information

| Code | Description | Code | Description |
|------|--|------|---------------------------------------|
| 9798 | Capacitance and Inductance | 9791 | DMM 6.5 digit |
| 9787 | Full Range Resistance & PT100 | 9794 | USB to GPIB Interface |
| 9770 | Oscilloscope Calibration | 9795 | Printer and Connectivity Kit |
| 9769 | 2.2 GHz Sweep | 9747 | EasyCal Software |
| 9790 | 100A Current Option | 9749 | Cal Manager Software |
| 9780 | Clamp Meter Adaptor 1 and 50 Turns | 9796 | Test Lead Set |
| 9773 | Optical Tachometer Calibration Adaptor | 9165 | NPL Traceable Calibration Certificate |
| 9767 | External Low Noise Attenuator | 9134 | UKAS Calibration Certificate |
| 9771 | High Frequency AC Voltage | 9082 | Carry Case |

Full specifications are available on request.

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

5051 Extended Specifications

1. Accuracies are shown as ppm or % of output + floor.
2. Specifications apply for settings between 10% and 100% of range.
3. Specifications apply at ambient temp of 22°C +/- 3°C
4. For temperatures outside the above range apply 0.2 x specification per °C
5. Calibrator warm up time at least 1 hour.
6. All values are relative to calibration standards.
7. Accuracies quoted are for 1 year.

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

CALIBRATOR SECTION

| DC VOLTAGE | | | | |
|--------------------|--------------|-------------------|--------------------|------------|
| Range | Accuracy ppm | Output Resistance | Max Output Current | Resolution |
| 20mV ¹ | 100 + 4uV | 10 Ω | - | 100nV |
| 200mV ¹ | 30 + 6uV | 10 Ω | - | 1uV |
| 2V ¹ | 15 + 20uV | < 0.1 Ω | 20mA | 1uV |
| 20V ¹ | 15 + 150uV | < 0.1 Ω | 20mA | 10uV |
| 200V ¹ | 30 + 6mV | < 5 Ω | 20mA | 100uV |
| 1050V | 50 + 30mV | < 10 Ω | 10mA | 1mV |

1. Over-Range 10%.

| AC VOLTAGE 10Hz - 20kHz (sine-wave) | | | | | |
|-------------------------------------|------------------------|--------------|-------------------|--------------------|------------|
| Range RMS | Frequency ² | Accuracy % | Output Resistance | Max Output Current | Resolution |
| 20mV ¹ | 10Hz-45Hz | 0.05 + 250uV | 10 Ω ³ | - | 1uV |
| | 45Hz-1kHz | 0.05 + 100uV | 10 Ω ³ | | 1uV |
| | 1kHz-10kHz | 0.05 + 150uV | 10 Ω ³ | | 1uV |
| | 10kHz-20kHz | 0.05 + 250uV | 10 Ω ³ | | 1uV |
| 200mV ¹ | 10Hz-45Hz | 0.05 + 250uV | 10 Ω | - | 1uV |
| | 45Hz-1kHz | 0.04 + 100uV | 10 Ω | | 1uV |
| | 1kHz-10kHz | 0.04 + 150uV | 10 Ω | | 1uV |
| | 10kHz-20kHz | 0.05 + 250uV | 10 Ω | | 1uV |
| 2V ¹ | 10Hz-45Hz | 0.08 + 500uV | < 0.1 Ω | 20mA | 10uV |
| | 45Hz-1kHz | 0.03 + 170uV | < 0.1 Ω | 20mA | 10uV |
| | 1kHz-10kHz | 0.03 + 250uV | < 0.1 Ω | 20mA | 10uV |
| | 10kHz-20kHz | 0.08 + 500uV | < 0.1 Ω | 20mA | 10uV |
| 20V ¹ | 10Hz-45Hz | 0.08 + 4mV | < 5 Ω | 20mA | 100uV |
| | 45Hz-1kHz | 0.03 + 2mV | < 5 Ω | 20mA | 100uV |
| | 1kHz-10kHz | 0.03 + 3mV | < 5 Ω | 20mA | 100uV |
| | 10kHz-20kHz | 0.08 + 4mV | < 5 Ω | 20mA | 100uV |
| 200V ¹ | 40Hz-1kHz | 0.06 + 20mV | < 5Ω | 20mA | 1mV |
| 1050V | 40Hz-1kHz | 0.08 + 90mV | < 10 Ω | 10mA | 10mV |

1. Over-Range 10%

2. The frequency accuracy for AC ranges is 0.01% and is crystal controlled. The setting resolution is 1Hz.

3. The output resistance on the 20mV and 200mV ranges is 10 ohms. This must be taken into account when loads of 100K ohms or less are being driven. A 100K load will result in a 0.01% error.
Less than 0.1% THD.

All AC outputs exclude the DC component.

It is recommended that for very high accuracy low level AC calibration a precision attenuator with known characteristics is used. This can be driven from the 5051's 2V or 20V ranges and with proper screening of the attenuator the signal to noise ratio of the resulting output can be improved significantly. A 1000:1 screened precision attenuator is available from Time Electronics.

5051 Extended Specifications

| DC CURRENT | | | |
|--------------------|---------------------|---------------------------|-------------------|
| Range | Accuracy ppm | Compliance Voltage | Resolution |
| 200uA ¹ | 150 + 15nA | 11V | 1 nA |
| 2mA ¹ | 100 + 40nA | 11V | 10 nA |
| 20mA ¹ | 80 + 200nA | 11V | 10 nA |
| 200mA ¹ | 80 + 3uA | 11V | 100 nA |
| 2A ¹ | 250 + 40uA | 5V | 1 uA |
| 20A ¹ | 600 + 2mA | 4V | 10 uA |

1. Over-Range 10%.

| AC CURRENT (sine-wave) | | | | |
|-------------------------------|------------------|-------------------|-------------------------------|-------------------|
| Range | Frequency | Accuracy % | Compliance Voltage rms | Resolution |
| 200uA ¹ | 20Hz – 1kHz | 0.07 + 300nA | 8V | 10nA |
| 2mA ¹ | 20Hz – 1kHz | 0.05 + 300nA | 8V | 10nA |
| 20mA ¹ | 20Hz – 1kHz | 0.05 + 3uA | 8V | 100nA |
| 200mA ¹ | 20Hz – 1kHz | 0.05 + 30uA | 8V | 1uA |
| 2A ¹ | 20Hz – 500Hz | 0.1 + 0.5mA | 3.5V | 10uA |
| 20A ¹ | 20Hz – 500Hz | 0.2 + 5mA | 3V | 100uA |

1. Over-Range 10%.

| THERMOCOUPLE SIMULATION | | |
|--------------------------------|-----------------------------|--------------------|
| Thermocouple Type | Temperature Range °C | Accuracy °C |
| J | -210 to 150 | 0.15 |
| | 150 to 1200 | 0.3 |
| K | -270 to 190 | 0.5 |
| | 190 to 1250 | 0.6 |
| T | -200 to 150 | 0.4 |
| | 150 to 400 | 0.5 |
| R | -50 to 800 | 0.8 |
| | 800 to 1750 | 2.0 |
| S | -50 to 850 | 0.9 |
| | 850 to 1750 | 2.0 |
| B | 100 to 1200 | 1.0 |
| | 1200 to 1800 | 2.0 |
| N | -270 to 260 | 0.5 |
| | 260 to 1300 | 0.4 |
| E | -50 to 1000 | 0.3 |

Cold Junction Compensation +/- 0.5°C (applies to ambient changes of +/- 1°C)

The accuracy of the thermocouple simulation is determined by the accuracy of the 5051's DC Voltage function and the accuracy of the standard thermocouple tables (BS EN 60584-1) published by the British Standards Institute.

The 5051 uses precise digital interpretation of the tables to output voltage levels that are within the accuracies specified in the table above.

5051 Extended Specifications

| RESISTANCE ¹ | | |
|--------------------------------|-----------------|-------------------|
| Value | Accuracy | Max Rating |
| 1 Ω | 800 ppm | 0.1W |
| 10 Ω | 70 ppm | 0.1W |
| 100 Ω | 30 ppm | 0.1W |
| 1K Ω | 20 ppm | 0.1W |
| 10K Ω | 20 ppm | 0.1W |
| 100k Ω | 30 ppm | 0.1W |
| 1M Ω | 150 ppm | 200V |
| 10M Ω | 0.1% | 200V |
| 100M Ω | 1% | 200V |
| 1G Ω | 10% | 200V |

1. Resistance specifications are +/- 1m Ω .

| CONDUCTANCE | | |
|--------------------|-----------------|-------------------|
| Value | Accuracy | Max Rating |
| 1 S | 800 ppm | 0.1W |
| 100m S | 70 ppm | 0.1W |
| 10m S | 30 ppm | 0.1W |
| 1m S | 20 ppm | 0.1W |
| 100u S | 20 ppm | 0.1W |
| 10u S | 30 ppm | 0.1W |
| 1u S | 150 ppm | 200V |
| 100n S | 0.1% | 200V |
| 10n S | 1% | 200V |
| 1n S | 10% | 200V |

1. Conductance specifications are +/- 1m Ω

10MHz DIGITAL FREQUENCY

Variable Values 0.1Hz to 10MHz, ~2V pk-pk square wave. Accuracy 20ppm

PERIOD

Variable Values 100nS to 10S, ~2V pk-pk square wave. Accuracy 20ppm

OPTIONS

| CAPACITANCE ¹ | | | |
|--------------------------|-----------|-------------|-----------|
| Value | Frequency | Accuracy % | Max volts |
| 1 nF | 1kHz | 0.5 +/-10pf | 100V |
| 10 nF | 1kHz | 0.5 +/-10pf | |
| 100 nF | 1kHz | 0.5 | |
| 1 uF | 1kHz | 0.25 | |
| 10 uF | 1kHz | 0.5 | |
| 100 uF | 100Hz | 0.5 | |

1. After Subtraction of residual capacitance.

| INDUCTANCE ^{1 2} | | | |
|---------------------------|-----------|------------------------------------|-------------|
| Value | Frequency | Accuracy | Max current |
| 1 mH | 1kHz | 1% of nominal | 10mA |
| 1.9 mH | 1kHz | | |
| 5 mH | 1kHz | OR | |
| 10 mH | 1kHz | | |
| 19 mH | 1kHz | 0.1% of previous calibration value | |
| 50 mH | 1kHz | | |
| 100 mH | 1kHz | | |
| 190 mH | 1kHz | | |
| 500 mH | 1kHz | | |
| 1H | 1kHz | | |
| 10H | 100Hz | | |

1. After Subtraction of residual inductance.

2. Specification based on 4 wire sine-wave measurement technique.

| OSCILLOSCOPE 100MHz | |
|--|--|
| FREQUENCY Fixed Values 0.1Hz to 10MHz accuracy 0.1ppm* 20, 50, 100MHz accuracy 20ppm | PERIOD Fixed Values 100nS to 10S accuracy 0.1ppm* 50, 20, & 10nS accuracy 20ppm |
| * 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) | |
| DUTY CYCLE 3 frequencies, 100Hz, 1kHz, 10kHz. Duty cycle settable from 0 to 100% Setting resolution 0.01% at 100Hz, 0.1% at 1 kHz, 1% at 10 kHz Deviation function is not available. | |

| OSCILLOSCOPE AMPLITUDE | |
|------------------------|---|
| Output per div | 1mV to 50V in 1, 2, 5 sequence. 1kHz square wave or DC. |
| Graticule X | 1, 2, 4, 6, 8. Max output 200V pk-pk ¹ |
| Range | Accuracy |
| 1mV to 200mV | 0.2% +/- 4uV |
| 200mV to 200V | 0.05% |
| 1mV to 20mV 50Ω | 0.5% +/- 10uV |
| 20mV to 2V 50Ω | 0.25% |
| FAST RISE | < 300ps. Bandwidth Checking up to 600 MHz |

1. At 1mV/div 1,2,4X not available

| 2.2GHz-LEVELLED SWEEP 0.5V, 1V, 1.5V pk-pk Sine-Wave, 50Ω Output. | | |
|---|--------------------|--------------------|
| Range | Amplitude Accuracy | Frequency Accuracy |
| 10 MHz to 200 MHz | 1% | 20ppm |
| 200 MHz to 500 MHz | 4% | 20ppm |
| 500 MHz to 1 GHz | 10% | 20ppm |
| 2.2 GHz to 2.2 GHz | 20% | 20ppm |

5051 Extended Specifications

OPTIONS (continued)

| FULL RANGE RESISTANCE | | | |
|------------------------------|-----------------------------|-------------------|-------------------|
| Range | Accuracy¹ | Resolution | Max Rating |
| 1Ω – 20Ω | 0.01% +/- 5mΩ | 1Ω | 0.1W |
| 20Ω – 99.999Ω | 0.01% +/- 5mΩ | 1mΩ/5mΩ* | 0.1W |
| 100Ω – 999.999Ω | 0.01% +/- 5mΩ | 1mΩ | 0.1W |
| 1kΩ – 9.999kΩ | 0.02% +/- 20mΩ | 1Ω | 0.1W |
| 10kΩ – 99.999kΩ | 0.01% +/- 1Ω | 1Ω | 0.1W |
| 100kΩ – 999.99kΩ | 0.01% +/- 10Ω | 10Ω | 0.1W |
| 1MΩ – 9.9999MΩ | 0.02% +/- 100Ω | 100Ω | 0.1W |
| 10MΩ – 120MΩ | 0.1% +/- 1kΩ | 1kΩ | 0.1W |

1. After subtraction of lead resistance. Add end resistance variation +/- 2.5mΩ

* Output resolution is 5mΩ below 50Ω

| PRT SIMULATION (Uses Full Range Resistance option) | | | |
|---|----------------------|---------------------|----------------|
| Pt100 DIN | Alpha Coeff 0.003850 | Range -180 to 850°C | Accuracy 0.1°C |

It should be noted that the accuracy of the PRT simulation is determined by the accuracy of the PRT tables (BS EN 60751) published by the British Standards Institute. The 5025 uses precise digital interpretation of the tables to output resistance values that are within the accuracies specified in the table above.

| SIMULATED RESISTANCE | |
|-----------------------------|-------------------------------------|
| RANGE | ACCURACY |
| 2 Wire¹ | |
| 40 ohms (min 10 ohms) | 0.15% of setting +/- 20 milliohms |
| 400 ohms | 0.05% of setting +/- 0.05% of range |
| 4K ohms | 0.02% of setting +/- 0.05% of range |
| 40K ohms | 0.02% of setting +/- 0.05% of range |
| 400K ohms | 0.02% of setting +/- 0.05% of range |
| 4M ohms | 0.05% of setting +/- 0.05% of range |
| 40M ohms | 0.2% of setting +/- 0.05% of range |

1. After subtraction of lead resistance.

Maximum measure current allowed in simulated resistance mode is 20mA. Simulated resistance mode is suitable for DC only, i.e. only DC current may be passed through the active resistance.

Simulated resistance limitations

It should be noted that the 5051's simulated resistance circuitry has a 2V voltage compliance. This means that the simulation is only valid if the measure current multiplied by required resistance is less than 2V. For example, if the measure current is 1mA, the maximum simulated resistance will be 2K ohms. The user should be aware of the measure currents being used by the instrument being calibrated in order to prevent incorrect simulated resistance being output by the 5051.

It should also be noted that some DMMs use measuring currents which are outside the 5051 simulated resistance limits. If in doubt over the validity of the 5051's output it is recommended that the voltage across the output terminals is checked – it should be less than 2V for correct operation.

| PRT SIMULATION (Uses Simulated Resistance option) | | | |
|--|----------------------|---------------------|----------------|
| Pt100 DIN | Alpha Coeff 0.003850 | Range -250 to 850°C | Accuracy 0.1°C |

It should be noted that the accuracy of the PRT simulation is determined by the accuracy of the 5051's simulated (active) resistance function and the accuracy of the PRT tables (BS EN 60751) published by the British Standards Institute. The 5051 uses precise digital interpretation of the tables to output resistance values that are within the accuracies specified in the table above.

| AC VOLTAGE HI FREQUENCY (Frequency Accuracy 0.01%) | | | |
|---|-------------------------|---------------------------|-----------------------|
| Range | 20 kHz – 100 kHz | 100 kHz to 300 kHz | 300kHz to 1MHz |
| 20mV | 0.05% + 0.1mV | 0.1% + 0.5mV | - |
| 200mV | 0.05% + 0.1mV | 0.1% + 0.5mV | - |
| 2V | 0.05% + 1mV | 0.1% + 5mV | 1% + 10mV |
| 20V | 0.1% + 10mV | - | - |

OPTIONS (continued)

| POWER | | | | |
|-------------------|--------------|-------------------|--------------------|------------|
| DC Voltage | | | | |
| Range | Accuracy ppm | Output Resistance | Max Output Current | Resolution |
| 2V | 80 + 100uV | < 0.5 ohm | 20mA | 1uV |
| 20V | 80 + 300uV | < 0.5 ohm | 20mA | 10uV |
| 300V | 100 + 20mV | < 5 ohm | 20mA | 100uV |
| 1kV | 250 + 50mV | < 10 ohm | 10mA | 1mV |

| AC Voltage (45Hz to 400Hz Accuracy 0.02%, Resolution 0.1Hz) | | | | |
|--|--------------|-------------------|--------------------|------------|
| Range | Accuracy ppm | Output Resistance | Max Output Current | Resolution |
| 2V | 0.03 + 200uV | < 0.5 ohm | 20mA | 100uV |
| 20V | 0.03 + 2mV | < 1 ohm | 20mA | 1mV |
| 300V | 0.06 + 30mV | < 5 ohm | 20mA | 10mV |
| 1kV | 0.08 + 90mV | < 10 ohm | 10mA | 100mV |

| DC Current | | | |
|-------------------|--------------|--------------------|------------|
| Range | Accuracy ppm | Compliance Voltage | Resolution |
| 200mA | 400 + 200uA | 5V | 100uA |
| 2A | 250 + 200uA | 5V | 100uA |
| 20A | 600 + 2mA | 4V | 1mA |

| AC Current (45Hz to 400Hz Accuracy 0.02%, Resolution 0.1Hz) | | | |
|--|------------|--------------------|------------|
| Range | Accuracy % | Compliance Voltage | Resolution |
| 200mA | 0.1 + 1mA | 3.5V | 100uA |
| 2A | 0.1 + 1mA | 3.5V | 100uA |
| 20A | 0.2 + 10mA | 3V | 1mA |

| Phase (10% to 100% of range V & I) | | | |
|---|-------------------|----------|------------|
| Frequency | Range | Accuracy | Resolution |
| 40 to 95Hz | -90.0 to +90.0deg | 0.3deg | 0.1deg |
| 100Hz to 400Hz | -90.0 to +90.0deg | 1deg | 0.1deg |

| Power Factor ¹ | | |
|----------------------------------|-----------------------|----------|
| Frequency | Range | Accuracy |
| 40 to 400Hz | 0.00 to 1.00 lead/lag | 0.01 |

| General | |
|----------------|-----------------------------------|
| Form Factor | External option connected via USB |
| Dimensions | W 447 x D 470mm x H 152mm |
| Weight | 13kg |

1. 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 Acc (%) = SqrRt (Vacc² + Iacc² + Phase Correction²)

Where Phase Correction (%) = 100x(1-Cos(Phase+PhaseAcc)/Cos Phase))

DMM SECTION

6.5 Digits RDG = Reading. RNG = Range.

| DC VOLTAGE | | | |
|-------------------|-----------------------------------|------------------------|-------------------|
| Range | Accuracy PPM (RDG+RNG) | Input Impedance | Resolution |
| 100 mV | 50 + 40 | 10M Ω | 1uV |
| 1 V | 40 + 8 | 10M Ω | 1uV |
| 10 V | 35 + 6 | 10M Ω | 10uV |
| 100 V | 45 + 7 | 10M Ω | 100uV |
| 1 kV | 45 + 10 | 10M Ω | 1mV |

| AC VOLTAGE | | | |
|-------------------|-------------------|---------------------------------|-------------------|
| Range RMS | Frequency | Accuracy % (RDG+RNG) | Resolution |
| 100 mV | 5 Hz – 10 Hz | 0.4 + 0.04 | 10uV |
| | 10 Hz – 20 kHz | 0.06 + 0.04 | 10uV |
| | 20 Hz – 50 kHz | 0.12 + 0.05 | 10uV |
| | 50 kHz – 100 kHz | 0.6 + 0.1 | 10uV |
| | 100 kHz – 300 kHz | 5.0 + 0.5 | 100uV |
| 1V – 750V | 5 Hz – 10 Hz | 0.4 + 0.03 | 0.01% of f.s. |
| | 10 Hz – 20 kHz | 0.15 + 0.05 | 0.01% of f.s. |
| | 20 kHz – 50 kHz | 0.6 + 0.1 | 0.01% of f.s. |
| | 50 kHz – 100 kHz | 5.0 + 0.5 | 0.01% of f.s. |

| DC CURRENT | | | |
|-------------------|-----------------------------------|-----------------------|-------------------|
| Range | Accuracy PPM (RDG+RNG) | Burden Voltage | Resolution |
| 10 mA | 500 + 200 | <0.1V | 100nA |
| 100 mA | 500 + 50 | <0.7V | 1uA |
| 1 A | 1000 + 100 | <1V | 10uA |
| 3 A | 1200 + 200 | <2V | 100uA |

| AC CURRENT | | | |
|-------------------|------------------|---------------------------------|-------------------|
| Range RMS | Frequency | Accuracy % (RDG+RNG) | Resolution |
| 1 A | 10Hz – 5kHz | 0.15 + 0.05 | 100uA |
| 3 A | 10Hz – 5kHz | 0.25 + 0.1 | 100uA |

| RESISTANCE | | |
|-------------------|---------------------|-----------------------------------|
| Range | Test Current | Accuracy PPM (RDG+RNG) |
| 100 Ω | 1mA | 100 + 40 |
| 1k Ω | 1mA | 100 + 10 |
| 10k Ω | 100uA | 100 + 10 |
| 100k Ω | 10uA | 100 + 10 |
| 1 M Ω | 5uA | 100 + 10 |
| 10 M Ω | 0.5uA | 400 + 10 |
| 100 M Ω | 0.1uA | 9000 + 10 |

| FREQUENCY/PERIOD (100mV – 750V) | |
|--|-----------------------------|
| Range | Accuracy % (RDG) |
| 3Hz to 10Hz | 0.1 |
| 10Hz to 40Hz | 0.03 |
| 40Hz to 300kHz | 0.01 |

PC SPECIFICATION

| | |
|-------------------------|-------------------------------------|
| Processor | 1 GHz |
| RAM | 256MB |
| Hard Drive | 40 GB |
| Ports | 4 x USB |
| Display | 10.5in LCD, (Touch Screen Optional) |
| Operating System | Windows XP Professional |

GENERAL

| | |
|--|---------------------------------------|
| POWER SUPPLY | |
| Mains Voltage | 100 - 230V AC 50/60 Hz. |
| Fuse Ratings | 3.15A anti-surge |
| Connector | IEC Plug |
| Power Consumption | 125W typical, 220W Max. |
| MAXIMUM ALLOWABLE VOLTAGE BETWEEN TERMINALS | |
| Source | |
| Between V+ and V- terminals | < 1500V Peak |
| Between V- and Earth | < 75V Peak |
| Between Main, Aux and Earth | < 75V Peak |
| Measure | |
| Between V+ and V- terminals | <1000V Peak |
| Between V- and Earth < 75V Peak | <75V Peak |
| ENVIRONMENTAL | |
| Operating Temperature | 15 - 25 °C, Full Spec: 22 °C +/- 3°C. |
| Storage Temperature | -10 °C to 50 °C |
| Humidity | Operating < 80% |
| Altitude | 0 - 3km. Non Operating 3Km - 12km |
| Warm Up Time | 1 hour to full accuracy |
| MECHANICAL | |
| Dimensions | Width 430mm, Height 202, Depth 538mm |
| Weight | 23kg |



9780 Clamp Meter Adaptor

Time Electronics

Calibration, Test & Measurement

- Twin coils fitted as standard
- Ratios 1:1 and 50:1
- Primary current up to 22A
- Simulated current up to 1100A
- AC or DC
- Frequency up to 90Hz
- Max drive voltage 3V
- Low resistance test leads included



The Time Electronics 9780 precision clamp meter adaptor is built onto a solid quality 20mm thick high insulation base plate; the twin coils are potted into a recess on the top side of the base, forming a strong bond. The foam protective mat allows accurate positioning of the clamp meter being calibrated.

Three heavy duty terminal posts with removable caps provide connection to the clamp adaptor, the black centre post is the common connection and the two red posts allow selection of the X1 or X50 turn coils.



