Thermometry Bridge
microK²

- **Accuracy and Stability:** Superior resistance ratio accuracy and zero drift to ensure long-term stability
- **Trusted by NMIs:** Widely recognised by leading NMIs with independent reports validating its exceptional performance
- **Second Generation:** Improved performance with new features and a 10.1-inch high-resolution touchscreen for clear visualisation of measurements and data

The microK² builds on the success of the original microK models that were quickly adopted by the world's leading National Metrology Institutes and commercial laboratories. Retaining Isotech's innovative technology and operating mode to achieve accuracies as low as 7.5 µK, microK² remains first choice to measure with SPRTs and supports all standard thermometer types including Standard Thermocouples, Industrial PRTs and Thermistors.

New: The microK² introduces several new features designed to enhance usability, accuracy, and versatility. A notable addition is the new fourth channel, which accepts SPRTs, reference resistors, or the channel expander, offering greater flexibility in measurement systems. The touchscreen has been upgraded to a 10.1-inch high-resolution display with improved capacitive touch technology, ensuring a more responsive and intuitive user interface, input terminals are now more robust and easier to use. Enhanced connectivity options now include Ethernet, two RS232 serial ports, three USB ports and a IEEE 488 Port with new software features.

Performance by Design – Inherently Drift-Free
The microK was developed with a clear design philosophy: to ensure genuine, long-term performance without relying on "tweak pots," software adjustments, or self-calibration. This innovative approach has resulted in a resistance ratio accuracy that is uniquely drift-free, ensuring unparalleled accuracy and stability.

As a ratio bridge, the microK leverages a substitution topology that inherently eliminates drift. With no need for compensation circuits, software offsets, or routine calibration, the microK maintains its performance without requiring adjustments or service interventions, delivering consistent, reliable measurements year after year, thereby reducing operating costs.

Since its introduction in 2006, the microK has been rigorously studied and validated by temperature metrologists worldwide, confirming its superior performance and reliability.

For an in-depth understanding of the microK's technology and performance, visit our website. You'll find a range of technical papers, including those presented at conferences, academic studies, and more general articles, all providing solid evidence of the microK's exceptional capabilities, www.isotech.co.uk/evidence.

Accuracy

Model	Ratio Accuracy	Equivalent Temperature Accuracy at Water Triple Point [2]
microK² ELITE	30 ppb	7.5 µK
microK² 60	60 ppb	15 µK

Key Features

- **Resistance Thermometry**
  - 0.1Ω, 0.25Ω, 1Ω, 10Ω, 25.5Ω, 100Ω SPRTs
  - Industrial PRTs
  - Thermistors
  - Rhodium-Iron (Resistance only)
- **Voltage Measurement**
  - Laboratory Standards: Platinum / Rhodium, Gold / Platinum and Base Metal, Accuracy to 0.15µV
- **Accurate**
  - World-Leading Accuracy for Primary & Secondary Laboratories
- **Stable**
  - ZERO drift in ratio measurement
- **Four Input Channels**
  - Best Practice Ready
  - Expandable to 93
  - Allows for future-proof scalability, accommodating growing laboratory needs
- **Ease of Use**
  - Upgraded Touch Screen Operation, Store all Standard Thermometer and Standard Resistors internally
  - Log to internal memory or USB Memory Drive
- **Trusted**
  - Documented Performance with Acceptance by the World's Leading NMIs
- **microK²**
  - New & Improved Performance, Upgraded with New Features

microK Benefits

New

- **Unmatched Accuracy**
  Documented ratio accuracy as low as 0.03 ppm
- **Extra Channel**
  Features a new fourth channel on the rear panel for increased flexibility.
- **Extensive Connectivity**
  Includes Ethernet, RS232, USB & IEEE 488 (GPIB)
- **Trusted by Experts**
  Chosen by leading National Metrology Institutes worldwide
- **Versatility**
  Suitable for all temperature metrology applications & budgets
- **Intuitive Operation**
  Faster, larger touchscreen interface for easy navigation provides a clear and responsive interface, even in bright environments, making it easier to read and navigate.

Thermocouple Measurements

When used with an external 0°C cold junction reference unit (or by measuring the junction temperature with a PRT on another channel), the microK can be used for low uncertainty precision thermocouple measurements. The microK is designed for ALL the thermometer types used in a laboratory including Standard Thermocouples. The voltage uncertainty is 0.15 µV, equivalent to 0.006°C for a Platinum / Gold thermocouple at 1000°C.

ADC

The microK achieves unrivalled linearity and low noise through innovative techniques that include parallel analogue amplifiers, solid-state switching, advanced guarding and a zero-drift substitution topology. Its novel sigma-delta ADC employs a multi-bit, pulse-width modulation (PWM) DAC under NPL's "Technology Applied" scheme to achieve <0.03 ppm accuracy and low quantisation noise.

