

# 4000 SERIES Advanced multi product calibrator



# ABOUT US

We truly believe in offering Solutions in Calibration, offering bespoke solutions for calibration laboratories and manufacturers across the globe. Our mission statement is not just a phrase, it is our design and support philosophy, offering support and advice that cannot be found elsewhere with a friendly atmosphere.

Transmille was founded in 1997 as a commercial calibration service, and soon after began to develop and manufacture a range of electrical calibration products and software to answer a growing requirement for solutions to common problems. Following this small beginning, Transmille has worked year on year to provide unique equipment and software to benefit calibration laboratories and manufacturers across the globe.

Ever since releasing the very first products Transmille have continued to innovate and develop new products for the metrology community, from world first products such as the 2100 Electrical Test Equipment calibrator, through to the worlds lowest cost multi product calibrator the 1000 series.

Transmille now produce over 600+ calibration instruments per year, shipping instruments to customers ranging from National Standards Laboratories and manufacturers through to small calibration test houses around the world.

An unrivalled commitment to quality and innovation drives Transmille forwards, with a dedicated design and support team in house with a combined experience of over 60 years in manufacture and design of electrical calibration products and software.

With local distributors across the globe, we can offer one to one personalised support, no matter how large or small the customer.



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# 4000 SERIES ADVANCED MULTIPRODUCT CALIBRATOR



The 4000 Series is aimed at laboratories, manufacturers and design facilities requiring a wide range of outputs with accuracies up to 8ppm.

The 4000 Series builds on the trusted reliability of the 3000A series, offering an updated user interface accessed through a large 7" capacitive touch screen to enable advanced functionality, including a built-in procedure mode and inbuilt connection prompts to minimise errors.

Procedures can be loaded into the 4000 Series via USB memory stick, with results stored for integration back into ProCal software.

The 4000 Series also provides USB printer connectivity as standard, supporting a wide range of PCL compatible printers.

# **KEY FEATURES**

• Extended AC Voltage and Current Frequency range

- Variable resistance to 1 GOhm
- Variable capacitance to 100mF
- USB & GPIB (IEEE-488) Interfaces as standard
  - Remote command emulation mode
    - 7" Full Colour Touch Screen
    - Embedded Calibration System

# 4000 SERIES HIGHLIGHTS





# INNOVATIVE PROTECTION CIRCUITRY

The 4000 Series is protected by Transmille's I-GUARD protection circuitry protecting the calibrator against accidental damage through wrong connections up to ± 1000V RMS.

All Transmille calibrators have been protected by I-GUARD since 2006.

# LOW THERMAL BINDING POSTS

Fitted with low thermal beryllium copper terminals, the 4000 Series enables connection with 4mm banana jacks, spades and bare wire without the need for additional adapters.



\*IDN? \*RST R2/01 OUTPUT ON STBY OUT 1 V, 50HZ

# SOFTWARE COMPATIBILITY

The 4000 Series features an advanced command set including emulation modes for popular remote languages. This enables the 4000 Series to be used with Legacy metrology software that does not yet support Transmille equipment.

As with all Transmille products, compatibility with ProCal calibration software is guaranteed.

# **SUPERIOR ACCURACY**

Using modern precision components Transmille offer superior accuracy and value. Compared to competitive models the 4000 Series offers higher performance and wider ranges for lower cost



### ACTIVE TERMINAL INDICATORS

All Transmille calibrators offer active terminal indication to assist with making connections, combined with dynamic prompts

### 7" HIGH RESOLUTION TOUCHSCREEN

Clear, easy to read menus enable fast access to key functions, display dynamic output specification and user assistance prompts.