The quality low resistance test lead set supplied is made of multi strand (735/0.12mm) oxygen free copper and is terminated with 8AWG gold plated ring and plug terminals.

When used in conjunction with a high current multi-function calibrator such as the Time Electronics 5051 or 5025 (available separately), clamp calibration up to 1100A is possible.



Two coil options are available, firstly a 1:1 coil (X1) i.e. 10 amps in, 10 amps out and secondly a specially designed 50 turn coil (X50) which gives 1:50 i.e. 10 amps in, 500 amps out.

9780 Technical Specifications

The 9780 is a precision adaptor for use with calibrated AC or DC sources and allows accurate calibration of a wide range of clamp meters.

Two current loops are provided; a 1 to 1 ratio and the high range a 50 to 1 ratio.

The maximum allowed primary current is 22A RMS. The frequency range is 45—90 Hz.

The series resistance of the 50 turn coil is approximately 0.11Ω and the inductance is 1mH. The resistance of the 1 turn coil is approximately 1mΩ.

The 9780 is rated for continuous operation at 10amps. At 22 amps the duty cycle should be a maximum of 3 minutes on and 6 minutes off.

When used with older style clamp meters where substantial operating power is required it should be noted that additional power will be required from the current source. For example a 1000amp Ferranti clamp on ammeter will require at least 50% more power from the current source.

This will require increased power transfer through the clamp meter adaptor and therefore the on to off time should be increased to 1 to 10 ie 1 minute on and 10 minutes off.

SPEC 0 TO 22 AMPS TRANSFER RATIO 50 TO 1 OR 1 TO 1

| Calibrator | O/P Frequency | Amp Turns | Accuracy (% of O/P) | plus Floor (Amps) |
|--------------|---------------|------------|---------------------|-------------------|
| 0.2A to 2.2A | DC | 10 - 110 | 0.5 | 0.05 |
| 2.2A to 22A | DC | 110 - 1100 | 0.5 | 0.15 |
| 0.2A to 2.2A | 45-65 Hz | 10 - 110 | 0.5 | 0.2 |
| 0.2A to 2.2A | 65-90 Hz | 10 - 110 | 1 | 0.25 |
| 2.2A to 22A | 45-65 Hz | 110 - 1100 | 0.5 | 0.7 |
| 2.2A to 22A | 65-90 Hz | 110 - 1100 | 1 | 0.9 |

The coils are rated for continuous use at 10A.
At 22A the duty cycle is 3 mins on and 6 mins off.

Max drive voltage is 3Vdc or 3V rms ac.

The above specification applies for use with general purpose clamp meters such as the Fluke 801-1000 or LEM LH1020.

General Specification

Dimensions: 240W X 280D X 85H mm

Weight: 3.9Kg

Ordering Information

| Code | Description |
|------|---------------------|
| 9780 | Clamp Meter Adaptor |

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



9773 Optical Tacho Adaptor

Time Electronics

Calibration, Test & Measurement

- **Compatible with 5051 and 5025**
- **0.01 % Accuracy**
- **EasyCal Software Compatible**



The Optical Tacho Adaptor is designed to provide an interface to allow Time Electronics 5025 and 5051 multifunction calibrators to calibrate most optical tachometers.

A high brightness LED is driven from the multi-function calibrator's 10MHz digital Frequency output. By selecting various frequencies precision RPM calibration can be performed.

EasyCal procedures can easily be written to produce calibrations certificates showing the tachometers accuracy at any desired RPM.

9773 Technical Specifications

| | |
|---|---|
| RPM range (using Digital Frequency): | 6 rpm (0.1Hz) - 600,000 rpm (10KHz) |
| Accuracy: | 0.01% |
| Connection: | Screened 400mm lead, terminated with BNC plug for connection to 10MHz frequency output on 5025 or 5051 calibrators. |

General Specification

| | |
|-------------|--------------------------|
| Dimensions: | 76.5mm x 50.5mm x 28.0mm |
| Weight: | 80g |

Ordering Information

| Code | Description |
|------|---|
| 9773 | Optical Tacho Adaptor |
| 9747 | EasyCal Software (Automatic Calibration Software, including over 1000 procedures) |

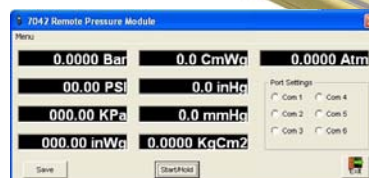


7042 Remote Pressure Module

Time Electronics

Calibration, Test & Measurement

- Compatible with 5051 Multifunction Calibrator
- Vacuum, 0.2, 2, 5, 10, 20 bar options
- Pressure/Vacuum calibration 0.04% accuracy
- PC Software Included
- USB powered



The 7042 is a Remote pressure module suitable for workshop, laboratory and field use.

Pressure is read back on screen using the interactive PC software supplied. A data logging feature allows the user to record and store pressure readings as required. Alternatively EasyCal calibration management software can be used.

7042 Technical Specifications

Pressure Calibration

| | |
|----------------------|---|
| Pressure Range: | 0.2, 2, 5, 10, or 20 bar (specified on ordering) |
| Vacuum: | Available on 2 bar range. Measures vacuum to - 1 bar |
| Accuracy: | 0.04% of range +/- 1 digit (0.2 bar version, 0.1% of range +/- 1 digit) |
| Temp. Stability: | Less than 0.005% per °C |
| Sensor: | Piezoresistive |
| Pressure connection: | 1/8" BSP female in a stainless steel manifold |
| Over-pressure: | 3 x full scale or, 35 bar |
| Wetted parts: | Stainless steel & silicon (contaminated media version - stainless steel only) |
| Units: | Bar, PSI, KPa, inWg, cmWg, inHg, mmHg, Kg/cm ² , Atm |

General Specification

| | |
|-------------------------|---|
| Power: | USB |
| Front panel: | Polycarbonate |
| Case: | Impact resistant ABS |
| Operating temp: | 0 to 50 °C. |
| Storage temp: | -10 to 60 °C |
| Accessories: | Carry case, Pneumatic fittings kit and hose, Test lead, 1m USB cable |
| Dimensions: | 157 x 90 x 33 mm (6 x 3.5 x 1.2 inch) |
| Weight: | 0.29kg (10oz) |
| Optional Extras: | Hand pressure pump Vac-40bar EasyCal calibration software Calibration Certificates – traceable to N.P.L. and UKAS |

Ordering Information

| Code | Description |
|-------|--|
| 7042 | Digital Pressure Calibrator 7042/71xx/C The pressure range is specified as follows: 7100 = 200mbar 7101 = 2 bar 7102 = 5 bar 7103 = 10 bar 7104 = 20 bar For contaminated media version add /C |
| 7090A | Pneumatic hand pump – 950mB to 40 bar |
| 9747 | EasyCal Software (Automatic Calibration Software, including over 800 procedures) |
| 9185 | N.P.L. Traceable Calibration Certificate |
| 9196 | UKAS Calibration Certificate |



9840 Series Power Calibrators (Single and 3 Phase)

Time Electronics

Calibration, Test & Measurement

- 4 voltage ranges: 57 - 110 - 220 - 500V
- 4 current ranges: 1 - 5 - 20 - 100A
- Frequency: 45 - 70Hz
- Phase angle: $-90/0/+90^\circ$
(0.1° resolution)
- Total harmonic distortion:
Pre-settable from 1% to 15%



The **9840 series calibrators** are used for adjusting, checking and verification of measuring instruments used in power engineering. These include active and reactive power meters, phase meters, frequency meters, ammeters, voltmeters, transducers, monitoring systems, and frequency, voltage and current relays.

It is constructed in a standard 19" rack-mount size case. Voltage and current output signals are set by multi-turn potentiometers and are simultaneously indicated on 4.5 digit LED displays. Frequency and phase angle are also set by multi-turn potentiometers and are displayed on 4 digit LED indicators.

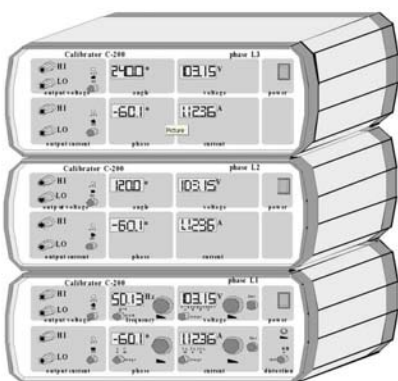
Instruments to be calibrated can safely be connected to the outputs without changing the set values since the calibrator can be switched to 'standby' mode to isolate the output terminals.

Sinusoidal signals are generated on both voltage and current outputs. If required, between 1% and 15% harmonic distortion can be added to the signals.

Three Phase Calibrator Set

Calibrator 9840 can work in a three phase set (order code 9845). It consists of one calibrator in basic configuration (phase L1) and two calibrators in special configuration (phase L2 and phase L3). Calibrator phase L1 controls phase L2 and L3 by means of analogue and digital signals. All connections are on the rear panels.

The calibrator set is able to generate a symmetrical three phase vector, programmed from control calibrator phase L1. The phase angles between the 3 phases are shown on the displays.



| | |
|---|---------------------------|
| Shift angle between voltage signals | $120^\circ \pm 1^\circ$ * |
| Maximum amplitude difference in each phase from average value (voltage) | $\pm 1\%$ of value |
| Maximum amplitude difference in each phase from average value (current) | $\pm 1\%$ of value |
| Maximum difference in phase angle between voltage and current | $\pm 1^\circ$ * |
| * for settings greater than 10% on voltage and current range | |

9840 Series Technical Specifications

| Parameter | Range | Settings Span | Resolution | Accuracy | Maximum Load |
|--|-------------|----------------|------------|------------------------------------|------------------|
| Voltage | 57V | 0.5 - 60V | 0.01V | ±0.05% of set value ±3 digits | 250mA@60V |
| | 110V | 1.00 - 125V | 0.01V | | 140mA@130V |
| | 220V | 2.0 - 250V | 0.1V | | 70mA@250V |
| | 500V | 3.0 - 500V | 0,1V | | 40mA@420V |
| Current | 1A | 0.01 - 1.3A | 0.0001A | ±0.05% of set value ±3 digits | 12V@1.2A |
| | 5A | 0.05 - 6A | 0.001A | | 3V@6A |
| | 20A | 0.2 - 20A | 0.001A | | 1V@20A |
| | 100A (9841) | 1 - 100A | 0.01A | | 0.7/0.3V@50/100A |
| Frequency | | 45 - 70Hz | 0.01Hz | ±0.02Hz | |
| Phase | | 0.0 - +/-90.0° | 0.1° | ±0.5° * | |
| Total Harmonic Distortion (adjustable 1 - 15%) | | | | 0.5% of set value | |
| Dimensions (width x height x depth) | | | | 478 x 194 x 342 mm / 14Kg | |
| Power Supply | | | | 230V±10% / 50Hz 200VA, 110V option | |

** for settings greater than 10% of voltage and current range*

| Parameter | Operating conditions |
|----------------------|---|
| Ambient temperature | +5...+40°C |
| Atmospheric pressure | 70...106kPa |
| Relative humidity | 20...80% non-condensing |
| Power supply voltage | 230V ±10% 50Hz +/-5Hz. 110V 60Hz optional |
| Power supply freq | 45...65Hz |
| Power supply w/form | Sine, distortion factor <0.05 |
| Warm up time | 30 min |

| Parameter | Requirement |
|---|------------------------------|
| Safety | Class 1 according to EN61010 |
| Insulation (50Hz) power supply pins – case | 1.5kV |
| Voltage and current output terminals – case | 2kV |
| Voltage output terminals – current output terminals | 2kV |
| Control D-sub connection – case | 500V |
| Degrees of protection electrical equipment | IP20 according to IEC529 |
| Climatic conditions | Group I according to IEC359 |
| Power consumption | 200VA max |
| Dimensions (with/height/depth), Weight | 478/194/342mm, 14kg |

Ordering Information

| Code | Description |
|------|--|
| 9840 | Standard single phase source with current range up to 20A |
| 9841 | Single phase source with additional 100A current range |
| 9845 | Three phase symmetrical source with current range up to 20A |
| 9846 | Three phase symmetrical source with additional 100A current range |
| 9847 | Three phase asymmetrical source with current range up to 20A |
| 9848 | Three phase asymmetrical source with additional 100A current range |

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



Calibration Software

Time Electronics' EasyCal Calibration software is the ultimate addition to any calibration process, with easy to operate features that make instrument calibration faster and more reliable. This comprehensive suite of programs combines a user friendly interface with TE technologies to improve the way you automate calibration procedures. EasyCal operates with all Time Electronics' programmable instruments and calibrators.

EasyCal Calibration Software **Page 86**

Introduction **Page 87**

EasyCal Overview **Page 88**

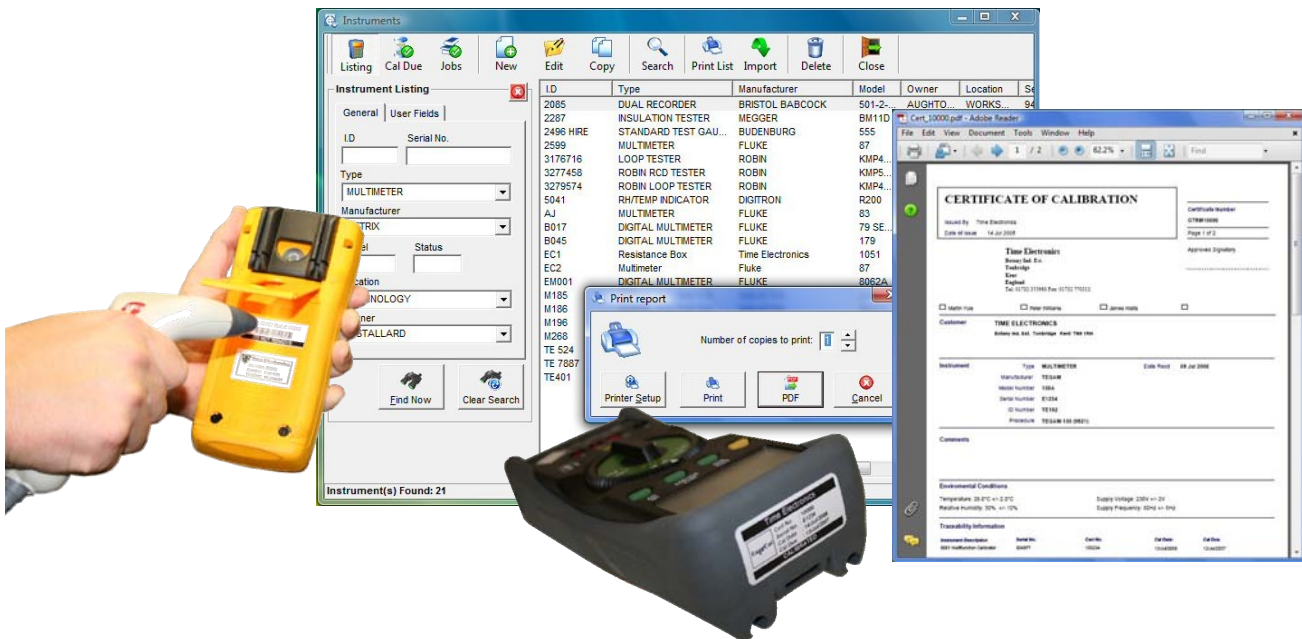
Example Certificates and Reports **Page 92**



EasyCal Calibration Software

The comprehensive solution to calibration management

EasyCal



laboratory . site . office

- ✓ Calibrate electrical, mechanical, pressure and temperature devices
- ✓ Automated Calibration Run
- ✓ Calibration Label Printing
- ✓ E-mail Reminder Letters
- ✓ Instrument Control GPIB/RS232/USB
- ✓ Calibration Due Reminder System
- ✓ Network Compatible
- ✓ ID Label Printing
- ✓ Customise reports and certificates
- ✓ Bar Codes
- ✓ Generate PDF reports & certificates
- ✓ Over 1000 Standard Calibration Procedures Included

For windows 2000, xp, and vista

Introduction

For laboratory, office and site calibration work, EasyCal is the ideal solution.

Automating the calibration process brings important benefits and provides increased speed of calibration and consistency of results. Calibration certificates and reports are produced easily to ISO 9001, ISO 17025, and UKAS quality standards. EasyCal also simplifies the administration process from reminder reports, through to despatch.

✓ EasyCal Networking

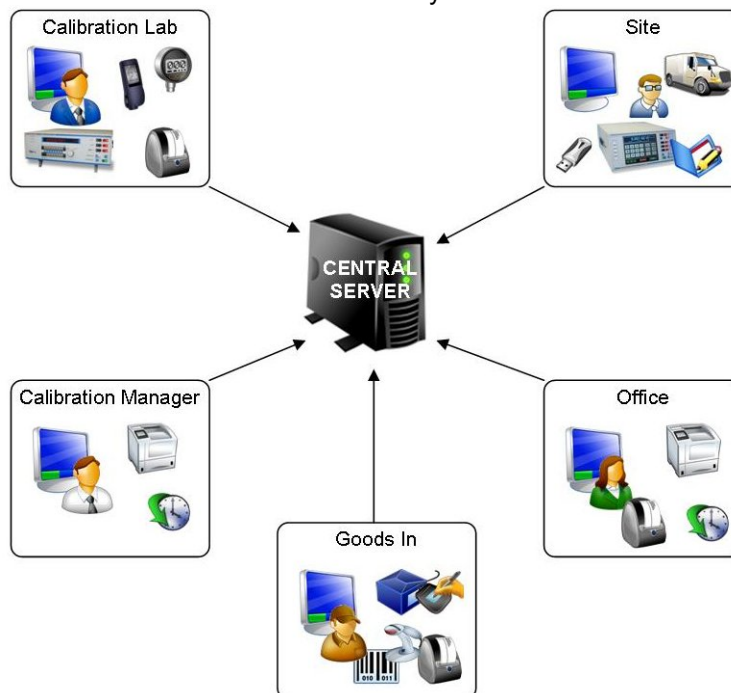
With networking capabilities a multi-user installation can be implemented.

Office stations can keep track of job information, produce reminder reports and issue certificates.

Laboratory stations perform the actual calibration, enter any 'on going' job information, create or edit test procedures and issue certificates.

Management can over-see the complete operation. Keep track of calibration standards and instruments. Create and update uncertainty information. View and issue reports and certificates. Control user access and monitor job progress. Create, edit and sign off test procedures. With the ability to 'simulate' calibration runs procedures can be tested without the need for the calibrating instrument or unit under test.

Site calibration is also controlled by EasyCal. The required information for a site job is transferred to a laptop or 5051 calibration system. Alternatively 'calibration test forms' can be produced for hand written entry. The data is imported to the central servers' database or entered into EasyCal back at base.



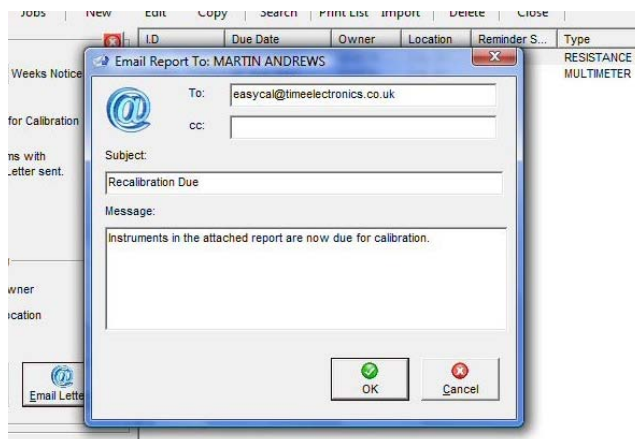
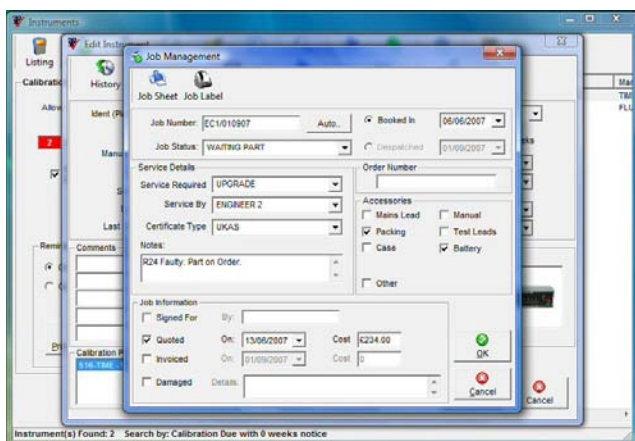
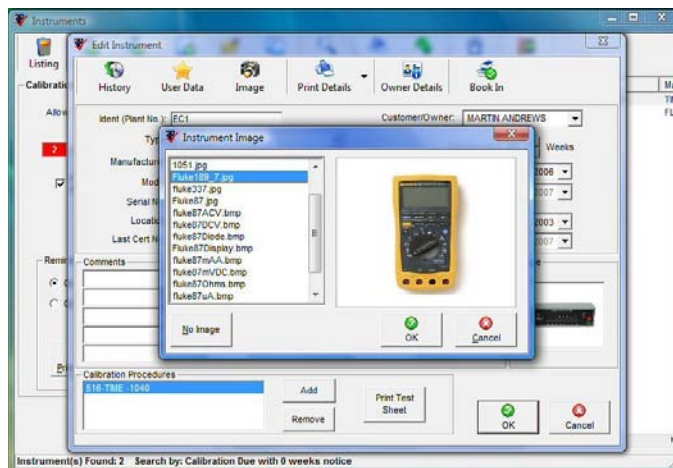
EasyCal Features

| | |
|--------------------------------|---|
| Networking: | For multi-station and site calibration work |
| Licensing: | Portable, only required for calibration runs |
| Instrument Control: | Control and communicate with any RS232/USB/GPIB instrument |
| TE Instrument Support: | Time 5025, 5051, 5075, 5018, 5011 and more |
| GPIB Support: | NI, Agilent, Measurement Computing, CEC |
| Security: | Secure User Log In and Digital Signatures |
| Crystal Reports: | Edit certificate and report templates. Create custom reports |
| Uncertainty Management: | Create uncertainty tables for Laboratory and Site |
| Built –in PDF engine: | Produce PDF certificates and reports without 3 rd party software |
| Data export: | To CSV and HTML formats. |

EasyCal Overview

✓ Instruments, Customers, and Jobs

A comprehensive database of instruments and customers (or owner) allows the operator to access any information required. By clicking the search button on the toolbar it is possible to enter specific criteria to quickly find the instrument or customer. When adding details the user is aided by comprehensive drop-down lists, which automatically update when a new detail is added. When an instrument is booked in the job process starts. Specific information about the job is entered; such as 'service required', 'service by' and 'accessories supplied'. A job sheet and label can be produced at this stage to accompany the instrument. As the job is put through the system these parameters can be updated for example 'quote price', 'job status' and 'invoiced'.



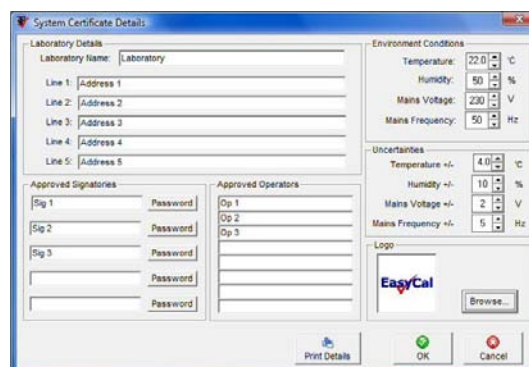
✓ Instrument Recall and Reminder System

Instruments which are due for calibration are listed on screen. From here reminder letters and lists can be printed or emailed directly to the customer or department.

✓ Calibrating Instruments, Standards and Uncertainties

Traceability information on calibrating instruments and standards is stored and maintained by EasyCal. Uncertainty tables for laboratory and site can be created for each calibrating instrument. These are then automatically processed and applied to certificates.