NPL National Physical Laboratory
Technology Applied

Extensive Testing and Validation

The microK² performance, rigorously tested by NMIs and leading research organizations, confirms its reliability and precision. Visit our website for a full brochure along with technical articles and papers highlighting the microK² unmatched capabilities.

Cryogenic Measurements

The microK supports Rhodium-Iron thermometers (RhFe or RIRTs) and SPRTs for measurements down to 4K in ratio and resistance modes (resistance only).

Keep Warm Currents

The keep warm current for each channel, whether on the microK or via the microsKanner channel expander, is automatically set to the last applied sense current. This feature not only simplifies the use of the microK but also ensures that measurements remain immune to power coefficient effects.

Zero Current Resistance

The microK was the first Bridge to have the ability to automatically compute and display the zero current resistance with no manual correction. Automatically computes and displays resistance with no manual correction needed, simplifying the process and reducing potential errors. Now available on all microK² models.

Low Noise

The new ADC, together with the low noise pre-amplifiers used in the microK, means you achieve a lower measurement uncertainty in a shorter time.

Parallel Processing Technology

A key innovation developed specifically for the microK² is Parallel Analogue Processing, which reduces voltage noise to levels previously achievable only by the best AC resistance bridges. Each amplifier contributes linearly to the signal, while noise adds as the root mean square (RMS), resulting in significantly lower overall noise. By using multiple parallel amplifiers, the microK² minimises voltage noise without compromising performance, making it a valuable feature in precision measurement.