200mV DC

STANDOY

STANDBY

OUTPUT

000.00000r

OUTPUT CONTROL

Specification :

RANGE

÷10

X10

4010 ADVANCED MULTI PRODUCT CALIBRATOR

#### **CARRY HANDLES**

Rugged handles protect output – connections and assist movement around the laboratory

### DEDICATED TYPE N CONNECTOR

Low loss Type N connector used for high bandwidth output from 6GHz Oscilloscope option

### **CLEAR CONTROLS**

Operation of the 4000 Series is simple, with enlarged keys for key functions, and output status marked with LEDs

# EASY TO USE MENUS

Designed from the ground up to be easy to use through both touch and physical keys, menus and advanced functions of the 4000 Series feature intuitive controls. The 4000 Series interface is also fully translatable.





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### INPUT BY TOUCHSCREEN OR TRCTILE SOFT-KEYS

Data entry and menu selection is available through both touch screen and physical keys allowing flexible interaction based on user preference

### DEDICATED BUTTONS FOR KEY FUNCTIONS

Calculator style numerical entry with direct access to common units and multipliers accelerates manual entry of set points, saving time and minimising errors



Transmille's ProCal software provides auto configuration for the 4000 Series when connected over the convenient USB interface, and the GPIB (IEEE-488) interface enables fast connection to Legacy software and systems

### TRANSMILLE OUTPUT SELECT NEG TO GND 9 M nV 💿 DC m ± 0.00200mV to GND DC Help Hz ENTER SHIFT L CONTROL SB DEVICE PORT ADAPTER INTER

### FRONT MOUNTED USB PORT

For data offload, printing, updates and importing custom connection prompts

### EXTEND WORKLOAD COVERAGE THROUGH ACCESSORIES

Using external accessories workload coverage can be extended while minimising upgrade fees

# **INTEGRATED CONNECTION PROMPTS**

Using the touchscreen, dynamic connection prompts can be displayed for any output, showing a full colour connection diagram. For ease of use, the connection diagrams can easily be customised by users.





10.0012mA	10 10 00 m H
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	SI

# **TEMPERATURE SIMULATION OPTION**

### **OPTION PRT**



The PRT Option simplifies calibration of high accuracy resistance thermometers.

Because the calibrator uses passive precision resistors, reliable readings are guaranteed regardless of the measurement technique used by the thermometer.

When the PRT option is calibrated, the exact temperature values on the ITS90 scale for PT-385 resistors is stored in memory. This value is recalled and displayed each time a specific resistor is selected, allowing accurate calibration to be performed.

When combined with the SIMRC option an additional 2 Wire variable output is available enabling simulation of any value.

### ULTRA ACCURATE RESISTANCE VALUE

**8 PASSIVE RESISTANCE VALUES** 

### 2, 3 OR 4 WIRE SIMULATION OF PRT PROBES

# SIMULATED RESISTANCE & CAPACITANCE

# **OPTION SIMRC**



Included in -SYS units, the simulated option provides for resistance calibration between cardinal points and gives a continuous resistance range from 0 Ohms to 1 GOhms, with variable capacitance from 0.95uF through to 100mF.

This option enables calibration of multimeters with non decade calibration points.

# **INDUCTANCE CALIBRATION OPTION**

By incorporating this option, the workload of the calibrator can be increased to allow calibration of LCR (Inductance, Capacitance and Resistance) meters/bridges and allow calibration of DMMs with inductance measurement ranges.

Incorporating 8 fixed values, including 19mH and 29mH for '3' range meters enables testing of these meters at points which can verify their linearity at near full scale points.

When the IND option is calibrated, the exact value of the inductor at 1kHz is stored in memory. This value is recalled and displayed each time a specific inductor is selected, allowing accurate calibration to be performed.

### 8 PRECISION VALUES FROM 1mH TO 10H

COST-EFFECTIVE OPTION

### **OPTION IND**

#### COMPATIBLE WITH AC & MAINS POWERED BRIDGES

ADVANCED METROLOGY SYSTEMS



### IDEAL FOR CALIBRATION OF LCR METERS / BRIDGES

AUTOMATED CALIBRATION USING PROCAL SOFTWARE

# HIGH STABILITY FREQUENCY OUTPUT

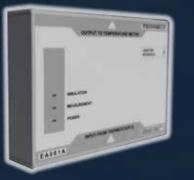
# **OPTION FRQ**



For calibration of high accuracy frequency counters, a 1ppm high stability frequency output is available (Included in 4010)

This simplifies the equipment requirements for calibrating handheld frequency counters and removes the need for installation of 10MHz distribution throughout the laboratory or workshop.