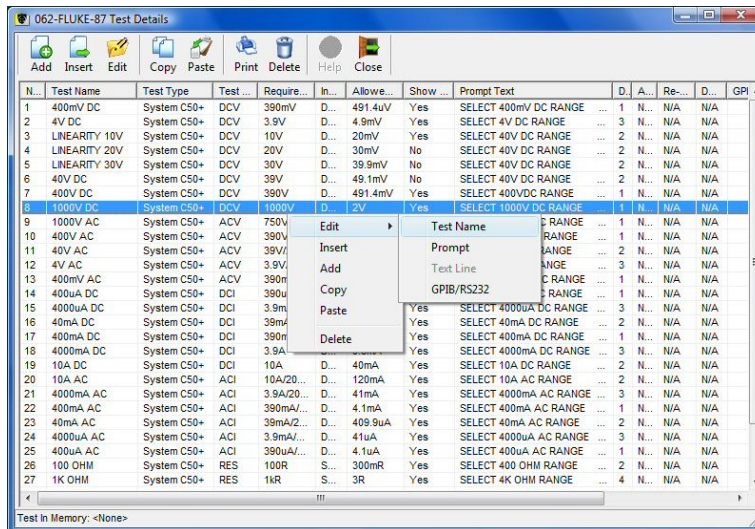
| Function | Lower Limit | Upper Limit | Uncertainty |
|------------|-------------|-------------|-------------|
| DC Voltage | 0V | 0.02V | ± 11.88µV |
| DC Voltage | 20V | 200V | ± 30.37mV |
| DC Voltage | 2V | 20V | ± 1.47mV |
| DC Voltage | 0.02V | 0.2V | ± 30.54µV |
| DC Current | 250A | 500A | ± 55.14mA |
| DC Current | 20A | 50A | ± 2.52mA |
| DC Current | 2A | 20A | ± 55.12mA |
| DC Current | 500A | 1000A | ± 55.14mA |
| DC Current | 0.002A | 0.002A | ± 1.25µA |
| DC Current | 0.002A | 0.02A | ± 7.61µA |
| DC Current | 0.02A | 0.2A | ± 80.53µA |
| DC Current | 50A | 250A | ± 55.12mA |
| DC Current | 0A | 0.0002A | ± 0.14µA |



EasyCal Overview

✓ Procedure Writing and Editing

Creating and editing test procedures is made simple with intuitive, user-friendly windows. Editing test information can be done by replacing, adding, or copy/pasting. EasyCal keeps track of each time a procedure is edited.



✓ Standard Procedures

A standard calibration library comprising of over 1000 procedures covering a wide variety of instruments is included as standard. Procedure templates for multi-meters, clamp meters, decade boxes, insulation testers, and more can be used for creating any new procedures as required.

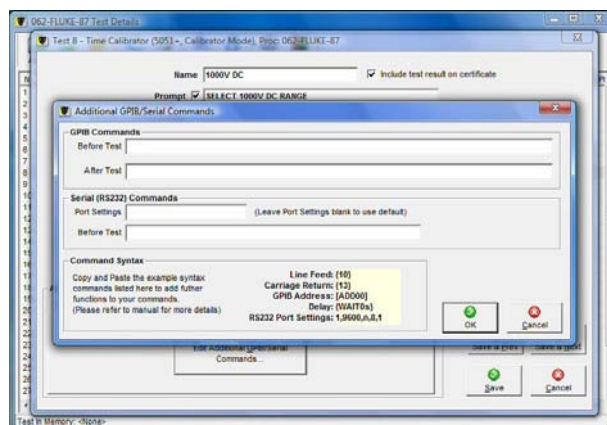


✓ Conversion Tables

Conversion tables for thermocouples and RTDs are included; alternatively user-defined tables can be created.

✓ RS232 / GPIB Commands

For more complex instrument control GPIB / RS232 commands can be sent on a test-by-test basis or run as a script.



✓ Procedure Reports

Procedure reports are available for approval and signing off.

✓ Procedure Simulation

To help with the development of procedures a test can be edited while a calibration run is being performed. Also the Calibration Run Simulator means a procedure can be tested without the need for controlling an instrument.

EasyCal Overview

✓ Instrument Calibration

Selection of the instrument under test is quick and easy. With the use of a barcode scanner this selection becomes automatic.

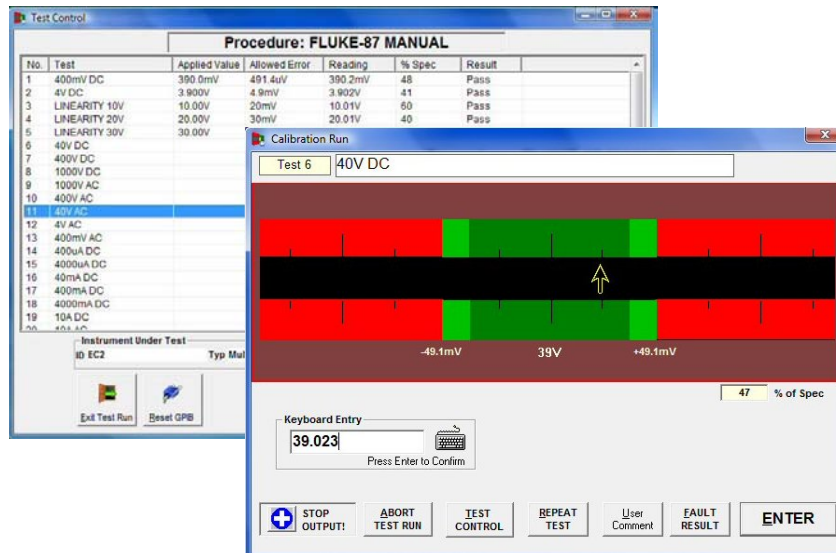
✓ Calibration Prompts

Picture prompts are shown to aid the user with instrument range selection and connection.



✓ Test Control

At any stage during the calibration run a summary of the results for the tests completed is displayed. The operator is able to move forward or backward through the procedure as required. A summary printout is also available from Test Control.



✓ Graphical Test Screen

The calibration run is made simple and efficient by a graphical user-interface, which increases speed of data entry. Instruments, which cannot be automatically calibrated, can still have the results data entered manually. The entered value is compared with the required value as specified in the procedure.

✓ End of Calibration Run

At the end of a calibration run the operator has the option to print a certificate and label. The ability to edit service information is also presented to the operator.

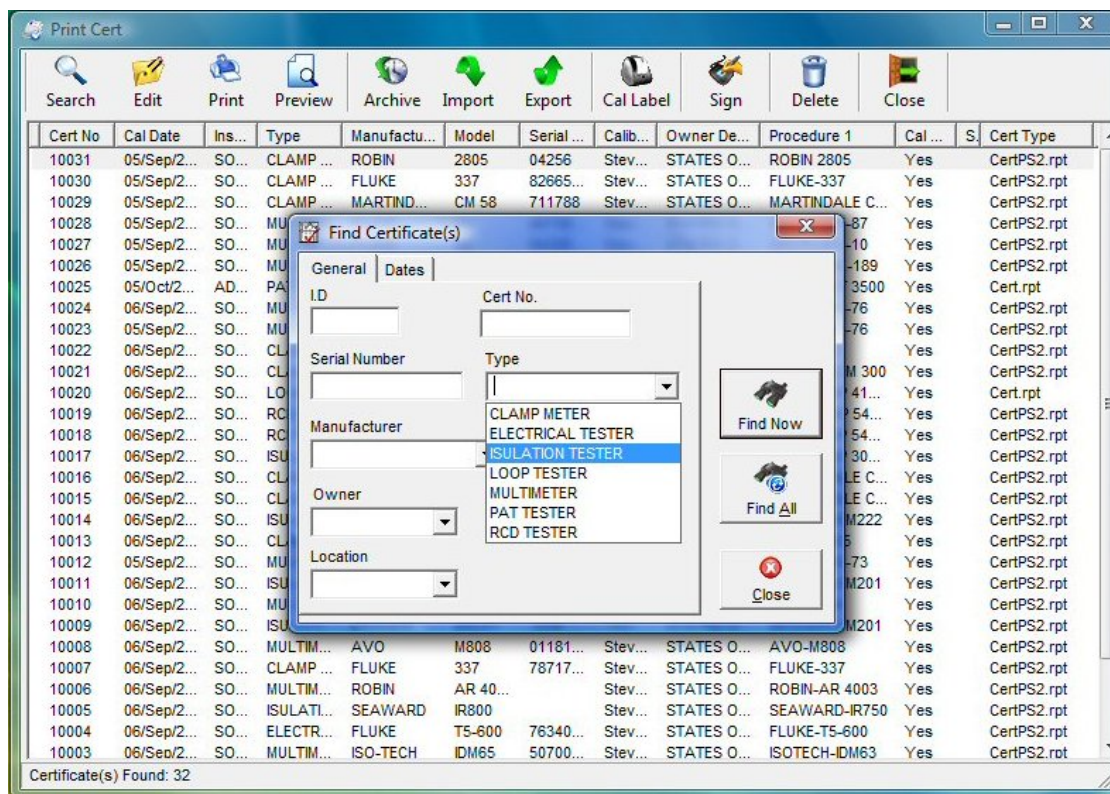
✓ Calibration Test Forms

Alternatively 'calibration test forms' for hand written results are available. This data is then entered into EasyCal at a later date.

EasyCal Overview

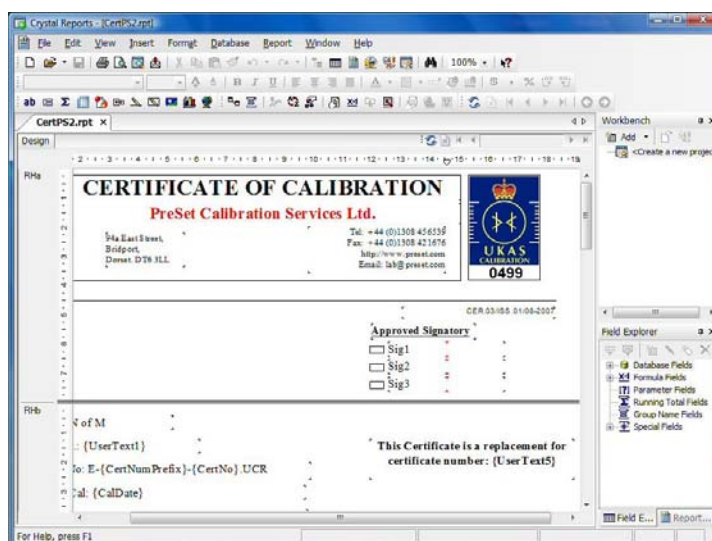
✓ Certificates

Produce Calibration Certificates & labels on demand. The user can keep a record of instrument history and servicing. Simple search facilities help find the required certificate.



✓ Customise Certificates

Using Crystal Reports (optional) certificates formats can be easily customised, or design a new certificate layout.



✓ Import and Export Results

Data can be exchanged from one system to another user via the import and export features. Certificate data can be converted in spreadsheet, CSV and HTML formats.


Example Reports and Certificates

Certificates

| CERTIFICATE OF CALIBRATION | | Certificate Number |
|---|------------------|---|
| Issued By | Time Electronics | GTRM10000 |
| Date of Issue | 14 Jul 2006 | Page 1 of 2 |
| Time Electronics Botany Ind. Est. Tonbridge Kent England Tel: 01732 355993 Fax: 01732 770312 | | Approved Signatory |
| <input type="checkbox"/> Martin Yule <input type="checkbox"/> Peter Williams <input type="checkbox"/> James Watts <input type="checkbox"/> | | |
| Customer TIME ELECTRONICS Botany Ind. Est. Tonbridge Kent TN9 1RH | | |
| Instrument | Type | Date Recd |
| | MULTIMETER | 09 Jul 2006 |
| Manufacturer: TEGAM Model Number: 139A Serial Number: E1234 ID Number: TE192 Procedure: TEGAM-139 (M21) | | |
| Comments Calibrated After adjustment. See Cert No. 2304 for before adjustment. | | |
| Environmental Conditions Temperature: 29.0°C +/- 2.0°C Supply Voltage: 230V +/- 2V Relative Humidity: 30% +/- 10% Supply Frequency: 50Hz +/- 5Hz | | |
| Traceability Information | | |
| Instrument Description | Serial No. | Cert No. |
| 5051 Multifunction Calibrator | 3046F7 | 100234 |
| Cal Date | Cal Due | |
| 13Jul/2006 | 13Jul/2007 | |
| Calibrated by: Stuart Richards | | Date of Calibration: 14 Jul 2006 |

| CERTIFICATE OF CALIBRATION | | Certificate Number | | | | |
|---------------------------------|------------------|--------------------|--------------|---------------|-----------|-----------|
| Issued By | Time Electronics | GTRM10000 | | | | |
| Date of Issue | 14 Jul 2006 | Page 2 of 2 Pages | | | | |
| Test Name | Freq (Hz) | Rqd Val | Actual Value | Allowed Error | % of Spec | Pass/Fail |
| DC Voltage Ranges | | | | | | |
| 200mV D.C. | | 190.09 mV | 190.0 mV | 1.00 mV | -0.5% | Pass |
| 2V D.C. | | 1.9037 V | 1.900 V | 10 mV | -0.1% | Pass |
| 20V D.C. | | 19.500 V | 19.00 V | 105 mV | 0.5% | Pass |
| 200V D.C. | | 188.95 V | 190.0 V | 1.00 V | 5% | Pass |
| 1000V D.C. | | 999.88 V | 1000 V | 8.0 V | 2% | Pass |
| AC Voltage Ranges | | | | | | |
| 1000V A.C. | 210Hz | 750.0 V | 750.0 V | 12 V | 0% | Pass |
| 200V A.C. | 200Hz | 190.00 V | 190.0 V | 2.4 V | 0% | Pass |
| 20V A.C. | 200Hz | 18.894 V | 19.00 V | 236 mV | 1.5% | Pass |
| 2V A.C. | 200Hz | 1.9030 V | 1.900 V | 24 mV | 0% | Pass |
| 200mV A.C. | 200Hz | 190.00 mV | 190.0 mV | 2.4 mV | 0% | Pass |
| DC Current Ranges | | | | | | |
| 2mA D.C. | | 1.9920 mA | 1.900 mA | 20 uA | -10% | Pass |
| 20mA D.C. | | 19.040 mA | 19.00 mA | 200 uA | -20% | Pass |
| 200mA D.C. | | 190.20 mA | 190.0 mA | 3.0 mA | -10% | Pass |
| 2A D.C. | | 1.9370 A | 1.900 A | 39 mA | -45% | Marginal |
| 10A D.C. | | 19.297 A | 19.00 A | 205 mA | -145% | Fail |
| AC Current Ranges | | | | | | |
| 10A A.C. | 200Hz | 10.000 A | | 360 mA | | Fault |
| 2A A.C. | 200Hz | 1.9952 A | 1.900 A | 62 mA | -10% | Pass |
| 200mA A.C. | 200Hz | 190.00 mA | 190.0 mA | 4.3 mA | 0% | Pass |
| 20mA A.C. | 200Hz | 19.043 mA | 19.00 mA | 429 uA | -10% | Pass |
| 2mA A.C. | 200Hz | 1.9957 mA | 1.900 mA | 43 uA | 10% | Pass |
| Linearity - 20V DC Range | | | | | | |
| LINEARITY 5V | | 5.0018 V | 5.000 V | 35 mV | -0.5% | Pass |
| LINEARITY 10V | | 10.0012 V | 10.000 V | 60 mV | -0.2% | Pass |
| LINEARITY 15V | | 15.0042 V | 15.000 V | 85 mV | -0.5% | Pass |
| Resistance Ranges | | | | | | |
| 100 OHMS | | 100.000 R | 100.1 R | 900 mR | 11% | Pass |
| 1 KOHMS | | 1.00000 kR | 0.999 kR | 8.0 R | -17% | Pass |
| 10 KOHMS | | 10.0000 kR | 9.99 kR | 60 R | -17% | Pass |
| 100 KOHMS | | 100.000 kR | 100.0 kR | 600 R | 0% | Pass |
| 10 MOHMS | | 10.000 MR | 10.000 MR | 210 R | 0% | Pass |

Job Sheet and Labels

| Job Sheet | | Print Date: 25-May-07 |
|--|--|---------------------------------|
| Job Number: 146-0461/230507 | | Date Received: 23-May-07 |
|  | | Order Number: |
| Owner Details GOLDSCHMIDT UK LTD Firmby Works Maryport Cumbria CA15 8RP | Instrument Details Inst ID: 146-0461 Type: APPLIANCE TESTER Manufacturer: SEAWARD Ser No.: 146-0461 Model: 2000i | |
| Service Details Service Required: Upgrade Service By: CG Job Status: Awaiting Quote Certificate Required: NPL Battery Requires Replacement. Fit New R34 & 56. Clean instrument and install new firmware. | | |
| Return with Accessories ; Packing ; ; Test Leads ; ; Case ; ; Manual ; | | |
| Signed For By: Peter Farnham | | Signature: |





Calibration Bench and Options

The Time Electronics Calibration Bench is designed for a wide range of calibration and test procedures. It covers temperature, pressure, and electrical signals; calibrating multi-meters, AC/DC signal sources, frequency timers, oscilloscopes, resistance boxes, thermocouple transmitters, pressure transducers, loop signal indicators, and much more.

Offering versatility and precision the Calibration Bench is ideal for laboratories and workshops in need of multi-product testing that meets the highest industry standards. Specific functions can be added, making a complete system for your industry and engineering needs. The bench is a safe, organized, efficient workspace made for professionals.

| | |
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Calibration Bench

The ultimate multifunction calibration station from *Time Electronics*

TEMPERATURE – PRESSURE – ELECTRICAL SIGNALS



- Multimeters
- AC/DC signal sources
- Signal generators
- Frequency meters
- Timer counters
- Oscilloscopes
- AC/DC Milli-voltmeters
- Ohm meters
- Resistance boxes
- Temperature indicators
- Clamp meters
- RTD transmitters
- Temperature sensors
- Power supplies
- Loop signal indicators
- Thermocouple transmitters
- Pressure transducers
- Pressure transmitters
- Pressure switches, gauges
- Loop signal transmitters

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Introduction

CalBench is the ultimate multifunction calibration station from Time Electronics. A wide range of standard modules can be mounted in the primary console; this gives a highly flexible system that is both functional and easy to use. Further expansion can be achieved by adding the optional secondary console 7081.

Core modules cover electronic signal, temperature, and pressure applications, non-standard modules for special applications can be incorporated into the bench consoles; each module is an independent item and there is a high degree of inter-changeability. This allows each bench to be custom designed to meet specific engineering requirements.

Functions are clearly defined on each module and a competent technician will quickly master the operation of the system without expensive training or constant reference to manuals.



Module Options

Pressure: Ranges from vacuum to 600bar. Also available is an Automatic Pressure Calibrator that allows 4 preset points to be selected at the push of a button, or by EasyCal remote control.

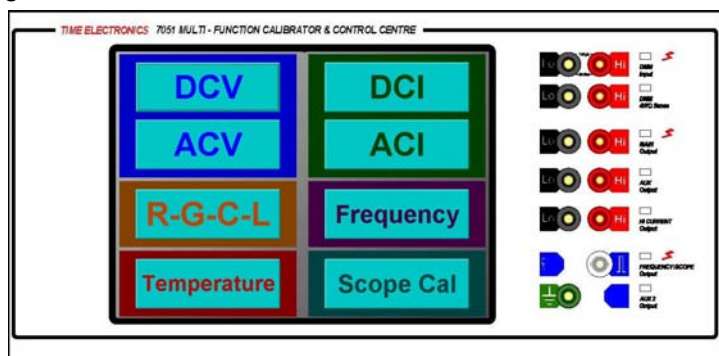
Power: Variable AC mains, variable DC and fixed quad or dual DC supplies can be fitted.

Loop and Temperature: High accuracy loop calibrator modules with source, measure and sink functions. Temperature calibrators capable of measuring and simulating RTDs/thermocouples.

External Options: Pneumatic (35bar) and hydraulic (250bar) handheld calibration pumps. Dry block calibrators with ranges from -25°C to 700°C.

Multifunction Calibrator and Control Centre

Mounted centrally in the console with touch screen control. Source and measure voltage, current, resistance, frequency and much more. To make calibration faster and more productive, the control centre is preloaded with Time Electronics' well-established EasyCal software, which integrates with bench modules. Offering over 850 test procedures and networking capabilities, it fully automates the calibration process. Engineers can print and customise test certificates as required.



7080 Bench, Primary Console and 7081 Secondary Console

The Calibration Bench is constructed from a **7080** bench and primary console. The Secondary Console, **7081** is an optional expansion.




The bench consists of frame, back plates, support arms, and worktop. It is supplied in knockdown format that is simple to assemble - a separate assembly instruction manual is provided.

The primary console is mounted above the tabletop workspace and houses the calibration modules, DC and AC power supplies and the central control centre. Switchable under-console lighting is provided as a standard feature.

The Secondary console is located under the primary console, and can house power supplies, pressure calibration modules, and temperature distribution.

These consoles are supplied complete, fully tested and with the modules installed. They are ready to operate and require only mains power and line pressure to be connected.

The bench assembly is constructed from mild steel throughout. The side panels and console support arms are welded to provide a strong frame. The whole assembly paint finished in hardwearing light grey oven baked paint.

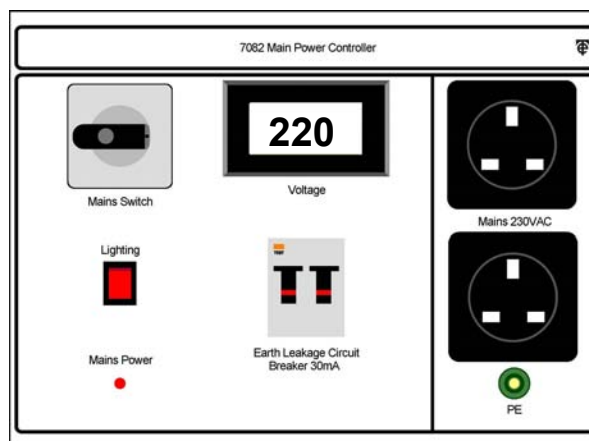
| | | |
|---|--|---|
|  |  |  |
| Primary Console | Bench with back plate and drawer option | Secondary Console |
| Dimensions | | |
| Overall (including console): | Width 200 x height 156 (or 166) x depth 85cm, 175Kg typical. | |
| Primary Console: | Width 200 x height 29 x depth 47cm, 90Kg typical. | |
| Secondary Console: | Width 192 x height 40 x depth 19.5 cm, 30Kg typical. | |
| Height from worktop | | |
| Primary Console: | 42cm | |
| Secondary Console: | 12.5cm | |
| Worktop: | Width 200 x 80 deep x 3.8cm, 85cm above floor, durable finish. | |
| Supply Connections | | |
| Electrical – The Primary console is powered from a single-phase mains supply via a 16A heavy-duty type IEC socket at the rear of the console. | | |
| The Secondary console is powered from the primary console via a IEC power link cable. | | |
| Pressure - 'The external line pressure input ports are arranged on the rear of the primary and secondary consoles | | |

Power Modules

7082 Mains Power Controller

Mains Power is controlled via a **7082** single-phase unit equipped with 2 mains power sockets (types selectable). A further 4 sockets are available on the underside of the console. A main power switch, residual current circuit breaker with over-current protection (RCBO), and under console lighting switch are included. Mains input and lighting supply lines are filtered.

The mains voltage is continuously monitored on a digital meter. The two front panel sockets can be supplied via an isolation transformer as an optional extra. With this fitted the total current from the two sockets is limited to 1A. Another additional option is a 110V DC 5A supply with circuit breaker.



Available fittings include UK 13A, Euro Shuko 16A, Indian Round Pin 15A, and US 15A

Panel size: Width 270 x height 201mm

Specification

| | |
|--------------------|--|
| Switches: | Mains power on/off switch to provide isolation for the entire bench Lighting switch to provide separate control of the work-top lighting |
| Protection: | 16A overload protection for entire bench. Residual current protection is 0.03A. 5amp circuit breaker is fitted for the unregulated 110 volt DC supply option. |
| Sockets: | 2 x console front panel earthed sockets, 4 x console underside earthed sockets. 2 x 4mm front panel shrouded sockets for the 110-volt DC supply option. |
| Meters: | Mains voltage (0-300V) |
| Filter: | 2 filters fitted to attenuate mains spikes. |
| Panel size: | Width 270 x height 198mm. |
| Cooling: | 2 x Mains powered 80mm cooling fans are fitted internally to the console. |
| Earthing: | A PE socket is provided. All metal parts of the bench are connected to mains earth. |

Options

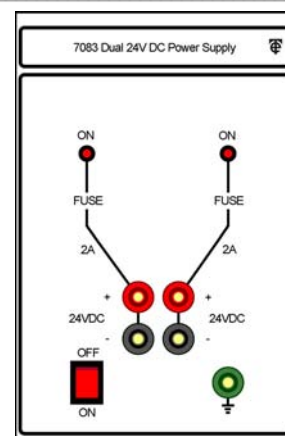
| | |
|-------------|--|
| 7063 | Isolated mains power up to 1 Amp, from the two front sockets. A 1 Amp cartridge fuse protects the supply. |
| 7075 | 110 volts DC up to 5 Amps. The supply is via two front panel mounted shrouded sockets and is protected by a reset-able 5 Amp circuit breaker, this also acts as a independent 110V power switch. |

7083 Dual 24V DC Supply

The **7083** provides two 24V, 2A outputs, which are floating with respect to each other and ground. A power on/off switch, fuses and LED indicators are provided. It is suitable for powering loop signal instrumentation.