Introducing the microK² ELITE Package

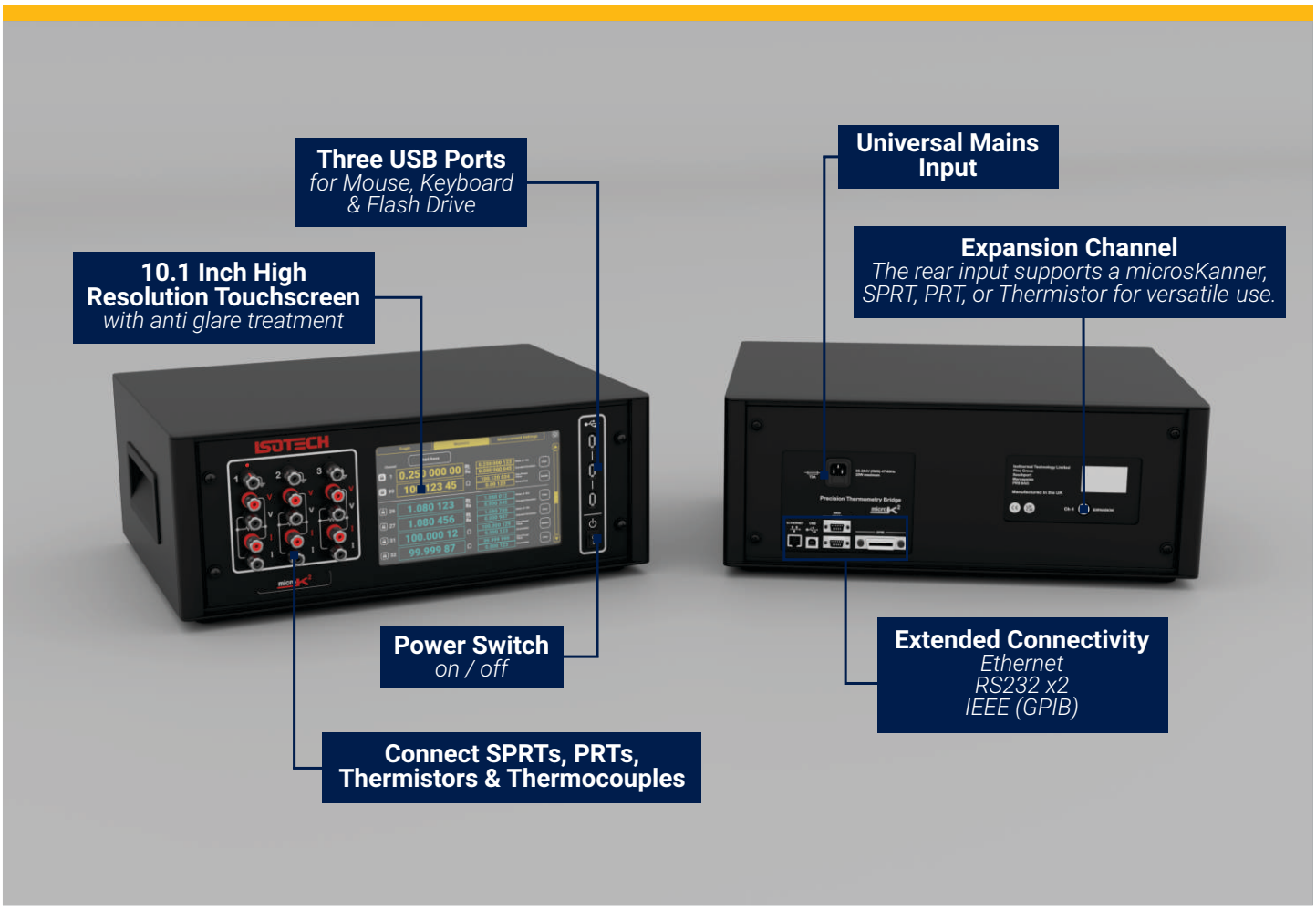
Unmatched Performance and Assurance

We are proud to offer the microK² ELITE package, a premium offering that combines enhanced performance with an exclusive set of benefits designed to provide you with the highest level of confidence and support.

Performance Guarantee – <30 ppb Accuracy
The microK² ELITE package includes a microK² instrument with superior performance, achieving ratio accuracy of <30 ppb across the entire range (0 to unity). This exceptional level of precision is guaranteed, with each unit calibrated using our Automatic Ratio Bridge Calibrator, (RBC-A)

Exclusive Benefits – Extended Warranty and Free Recalibration
As part of the microK² ELITE package, you'll receive an extended three-year warranty, ensuring long-term reliability and peace of mind. Additionally, we offer free ratio accuracy recalibration in years two and three you only cover the shipping costs.

A Commitment Like No Other
No other company matches our commitment to precision and reliability. We are the only provider offering guaranteed performance validated by the advanced RBC-A (Automatic Ratio Bridge Calibrator), developed by renowned metrologist Rod White. Backed by a three-year guarantee, the microK² ELITE package represents the pinnacle of performance, delivering assurance and protecting your investment for the long term.



microK² Specifications *(Specifications are subject to change without prior notice)*

Parameter	microK² ELITE	microK² 60
Accuracy, Whole Range *[1]*	30 ppb	60 ppb
Equivalent Temperature Accuracy Whole Range *[1]*	30 µK	60 µK
Equivalent Temperature Accuracy Water Triple Point *[2]*	7.5 µK	15 µK

Common Specifications

Weight	13.2 kg
Resolution, Temperature	0.001 mK 0.000001°C
Input Channels **NEW**	Four - three front and one rear
Ratio Range	Unlimited
Ratio Accuracy Stability *[3]*	Zero Drift
Ratio Accuracy Temperature Coefficient *[4]*	Zero
Resistance Range	0 - 500 kΩ
Keep Warm Current	Each Channel Individually Programmable
Voltage Range *(Thermocouple)*	125 mV
Voltage Accuracy 0 - 20 mV	0.15 µV Equivalent to 0.006°C for a Platinum / Gold thermocouple at 1000°C
Resolution Voltage	10 nV
Cold Junction Mode	External and Remote with PRT
Sensor Current **NEW**	Each Channel Adjustable 0 - 14.2 mA
Cable Length	Limited to 10Ω per core and 10nF shunt capacitance *(equivalent to 100m of RG58 coaxial cable)*
Temperature Conversions **NEW**	PRTs: ITS-90, Callendar-van Dusen. Thermocouples: *IEC 60584-1 Ed. 3.0 2013 (B, E, J, K, N, R, S, T), L, Pt/Pd and Au/Pt, Thermistors: Steinhart-Hart, Polynomial*
Internal Resistance Standards	25, 100, 400Ω
Optional Internal Values	1, 10, 10KΩ, Custom
Internal Standard Resistor Stability	TCR < 0.5 ppm/°C and stability < 2 ppm/year
Input Connectors	Upgraded: Gold Plated 4mm binding posts for plugs, spades or bare wires, material tellurium-copper alloy for low thermal EMF
Interfaces	Ethernet, 3 x USB Host, 2 x RS232, IEEE
Store Calibration Coefficients	Unlimited
Datalogger	32 GB Storage
Expandable **NEW**	Add up to 90 expansion channels
Switching Technology	Solid State
Units	Ratio, V, Ω, °C, °F, K
Display	10.1-inch high-resolution touchscreen with anti glare treatment
Operating Conditions	Full Specification: 15 - 30°C 10 - 80% RH Operational: 0 - 40°C 0 - 95% RH
Power	85 - 264 Vac 50/60 Hz 20 watts maximum
Dimensions	539mm x 200mm x 300mm *(19" Rack Mountable)*

[1] Over whole range of SPRT, -200°C to 962°C. For Ro=0.25Ω increased by a factor of 2.5
[2] E.g. With 25.5Ω SPRT and 25Ω Reference Resistor or Direct Comparison of SPRTs with Ro > 2.5Ω
[3] The microK2 uses a "substitution technique" in which the Device-Under-Test and the Reference are successively switched into the same position in the measuring circuit. This means that the stability of resistance ratio measurements is immeasurably small.
[4] Using external reference resistors.