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# SUMMARY SPECIFICATIONS

ТҮРЕ	RANGE
J	-210°c to 1200°c
К	-200°c to 1370°c
Т	-250°c to 400°c
R	0°c to 1760°c
S	0°c to 1760°c
В	-600°c to 1820°c
N	-200°c to 1300°c
Е	-250°c to 1000°c
L	-200°c to 900°c
U	-200°c to 600°c
С	-0°c to 2316°c

For the ultimate in accuracy, Transmille has designed a dedicated source/ measure external adapter. This keeps the electronics required to generate the low-level signals used for thermocouple simulation as close as possible to the measuring input of the thermometer, which also allows the signal to be as free from electrical noise as possible, while eliminating errors caused by heat generated by surrounding electronics.

The cold junction compensation (CJC) sensor is mounted in the thermocouple plug itself. By measuring the cold junction at the instrument's input, any type of thermocouple can be simulated without requiring the use of thermocouple compensation cables.

#### SUPERIOR THERMOCOUPLE SIMULATION/MEASUREMENT

### 1 1 BUILT-IN TYPES (SEE SPECIFICATION TABLE)

THERMOCOUPLE MEASUREMENT USES NEUTRAL (COPPER) PLUG

### CJC SENSOR BUILT INTO THERMOCOUPLE PLUG & SOCKET

### OPTICAL TACHOMETER CALIBRATION ADAPTER OPTION EROO3



Using a high intensity LED light source, optical tachometers can be calibrated quickly and easily. Simply enter the RPM value using the calibrator keypad or use with ProCal software for automated calibration. With a range of 60 - 60,000 RPM the EA003 can be used to calibrate a wide range of optical tachometers.

60 - 60,000 RPM RANGE



### 2 / 10 / 50 TURN COIL ADAPTER (1500A) OPTION EROO2



Designed for the calibration of both wound AC and magnetic field hall effect AC/DC clamp meters, the Transmille EA002 current coil offers several unique features.

A robust construction allows for years of hard use without risk of damage to the coil element, and an included alignment table ensures repeatable results.

## SPECIFICATIONS

	2 Turn (LHS)
Configuration	10 Turn (RHS)
	50 Turn (Centre)
Туре	High Accuracy Bal- anced
Internal Dimensions	10mm (2/10 Turn)
	25mm (50 Turn)
Maximum Current	30A
Duty Cycle @ 20A	70% On / 30% Off
Maximum RMS Voltage	4V
Frequency Range	DC to 400Hz
Accessories	Detachable Platform

### CALIBRATES CLAMP METERS UP TO 1500A

HIGH ACCURACY AC/DC BALANCED DESIGN

WIDE RANGE OF CLAMP SIZES COVERED

#### INCLUDES ALIGNMENT TABLE FOR REPEATABLE READINGS

### 2 / 10 / 50 TURN COIL ADAPTER (2000A) OPTION ERO19

EADID 2000 AMP ACOC CAMP COL MANTIN

Designed for the calibration of both wound AC and magnetic field hall effect AC/DC clamp meters, the Transmille current coil offers several unique features.

The EA019 option allows for a 40A input, allowing for calibration up to 2000A when using the 50 turn coil when used in conjunction with the EA3012A Transconductance Amplifier.

### **MULTI-FUNCTION WORKSTATION**

**OPTION ERO15** 



The Multi-Function Workstation provides a central work area with all connections routed conveniently to remote terminals mounted at the front of the adapter.