Output: 2 x 24v, 2A

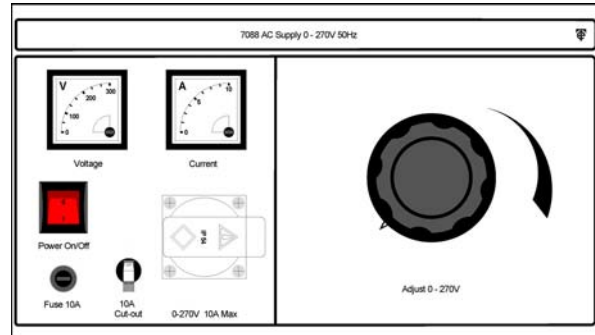
Panel size: Width 131 x height 201mm



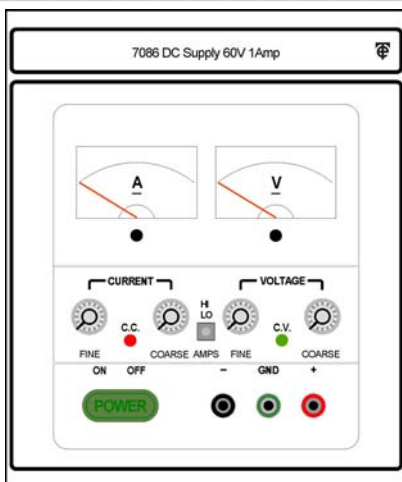
Power Modules

7088 Variable 0 to 270V 50Hz 10A Power Unit (0 to 150v 60Hz 10A also available)

The **7088** provides variable 50Hz AC power up to 10Amps. The output voltage and current are monitored on two meters and is available from a front panel socket (type selectable when placing order). The output is protected by a 10A circuit breaker. Further protection is provided a front panel fuse. The output voltage is adjustable by turning the front panel control knob. An independent incoming power switch is also provided. **Please note this power supply is not isolated from the mains supply and the highest voltage is dependant upon the mains line voltage**



Panel size: Width 350 x height 201mm



7086 Adjustable DC Power Supply: 0 to 60V or 0 to 30V

The output voltage and current for the **7086** is shown simultaneously on meters and coarse and fine control is provided with adjustable current limit. For maximum output current see below.

Output: 0 to 30V 3A
0 to 60V 1A

Panel size: Width 168 x height 201mm

7087 Quad DC Power Supplies

The **7087** Quad DC Power Supply provides four fixed independent floating supplies. The voltage and current ratings are 6V(8A), 12V(8A), 24V(4A), 48V(3A).

Each supply can be switched on/off individually and has its own fuse and power LED. Output connections are industry standard 4mm shrouded sockets.

The supplies can be connected in series to obtain an alternative output voltage. However, the current rating is that of the lowest rated supply.

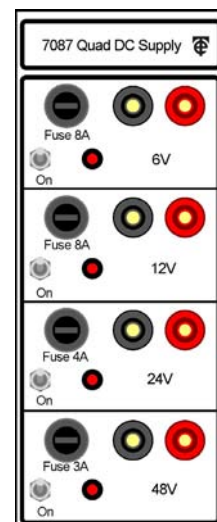
Regulation: 6V, 0.3V at 8A: 12V, 0.2V at 8A: 24V, 0.15V at 4A: 48V, 0.2V at 3A

Ripple and Noise: 50mV or 1% pk-pk, whichever is greater

Over-volt protection: 1.25 x nominal voltage output

Current Overload: 1.4 x max current rating

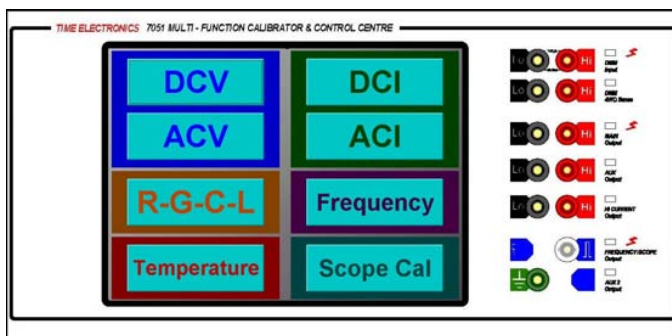
Panel size: Width 80 x height 201mm



Bench Control Centre

7051 Multifunction Calibration System

- 0-22V AC/DC, 0 – 220mA AC/DC
- 0 - 1G ohm - decade steps
- 10 MHz frequency
- Thermocouple Simulation/Measure 10 types
- RTD Simulation/Measure
- Digital Multi Meter 6½ digit - internal
- Simulated Resistance 10 ohms to 40M ohms
- Pressure Calibration control software
- EasyCal Calibration software
- Touch Screen



Panel size: Width 425 x Height 201mm

Mounted centrally in the primary console the **7051** acts as a control centre for the whole bench. It incorporates an industrial PC that is preloaded with the control programs and Time Electronics well established EasyCal calibration software. Full control of Electrical, Temperature, Pressure, and Loop signals, both in source and measure modes is available.

The control software allows a wide range of functions to be selected using mouse, keyboard, or touch screen. Precise calibration is possible using the deviation function - this provides a direct error readout for the instrument being calibrated.

The standard 7051 can calibrate, bench and handheld multi-meters, frequency meters, ohm meters, ac/dc millivoltmeters, thermocouple indicators etc. With 7051 options added, resistance boxes, clamp meters, temperature indicators/sensors, RTDs, power supplies, signal generators, ac/dc signal sources, timer counters, oscilloscopes. **For specifications and options see the 5051 datasheet.**

The **7051** includes a comprehensive package of options and provides a lab ready solution. It comes equipped with every item required for a complete calibration station:

DMM; Simulated Resistance; Touch Screen; Test Lead Set; EasyCal; Printer and Connectivity Kit (As Shown).

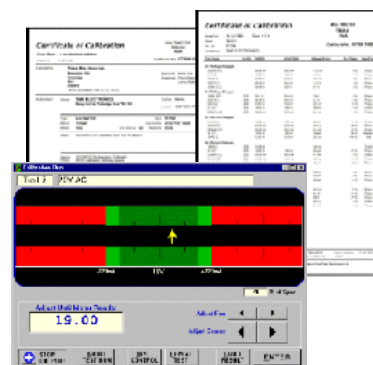


EasyCal

A suite of calibration programs that simplify and speed up calibration.

If you have an instrument that needs calibrating against specification and the results stored and printed, **EasyCal** is the answer.

CalMan provides the overall administration function for a modern cal lab. Providing calibration reminders, job control, site and pre-cal documentation



Pressure Modules

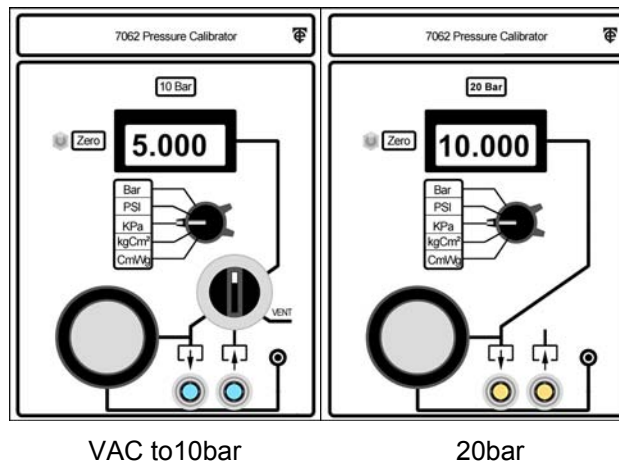
7062 Pressure Calibrator

Features a 4.5 digit display with 5 selectable pressure units.

A pneumatic switch allows direct pressure input, regulator output or vent control (not fitted on 20bar model). See **table 1, page 20** for units of engineering selection.

Fully integrated with the 7051 Control Centre and EasyCal the user can define pressure calibration procedures. Fully traceable calibration certificates can be printed as required.

Panel size: Width 129 x Height 201mm



VAC to 10bar

20bar

Specification

| Range | Vacuum | 0.2 | 2 | 5 | 10 | 20 |
|--|--|--------|-------|-------|-------|-------|
| Resolution (bar) | .001 | 0.01mb | .0001 | 0.001 | 0.001 | 0.001 |
| Regulator | Yes | Yes | Yes | Yes | Yes | Yes |
| Accuracy % +/- 1 digit | 0.04 | 0.1 | 0.04 | 0.04 | 0.04 | 0.04 |
| Temp Stability | Less than 70 ppm per degC | | | | | |
| Units | Bar, PSI, kPa, Mpa, inWg, cmWg, inHg, mmHg, Kg/cm2, atm** | | | | | |
| Maximum Pressure | 2 x range. 1.5 x range for 20 bar | | | | | |
| Sensor | Piezo-resistive – stainless steel diaphragm | | | | | |
| Over press warning | 1.2 x range full scale – audio and visual (on LCD) warning | | | | | |
| Fittings | Quick Release | | | | | |
| ** Specify on ordering: 5 pressure units max | | | | | | |

General Information and Options

| | | | |
|-------------------|--|--------------------|-------------------------|
| Regulator Supply: | Maximum of 15bar for 0.2, 2, 5, 10bar modules Maximum of 30bar for 20bar modules. | | |
| Connections: | Quick release couplings | | |
| Panel size: | Width 129 x Height 201mm | | |
| Order code: | 7062 / Pressure range option code | | |
| Pressure Options | 7100 = 200mbar range | 7101 = 2bar range | 7102 = 5bar range |
| | 7103 = 10bar range | 7104 = 20bar range | 7111 = Vacuum regulator |

Pressure Modules

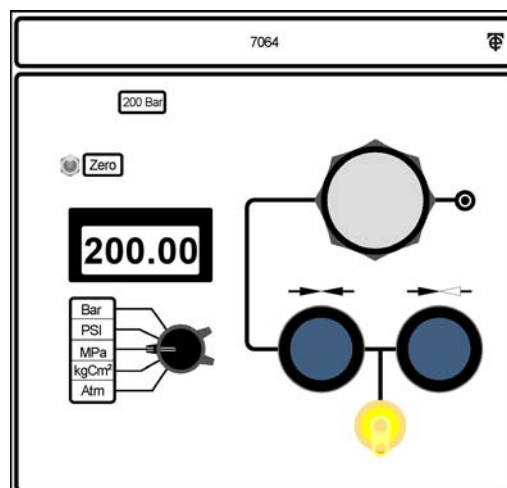
7064 High Pressure Calibrator

Features a 4.5 digit display with 5 selectable units. External line pressure (pneumatic) is connected to the console rear panel.

Output pressure is controlled by a non-relieving type regulator, with Bleed and Block needle valves used to vent and isolate the output port. All connections are Minimesh high-pressure type. For units of engineering selection see **table 1, page 20**.

Fully integrated with the 7051 Control Centre and EasyCal the user can define pressure calibration procedures.

Panel size: Width 200 x Height 201mm



Specification

| | | | | |
|-------------------------------|--|------|------|------|
| Range | 35 | 70 | 100 | 200 |
| Resolution (bar) | 0.01 | 0.01 | 0.01 | 0.01 |
| Regulator | Yes | Yes | Yes | Yes |
| Accuracy % +/- 1 digit | 0.04 | 0.04 | 0.04 | 0.1 |
| Temp Stability | Less than 70 ppm per degC | | | |
| Units | Bar, PSI, kPa, Mpa, inWg, cmWg, inHg, mmHg, Kg/cm2, atm** | | | |
| Maximum Pressure | 1.5 x range | | | |
| Sensor | Piezo-resistive – stainless steel diaphragm | | | |
| Over press warning | 1.2 x range full scale – audio and visual (on LCD) warning | | | |
| Fittings | Minimesh | | | |

** Specify on ordering: 5 pressure units max

General Information and Options

| | | | |
|-------------------------|-----------------------------------|---------------------|--|
| Panel size: | Width 200 x Height 201mm | | |
| Order code: | 7064 / Pressure range option code | | |
| Pressure Options | 7105 = 35bar range | 7106 = 70bar range | |
| | 7107 = 100bar range | 7108 = 200bar range | |

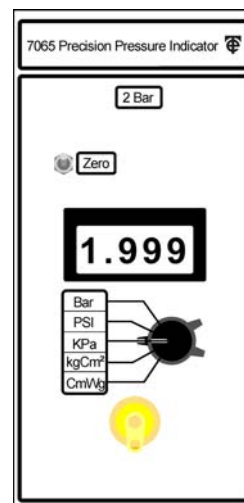
Pressure Modules

7065 Calibration Precision Pressure Indicator

Features a 4.5 digit display with 5 selectable pressure units.
For use with pneumatic up to 20bar and hydraulic/pneumatic up to 600bar.
Input connection is standard quick release or minimess high-pressure type above 20bar. For units of engineering selection see **table 1, page 20**.

Fully integrated with the 7051 Control Centre and EasyCal the user can define pressure calibration procedures.

Panel size: Width 96 x Height 201mm



Specification

| Range | Vacuum | 0.2 | 2 | 5 | 10 | 20 | 35 | 70 | 100 | 200 | 400 | 600 |
|-------------------------------|--|--------|-------|-------|-------|-------|------|------|------|------|-----|-----|
| Resolution (bar) | .0001 | 0.01mb | .0001 | 0.001 | 0.001 | 0.001 | 0.01 | 0.01 | 0.01 | 0.01 | 0.1 | 0.1 |
| Accuracy % +/- 1 digit | 0.04 | 0.1 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.1 | 0.1 | 0.1 |
| Temp Stability | Less than 70 ppm per degC | | | | | | | | | | | |
| Units | Bar, PSI, kPa, Mpa, inWg, cmWg, inHg, mmHg, Kg/cm2, atm** | | | | | | | | | | | |
| Maximum Pressure | 2 x range, 1.5 x range for 20 bar and above | | | | | | | | | | | |
| Sensor | Piezo-resistive – stainless steel diaphragm | | | | | | | | | | | |
| Over press warning | 1.2 x range full scale – audio and visual (on LCD) warning | | | | | | | | | | | |
| Fittings | Minimess (> 20 bar) and Quick Release (< 20 bar) | | | | | | | | | | | |

** Specify on ordering: 5 pressure units max

General Information and Options

Connections: Quick release coupling for 0.2 to 20 bar ranges.
Minimess coupling for 35 to 600 bar ranges.

Panel size: Width 96 x Height 201mm

Order code: 7065 / Pressure range option code

| Pressure Options | 7100 = 200mbar range | 7101 = 2bar range | 7102 = 5bar range |
|------------------|----------------------|---------------------|-------------------------|
| | 7103 = 10bar range | 7104 = 20bar range | 7105 = 35bar range |
| | 7106 = 70bar range | 7107 = 100bar range | 7108 = 200bar range |
| | 7109 = 400bar range | 7110 = 600bar range | 7111 = Vacuum regulator |

Pressure Modules

7038 Multifunction Precision Pressure Indicator

Features a 4.5 digit display with up to 9 selectable Pressure units depending on what pressure range is chosen, Loop current can also be displayed in mA, or as a percentage of span (4-20mA).

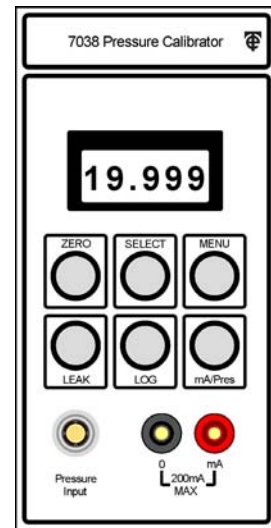
A min/max logging function (pressure or loop current) is provided. The min or max values can be recalled to the display and if required can be viewed in real time.

An additional feature is leak rate display. This allows the actual leakage rate to be observed in real time in the selected 'pressure units' per sec, or per min.

Input connection is standard quick release or minimess high pressure type. For units of engineering selection see **table 1, page 20**.

The 7038 is fully intergratable with the 7051 control centre and Easycal. The user can define pressure calibration procedures.

Panel size: Width 100 x Height 201mm



Specification

| | | | | | | | | | | | | |
|--|--|--------|-------|-------|-------|-------|------|------|------|------|-----|-----|
| Range | Vacuum | 0.2 | 2 | 5 | 10 | 20 | 35 | 70 | 100 | 200 | 400 | 600 |
| Resolution (bar) | .0001 | 0.01mb | .0001 | 0.001 | 0.001 | 0.001 | 0.01 | 0.01 | 0.01 | 0.01 | 0.1 | 0.1 |
| Accuracy % +/- 1 digit | 0.04 | 0.1 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.1 | 0.1 | 0.1 |
| Temp Stability | Less than 70 ppm per degC | | | | | | | | | | | |
| Units | Bar, PSI, kPa, Mpa, inWg, cmWg, inHg, mmHg, Kg/cm2, atm** | | | | | | | | | | | |
| Maximum Pressure | 2 x range, 1.5 x range for 20 bar and above | | | | | | | | | | | |
| Sensor | Piezo-resistive – stainless steel diaphragm | | | | | | | | | | | |
| Over press warning | 1.2 x range full scale – audio and visual (on LCD) warning | | | | | | | | | | | |
| Fittings | Minimess (> 20 bar) and Quick Release (< 20 bar) | | | | | | | | | | | |
| ** Specify on ordering: 9 pressure units max | | | | | | | | | | | | |

General Information and Options

Connections: Quick release coupling for 0.2 to 20 bar ranges.
Minimess coupling for 35 to 600 bar ranges.

Panel size: Width 100 x Height 201mm

Order code: 7038 / Pressure range option code

| | | | |
|-------------------------|----------------------|---------------------|-------------------------|
| Pressure Options | 7100 = 200mbar range | 7101 = 2bar range | 7102 = 5bar range |
| | 7103 = 10bar range | 7104 = 20bar range | 7105 = 35bar range |
| | 7106 = 70bar range | 7107 = 100bar range | 7108 = 200bar range |
| | 7109 = 400bar range | 7110 = 600bar range | 7111 = Vacuum regulator |

Pressure Modules

7066 Differential pressure calibrator module

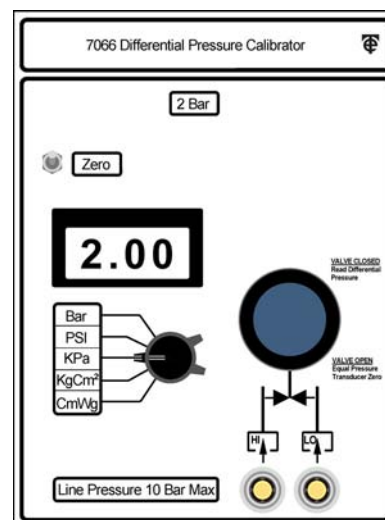
Pneumatic – The connection is made via two front panel quick release connector ports. These are available for differential pressure input (Hi and Lo ports).

Electrical - The 7066 is powered from an internal power supply located in the console.

Optional: Vacuum regulator and rear panel connection.

The regulator is for vacuum and can be configured to supply the differential pressure on the negative side of the 7066 differential pressure module. The regulator must in turn be supplied by a primary high vacuum electric pump (not supplied) – this should be connected via the console rear. The level of vacuum achievable will depend on the efficiency of the Primary Pump.

Panel size: Width 150 x Height 201mm



Specification

| | | | | | |
|--|--|-------------|------------|-----------|-----------|
| Range | Vacuum | 0.2 bar | 2 bar | 5 bar | 10 bar |
| Resolution (bar) | 0.001 mbar | 0.01 mbar | 0.1 mbar | 0.001 bar | 0.001 bar |
| Accuracy % +/- 1 digit | 0.04 | 0.1 | 0.04 | 0.04 | 0.04 |
| Full scale | | 199.99 mbar | 1.9999 bar | 5.000 | 10.000 |
| Temp Stability | 100ppm per degC | | | | |
| Units | Bar, PSI, Kg/Cm ² , inHg, mmHg, KPa, cmWg. ** | | | | |
| Linearity | 0.02% of full scale | | | | |
| Maximum Static Pressure | 20bar | | | | |
| Sensor | Piezo-resistive – stainless steel diaphragm | | | | |
| Over press warning | 1.2 x range full scale – audio and visual (on LCD) warning | | | | |
| Fittings | Quick Release | | | | |
| ** Specify on ordering: 5 pressure units max | | | | | |

General Information and Options

| | | | |
|-------------------------|-----------------------------------|-------------------------|-------------------|
| Panel size: | Width 150 x Height 201mm | | |
| Order code: | 7066 / Pressure range option code | | |
| Pressure Options | 7100 = 200 mbar range | 7101 = 2 bar range | 7102 = 5bar range |
| | 7103 = 10bar range | 7111 = Vacuum regulator | |

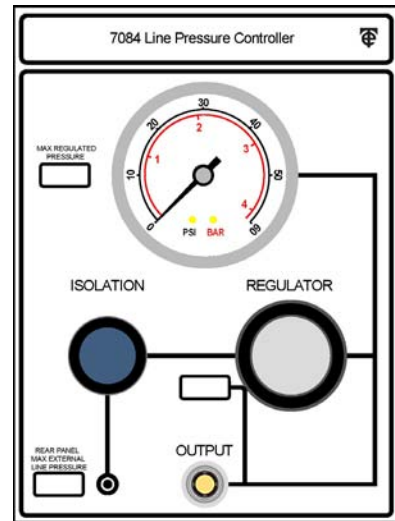
Pressure Modules

7084 Pneumatic Line Pressure Controller

The **7084** is used for management of internal line pressures. The external line pressure is connected to the console rear panel (the maximum permitted pressure depending upon the version ordered). The regulator used is of the self-relieving type and sets the internal line pressures to the calibration modules.

Multiple 7084's can be fitted to provide a choice of pressures simultaneously. The 60mm Gauge displays the internal regulated line pressure. The external line pressure can be isolated using a needle block valve on the front panel. Direct output of the internal line pressure is also available on the front panel via Minimes or Quick Release connectors.

Panel size: Width 150 x Height 201mm



Specification

| | |
|--------------------------------|---|
| Gauges | 63mm anti-shock analogue |
| Regulators | Pneumatic self-relieving. Maximum input pressure 400bar, depending on regulator |
| Output pressure range | See pressure options below |
| Fittings | Minimes and Quick release |
| Line input port | Rear of console. Quick release 5bar; minimes or NPT for 35 and 70bar options. |
| Front panel output port | Same connection options as line input port |
| Valve | Swagelok needle isolation valve on line input port |

General Information and Options

Panel size: Width 150 x Height 201mm
 Order code: 7084 / Pressure range option code

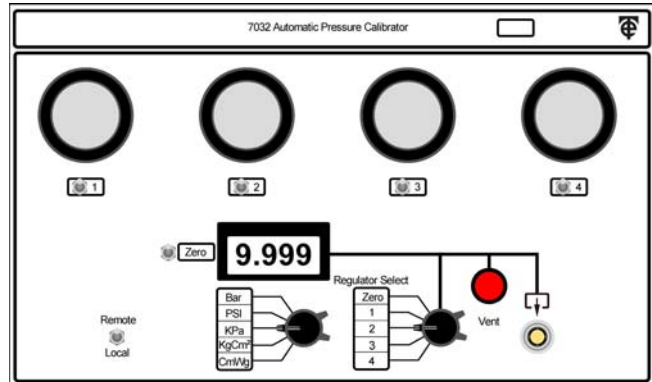
| | | | |
|-------------------------|-------------------|---------------|---------------|
| Pressure Options | 7102 = 5bar range | 7105 = 35 bar | 7106 = 70 bar |
|-------------------------|-------------------|---------------|---------------|

Pressure Modules

7032 Automatic Pressure Calibrator

The **7032** is a low cost programmable pressure calibrator module that features a 4.5 digit display with 5 selectable pressure units. It is designed to speed up routine calibration of pressure gauges, indicators and pressure transmitters. The user presets the required calibration points, usually 0%, 25%, 50%, 75%, 100% of full scale – these are generally considered most useful. However for example, 0%, 10%, 50%, 70%, 95% could be used.

The output line can be vented either by pressing the vent button or selecting zero on the regulator switch to enable zero checking. Output pressure is displayed on the 4.5 digit LCD display.



Panel size: Width 340 x Height 201mm

Manual operation

The 7032 can be controlled manually from a front panel, which allows immediate selection of any of the pre-set calibration pressures.

PC (7051) controlled operation – EasyCal

The 7032 is connected to the 7051 Console Controller and automatic calibration is possible. Using EasyCal, Time Electronics universal calibration software, the calibration procedure can be fully automated. Procedures can be written for pressure gauges, indicators, and pressure transmitters. The results of the calibration are automatically stored on the 7051, and can be printed on demand. Closed loop calibration of pressure transducers can be fully automated by implementing transmitter read-back using the 7051's internal DMM.

Specification

| | | | | |
|--|--|--------|-------|-------|
| Range | Vacuum | 0.2 | 2 | 10 |
| Resolution (bar) | .0001 | 0.01mb | .0001 | 0.001 |
| Regulator | Yes | Yes | Yes | Yes |
| Accuracy % +/- 1 digit | 0.04 | 0.1 | 0.04 | 0.04 |
| Temp Stability | Less than 70 ppm per degC | | | |
| Units | Bar, PSI, kPa, Mpa, inWg, cmWg, inHg, mmHg, Kg/cm2, atm** | | | |
| Maximum Pressure | 2 x range | | | |
| Sensor | Piezo-resistive – stainless steel diaphragm | | | |
| Over press warning | 1.2 x range full scale – audio and visual (on LCD) warning | | | |
| Fittings | Minimess (>20 bar) & Quick Release (<20 bar) | | | |
| ** Specify on ordering: 5 pressure units max | | | | |

General Information and Options

| | | | |
|-------------------------|---------------------------------------|-------------------------|--|
| Power Supply: | Internal to Calibration Bench Console | | |
| Panel size: | Width 340 x Height 201mm | | |
| Order code: | 7032 / Pressure range option code | | |
| Pressure Options | 7100 = 200mbar range | 7101 = 2bar range | |
| | 7103 = 10bar range | 7111 = Vacuum regulator | |

Loop and Temperature Modules

7079 Loop Ancillaries Calibrator

The **7079** provides the following for the testing and calibration of electrical process loop signals.

0 to 199.99mA Measurement

To measure current connect the 7079 in series with the circuit under test. The display will now show the current flow in the circuit together with the polarity.

Continuity

To test for circuit continuity connect the circuit under test in series with the 7079 continuity terminals. If a circuit exists a audible and visual alarm will sound. The threshold for this test is approximately 100 ohms.

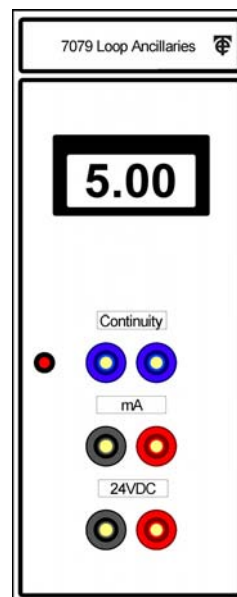
Output 24V

A separate isolated 24VDC supply is provide to enable the powering up of 4 - 20mA loops for the instrumentation under test. This output is overload protected with an auto re-settable fuse. In the event of an overload allow the fuse to cool for a few minutes before further use.

EasyCal

An RS232 port is provided for connection to an EasyCal control port. EasyCal can readback the loop current on demand to allow automatic calibration of pressure transmitters.

Panel size: Width 96 x height 201mm



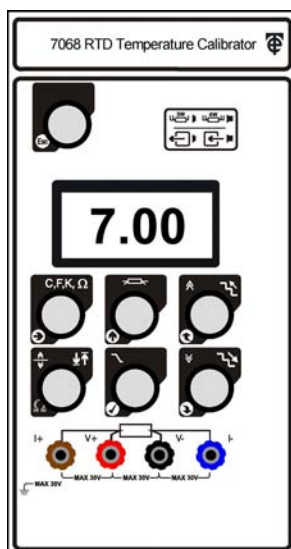
7068 RTD Temperature Calibrator

The **7068** Resistance Temperature Detector (RTD) is a Microprocessor-based calibrator. The calibrator is capable of accurately simulating and measuring the most commonly used RTD probes, which facilitates the calibration of process RTD input instruments without the need for expensive probes and the use of slow temperature baths.

If used with a certified probe the unit performs as a highly accurate thermometer. Readout is available in °C, °F and °K.

The 7068 is specifically designed to automate and to speed up the task of calibrating instrumentation used in the process control industry. Simply enter in engineering units (°C; °F or °K) the desired zero and span values and the calibrator will automatically calculate the standard five calibration points (0, 25, 50, 75 and 100%).

Panel size: Width 107 x height 201mm



Loop and Temperature Modules

7067 Loop Calibrator

The **7067** is a micro-processor based instrument for the calibration of voltage and current loop signals. It can operate in three modes:

- Loop current/voltage source (simulating a transmitter and the loop supply)
- Sink of loop current (simulating a transmitter)
- Measurement of loop current/voltage (simulating a loop indicator).

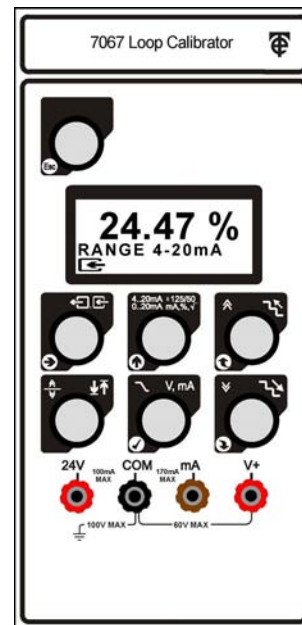
Display is via a dot matrix LCD screen. User input is by 7 front panel buttons.

Source functions are a) Manual step, b) Auto step c) Ramp. In step function there are five calibration points, 0%, 25%, 50%, 75% and 100% of span. In ramp function the output ranges between 0% and 100% of span the ramp rate and dwell time are user programmable.

In source mode the range can be user programmed for any values between 0mA to 50mA, or 0V to 21V. For example a low point of 10mA and a high point of 50mA could be set giving a span of 40mA

In measure mode only fixed ranges are available. Current and voltage is displayed in 5-digit format in mA or Volts. Alternatively the current may be displayed in % of span.

An automatic power-down feature is incorporated and turns the unit off after approximately 7 minutes if no buttons are pressed. If required the automatic power-down feature can be disabled in the user set-up.



Panel size: Width 97 x height 201mm

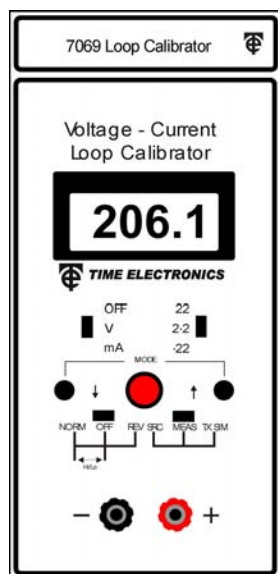
7069 Current Voltage Loop Calibrator

The 7069 is a current, voltage, and loop calibrator that meets the needs of R&D labs and process control engineers. It provides source and measure functions in three ranges, plus a transmitter simulator/sink function. Accuracy is 0.02% of span with a display resolution of 4.5 digits.

Output modes include steps and ramps. No menus to learn, just switches and buttons. A multi-turn potentiometer controls coarse output adjustment while increment/decrement buttons are provided for fine control. The source output can be reversed (+/-) and zeroed at the flick of a switch. The front panel features a large easy-to-read 4.5 Digit LCD display that auto-ranges to allow the ranges to be extended by 10% above the normal 0.2/2.0/20 full scale. Manual reset of the ramp function is also provided for quick restore.

When used as a source the output can be zeroed and reversed to enable the calibration of centre-zero type voltage or current instruments e.g. -10V to 0 to +10V.

If the unit is not operated for approximately 15 minutes, it will automatically power down. If required this feature can be disabled in the user set-up.



Panel size: Width 97 x height 201mm.

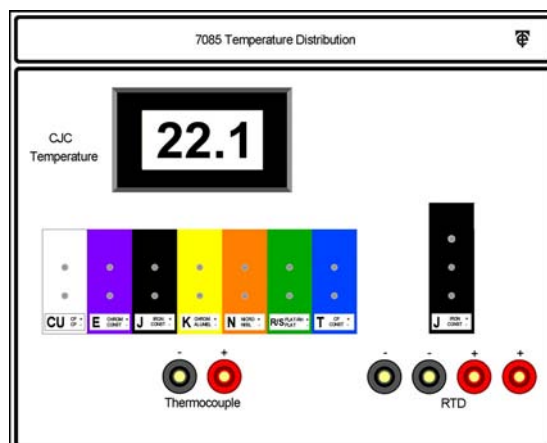
Loop and Temperature Modules

7085 Temperature Distribution Panel

Has a range of different types of thermocouple and 4 wire RTD. Both simulate and measure mode calibration is available. To simplify thermocouple calibration the Cold Junction Compensation (CJC) temperature is displayed in clear easy-to-read digits.

Fully integrated with the 5051 Control Centre and EasyCal, the user can define both thermocouple and RTD temperature calibration procedures.

Panel Size: Width 250 x height 201mm

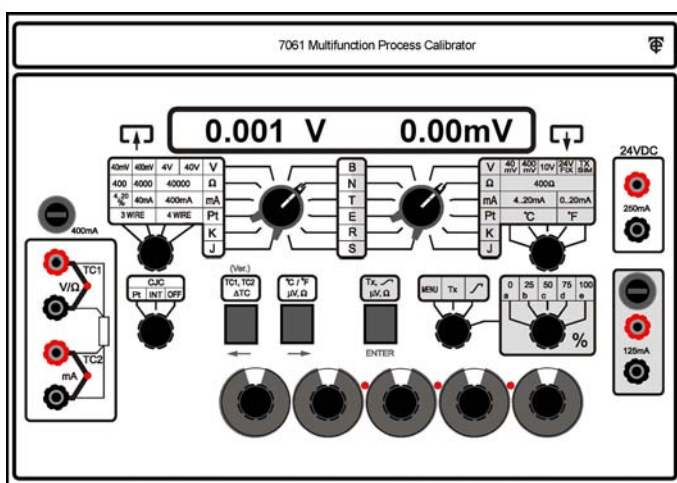


7061 Multifunction Process Calibrator

The **7061** is a comprehensive microprocessor controlled temperature and loop control calibrator. It is the latest version of the series and incorporates high performance digital technology.

The 7061 is primarily designed to perform calibration of thermocouple and resistance thermometer input/output instruments. In addition, the calibration and measurement of volts, millivolts, milliamps and ohms can be performed.

Panel size: Width 285 x height 201mm



Features and Functions

Input signals are connected via 4 sets of terminals, which can be switched by the system to measure thermocouples, volts, milliamps and resistance thermometers. The terminals can be configured for use in many different configurations, e.g. 4 wire resistance thermometers or twin thermocouples.

The output section is galvanically isolated from the input section, thus allowing the unit to perform calibrations on both the input and output of the same instrument without regard for common mode voltages, which could otherwise upset the calibration results.

The output section can source volts and milliamps, and simulate thermocouples and PT100 resistance thermometers via a pair of terminals. The input and output values are displayed simultaneously on a large alphanumeric LCD display.

In addition to conventional functions and ranges, this section provides special ramp and Tx features to enable automatic calibration of loops. The operational parameters of these functions are set-up using menu driven procedures.

External Options

7070 / 7072 Dry block temperature calibrators

Provides a convenient precision temperature source for the calibration of industrial thermometers. It is able to fully automate closed loop temperature calibration and can be configured using Time Electronics **EasyCal Software**. The cold Junction Compensation (CJC) temperature is available to allow correction for the ambient temperature.

Temperature ranges: -25 to +140 degC or +50 to +700 degC

Power requirements: 230VAC, 115VAC, 320VA maximum.

Size: Width 305 x height 325 x deep 165mm



7090A Pneumatic Calibration Pump

This is hand operated and ideal for pneumatic calibration work from Vacuum (-950mbar) to 40bar and features adjustable volume chamber.

It comes complete with a set of hoses, adapters and a carrying case. A digital pressure gauge which locates on the top of the pump body is available as an optional extra.

7089: Optional digital pressure gauge

Can display pressure in bar, mbar/hpa, kPa, MPa and PSI, the user can set the zero reference or use factory default. Maximum and minimum pressures can be stored. Features an auto turn – off function, which can be disabled. The supplied battery life is about 1000 hours in normal measuring mode.

Accuracy: 0.2% FS typical.



7095A Hydraulic Calibration Pump

Hand operated for hydraulic calibration work from 0 to 700bar. It comes complete with hoses and a carrying case. A digital pressure gauge that locates on the top of the pump body is available as an optional extra.

7096: Optional digital pressure gauge. Features see 7089.

7097 Minimesse test kit

A selection of items from the Minimesse 1620 series connectors used on the high-pressure calibration modules.

The kit includes In-line tees for 1/4", 3/8" and 1/2" BSP, and a capped Minimesse / 1/4" BSP test point enabling easy quick connection to most pressure systems.

Also included are two reducing bushes, male to female, 1/2" / 1/4" BSP and 3/8" to 1/4" BSP. 3 Dowty washers, a gauge adaptor, one Microbore hose and a cloth wipe.

The whole kit comes in a convenient plastic case, with cut outs for gauges if required. The adaptors are made of mild steel.

Dimensions: 272 x 230 x 81mm. (case closed), weight: 1.44Kg



Bench Extras

The Time Electronics Calibration Bench is a custom-made unit with a full range of extras. Listed below are some of the available options, with many more available upon request.

ESD equipment

- Laminated tabletops
- Mats
- Grounding kits
- Wrist wraps



Tools

- Soldering/de-soldering stations
- Vacuum pumps
- Vices
- Oscilloscopes, multimeters, clamp meters
- Magnifying lamps
- Test lead sets and racks
- Printer kits
- Bar code readers

Fittings

- Under-counter CPU holder
- Pull-out roller bearing keyboard tray
- Under-counter draw units and cabinets
- Bench stools or chairs
- Tool holders
- Extendable dry block calibrator Shelf
- Top mount monitor arm
- Document holders
- Palm and forearm supports



Reference Tables

Engineering units to pressure Compatibility table

Table 1

| Unit of Pressure | Vacuum | 200mb | 2bar | 5bar | 10bar | 20bar | 35bar | 70bar | 100bar | 200bar | 400bar | 600bar |
|------------------|--------|-------|------|------|-------|-------|-------|-------|--------|--------|--------|--------|
| bar | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes |
| PSI | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes |
| kPa | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes | no | no |
| inWg | yes | yes | yes | yes | yes | yes | yes | no | no | no | no | no |
| cmWg | yes | yes | yes | yes | yes | yes | no | no | no | no | no | no |
| inHg | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes |
| mmHg | yes | yes | yes | yes | yes | yes | no | no | no | no | no | no |
| Kg/cm2 | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes |
| atm | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes |
| Mpa | no | no | no | no | no | no | no | no | no | no | yes | yes |
| Regulator | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes | no | no |

CalBench Quick-Guide Specifications Table

Table 2

| | | | |
|---|---|--|--|
| Console Dimensions | | | |
| Overall: | | Width 200 x height 156 x depth 85cm, 175Kg typical. With secondary console fitted height is 166cm. | |
| Primary Console: | | Width 200 x height 29 x depth 47cm, 90Kg typical. | |
| Secondary Console: | | Width 192 x height 40 x depth 19.5 cm, 30Kg typical. | |
| <i>Individual module height 201mm standard, Individual module width shown in brackets.</i> | | | |
| Power Modules | | | |
| 7082 Mains Power Controller (270mm) | | 7083 Dual 24V DC Supply (131mm) | |
| 7086 Adjustable DC Power Supply (168mm) | | 7087 Quad DC Power Supplies (80mm) | |
| 7088 Power Unit (350mm) | | | |
| 7051 Multifunction Calibrator and Control Centre (425mm) | | | |
| <ul style="list-style-type: none"> ▪ 0-22V AC/DC, 0 – 220mA AC/DC ▪ 0 – 1GΩ - decade steps ▪ 10 MHz frequency | | <ul style="list-style-type: none"> ▪ Digital Multi Meter 6½ digit – internal ▪ Simulated Resistance 10Ω to 40MΩ ▪ RTD Simulation/Measure ▪ Thermocouple Simulation/Measure 10 types ▪ EasyCal Calibration Management Software ▪ Touch Screen | |
| Options: Hi Voltage/Current AC/DC1050V/22A (9782), Oscilloscope calibration (9775), Capacitance / Inductance (9798), Clamp meter adapter (9780), Tacho Meter adapter (9773), and Test lead set (9796). | | | |
| Pressure Modules | | | |
| Available Units of Measure: Bar, PSI, kPa, MPa, inWg, cmWg, inHg, mmHg, Kg/cm2, atm. | | | |
| Pressure Range Option Codes: 200mbar (7100), 2bar (7101), 5bar (7102), 10bar (7103), 20bar (7104), 35bar (7105), 70bar (7106), 100bar (7107), 200bar (7108), 400bar (7109), 600bar (7110), Vacuum Regulator (7111). | | | |
| Module and Description | Range (bar) | Accuracy (%) | Fittings |
| 7062 Pressure Calibrator (129mm) | VAC, 2, 5, 10, 20 | 0.04 | Quick release |
| | 0.2 | 0.1 | |
| 7064 High Pressure Calibrator (200mm) | 35, 70, 100 | 0.04 | Minimess |
| | 200 | 0.1 | |
| 7065 Pressure Indicator (96mm) | VAC, 2, 5, 10, 20, 70, 100 | 0.04 | Under 20bar Quick release Over 20bar Minimess |
| | 0.2, 200, 400, 600 | 0.1 | |
| 7038 Multifunction Pressure Indicator (100mm) | VAC, 2, 5, 10, 20, 70, 100 | 0.04 | Under 20bar Quick release Over 20bar Minimess |
| | 0.2, 200, 400, 600 | 0.1 | |
| 7066 Differential Pressure Calibrator (150mm) | VAC, 2, 5, 10 | 0.04 | Quick release |
| | 0.2 | 0.1 | |
| 7032 Automatic Pressure Calibrator (340mm) | VAC, 2, 10 | 0.04 | Quick release |
| | 0.2 | 0.1 | |
| 7084 Pneumatic Line Pressure Control (150mm) | Regulator sets the internal line pressures to the calibration modules: 5, 35, 70bar | | |
| Temperature and Loop Calibration Modules | | | |
| 7085 Temperature Distribution Panel (250mm) | 7079 Loop Ancillaries Calibrator (96mm) | 7067 Loop Calibrator (97mm) | |
| 7068 RTD Temperature Calibrator (107mm) | 7061 Multifunction Process Calibrator (285mm) | 7069 V-I Loop Calibrator (97mm) | |



Process Control Equipment

Time Electronics manufacture a complete range of process control equipment, designed for pressure calibration, temperature calibration, and loop signal calibration. These well-proven precision test instruments cover the requirements of the process industry. They are high performance, versatile instruments that deliver accuracy, stability, and ease of use for any application.

| | |
|---|-----------------|
| 7000 RTD Temperature Calibrator | Page 115 |
| 7005 Loop Calibrator | Page 117 |
| 7006/7007 Loop-Mates 1 and 2 | Page 119 |
| 7010 Single Channel Pressure Calibrator | Page 121 |
| 7015 Dual Channel Pressure Calibrator | Page 123 |
| 7016 Single Channel Pressure Calibrator with Regulator | Page 125 |
| 7018 Differential Pressure Calibrator | Page 127 |
| 7040 Digital Pressure Calibrator | Page 129 |
| 7050 Process and Thermocouple Calibrator | Page 131 |
| 7060 Modular Calibration Station | Page 133 |
| 7070/7072 Dry Block Calibrators | Page 135 |
| 7090A Vacuum & Pressure Calibration Pump -0.95 bar to 40 bar | Page 137 |
| 7095A Hydraulic Pressure Calibration Pump 0 to 700 bar | Page 138 |



7000 RTD Temperature Calibrator

Time Electronics

Calibration, Test & Measurement

- **Temperature:** Accuracy 0.05 °C (0.09 °F)
Resolution 0.01 °C (0.02 °F)
- **Resistance:** Accuracy 0.03 ohms
Resolution 0.01ohms
- **2, 3 and 4 Wire Connections**
- **Read and Simulate °C, °F, °K, and Ohms**
- **Ramp & Step**
- **PT100 plus 7 other RTD types**
- **User programmable**
- **Supplied in protective carrying case**



High Accuracy Temperature Reference Resistance & RTD Calibrator:

A hand held instrument that combines a precision **Digital Thermometer** (using RTD probes) with an **RTD/Ohms Calibrator**.

Compact and easy to use, it solves the problem of making high accuracy temperature measurements without using bulky mains powered instrumentation.

Powered from internal long life re-chargeable batteries or an external mains adapter, it is equally valuable in laboratory, workshop or the field. It can also be used as an external temperature reference for dry block and other precision temperature baths.

7000 Technical Specifications

MONITOR MODE (4 WIRE) FUNCTIONS

1. Check RTD probes by measuring their resistance at known temperatures.
2. Measure resistance values.
3. Indicate temperature when connected to an RTD probe.
4. Can be pre-programmed with a particular RTD's characteristics to allow very high accuracy.

Excitation current: 1mA on all ranges
Resistance range: 0.01 ohms to 2.6K ohms
Resolution: 0.01 ohms
Accuracy: See tables below
Auto re-calibration: Every 0.6 secs.
Temperature stability: Better than 0.0015%/°C
Max/Min values: Logged automatically

The 7000 may be used with a calibrated and certified probe to produce a highly accurate thermometer. The performance can be further enhanced by programming the actual characteristic of the probe into the unit.

SIMULATOR MODE (4 WIRE) FUNCTIONS

1. Output resistance of precise known value.
2. Simulate an RTD value from an RTD table chart.
3. Simulate an RTD value using the internal table.

Excitation current: 0.6mA to 1mA.
Resistance range: 0.01 to 2.6K ohms
Resolution: 0.01 ohm
Accuracy: See tables below
Auto re-calibration: Every 0.6 secs
Temperature stability: Better than 0.0015%/°C.

Enhanced performance may be achieved by programming the unit to simulate the characteristic of a particular probe.

Five fixed step points (0, 25, 50, 75, 100%) are available between a user set minimum (0%) and a maximum (100%). Programmable ramp function is also available.

Standard RTD types (Non standard RTD types user programmable)

| Element | Alpha Coeff. | Celsius | | Fahrenheit | |
|-------------|----------------------------|-------------------|----------------|------------------|----------|
| | | Range | Accuracy | Range | Accuracy |
| Pt 100 DIN | 0.003850 | -200 to 250 | 0.05 °C | -330 to 480 | 0.10 °F |
| | | 250 to 849 | 0.07 °C | 480 to 1560 | 0.14 °F |
| Pt 100 US | 0.003916 | -100 to 250 | 0.05 °C | -150 to 480 | 0.10 °F |
| | | 250 to 457 | 0.07 °C | 480 to 850 | 0.14 °F |
| Pt 200 DIN | 0.003850 | -200 to 300 | 0.05 °C | -330 to 570 | 0.10 °F |
| Pt 500 DIN | 0.003850 | -200 to 250 | 0.05 °C | -330 to 480 | 0.10 °F |
| | | 250 to 630 | 0.07 °C | 480 to 1160 | 0.14 °F |
| Pt 1000 DIN | 0.003850 | -200 to 250 | 0.05 °C | -330 to 480 | 0.10 °F |
| | | 250 to 630 | 0.07 °C | 480 to 1160 | 0.014 °F |
| Ni 120 | 0.006180 | -100 to 200 | 0.05 °C | -150 to 390 | 0.10 °F |
| Ni 1000 | 0.006180 | -100 to 200 | 0.05 °C | -150 to 390 | 0.10 °F |
| | Resistance accuracy | Range ohms | Monitor | Generator | |
| | | 20 to 400 | 0.03 ohms | 0.03 ohms | |
| | | 400 to 800 | 0.10 ohms | 0.10 ohms | |
| | | 800 to 1200 | 0.20 ohms | 0.20 ohms | |
| | | 1500 to 2600 | 0.50 ohms | 0.50 ohms | |

General Specification

| | |
|-------------------------------------|---|
| Operating temperature range: | -10 to 50°C |
| Battery power: | NiCad rechargeable |
| Mains power: | External mains adapter. |
| Battery life: | > 30hrs |
| Case: | Impact resistant ABS |
| Size: | 165mm x 90mm x 45 mm |
| Weight: | 0.40 kg |
| Optional Extras: | Mains Adapter 230V AC, Mains Adapter 110V AC Calibration Certificates – traceable to N.P.L. and UKAS |

Ordering Information

| Code | Description |
|------|--|
| 7000 | RTD Temperature Calibrator |
| 7633 | Mains Adapter 230V AC |
| 7633 | Mains Adapter 110V AC |
| 9183 | N.P.L. Traceable Calibration Certificate |
| 9194 | UKAS Calibration Certificate |

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



7005 Loop Calibrator

Time Electronics

Calibration, Test & Measurement

- **Loop Source - Current or Voltage**
- **Loop Measure - Current or Voltage**
- **Loop Current Sink**
- **Accuracy 0.01%**
- **Resolution 1uA or 1mV**
- **Programmable Ranges**
- **Manual Step, Auto-Step and Ramp**
- **Square Root Functions for Flow**
- **20mA drive capability into 1100 ohms**



The **7005** is a micro-processor based instrument for the calibration and simulation of voltage and current loops. It can operate in three modes:

- a) Loop current/voltage Source (simulating a transmitter and the loop supply)
- b) Sink of loop current (simulating a transmitter)
- c) Measurement of loop current/voltage (simulating a loop indicator).