Incorporating the advanced clamp coil, thermocouple simulation and tachometer calibration adapters, as well as process control source/measure capabilities, this workstation adapter provides a versatile platform for efficient calibration of a wide range of equipment.

# **CLAMP METERS**

INSULATION TESTERS



# DIGITAL THERMOMETERS

OPTICAL TACHOMETERS Using the built in 2, 10 and 50 turn coils, clamp meters can be accurately and quickly calibrated.

Insulation to 2GOhms @ 1000V and continuity to 1kOhm is available from dedicated terminals.

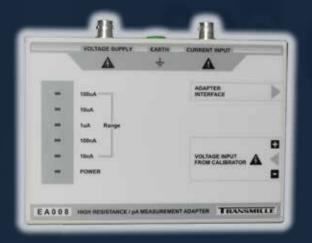
Integrates all required functions to both source and measure the required signals for process control calibration.

Easily calibrate digital thermometers with the built in thermocouple simulation output with automatic cold junction compensation.

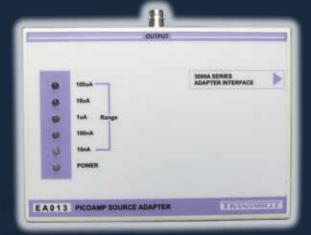
Using a high density LED light source, optical tachometers can be calibrated quickly and easily.



### HIGH RESISTANCE/pA MERSUREMENT ADAPTER OPTION EROO8



# PICOAMP SOURCE ADAPTER OPTION ERO13



IDEAL FOR CALIBRATING ELECTROMETERS

SOURCE CURRENT ACCURATE DOWN TO PICO AMP LEVEL

> LOW OPEN CIRCUIT COMPLIANCE VOLTAGE

SAFE TO USE ON SENSITIVE INPUT CIRCUITS

SUPPLIED WITH VFP SOFTWARE

The high resistance/pA measurement adapter eliminates the need for a separate electrometer instrument. The low cost EA008 provides 5 current measurement ranges down to 10nA with a resolution of 1pA and incorporates a 'virtual ground' input, avoiding input impedance errors.

Using the high voltage output from the 4000 series calibrators together with the current measurement capability of the EA008 allows high accuracy resistance measurements to be at any voltage up to 1000V.

The EA013 Picoamp source adapter allows the 4000 Series calibrator to source current outputs from 100uA to below 10nA with a resolution of 1pA

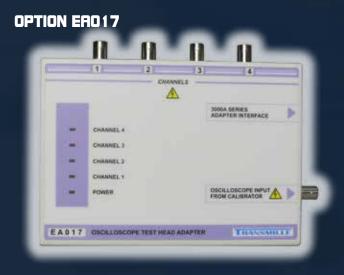
A unique circuit converts the low noise voltage output from the calibrator into a precision low noise currents source which avoids the use of external high value resistance standards and minimises the chance of damage to sensitive electrometer inputs.



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### 4-CHANNEL OSCILLOSCOPE TEST HEAD ADAPTER



### PRECISION ANALOGUE LEAD SET OPTION OPTION 40XXLEAD



### HUMIDITY MERSUREMENT 10% TO 90%

### TEMPERATURE MEASUREMENT 0°C TO 50°C

The EA016 adapter provides the ability to measure the local temperature and humidity for recording on certificates and test reports.

Essential for on-site work to maintain accurate calibration records and avoids the requirement for humidity/ temperature probes.

#### 4 CHANNELS FOR AUTOMATING OSCILLOSCOPE CALIBRATION

### CHOOSE BETWEEN DIRECT OR BUFFERED OUTPUTS

For automation of oscilloscope calibration, Transmille provide a 4-channel switching test head.

For accurate calibration of 50 Ohm input oscilloscopes, up to 1V/Division, a low impedance buffered amplitude output can be selected.

#### LOW THERMAL GOLD/COPPER VOLTAGE LEADS (0.7uV)

### **HIGH CURRENT 32A LEADS**

### ALL 4mm LEADS WITH SAFETY SHROUDS

Provided in a hard carry case for storage, the Precision Analogue Lead Set provides a comprehensive set of leads for making connections to typical test equipment.



### **TPMXX PRESSURE MODULES**

TPMOO1 to TPMO18



#### PRESSURE MEASUREMENT FROM 25mBAR TO 10,000 PSI

### **OPTIONAL HAND PUMP AVAILABLE**

A modern calibration laboratory must calibration in multiple disciplines to remain competitive. To assist, Transmille have a range of pressure modules to add pressure measurement capability to our products.

Select from a range of pressure modules that connect directly to our products and provide read-back directly on the screen.

OPTION	PRESSURE	
PSI Gauge	Accuracy 0.04%	
TPM001	1 PSI	
TPM002	5 PSI	
TPM003	10 PSI	
TPM004	50 PSI	
TPM005	100 PSI	
TPM006	500 PSI	
TPM007	1000 PSI	
TPM008	5000 PSI	
TPM009	10000 PSI	
Bar Gauge	Accuracy 0.04%	
TPM011	350 mBar	
TPM012	1 Bar	
TPM013	10 Bar	
TPM014	35 Bar	
TPM015	100 Bar	
	100 Bar <b>Accuracy 0.04%</b>	
TPM015 Bar Gauge		
TPM015 Bar Gauge (Vacuum)	Accuracy 0.04%	

### TORQUE CALIBRATION ADAPTER

**OPTION ERO14** 



By connecting the EA014 Torque Measurement adapter to a Transmille calibrator, torque calibration capabilities can be added to your laboratory in a cost-effective manner.

Housing an external torque transducer allows torque screwdrivers up to 10Nm to be calibrated, with a range of available torque transducers from 1Nm to 1500Nm.

### AC/DC TRANSCONDUCTANCE AMPLIFIER OPTION ER3012R



LOW NOISE LINEAR MOSFET TECHNOLOGY

CONTROL FROM FRONT PANEL OR THROUGH PROCAL SOFTWARE

### **3A/63V CALIBRATION ADAPTER**

**OPTION EA3023** 



MEASURE PSU OUTPUT VOLTAGE TO 63V

ACTIVE CURRENT LOAD TO 3 AMPS The EA3012A is a powerful linear transconductance amplifier designed for use with Transmille calibrators to provide a cost-effective solution for the generation of high currents.

Use of linear technology throughout gives a very low noise output, completely free from switching spikes. Long-term accuracy is assured by using precision foil resistors and a custom internal shunt.

Higher currents are available by paralleling multiple EA3012A amplifiers to reach currents in excess of 300A.

#### STACKABLE FOR HIGHER CURRENTS

#### IDEAL FOR HIGH POWER CURRENT SHUNTS & METERS

An essential option for simplifying calibration of power supplies. The PSU adapter can measure the output voltage and also provides a precision electronic current load allowing volts, current and even output resistance to be calibrated by one compact unit. 4 wire connection ensures accuracy and repeatability.

By measuring a power supply's on load/ off load voltages, the output resistance of the PSU can easily be measured. The operation is controlled using the virtual front panel software (supplied) or ProCal calibration software.

#### DETERMINE OUTPUT RESISTANCE/VOLTAGE DROP

CALIBRATE POWER SUPPLY CURRENT METER



### AC/DC KILOVOLT AMPLIFIER

#### **OPTION ER3024**



The EA3024 kilovolt amplifier provides a simple and safe solution for the calibration of high voltage probes and dividers.

Using the advanced electronics inside the Transmille calibrators, the EA3024 provides a cost-effective solution for calibration of these common instruments.

The EA3024 is controlled via dedicated front panel software or via ProCal for safe calibration at high voltages.