Manual step of the output is available at five calibration points, 0%, 25%, 50%, 75% and 100% of span. Automatic stepping of the output is also available both up and down with programmable dwell times.

Continuous up/down ramping is also available with user programmable ramp rates and dwell time (top and bottom).

In source mode the range can be user programmed to any value between 0mA and 50mA, or 0V and 21V. For example a low point of 10mA and a high point of 50mA could be set giving a span of 40mA

Measure mode provides both voltage and current measuring capability with 5 digit resolution. Ranges are 0 to $\pm 5V$ and ± 5 to $\pm 25V$, 0 to $\pm 25mA$ and ± 25 to $\pm 125mA$. Alternatively the signal can be measured as a % of span for the following ranges, 4 to 20mA, 0 to 20mA, square root 4 to 20mA, square root 0 to 20mA. For all measurements a Min/Max recording function is available on demand.

An internal NiCad battery can power the unit for typically 9 hours and an external mains charger is supplied as standard. An automatic power-down feature is incorporated to conserve battery life.

7005 Technical Specifications

| Measurement | Source |
|--|--|
| DC CURRENT 0 to ±125mA, Auto-ranging Accuracy (0 to 25mA): ±0.01% of reading ±2uA Resolution: 1uA Accuracy (25 to 125mA): ±0.01% of reading ±20uA Resolution: 10uA Measure load: 24.5 Ohms on all ranges | DC CURRENT 0 to 50mA Accuracy: ±0.01% of setting ±2uA Resolution: 1uA Max drive: 22V Loop Resistance: 1100 Ohm @ 20mA max DC VOLTS 0 to 21V @ 50mA Accuracy: ±0.01% of setting ±4mV Resolution: 1mV Output resistance: < 1 Ohm |
| DC VOLTS 0 to ±25V, Auto-ranging Accuracy (0 to 5V): ±0.01% of reading ±0.4mV Resolution: 0.1mV Accuracy (5 to 25V): ±0.01% of reading ±2mV Resolution: 1mV Measure load: 10M Ohm on all ranges | DC CURRENT SINK 0 to 50mA Accuracy: ±0.01% of setting ±2uA Resolution: 1uA Min external drive: 4V Max external drive: 40V |

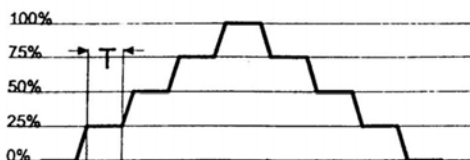
Summary of Functions

SOURCE MODE

- User programmable ranges - any values between 0 and 50mA or 0 and 21V.
- Fixed ranges are available: 4 to 20mA, 0 to 20mA, sqrt 4 to 20mA, sqrt 0 to 20mA.
- Fine adjustment (inching) is available for precise deviation from the calibration point.
- Manual step output - five calibration points 0%,25%,50%,75% and 100%
- Automatic step output (up/down) - five cal points with programmable dwell period.
- Ramp output - programmable ramp rate (0 to 20mA/Sec or 0 to 20V/Sec)
programmable dwell period (0 to 1000 seconds)

MEASURE MODE

This mode provides both voltage and current measuring capability with 5 digit resolution. Ranges are 0 to ±5V and ±5 to ±25V, 0 to ±25mA and ±25 to ±125mA. Alternatively the signal can be measured as a % of span for the following ranges, 4 to 20mA, 0 to 20mA, square root 4 to 20mA, square root 0 to 20mA. For all measurements a Min/Max recording function is available on demand.



General Specification

Power: Internal NiCad battery. Battery life typically >9 hours. Auto power-down. External battery charger supplied

Dimensions: 17 x 9 x 5 cm

Weight: 0.42kg

Housing: Case Impact resistant ABS

Optional Extras: Calibration Certificates – traceable to N.P.L. and UKAS

Unit comes supplied complete with lead set.

Ordering Information

| Code | Description |
|------|--|
| 7005 | Loop Calibrator |
| 9184 | N.P.L. Traceable Calibration Certificate |
| 9195 | UKAS Calibration Certificate |

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



7006/7007 Loop-Mates 1 and 2

Time Electronics

Calibration, Test & Measurement

- Pocket sized 140 x 66 x 27 mm
- 4 - 20mA or 0 - 10V loops
- 7 calibration set-points
- TxSim and RxTest (Loop-Mate1)
- RxSim and TxTest (Loop-Mate2)
- Auto-Step output - adjustable rate
- Battery powered PP3
- Internal loop drive supply



The Loop-Mates are single function low-cost pocket sized units, designed for test and calibration of process loops. Simplicity of operation is their key - no keypads or complicated selections. Engineers will be able to pick them up and get to work immediately. Just select 4 - 20mA, or 10V loop, and TxSim, RxTest, RxSim or TxTest. Both have internal loop drive supplies, which can be used to power the loop if required.

Loop-Mate1 is the simulator and acts as a source to provide the loop signals, 4 - 20mA or 0 - 10V. No complicated selection of the output, just operate up/down buttons to increase or decrease the signal. There are 7 set-points, 0%, 10%, 25%, 50%, 75%, 90%, 100%. Each is indicated on a high brightness LED and an audible beep sounds as you step between them. Auto-stepping mode (adjustable rate) allows Loop-Mate1 to be left connected stepping up and down. The engineer can then move to another location to check (using Loop-Mate2) that the signal is arriving correctly and is within specification.

Loop-Mate2 is a dedicated loop signal indicator, just as easy to operate. Once again select the loop type, 4 - 20mA, or 0 - 10V, and whether you want the display in direct units, or % of span. The LCD display shows the signal to an accuracy of 0.05% either in mA, V, or % of span.

Both units are powered by a single standard PP3 battery that gives up to 40hrs continuous use.

7006 & 7007 Technical Specifications

| 7006 Loop-Mate1 | 7007 Loop-Mate2 |
|--|---|
| Range: 4 - 20mA, or 0 - 10V | Range: 4 - 20mA, 0 - 10V, 0 - 50V |
| Set-Points: 0, 10, 25, 50, 75, 90, 100% of span | Display: LCD 4 digits, mA, V, or % of span |
| Accuracy: 0.1% | Accuracy: 0.05% |
| Modes: TxSim, or RxTest | Modes: RxSim, TxTest, or 50mA/50V measure |
| Loop Supply: Internal, 25mA max | Loop supply: Internal, 25mA max |
| Auto-Step: Up/Down/Up, 0.5, 1, 2, 4, or 8sec/step | |

General Specification (Applies to both units unless stated)

| | |
|-------------------------|---|
| Power: | PP3 battery, typical life 40hrs |
| Dimensions: | L 140mm x W 65mm x D 30mm |
| Weight: | 7006: 180g 7007: 200g |
| Optional Extras: | Calibration Certificates – traceable to N.P.L. and UKAS |

Loop-Mates are supplied with a carrying case, leads and technical manual.

Ordering Information

| Code | Description |
|------|--|
| 7006 | Loop-Mate 1 |
| 7007 | Loop-Mate 2 |
| 9145 | N.P.L. Traceable Calibration Certificate (7006 and 7007) |
| 9144 | UKAS Calibration Certificate (7006 and 7007) |

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



7010 Single Channel Pressure Calibrator

Time Electronics

Calibration, Test & Measurement

- Range options from 0.2 to 600 bar
- Accuracy 0.04% of full scale
- Pneumatic or Hydraulic
- Over- pressure alarm
- Piezo - resistive pressure sensor
- Isolated 24/36V loop supply
- Loop current measure
- Mains / Battery Power



Options:



40 bar pneumatic hand pump



700 bar hydraulic hand pump



7006 Loop-Mate

Rugged portable pressure calibrators designed for applications from 0.2 bar up to 600 bar in eleven ranges - specify when ordering. For the 7010, the pressure source is via external hand pumps: The 7090 Pneumatic (-950 mbar - 40 bar), or 7095 Hydraulic (0 - 700 bar). Also available a dual channel version (see separate 7015 Dual Channel datasheet). Alternatively, when external line pressures are available the 7010 can be supplied with an internal regulator to control the output pressure - see separate 7016 LPR datasheet.

For process signal calibration the loop signal is displayed on the LCD display to 0.05% accuracy. Loop drive supply (24V or 36V) is also provided. Both pressure and loop signal can be displayed at the same time to speed up the calibration of pressure transmitters. Additionally a continuity function is available for testing for open circuit loops.

The 7010 single channel version allows switch selection of five pressure units. These should be specified on ordering from the following:- bar, PSI, kPa, MPa, inWg, cmWg, inHg, mmHg, Kg/cm², atm.

Both pressure and loop current are displayed on 4.5 digit LCD displays.

RS232 connection for display read-back when used with Time Electronics EasyCal calibration software (option). Straightforward calibration procedures are easy for the user to write within EasyCal. Results from procedures are stored in EasyCal's results database and printing calibration certificates on demand is simple.

Power is via internal rechargeable cells with a built in mains charger. This allows the unit to be powered directly from the mains if required. The 7010 is housed in a strong resin case that provides on-site protection. All pressure connections are on the side of the case. Leads and an assortment of pressure connection accessories are provided.

For process control signal simulation Time Electronics' handheld 7006 Loop-Mate is available as an option. It provides 4 - 20mA and 0 - 10V signals at levels of 0%, 10%, 25%, 50%, 75%, 90%, 100%. It can also step through these set points automatically to allow hands free calibration. It is battery powered and can be stored in the 7010's pouch. Please see separate datasheet for more information.

7010 Technical Specifications

| Pressure | | | | | | | | | | | | |
|----------------------------|--|--------|-------|-------|-------|-------|------|------|------|------|-----|-----|
| Range (bar) | Vacuum | 0.2 | 2 | 5 | 10 | 20 | 35 | 70 | 100 | 200 | 400 | 600 |
| Resolution (bar) | .0001 | 0.01mb | .0001 | 0.001 | 0.001 | 0.001 | 0.01 | 0.01 | 0.01 | 0.01 | 0.1 | 0.1 |
| Acc. % +/-1 digit | 0.04 | 0.1 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.1 | 0.1 | 0.1 |
| Temp Stability: | Less than 70 ppm per °C | | | | | | | | | | | |
| Units: | bar, PSI, kPa, MPa, inWg, cmWg, inHg, mmHg, Kg/cm2, atm ** | | | | | | | | | | | |
| Max Pressure: | 2 x range, 1.5 x range for 20 bar and above | | | | | | | | | | | |
| Sensor: | Piezo-resistive - stainless steel diaphragm | | | | | | | | | | | |
| Over press warning: | 1.2 x range full scale - audio and visual (on LCD) warning | | | | | | | | | | | |
| Fittings: | Minimess (>20 bar) & Quick Release (<20 bar) | | | | | | | | | | | |
| | ** Specify on ordering: 5 off | | | | | | | | | | | |
| Electrical | | | | | | | | | | | | |
| Range: | Loop current measurement 0 - 200 mA | | | | | | | | | | | |
| Resolution: | 10 µA | | | | | | | | | | | |
| Resistance: | Loop load 5 ohm | | | | | | | | | | | |
| Accuracy: | 0.05% of reading ±1 digit | | | | | | | | | | | |
| Loop Drive: | 24V or 36V switch selectable, 50 mA max - isolated and with short circuit protection | | | | | | | | | | | |
| Continuity: | Threshold: 100 ohms with audio and visual warning | | | | | | | | | | | |
| RS232: | 3.5mm Stereo socket | | | | | | | | | | | |
| Terminals: | 4 mm industry standard terminal posts | | | | | | | | | | | |

General Specification

| | |
|-----------------------|---|
| Power Source: | Internal rechargeable Nickel Metal Hydride batteries, or mains supply (230V or 110V 50/60 Hz) |
| Battery Life: | 24 hrs of typical usage |
| Display: | 7 segment LCD with 'Low Battery' warning indicator |
| RS232: | For Read-back (Software not supplied) and re-calibration with supplied software via PC (not supplied) |
| Case: | Structural resin which is weather-proof to IP 66 standard |
| Size / Weight: | 27 x 25 x 17.5 cm (11" x 10" x 7"), 3 kg (6.5 lbs) <i>Unit comes supplied with test leads</i> |

Ordering Information

| Code | Description |
|------|---|
| 7010 | Pressure Calibrator single channel (+ pressure ranges required + pressure units required) |
| 7090 | Pneumatic hand pump |
| 7095 | Hydraulic Pressure Calibration pump |
| 7006 | Loop-Mate loop current simulator |
| 9747 | EasyCal Software (Automatic Calibration Software, including over 1000 procedures) |
| 9178 | N.P.L. Traceable Calibration Certificate |
| 9190 | UKAS Calibration Certificate |

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



7015 Dual Channel Pressure Calibrator

Time Electronics

Calibration, Test & Measurement

- **Dual Pressure Channel**
- **Range options from 0.2 to 600 bar**
- **Accuracy 0.04% of full scale**
- **Pneumatic or Hydraulic**
- **Over- pressure alarm**
- **Piezo - resistive pressure sensor**
- **Isolated 24/36V loop supply**
- **Loop current measure**
- **Mains / Battery Power**



Options:



40 bar pneumatic hand pump



700 bar hydraulic hand pump



7006 Loop-Mate

Rugged portable pressure calibrators designed for applications from 0.2 bar up to 600 bar in eleven ranges - specify when ordering. For the 7015, the pressure source is via external hand pumps: The 7090 Pneumatic (-950 mbar - 40 bar), or 7095 Hydraulic (0 - 700 bar). Also available a single channel version (see separate 7010 Single Channel datasheet). Alternatively, when external line pressures are available the 7015 can be supplied with an internal regulator to control the output pressure - see separate 7016 LPR datasheet.

For process signal calibration the loop signal is displayed on the LCD display to 0.05% accuracy. Loop drive supply (24V or 36V) is also provided. Both pressure and loop signal can be displayed at the same time to speed up the calibration of pressure transmitters. Additionally a continuity function is available for testing for open circuit loops.

The 7015 dual channel version allows switch selection of five pressure units on channel one and four pressure units on channel two. These should be specified on ordering from the following:- bar, PSI, kPa, MPa, inWg, cmWg, inHg, mmHg, Kg/cm², atm. Both pressure and loop current are displayed on 4.5 digit LCD displays.

RS232 connection for display read-back when used with Time Electronics EasyCal calibration software (option). Straightforward calibration procedures are easy for the user to write within EasyCal. Results from procedures are stored in EasyCal's results database and printing calibration certificates on demand is simple.

Power is via internal rechargeable cells with a built in mains charger. This allows the unit to be powered directly from the mains if required. The 7015 is housed in a strong resin case that provides on-site protection. All pressure connections are on the side of the case. Leads and an assortment of pressure connection accessories are provided.

For process control signal simulation Time Electronics' handheld 7006 Loop-Mate is available as an option. It provides 4 - 20mA and 0 - 10V signals at levels of 0%, 10%, 25%, 50%, 75%, 90%, 100%. It can also step through these set points automatically to allow hands free calibration. It is battery powered and can be stored in the 7015's pouch. Please see separate datasheet for more information.

7015 Technical Specifications

| Pressure | | | | | | | | | | | | |
|----------------------------|--|--------|-------|-------|-------|-------|------|------|------|------|-----|-----|
| Range (bar) | Vacuum | 0.2 | 2 | 5 | 10 | 20 | 35 | 70 | 100 | 200 | 400 | 600 |
| Resolution (bar) | .0001 | 0.01mb | .0001 | 0.001 | 0.001 | 0.001 | 0.01 | 0.01 | 0.01 | 0.01 | 0.1 | 0.1 |
| Acc. % +/-1 digit | 0.04 | 0.1 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.1 | 0.1 | 0.1 |
| Temp Stability: | Less than 70 ppm per °C | | | | | | | | | | | |
| Units: | bar, PSI, kPa, MPa, inWg, cmWg, inHg, mmHg, Kg/cm2, atm ** | | | | | | | | | | | |
| Max Pressure: | 2 x range, 1.5 x range for 20 bar and above | | | | | | | | | | | |
| Sensor: | Piezo-resistive - stainless steel diaphragm | | | | | | | | | | | |
| Over press warning: | 1.2 x range full scale - audio and visual (on LCD) warning | | | | | | | | | | | |
| Fittings: | Minimess (>20 bar) & Quick Release (<20 bar) | | | | | | | | | | | |
| | ** Specify on ordering: 5 off | | | | | | | | | | | |
| Electrical | | | | | | | | | | | | |
| Range: | Loop current measurement 0 - 200 mA | | | | | | | | | | | |
| Resolution: | 10 µA | | | | | | | | | | | |
| Resistance: | Loop load 5 ohm | | | | | | | | | | | |
| Accuracy: | 0.05% of reading ±1 digit | | | | | | | | | | | |
| Loop Drive: | 24V or 36V switch selectable, 50 mA max - isolated and with short circuit protection | | | | | | | | | | | |
| Continuity: | Threshold: 100 ohms with audio and visual warning | | | | | | | | | | | |
| RS232: | 3.5mm Stereo socket | | | | | | | | | | | |
| Terminals: | 4 mm industry standard terminal posts | | | | | | | | | | | |

General Specification

| | |
|-----------------------|---|
| Power Source: | Internal rechargeable Nickel Metal Hydride batteries, or mains supply (230V or 110V 50/60 Hz) |
| Battery Life: | 24 hrs of typical usage |
| Display: | 7 segment LCD with 'Low Battery' warning indicator |
| RS232: | For Read-back (Software not supplied) and re-calibration with supplied software via PC (not supplied) |
| Case: | Structural resin which is weather-proof to IP 66 standard |
| Size / Weight: | 27 x 25 x 17.5 cm (11" x 10" x 7"), 3 kg (6.5 lbs) <i>Unit comes supplied with test leads</i> |

Ordering Information

| Code | Description |
|------|---|
| 7015 | Pressure Calibrator dual channel (+ pressure ranges required + pressure units required) |
| 7090 | Pneumatic hand pump – 950mB to 40 bar |
| 7095 | Hydraulic Pressure Calibration pump – 700 bar |
| 7006 | Loop-Mate loop current simulator |
| 9747 | EasyCal Software (Automatic Calibration Software, including over 1000 procedures) |
| 9178 | N.P.L. Traceable Calibration Certificate |
| 9190 | UKAS Calibration Certificate |

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



7016 LPR Pressure Calibrator

Time Electronics

Calibration, Test & Measurement

- **Regulated Low Pressure**
- **Range options from 0.2 to 20 bar**
- **Accuracy 0.04% of full scale**
- **Pneumatic**
- **Over- pressure alarm**
- **Piezo - resistive pressure sensor**
- **Isolated 24/36V loop supply**
- **Loop current measure**
- **Mains / Battery Power**



Options:



40 bar pneumatic hand pump



7006 Loop-Mate

Rugged portable pressure calibrators designed for applications from 0.2 bar up to 20 bar in nine ranges - specify when ordering. For pressures above 20 bar please contact us for options. The external line pressure can be sourced from a compressor or cylinder (see table for maximum pressures). The 7016 can be used with the 7090 pneumatic hand pump (-950 mbar to 40 bar). Alternatively, the 7016 can be supplied without the internal regulator for hydraulic or pneumatic use up to 600bar - see separate 7010 Single channel and 7015 Dual channel datasheets.

For process signal calibration the loop signal is displayed on the LCD display to 0.05% accuracy. Loop drive supply (24V or 36V) is also provided. Both pressure and loop signal can be displayed at the same time to speed up the calibration of pressure transmitters. Additionally a continuity function is available for testing for open circuit loops.

The 7016 allows switch selection of five pressure units. These should be specified on ordering from the following:- bar, PSI, kPa, MPa, inWg, cmWg, inHg, mmHg, Kg/cm², atm.

Both pressure and loop current are displayed on 4.5 digit LCD displays.

RS232 connection for display read-back when used with Time Electronics EasyCal calibration software (option). Straightforward calibration procedures are easy for the user to write within EasyCal. Results from procedures are stored in EasyCal's results database and printing calibration certificates on demand is simple.

Power is via internal rechargeable cells with a built in mains charger. This allows the unit to be powered directly from the mains if required. The 7015 is housed in a strong resin case that provides on-site protection. All pressure connections are on the side of the case. Leads and an assortment of pressure connection accessories are provided.

For process control signal simulation Time Electronics' handheld 7006 Loop-Mate is available as an option. It provides 4 - 20mA and 0 - 10V signals at levels of 0%, 10%, 25%, 50%, 75%, 90%, 100%. It can also step through these set points automatically to allow hands free calibration. It is battery powered and can be stored in the 7016's pouch. See separate datasheet.

| 7016 Technical Specifications | | | | | | |
|--|---|--------|-------|-------|-------|-------|
| Pressure | | | | | | |
| Range (bar) | Vacuum | 0.2 | 2 | 5 | 10 | 20 |
| Resolution (bar) | .0001 | 0.01mb | .0001 | 0.001 | 0.001 | 0.001 |
| Regulator | Yes | Yes | Yes | Yes | Yes | Yes |
| Accuracy % +/-1 digit | 0.04 | 0.1 | 0.04 | 0.04 | 0.04 | 0.04 |
| Temp Stability | Less than 70 ppm per degC | | | | | |
| Units | bar, PSI, kPa, MPa, inWg, cmWg, inHg, mmHg, Kg/cm2, atm ** | | | | | |
| Max Pressure | 2 x range, 1.5 x range for 20 bar and above | | | | | |
| Sensor | Piezo-resistive - stainless steel diaphragm | | | | | |
| Over press warning | 1.2 x range full scale - audio and visual (on LCD) warning | | | | | |
| Fittings | Quick Release | | | | | |
| ** Specify on ordering: 5 off for channel one. | | | | | | |
| Electrical | | | | | | |
| Range | Loop current measurement 0 - 200 mA | | | | | |
| Resolution | 10 µA | | | | | |
| Resistance | Loop load 5 ohm | | | | | |
| Accuracy | 0.05% of reading ±1 digit | | | | | |
| Loop Drive | 24V or 36V switch selectable, 50 mA max - isolated and with short circuit protection | | | | | |
| Continuity | Threshold: 100 ohms with audio and visual warning | | | | | |
| RS232 | 3.5mm Stereo socket | | | | | |
| Terminals | 4 mm industry standard terminal posts. | | | | | |
| General Specification | | | | | | |
| Power Source: | Internal rechargeable Nickel Metal Hydride batteries, or mains supply (230V or 110V 50/60 Hz) | | | | | |
| Battery Life: | 24 hrs of typical usage | | | | | |
| Display: | 7 segment LCD with 'Low Battery' warning indicator | | | | | |
| RS232: | For Read-back (Software not supplied) and re-calibration with supplied software via PC (not supplied) | | | | | |
| Case: | Structural resin which is weather-proof to IP 66 standard | | | | | |
| Size / Weight: | 27 x 25 x 17.5 cm (11" x 10" x 7"), 3 kg (6.5 lbs) <i>Unit comes supplied with test leads</i> | | | | | |
| Ordering Information | | | | | | |
| Code | Description | | | | | |
| 7016 | Pressure Calibrator – Low Pressure Regulated (+ pressure ranges required + pressure units required) | | | | | |
| 7090A | Pneumatic hand pump – 950mB to 40 bar | | | | | |
| 7006 | Loop-Mate loop current simulator | | | | | |
| 9747 | EasyCal Software (Automatic Calibration Software, including over 1000 procedures) | | | | | |
| 9178 | N.P.L. Traceable Calibration Certificate | | | | | |
| 9190 | UKAS Calibration Certificate | | | | | |

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



7018 Differential Pressure Calibrator

Time Electronics

Calibration, Test & Measurement

- Differential range options from 0.2 to 10 bar
- Best accuracy 0.04% of full scale
- Pneumatic
- Over- pressure alarm
- Piezo - resistive pressure sensor
- Isolated 24/36V loop supply
- Loop current measure
- Mains / Battery Power



Options:



40 bar pneumatic hand pump



700 bar hydraulic hand pump



7006 Loop-Mate

From our range of rugged portable pressure calibrators designed for applications from 0.2 bar up to 600 bar, the 7018 differential calibrator covers DP from 0.2 bar to 10 bar in four ranges - specify when ordering the DP and static line pressures, The optional 7090 Pneumatic hand pump can be used as a pressure source covering the range -950 mbar to 40 bar, see separate datasheet.