### AC VOLTAGE 1 TO 5 KILOVOLTS

### INDEPENDENT SOCKETS FOR DC OR AC OUTPUT

### DC OUTPUT 1 TO 10 KILOVOLTS

CONTROLLED BY PROCAL OR VIRTUAL FRONT PANEL

# 60A / 60V POWER SUPPLY CALIBRATION ADAPTER

OPTION ER3025A



MEASURE OUTPUT VOLTAGE TO 60 VOLTS

ACTIVE CURRENT LOAD TO 60 AMPS The EA3025A provides an easy to use, low cost solution for the calibration of high current power supplies.

Overcoming many of the issues typically associated with measuring high current outputs, the EA3025A provides an all in one solution.

An accurate, stable electronic load simulates current loading on power supplies and provides measurement of voltage and output resistance, while minimising the equipment required for calibration of these common devices.

#### **MEASURES OUTPUT RESISTANCE**

#### APPLICATIONS INCLUDE BATTERY/UPS TESTING

www.transmillecalibration.com

# **OSCILLOSCOPE** CALIBRATION



To expand the workload coverage of the 4000 Series calibrators a range of internal oscilloscope options are available.

Suitable for calibration of both digital and analogue oscilloscopes the oscilloscope options provide a flexible solution to calibrating a wide range of models.

#### AMPLITUDE TO 300V PEAK - PEAK

Providing both a 1kHz square wave and DC Level, the oscilloscope output covers from 2mV/Division through to 50V/Division in a 1,2,5 sequence. Each level can be deviated up to 10% from nominal. With the wide output range of 300V pk-pk the 4000 Series can calibrate the full range of any modern oscilloscope.

Fitted with a precision frequency source, oscilloscope options for the 4000 Series offer a frequency accuracy of 5ppm with outputs available as a comb waveform below 100ns and a sine wave above to assist triggering.

#### TIMEBASE FROM 2ns to 5s

#### **BANDWIDTH TO 6 GHz**

A levelled sinewave output provides a continuously variable sinewave to verify the bandwidth of an oscilloscope. Unique to the 6GHz oscilloscope option is the ability to vary this level from 2mV pk-pk to 2V to verify the bandwidth of multiple vertical gain channels.

A Fast Rise signal is available for evaluating overshoot, undershoot and ringing of oscilloscope attenuation and amplifier circuits.

#### < 1ns FAST RISE OUTPUT

OPTION	BANDWIDTH	BANDWIDTH LEVEL
SCP350	5 MHz - 350 MHz	600 mV
SCP600	5 MHz - 600 MHz	600 mV

# **POWER CALIBRATION**





Included in -SYS units as standard, the PWRSINE option for the 4000 Series enables calibration of power meters, offering DC power output and AC power with variable phase between Voltage and Current outputs. Dynamic phase control enables calibration of both capacitive and inductive loads without additional error.

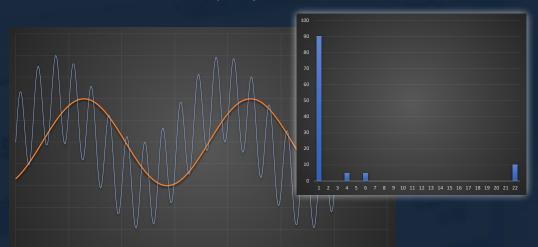
### DC POWER / AC POWER (TO 400HZ)

SIMULATE UP TO 1.5MW WITH EAOO2 CLAMP COIL ADAPTER

DYNAMIC PHASE COMPENSATION WITH 0.1° RESOLUTION O ° TO 359.9 ° / POWER FACTOR 1 TO -1

### **PWRDDS OPTION**

In addition to the standard Power option (PWRSINE), the PWRDDS option enables generation of distorted waveforms with both preset and user configurable waveforms, enabling simulation of harmonics, flicker and dropouts to calibration advanced power quality meters.



# PROCAL CALIBRATION SOFTWARE

Transmille's ProCal software suite provides a powerful and easy to use multidiscipline calibration software solution. The software allows for full control of the calibration laboratory, with a range of programs designed for system setup, instrument calibration, procedure management, certificate printing, instrument management, sales tracking and more.