Also available is a single channel pressure calibrator the 7010, complemented by a dual channel version; the 7015, see separate data sheets. Alternatively, when external line pressures are available the 7010 can be supplied with an internal regulator to control the output pressure - see separate 7016 LPR datasheet.

For process signal calibration the loop signal is displayed on the LCD display to 0.05% accuracy. Loop drive supply (24V or 36V) is also provided. Both pressure and loop signal can be displayed at the same time to speed up the calibration of pressure transmitters. Additionally a continuity function is available for testing for open circuit loops.

The 7018 allows switch selection of four pressure units. These should be specified on ordering from the following:- bar, PSI, kPa, cmWg, inHg, mmHg, Kg/cm².

Both pressure and loop current are displayed on a 4.5 digit LCD switchable back lit display.

RS232 connection for display read-back when used with Time Electronics EasyCal calibration software (option). Straightforward calibration procedures are easy for the user to write within EasyCal. Results from procedures are stored in EasyCal's results database and printing calibration certificates on demand is simple.

Power is via internal rechargeable cells with a built in mains charger. This allows the unit to be powered directly from the mains if required. The 7018 is housed in a strong resin case that provides on-site protection. All pressure connections are inside the case mounted on the top panel. Leads and an assortment of pressure connection accessories are provided.

For process control signal simulation Time Electronics' handheld 7006 Loop-Mate is available as an option. It provides 4 - 20mA and 0 - 10V signals at levels of 0%, 10%, 25%, 50%, 75%, 90%, 100%. It can also step through these set points automatically to allow hands free calibration. It is battery powered and can be stored in the 7018's pouch. Please see separate datasheet for more information.

7018 Technical Specifications

| Pressure | | | | | |
|-----------------------------|--|--------|-------|-------|-------|
| Range (bar) | Vacuum | 0.2 | 2 | 5 | 10 |
| Resolution (bar) | .0001 | 0.01mb | .0001 | 0.001 | 0.001 |
| Acc. % +/-1 digit | 0.04 | 0.1 | 0.04 | 0.04 | 0.04 |
| Temp Stability: | Less than 70 ppm per °C | | | | |
| Units: | bar, PSI, kPa, cmWg, inHg, mmHg, Kg/cm2, ** | | | | |
| Max Pressure: | 2 x range, 1.5 x range for 20 bar and above | | | | |
| Max Static Pressure: | 20bar | | | | |
| Sensor: | Piezo-resistive - stainless steel diaphragm | | | | |
| Over press warning: | 1.2 x range full scale - audio and visual (on LCD) warning | | | | |
| Fittings: | Minimess (>20 bar) & Quick Release (<20 bar) | | | | |
| | ** Specify on ordering: 4 off | | | | |

Electrical

| | |
|--------------------|--|
| Range: | Loop current measurement 0 - 200 mA |
| Resolution: | 10 µA |
| Resistance: | Loop load 5 ohm |
| Accuracy: | 0.05% of reading ±1 digit |
| Loop Drive: | 24V or 36V switch selectable, 50 mA max - isolated and with short circuit protection |
| Continuity: | Threshold: 100 ohms with audio and visual warning |
| RS232: | 3.5mm Stereo socket |
| Terminals: | 4 mm industry standard terminal posts |

General Specification

| | |
|-----------------------|---|
| Power Source: | Internal rechargeable Nickel Metal Hydride batteries, or mains supply (230V or 110V 50/60 Hz) |
| Battery Life: | 24 hrs of typical usage |
| Display: | 7 segment LCD with 'Low Battery' warning indicator |
| RS232: | For Read-back (Software not supplied) and re-calibration with supplied software via PC (not supplied) |
| Case: | Structural resin which is weather-proof to IP 66 standard |
| Size / Weight: | 27 x 25 x 17.5 cm (11" x 10" x 7"), approx 3 kg (6.5 lbs) <i>Unit comes supplied with test leads</i> |

Ordering Information

| Code | Description |
|------|--|
| 7018 | Pressure Calibrator differential (+ differential + static pressures + pressure units required) |
| 7090 | Pneumatic hand pump –950mB to40 bar |
| 7095 | Hydraulic Pressure Calibration pump 0 to 700bar |
| 7006 | Loop-Mate loop current simulator |
| 9747 | EasyCal Software (Automatic Calibration Software, including over 1000 procedures) |
| 9178 | N.P.L. Traceable Calibration Certificate |
| 9190 | UKAS Calibration Certificate |

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



7040 Digital Pressure Calibrator

Time Electronics

Calibration, Test & Measurement

- 0.2, 2, 5, 10, 20 bar options
- Pressure/Vacuum calibration 0.04% accuracy
- Loop current calibration
- 9 engineering units - bar, psi, KPa, inWg, cmWg, inHg, mmHg, Kg/cm², Atm
- Min / Max function
- Leak rate function
- 4.5 digit display
- 9V internal battery
- RS232 serial interface



Options:



40 bar pneumatic hand pump



Calibration Software

The **7040** is a portable pressure calibrator suitable for workshop, laboratory and field use.

Pressure can be displayed in any of nine popular engineering units. Loop current can also be displayed in mA, or as a percentage of span (4-20mA).

A min/max logging function (pressure or loop current) is provided. The min or max values can be recalled to the display and if required can be viewed in real time.

An additional feature is leak rate display. This allows the actual leakage rate to be observed in real time in the selected 'pressure units' per sec, or per min.

Using a PC or laptop computer and a suitable program the 7040's displayed parameters can be read back – Pressure, Loop Current, Max Value, Min Value. By arranging for the program to store these values in a database a full data logging function is available.

Alternatively, by using a calibration software package such as Time Electronics' EasyCal, pre-written calibration procedures can be executed and the results recorded automatically. Calibration certificates can then be printed on site or back at the lab as required.

7040 Technical Specifications

Pressure Calibration

| | |
|----------------------|---|
| Pressure Range: | 0.2, 2, 5, 10, or 20 bar (specified on ordering) |
| Vacuum: | Available on 2 bar range. Measures vacuum to - 1 bar |
| Accuracy: | 0.04% of range +/- 1 digit (0.2 bar version, 0.1% of range +/- 1 digit) |
| Resolution: | 4.5 digit (0.2 bar version, 3.5 digit) |
| Filter: | Off (4 readings/sec), average of 4 readings, or average of 16 readings |
| Temp. Stability: | Less than 0.005% per °C |
| Sensor: | Piezoresistive |
| Pressure connection: | 1/8" BSP female in a stainless steel manifold |
| Over-pressure: | 3 x full scale or, 35 bar |
| Wetted parts: | Stainless steel & silicon (contaminated media version - stainless steel only) |
| Units: | Bar, PSI, KPa, inWg, cmWg, inHg, mmHg, Kg/cm2, Atm |

Loop Current Calibration

| | |
|------------------|--|
| Ranges: | +/- 200mA, and '% of 4-20mA' |
| Accuracy: | 0.05% of reading +/- 2 digit, (0.1% for '% of 4-20mA' range) |
| Resolution: | 10 uA (200mA range), 0.1% (% of 4-20mA range) |
| Loop resistance: | Less than 2 ohms |
| Protection: | 250 mA automatic reset Poly-Fuse |
| Sockets: | 4mm industry standard |

Main Functions

Pressure display in one of 9 user selectable units

Loop current display in mA or % of 4 - 20mA

Leak rate display in pressure units per sec, or per minute, as selected in user set-up *Max/Min logging display*

RS232 Interface

The 7040's parameters can be read-back over a RS232 serial link - cable provided. User friendly commands from the PC allow data to logged directly to the PCs hard disk. Alternatively a calibration software package such as Time Electronics' EasyCal can run pre-written calibration procedures and gather the results automatically. Calibration certificates can be printed on site or back in the lab as required.

General Specification

| | |
|-------------------------|---|
| Power: | PP3 battery, life 50 hr continuous use |
| Front panel: | Polycarbonate membrane keypad |
| Case: | Impact resistant ABS |
| Operating temp: | 0 to 50 °C. |
| Storage temp: | -10 to 60 °C |
| Accessories: | Carry case, Pneumatic fittings kit and hose, Test lead, Serial link cable |
| Dimensions: | 157 x 90 x 33 mm (6 x 3.5 x 1.2 inch) |
| Weight: | 0.29kg (10oz) |
| Optional Extras: | Hand pressure pump Vac-35bar EasyCal calibration software Calibration Certificates – traceable to N.P.L. and UKAS |

Ordering Information

| Code | Description |
|-------|--|
| 7040 | Digital Pressure Calibrator 7040/71xx/CorA The pressure range is specified as follows: 7100 = 200mbar 7101 = 2 bar 7102 = 5 bar 7103 = 10 bar 7104 = 20 bar |
| | For contaminated media version add /C For absolute pressure sensor add /A |
| 7090A | Pneumatic hand pump – 950mB to 40 bar |
| 9747 | EasyCal Software (Automatic Calibration Software, including over 800 procedures) |
| 9185 | N.P.L. Traceable Calibration Certificate |
| 9196 | UKAS Calibration Certificate |

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



7050 Process and Thermocouple Calibrator

Time Electronics

Calibration, Test & Measurement

The **7050** Process Calibrator combines the essential functions of measurement and simulation of volts, millivolts, milliamps, and ohms with the direct readout simulation of thermocouples and RTD's in °C or °F units.

The instrument is microprocessor based and housed in a rugged case designed for use in the field. Input and Output functions are displayed simultaneously and the switch controls allow for easy and precise operation.

Five calibration points are instantaneously accessible through a preset percentage selector and all functions may be generated in a fully programmable ramp format.

In addition to the standard calibration facilities the instrument may be used as a signal converter. Any electronic input signal can be converted and output as a proportional signal of 4-20mA, 0-5V or sq. root 4-20mA.

The 7050 is highly adaptable, IPT 68 and ITS 90 curves are accommodated and non-standard thermocouples and RTD's may be programmed on request.



Input

| Voltage ranges | | | | |
|-------------------|-------|-------|---------------|-------|
| Range | 40V | 4V | 400mV | 40mV |
| Accuracy @ 23 °C | 0.03% | 0.03% | 0.03% | 0.03% |
| Resolution | 1mV | 100µV | 10µV | 1µV |
| Current ranges | | | | |
| Range | 400mA | 40mA | 4-20mA/0-100% | |
| Accuracy @ 23 °C | 0.03% | 0.03% | 0.06% | |
| Resolution | 10-µA | 1µA | .01% | |
| Resistance ranges | | | | |
| Range (ohms) | 40000 | 4000 | 400 | |
| Accuracy @ 23 °C | 0.03% | 0.03% | 0.06% | |
| Resolution (ohms) | 1 | 0.1 | 0.01 | |

Output

| Voltage ranges | | | |
|---------------------|--|----------------|------------------|
| Range | -2..+10V | -100mV..+400mV | -10mV..+40mV |
| Accuracy @ 23 °C | 0.06% | 0.03% | 0.03% |
| Resolution | 1mV | 10µV | 1µV |
| Output Impedance: | < 10 Ω | < 10 Ω | < 10 Ω |
| Current ranges | | | |
| Range | 0.20mA | 4.20mA | TX Sim (4..20mA) |
| Accuracy @ 23 °C | 0.03% | 0.03% | 0.03% |
| Resolution | 1µA | 1µA | 1µA |
| Max Load Resistance | 900Ω at 20mA, Open circuit voltage 18- 27V | | |
| Resistance ranges | | | |
| Range (ohms) | 0 400Ω | | |
| Accuracy @ 23 °C | ± 0.03% | | |
| Resolution (ohms) | 0.01 | | |
| Excitation Current | 0.2 2mA | | |

Other

Loop drive supply: Nominal 24V, current limit set to 30mA

| Technical Data - Process Signal & Temperature Measurement & Simulation | | | | |
|---|--|-----------------|--------------|-----------------|
| Thermocouple | Centigrade | | Fahrenheit | |
| | Range | Accuracy | Range | Accuracy |
| J Iron/Copper-Nickel | -210 to 0 | ± 0.4 | -410 to 32 | ± 0.7 |
| | 0 to 710 | ± 0.2 | 32 to 1310 | ± 0.4 |
| | 710 to 1200 | ± 0.9 | 1310 to 2192 | ± 1.0 |
| K Nickel-Chrome/ Nickel-Aluminium | -270 to -240 | ± 3.0 | -454 to -430 | ± 5.4 |
| | -240 to -180 | ± 1.2 | -430 to -292 | ± 2.0 |
| | -180 to -50 | ± 0.5 | -292 to -58 | ± 0.9 |
| | -50 to 960 | ± 0.3 | -58 to 1760 | ± 0.6 |
| | 960 to 1370 | ± 1.7 | 1760 to 2498 | ± 1.5 |
| T Copper/Copper-Nickel | -270 to -250 | ± 3.0 | -454 to -418 | ± 5.4 |
| | -250 to -180 | ± 1.0 | -418 to -292 | ± 1.8 |
| | -180 to -100 | ± 0.5 | -292 to -148 | ± 0.9 |
| | -100 to 400 | ± 0.2 | -148 to 752 | ± 0.4 |
| E Nickel-Chrome Copper-Nickel | -230 to 0 | ± 0.5 | -382 to 32 | ± 0.9 |
| | 0 to 540 | ± 0.2 | 32 to 1004 | ± 0.4 |
| | 540 to 1000 | ± 1.5 | 1004 to 1832 | ± 2.7 |
| R Platinum 13% Rhodium/Platinum | -50 to 0 | ± 3.0 | -58 to 32 | ± 5.4 |
| | 0 to 70 | ± 2.0 | 32 to 158 | ± 3.6 |
| | 70 to 400 | ± 1.5 | 158 to 752 | ± 2.7 |
| | 400 to 1000 | ± 1.0 | 752 to 1832 | ± 1.8 |
| | 1000 to 1760 | ± 0.8 | 1832 to 3200 | ± 1.4 |
| S Platinum 10% Rhodium/Platinum | -50 to 0 | ± 2.5 | -58 to 32 | ± 4.5 |
| | 0 to 100 | ± 1.8 | 32 to 212 | ± 3.2 |
| | 100 to 450 | ± 1.3 | 212 to 842 | ± 2.3 |
| | 450 to 1760 | ± 0.9 | 842 to 3200 | ± 1.6 |
| B Platinum 30% - Rhodium/ Platinum 6% - Rhodium | 200 to 400 | ± 5.0 | 392 to 752 | ± 9.0 |
| | 400 to 1000 | ± 2.0 | 752 to 1832 | ± 3.6 |
| | 1000 to 1820 | ± 1.0 | 1832 to 3308 | ± 1.8 |
| N Nickel-Chrome-Silicon/ Nickel-Silicon | 0 to 330 | ± 0.4 | 32 to 626 | ± 0.7 |
| | 330 to 1100 | ± 0.3 | 626 to 2012 | ± 0.5 |
| | 1100 to 1300 | ± 1.5 | 2012 to 2372 | ± 2.7 |
| RTD | Range | Accuracy | Range | Accuracy |
| Pt100 | -200 to 850 | ± 0.3 | -392 to 1562 | ± 1.0 |
| Thermocouple : Linearisation to BS 4937. ITS 90 or IPTS68 Selectable | | | | |
| Pt100 : Linearisation to BS1904 (1984).DIN43760 (1980) Linearisation Accuracy 0.1% of reading for Class A, 38.5 Ω F.I | | | | |
| Excitation current : 0.5mA(Input), 200uA to 2mA(Output) | | | | |
| Cold Junction Compensation: External (Pt100), Internal, Ice point. Accuracy +/-0.2°C at 23°C | | | | |
| Ramp | Fully programmable continuous and stepped | | | |
| Steps | 5 Steps with fully adjustable zero | | | |
| Transmitter | Tx function 4-20mA | | | |
| Signal Converter | Any input to any output | | | |
| Dual Readout | Measure and source simultaneously displayed | | | |
| General Specification | | | | |
| Mains Power: | 220/230V or 115/110V AC 50 or 60Hz | | | |
| Stability: | 100ppm per °C range 0 to 40°C | | | |
| Battery: | Rechargeable NiMHd - Internal Charger | | | |
| Displays: | LCD Dot Matrix, 1 line by 20 charx12mm, alphanumeric. | | | |
| Case: | Impact resistant structural resin. Dimensions: 273 x 248 x 178mm Weight: 4.5Kg | | | |
| Ordering Information | | | | |
| Code | Description | | | |
| 7050 | Process & Thermocouple Calibrator | | | |
| 9180 | N.P.L. Traceable Calibration Certificate | | | |
| 9192 | UKAS Calibration Certificate | | | |

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



7060 Modular Calibration Station

Time Electronics

Calibration, Test & Measurement



The Modular Calibration Station is a uniquely flexible system offering all the benefits of made to measure design without the high cost. Designed around a 19" x 4U case and utilising a wide range of standard modules, it gives a highly flexible system that is both functional and compact.

Each module is an independent unit using a common power supply and pneumatic services. The range and performance is selectable to your needs and the application. Careful thought and consultation goes into assembling modules in each rack in a way that provides both maximum benefit and versatility in operation.

Existing products can be incorporated into the Modular Calibration Station, however the 'core' modules are of our own design and manufacture and cover electronic signal, temperature and pressure. The examples shown give an idea as to the variants and how they may be assembled. Each module is an independent item and there is a high degree of inter-changeability. The right items are selected for your needs and put together to a logical, easy to understand plan.

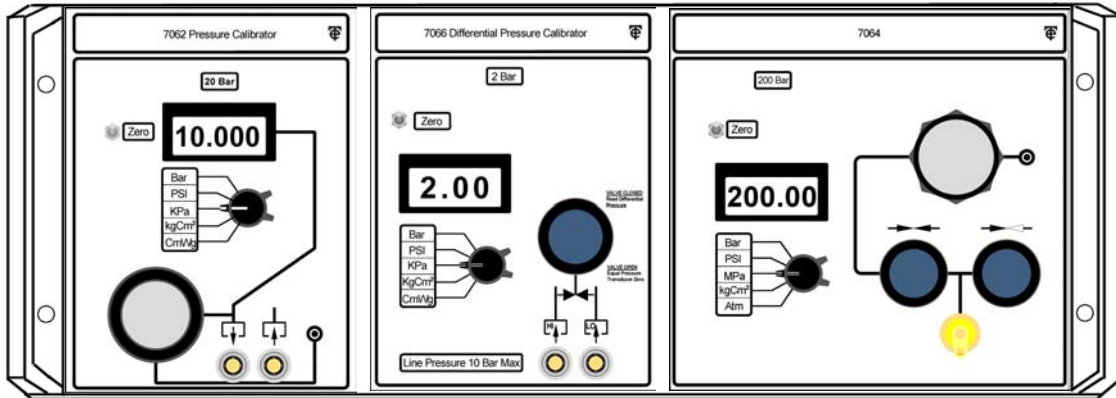
The resulting system is compact and, most importantly, easy to use. Functions are clearly defined on each module and a competent technician will quickly master the operation of the system without expensive training or constant reference to manuals.

A calibration station has to be cost effective. The modular approach, use of standard components and a highly flexible range of electronic systems allows us to offer a system that is both affordable and can be expanded in line with budgets and changing technical requirements.

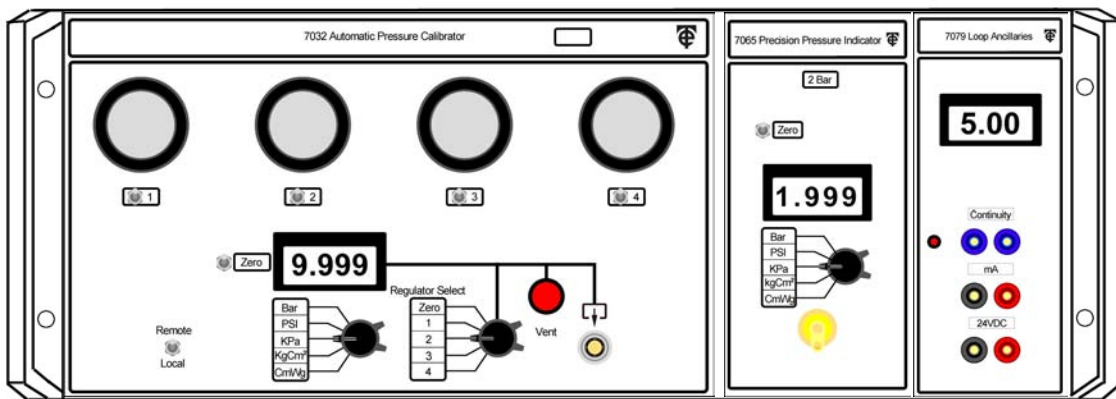
Customer requirement is the key factor when designing the modular system. As with the TE Calbench specific instruments can be incorporated into the station such as oscilloscopes, dmm's, and power supplies.

The Modular Calibration Station is based on the comprehensive TE Calibration Bench. Nearly all pressure, loop, and temperature modules in our bench section can be mounted in the unit. It is a functional, compact solution to workspace utilization. 7060 cases can be mounted on top of one another, allowing a wider selection of modular options. For individual module descriptions see the TE calibration bench datasheet

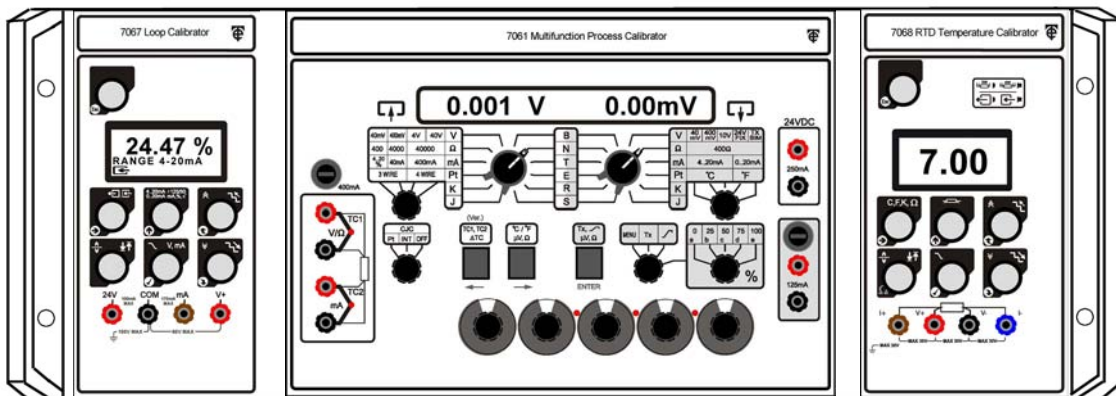
Pressure Calibration



Pressure and Loop Calibration



Loop and Temperature Calibration





7070 / 7072 Dry Block Temperature Calibrators

Time Electronics

Calibration, Test & Measurement

- Thermocouple and RTD calibrator
- Stability typically better than 0.05°C
- Ranges from -25 to 700°C
- Fully automatic remote operation using EasyCal software (via USB)
- Rapid heating, cooling and settling
- Rugged and portable design



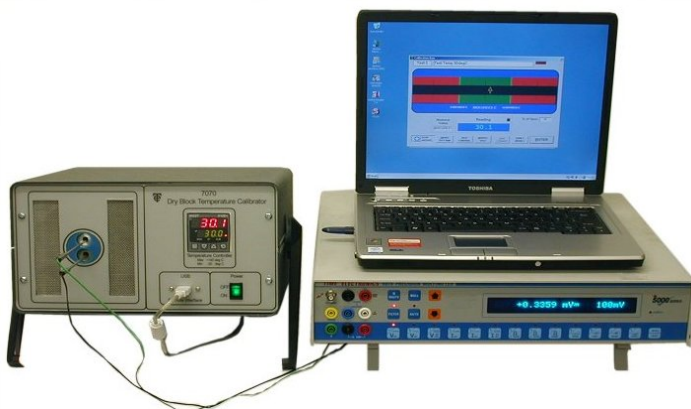
The **7070 series** are multiple temperature probe calibrators, designed to speed up routine calibration of thermocouple and RTD probes with 2 temperature ranges available, -25 to +140 or +50 to +700 °C. The calibrator can be controlled locally or remotely (using the optional Time Electronics' 5075 DMM and EasyCal software). Remote operation provides a fully automated multiple probe calibration system right through to the printing of calibration certificates. The type and number of Thermocouple/RTD probes that can be calibrated at one time depends on the inserts requested at the time of order (See separate 7070/7072 Dry Block Insert Options datasheet).

Local control

Using the 7070 in local mode the user can manually select test temperatures throughout a range. The test temperatures are set using the input keys on the front panel process controller. The controller displays both the set-point temperature (below) and the block temperature (above). Readings from the reference and test probes need be taken using a high accuracy DMM (Time Electronics 5075 with scanner option) when the block temperature reaches the set point temperature, the measurements from the probes are noted, and the next test temperature should be entered and the process repeated. Multiple probes can be on tested on a single run.

Remote control

Fully automatic control is possible using a precision DMM such as Time Electronics' 5075, and a PC (can be a laptop) running EasyCal universal calibration software. The process controller is then automatically set via the PC (USB interface) and the results automatically read back from the DMM by EasyCal. Straightforward calibration procedures are easy for the user to write in EasyCal and a few example standard procedures are even provided. The user can set the required calibration points (unlimited) within the EasyCal software, an example might be 0%, 25%, 50%, 75%, 100% of full scale – these are generally considered most useful. However, for example, 0%, 10%, 50%, 70%, 95% could be used. Once the set temperature has been reached, EasyCal will allow input of the measured readings for the reference and test probes. All the results are automatically stored in EasyCal's results database and printing of calibration certificates on demand is straightforward. Due to the extended settling times for accurate temperature calibrations many hours are often required - the remote operating system is particularly valuable since it can be left unattended and it will complete the calibration run completely automatically.



Shown here is a typical fully automatic thermocouple test system, showing 7070, 5075 DMM, and laptop PC with EasyCal software. For the 7070 a maximum of 3 probes can be calibrated at one time, for the 7072 a maximum of 11. EasyCal software can work with the following types of probe: RTD: PT100, PT200, PT500, PT1000, NI100. Thermocouple: K, J, N, E, D, R, B, C, T, L, U. Temperature transmitters: 4 - 20 mA and 0 - 5/10 Volts. See EasyCal datasheet for further specifications.

7070 / 7072 Technical Specifications

| Model No. | 7070 | 7072 | |
|-------------------------------|---|--|----|
| Range - specify on ordering | -25 to +140 | +50 to +700 | °C |
| Dual Display Resolution | 0.1 | 0.1 | °C |
| Stability | <±0.05 | <±0.05 | °C |
| Uniformity - Insert | <0.02 | <0.03 | °C |
| Uniformity Block | N/A | <0.1 | °C |
| Heating Time (Ambient to Max) | 10mins Typical | 45mins | |
| Cooling Time (Ambient to Min) | 25mins Typical | Dependant on cooling aid | |
| Block holes | 2 x 16mm x 155mm | 4 x 18mm x 155mm and 4 x 6.35mm x 155mm | |
| No. of probes | Up to 4 inc reference | Up to 12 inc reference | |
| Local temperature setting | Four input buttons | | |
| Operating Conditions | 15 to 25 °C for full accuracy, 0 to 50 °C Max | | |

General Specification

| | |
|-------------------------|---|
| Power Supply: | 240v or 110v 50/60Hz |
| Interface: | USB |
| Dimensions: | 305w x 165d x 325hmm 12" x 6.5" x 12.8" |
| Weight: | 9kg (19.8lbs) |
| Optional Extras: | Probe Inserts Precision Digital Multimeter EasyCal Calibration Management Software Calibration Certificates – traceable to N.P.L. and UKAS |

Ordering Information

| Code | Description |
|------|--|
| 7070 | Dry Block Temperature Calibrator -25 to 140°C |
| 7072 | Dry Block Temperature Calibrator +50 to 700°C |
| | Probe Inserts (See separate 7070/7072 Dry Block Insert options datasheet) |
| 5075 | Precision Digital Multimeter |
| 9747 | EasyCal Software (Automatic Calibration Software, including over 800 procedures) |
| 9160 | N.P.L. Traceable Calibration Certificate |
| 9124 | UKAS Calibration Certificate |

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



7090A Pneumatic Calibration Pump

Time Electronics

Calibration, Test & Measurement

- Pressure to 40bar (600psi)
- Vacuum to -950 mbar
- Oversized check valve for smooth controlled operation
- Non-oil based lubricant used on all moving parts
- Hoses, Fittings, and Carry Bag Included
- Optional Digital Gauge



The **7090A** is a pressure and vacuum calibration pump that combines performance with rugged design. Its features include contoured cushioned handles for comfort and control, protective caging for the vent valve guarding against accidental damage, and dual o-rings on all pistons to ensure zero leakage.

Specifications

| | |
|-----------------------|--|
| Range: | Vacuum - 950 mbar to pressure 40bar (600psi) |
| Compatibility: | All gauges and calibrators |
| Connections: | (2 ports) 1/4 inch and 1/8 inch NPT/BSP |
| Weight: | 910g (2lbs) |
| Size: | W 125mm (handle to handle) x H 200mm |

Ordering Information

| Code | Description |
|-------|---|
| 7090A | Pneumatic Calibration Pump – Vacuum 950 mbar (28"Hg) to pressure 40bar (600psi) |

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



7095A Hydraulic Calibration Pump

Time Electronics

Calibration, Test & Measurement

- 0 – 700bar (10,000psi)
- Priming feature
- Triple filtration (prevents failure caused by dirt)
- Non-oil based lubricant used on all moving parts
- Built in pressure relief valve (prevents over pressurizing)
- Hoses and Carry Bag Included
- Optional Digital Gauge



The **7095A** is a hydraulic calibration pump that combines performance with rugged design. Its features include contoured cushioned handles for comfort and control, protective housing for the vent knob, a shatter proof reservoir, and oversized check valves for smooth controlled operation

Specifications

| | |
|-----------------------|---|
| Range: | 0 – 700bar (10,000psi) |
| Compatibility: | Most hydraulic fluids, oils and water |
| Connections: | (2 ports) 1/4 inch and 3/8 inch NPT/BSP |
| Weight: | 1.4kg (3lbs) |
| Size: | W 125mm (handle to handle) x H 240mm |
| Options: | 7096 Digital Gauge |

Ordering Information

| Code | Description |
|-------|--|
| 7095A | Hydraulic Calibration Pump – 0 to 700bar (10,000psi) |
| 7096 | Digital Pressure Gauge |

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



Short Forms

For quick reference to products and basic specifications Time Electronics offers these categorically designed short forms.

| | |
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| Decade Boxes | Page 142 |
| Multifunction Calibrators | Page 144 |
| Programmable Test Instruments | Page 146 |
| Process Control Equipment | Page 148 |



Portable Instruments

Time Electronics

Calibration, Test & Measurement

1044 VOLTAGE AND CURRENT CALIBRATOR

The 1044 is designed to offer solutions in many applications from the R&D lab to the process/service engineer, and anywhere an accurate and low cost calibrator is required.

- Measure voltage and current
- Source voltage and current
- 3 voltage ranges 0-20V
- 3 current ranges 0-20mA
- 0.05% accuracy



1017 MULTIFUNCTION CALIBRATOR

The 1017 is a high performance portable DC calibrator for use in the field or laboratory. It is constructed in a durable, freestanding, plastic case with a tilt stand/carry handle.

- 0-100V in 5 ranges, 0-100mA in 1 range
- 0-10K Ω decade resistance
- Deviation function
- 0.005% accuracy
- 5ppm/day stability –
10ppm/ $^{\circ}$ C temp. coefficient



1021 MILLIAMPERE SOURCE WITH NULL DETECTOR

The 1021 is a precision DC current source suitable for calibration and test applications from micro-amp levels up to 100mA.

- Null meter measures to 1 μ A resolution
- 0.02% accuracy
- 20ppm/hr stability
- 0-100mA output in 3 ranges
- Up to 40V output drive



1024 DC CURRENT CALIBRATOR

The 1024 is a solid state battery/mains powered precision DC current source suitable for calibration and test applications from nanoamp levels to 100mA.

- Null meter facility measures to 1 μ A resolution
- 0-100mA output in 5 ranges
- 0.02% accuracy
- 30ppm/ $^{\circ}$ C temp. coefficient
- Up to 15V output drive



1010 DC VOLTAGE CALIBRATOR

The 1010 is a solid state battery/mains powered instrument designed for a wide range of applications requiring a precision voltage source of low internal resistance.

- 0-10V in 5 ranges
- 0.02% accuracy
- 30mA output current
- Battery or mains operation
- 10ppm/hr stability



1030 LOW COST VOLTAGE/CURRENT SOURCE

The 1030 is a compact, low cost, portable voltage and current calibrator for general purpose signal injection. Three voltage ranges give an adjustable output from 10 μ V to 1V and two current ranges give 10 μ A to 100mA.

- 10mV, 100mV, 1V ranges
- 10mA, 100mA ranges
- 0.1% accuracy
- 0 - 8V available
- Precision 10-turn dial
- Battery Powered 9V PP3
- Battery level indicator



1090 PROCESS & TEMPERATURE CALIBRATOR

A portable, key-press operation instrument that combines source and measurement functions for thermocouples, RTDs, mV and mA. The 1090 features a memory storage function that holds frequently used values.

- Measures/Simulates 8 thermocouple types PT100-RTD, mV & mA
- Displays units in °C, °F, uV/mV or mA
- Automatic or manual cold junction compensation
- Inching and step functions with time configurable step time
- Large super-twist LCD display
- Sealed membrane keyboard



7006/7007 LOOP-MATES 1 AND 2

The Loop-Mates are single function low-cost pocket sized units, designed for test and calibration of process loops.

- 4 - 20mA or 0 - 10V loops
- Auto-Step output - adjustable rate
- 7 calibration set-points
- TxSim and RxTest (Loop-Mate1)
- RxSim and TxTest (Loop-Mate2)
- Battery powered PP3
- Loop drive supply



5069 INSCAL INSULATION CALIBRATION SYSTEM

The 5069 is a precision instrument suitable for calibrating and testing general purpose insulation testers with test voltages up to 10kV.

- Display of open circuit voltage (0 - 2kV or 0 - 10kV)
- Display of short circuit current (0 - 2mA or 0 - 20mA)
- 10M ohm to 100G ohm in 4 decades
- Basic accuracy 1%
- 10kV max
- Battery operation
- Continuous connection - no arcing
- Fully shrouded safety connectors



1048 VOLTAGE & CURRENT LOOP CALIBRATOR

A current, voltage, and process loop calibrator that covers the needs of an R&D lab and process control engineer. Source and measure in three current and voltage ranges, plus a transmitter simulator/sink function. It has 4.5 digit (0.005% of span) resolution.

- Measure & Source, voltage and current
- 3 Current ranges 0 - 22mA
- 3 Voltage ranges 0 - 22V
- Transmitter Function
- Voltage & Current accuracy 0.02% FS per range
- Auto Ranging Hi/Lo Resolution, Ramp and Step functions
- 4.5 digit display



5080 PAT-CAL2 CALIBRATOR FOR PATS

PAT-Cal2 is designed to provide rapid high accuracy calibration of PATs (Portable Appliance Testers) and Insulation / Continuity Testers. The 5080 has calibration functions for Earth Bond, Insulation, Leakage, Touch Leakage and Load Test. Safety interlock prevents contact with Earth Bond studs during Insulation and Leakage tests.

- Battery powered
- Voltage and current displayed on integral LCD digital meter
- Earth Bond currents up to 50A AC
- Load Test currents up to 13A AC
- Impact resistant case to IEC1010



5070 DUCTORCAL

The DuctorCal is a portable instrument suitable for calibrating high current Ductor Testers and Micro-Ohm meters. It contains 5 sets of high current rating standard resistors that simulate the resistance being measured.

- Calibrate Ductor Testers and Micro-Ohm meters
- 0.2, 2, 20, 200, 2000mΩ
- 5 point calibration: 0, 25, 50, 75, 100%
- Gold plated terminals
- Low thermal emf connection





Decade Boxes

Time Electronics

Calibration, Test & Measurement



1051 LOW OHM RESISTANCE BOX

| | |
|---------------------------|--|
| Range: | 0.01 Ω to 1M Ω |
| Best Accuracy: | $\pm 0.1\%$ (100 Ω to 100k Ω) |
| Increment: | 0.01 Ω steps |
| Power Rating: | 1 watt per resistor |
| Voltage Rating: | Maximum 250V DC |
| End Resistance: | Less than 90m Ω |
| Temp. Coefficient: | Less than 100 ppm per $^{\circ}\text{C}$ |

1040 WIDE RANGE RESISTANCE BOX

| | |
|---------------------------|--|
| Range: | 1 Ω to 100M Ω |
| Best Accuracy: | $\pm 0.1\%$ (100 Ω to 9M Ω) |
| Increment: | 1 Ω steps |
| Power Rating: | 1 watt per resistor |
| Voltage Rating: | Maximum 300V |
| End Resistance: | Less than 250m Ω |
| Temp. Coefficient: | Less than 50 ppm per $^{\circ}\text{C}$ |



1041 LOW OHM RESISTANCE BOX

| | |
|---------------------------|--------------------------------|
| Range: | 0.01 Ω to 1k Ω |
| Best Accuracy: | $\pm 0.1\%$ (100 Ω) |
| Increment: | 0.01 Ω steps |
| Power Rating: | 1 watt per resistor |
| Voltage Rating: | Max 100V |
| End Resistance: | 60m Ω maximum |
| Temp. Coefficient: | 100 ppm per $^{\circ}\text{C}$ |

1053 INDUCTANCE BOX

| | |
|--------------------------|---------------------------|
| Range: | 1mH to 10H (4 decades) |
| Accuracy at 1kHz: | 3% of setting |
| Voltage Rating: | Max 30V AC |
| End Resistance: | Less than 0.2 Ω |
| End Inductance: | Less than 1 μH |





1061 LOW COST RESISTANCE BOX

| | |
|---------------------------|--------------------|
| Range: | 1Ω to 1.2MΩ |
| Accuracy: | ± 1% |
| Increment: | 1Ω steps |
| Number of Decades: | 6 |
| Power Rating: | 0.75W per resistor |
| End Resistance: | Less than 150mΩ |

1065 POWER RESISTANCE BOX

| | |
|---------------------------|------------------------------|
| Range: | 0.1Ω to 120kΩ |
| Accuracy: | ±5% (0.1Ω), ±1% (1Ω – 120kΩ) |
| Increment: | 0.1Ω steps |
| Power Rating: | 10W per resistor |
| Voltage Rating: | Max 500 V AC/DC |
| End Resistance: | Less than 20mΩ |
| Temp. Coefficient: | Less than 100 ppm per °C |



1067 PRECISION RESISTANCE BOX

| | |
|------------------------|---|
| Range: | 10mΩ to 12kΩ |
| Best Accuracy: | +/- 0.01% |
| Increment: | 10mΩ steps |
| End Resistance: | Less than 10mΩ, Less than 1mΩ variation |
| Stability: | Better than 20ppm/year (>1Ω) Better than 100ppm/year (<1Ω) |

1070/1071 CAPACITANCE BOXES

| | |
|-----------------------------|--|
| 1070 Range: | 100pF—10μF |
| 1071 Range: | 10pF—100μF |
| Accuracy: | 1% |
| Features: | Bi-polar working, Colour coded digits |
| Max Working Voltage: | 300 volts DC/200 volts AC (See data sheet for full specs) |





Multifunction Calibrators

Time Electronics

Calibration, Test & Measurement

5051 MULTIFUNCTION CALIBRATION SYSTEM

- 0 - 1050V, 0 - 22A (AC/DC)
- Internal 6.5 Digit DMM
- 0 - 1G Ω resistance
- Thermocouple & PT100 simulation
- Digital Frequency & Oscilloscope Calibration
- Capacitance & Inductance
- Clamp Meter Calibration
- EasyCal Software Compatible



5025 MULTIFUNCTION CALIBRATOR

- 0 - 1050V, 0 - 22A (AC/DC)
- 0 - 1G Ω Resistance
- Capacitance & Inductance
- Thermocouple & PT100 simulation
- Digital Frequency & Oscilloscope Calibration
- Clamp Meter Calibration
- RS232, GPIB & USB Interface
- EasyCal Software Compatible



5075 PRECISION DIGITAL MULTIMETER

- 7 digit resolution
- 10nV to 10kV, 10pA to 30A
- Resistance, Capacitance, Frequency
- 18ppm accuracy/best 1 year
- 10 channel low thermal emf scanner option
- EasyCal Calibration software compatible - GPIB



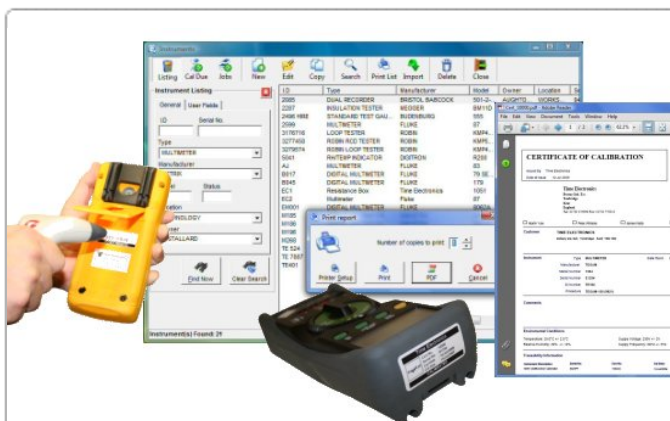
5018 PROGRAMMABLE DC-AC V-I CALIBRATOR

- 15ppm accuracy/0.5ppm resolution
- 1999999 full scale +10% over-range
- 20mV-200mV-2V-20V DC voltage
- Deviation control -9.999% to +9.999%
- GPIB & RS232 Interface
- Ideal for ATE applications



5041 OSCILLOSCOPE / TIMER CALBRATOR

- PC controlled
- Amplitude 1mV to 200V
- Frequency 0.1Hz to 100MHz
- Time Marker/Period 15s to 10ns
- Bandwidth check up to 600MHz
- Optional 2.2GHz levelled Sweep



EASYCAL CALIBRATION SOFTWARE

- Windows 2000/XP/VISTA
- Over 1000 standard procedures
- Create and customise test procedures
- Instrument control GPIB/RS232/USB
- Automated calibration run
- Comprehensive instrument database
- Print certificates, labels, and reminder letters
- Customise certificates & reports
- Network compatible

7080 CALIBRATION BENCH

The ultimate multifunction calibration station from Time Electronics
TEMPERATURE – PRESSURE – ELECTRICAL SIGNALS

Will calibrate the following:

- Pressure transducers, transmitters, switches, gauges
- RTD transmitters, thermocouple transmitters
- Signal generators, frequency meters, timer counters
- Oscilloscopes
- AC/DC Milli-voltmeters
- Ohm meters, resistance boxes
- Clamp meters
- Temperature indicators, sensors
- AC/DC signal sources
- Multi-meters
- Loop signal indicators, transmitters
- Power supplies



The Multifunction Calibrator 5051 is mounted centrally in the bench console and acts as a control centre for the whole bench. It incorporates an industrial PC that is preloaded with the control programs and Time Electronics well established EasyCal calibration software. Full control of Electrical, Temperature, Pressure, and Loop signals, both in source and measure modes is available. A complete connectivity kit including printer and cd rom drive is supplied as standard.



Programmable Instruments

Time Electronics

Calibration, Test & Measurement

5075 PRECISION DIGITAL MULTIMETER

- 7 digit resolution
- 10nV to 10kV, 10pA to 30A
- Resistance, Capacitance, Frequency
- 18ppm accuracy/best 1 year
- 20 channel low thermal emf scanner option
- EasyCal Calibration software compatible – GPIB



5018 PROGRAMMABLE DC-AC V-I CALIBRATOR

- 1999999 full scale +10% over-range
- 20mV-200mV-2V-20V DC voltage
- Deviation control -9.999% to +9.999%
- GPIB & RS232 Interface
- Ideal for ATE applications



5011 RESISTANCE/TEMPERATURE CALIBRATOR

- 1 Ohm to 120 MOhm
- RTD Simulation
- Thermocouple Simulation
- RS232/GPIB/USB
- Front Panel Operation





5033 3-CHANNEL PRECISION DC POWER SOURCE

- 3 Channel Power Source 0-20V DC 2A drive capability
- 22-bit voltage settable resolution (0.25ppm)
- 18-bit current read back resolution (4ppm)
- Programmable via GPIB (IEEE488) interface
- Easy to use SCPI-compatible command language
- 40 watts max per channel
- Stability: < 2ppm/24 hours, < 5ppm/month, < 15ppm/year
- Noise < 1ppm, Temp Coeff < 1ppm/°C uncompensated
- 4 terminal output, Compatible with EasyCal software

5077 POWER CALIBRATOR

- 90.0° to + 90.0°, or 0.00 to 1.00 Lead/Lag (power factor)
- 0 to 1000V AC or DC
- 0A to 20A AC or DC
- 0 to 20kVA or 0 to 20kW
- 100A AC current transformer option
- 40 - 400Hz in 0.1Hz steps
- RS232 programmable



EASYCAL CALIBRATION SOFTWARE



- Windows 2000/XP/VISTA
- Over 1000 standard procedures
- Create and customise test procedures
- Instrument control GPIB/RS232/USB
- Automated calibration run
- Comprehensive instrument database
- Print certificates, labels, and reminder letters
- Customise certificates & reports
- Network compatible



1090 PROCESS & TEMPERATURE CALIBRATOR

- Measures/Simulates 8 thermocouple types PT100-RTD, mV & mA
- Automatic or manual cold junction compensation
- Inching and step functions with time configurable step time
- Memory storage of frequently used values
- Displays units in °C, °F, uV/mV or mA
- Large super-twist LCD display



7005 VOLTAGE AND CURRENT LOOP CALIBRATOR

- mA measure 125mA, source 50mA.
- Volts measure 25V, source 21V
- Transmitter and square root functions
- Auto Ranging
- Programmable steps and ramp
- Accuracy 0.01% of reading

1048 VOLTAGE & CURRENT LOOP CALIBRATOR

- Measure & Source voltage and current
- Voltage in 3 ranges 0-220mV, 0-2.2V, 0-22V, over range 50V (M)
- Transmitter Function
- Current in 3 ranges 0-220uA, 0-2.2mA, 0-22mA, over range 70 mA (M)
- Voltage & Current accuracy 0.02% FS per range, optional 0.02% FS
- Auto Ranging Hi/Lo Resolution, Ramp and Step functions



7006/7007 LOOP-MATES 1 AND 2

- 4 - 20mA or 0 - 10V loops
- Auto-Step output - adjustable rate
- 7 calibration set-points
- TxSim and RxTest (Loop-Mate1)
- RxSim and TxTest (Loop-Mate2)
- Loop drive supply

7000 RTD CALIBRATOR

- Source and measure PT100, other RTD types and Ohms
- High accuracy thermometer with PT Probe
- Accuracy +/- 0.05 °C
- °C, °F, K, and Ohms, Programmed steps and ramps and RTD zero





7040 DIGITAL PRESSURE CALIBRATOR

- 4½ Digit Display
- Push Button Zero
- Pressure in 5 Standard Units
- Accuracy 0.05% fsd Pressure
- Accuracy 0.05% fsd Current
- 0.2bar / 2bar / 20bar optional ranges

7010 SINGLE CHANNEL PRESSURE CALIBRATOR

- Range options from 0.2 to 600bar
- Accuracy 0.04% of full scale
- Pneumatic or Hydraulic
- Over- pressure alarm
- Piezo - resistive pressure sensor
- Loop current measure
- Mains / Battery Power



7016 LPR PRESSURE CALIBRATOR

- Regulated Low Pressure
- Accuracy 0.04% of full scale
- Range options from 0.2 to 20bar
- Pneumatic
- Over- pressure alarm
- Piezo - resistive pressure sensor
- Loop current measure
- Mains / Battery Power

7050 PROCESS AND THERMOCOUPLE CALIBRATOR

The 7050 Process Calibrator combines the essential functions of measurement and simulation of volts, millivolts, milliamps, and ohms with the direct readout simulation of thermocouples and RTD's in °C or °F units.

Input and Output functions are displayed simultaneously and the switch controls allow for easy and precise operation.

Five calibration points are accessible through a preset percentage selector and all functions may be generated in a fully programmable ramp format. In addition to the standard calibration facilities the instrument may be used as a signal converter. Any electronic input signal can be converted and output as a proportional signal of 4-20mA, 0-5V or sq. root 4-20mA.



7090A CALIBRATION PUMP

A pressure and vacuum calibration pump suitable for pneumatic calibration up to 40bar.

- Pressure to 40bar
- Vacuum to -950mbar
- Three output ports
- Adjustable Volume chamber
- Optional digital pressure gauge



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