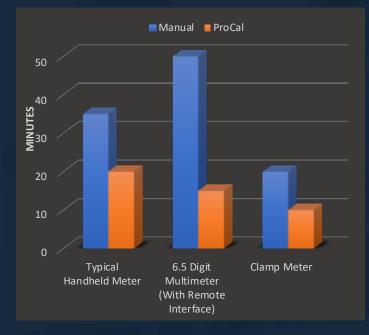
Ease of use is key for Transmille, and by using the Procal software suite you will be able to easily automate calibration with minimal training requirements.



Featuring powerful bar-code integration and instrument history management, ProCal Track provides all of the tools needed for the management of instruments from goods inwards through to despatch, and all points in-between.

ProCal simplifies the task of calibration by providing a graphical interface with clear indication of test status using a 'Traffic light' system, where Green indicates pass, Red indicates a fail and orange indicates a probable fail or probable pass condition.





ProCal and ProCal-Track provide a cost effective method of improving workflow throughout your laboratory or organisation.

Turnaround time of calibrations can be decreased by over 50%, reducing the cost per calibration and improving customer satisfaction and competitiveness.

# SUMMARY SPECIFICATIONS



	4010	4015
DC VOLTAGE	0 - ±1025V	0 - ±1025V
Best 1 Year Total Accuracy	± 8 ppm	± 15 ppm
DC CURRENT	0 - 30A	0 - 30A
Best 1 Year Total Accuracy	± 50 ppm	± 50 ppm
AC VOLTAGE	20mV - 1000V, 10Hz - 1MHz	20mV - 1000V, 10Hz - 500kHz
Best 1 Year Total Accuracy	± 0.015 %	± 0.03 %
AC CURRENT	20uA - 30A, 10Hz - 30kHz	20uA - 30A, 10Hz - 30kHz
Best 1 Year Total Accuracy	± 0.04 %	± 0.04 %
RESISTANCE (Passive)	0 Ohms - 1 GOhm	0 Ohms - 1 GOhm
Best 1 Year Total Accuracy	± 8 ppm	± 40 ppm
RESISTANCE (Variable) *	0 Ohms - 1 GOhm	0 Ohms - 1 GOhm
Best 1 Year Total Accuracy	± 100 ppm	± 100 ppm
CAPACITANCE (PASSIVE)	1nF - 10uF	1nF - 10uF
Best 1 Year Total Accuracy	0.25 %	0.25 %
CAPACITANCE (Variable) *	0.95uF - 100mF	0.95uF - 100mF
Best 1 Year Total Accuracy	0.7 %	0.7 %
FREQUENCY	1Hz - 10MHz	1Hz - 10MHz
Best 1 Year Total Accuracy	1 ppm	20 ppm (1ppm option)
POWER *	DC / 10Hz - 400Hz	DC / 10Hz - 400Hz
Best 1 Year Total Accuracy	0.06 % / 0.18%	0.08 % / 0.18%
TEMPERATURE (THERMOCOUPLE) *	11 Ту	pes
Best 1 Year Total Accuracy	±0.09°C	
TEMPERATURE (PRT / RTD) *	2 Wire Variable / 2,3,4 Wire Passive	
Best 1 Year Total Accuracy	±0.08°C /	±0.02°C
INDUCTANCE *	1 mH -	10 H
Best 1 Year Total Accuracy	0.5	%

Line Voltage	110V / 230V Selectable 100V Option Available
Line Frequency	50 to 60 Hz
Operating Temperature	0°C to +50°C 32°F to 122°F
Dimensions (LxWxH)	54.5 x 45 x 19 cm 21.4 x 17.7 x 7.5 inches
Weight	Calibrator : 20kgs Calibrator in Shipping Box : 25kgs Calibrator in Transit Case : 40kgs
Recommended Calibration Interval	12 Months
Warranty Period	1 Year

\* Denotes optional function - refer to available options for ordering details