Resistance Bridge Calibrator (RBC)

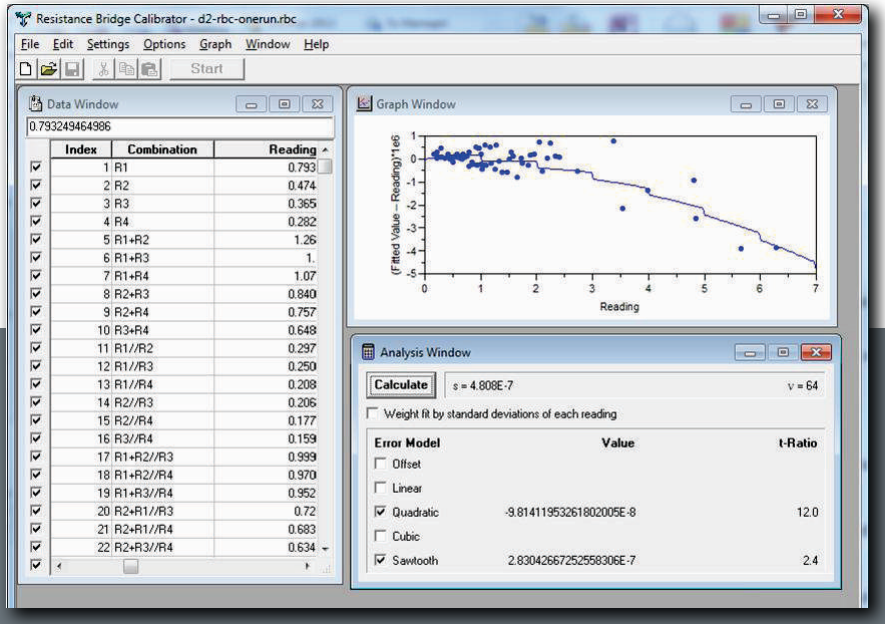
***Manual** and **Automatic** Models*

Isotech have a unique solution to measure the performance of resistance bridges - the RBC. It is used to verify the performance of all microK models. Developed by D. R. White at the Measurement Standard Laboratory of New Zealand, the RBC allows bridge performance to be fully evaluated. Isotech has an exclusive license from MSL to manufacture and supply the RBC.

Confidence

RBC testing of microK establishes both confidence and evidence of the microK's performance. When NMIs have used the RBC to evaluate other bridges many have been found to be out of specification or have 'small but significant' faults.

The RBC can generate 70 ratios (including complements) combining reciprocal and linearity checks. Neither the exact values or frequency dependence of the base resistors need to be known. The result is a system that can evaluate both AC and DC bridges with an accuracy to 10 ppb at 100 Ohms.
The supplied software produces full reports



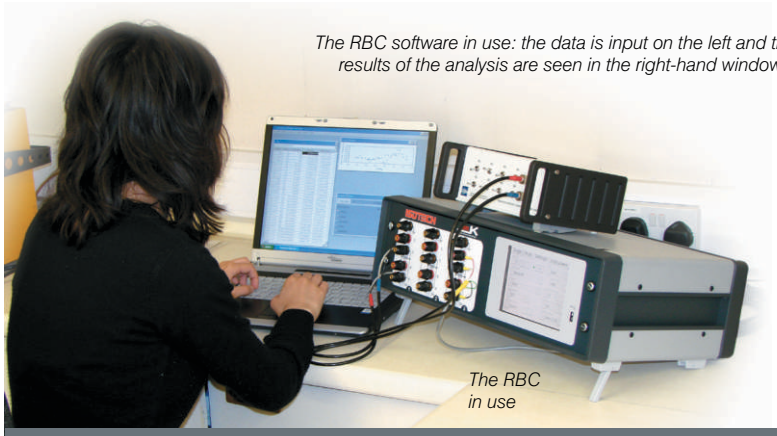
For further information, see our website: **http://www.isotech.co.uk/rbc**

The RBC has allowed both Isotech and leading NMIs to validate microK performance, it has given metrologists evidence of actual performance and contributed to the outstanding success of the microK bridge.

Automatic vs Manual

The manual model is operated from switches and the data manually entered into the software for analysis and reporting.

The new automatic model is operated from a PC via a USB connection. There are drivers for the Isotech microK, milliK and AC and DC bridges from other manufactures that allow for fully automatic and unattended calibration of commonly used thermometry bridges. The software design allows for new drivers to be created as DLLs and we expect to support a growing number of bridges, check the website for full details The RBC 100A / 400A benefits not only from automatic operation but with changes to the internal circuitry to increase the accuracy and they can be immersed in oil to allow temperature control.



The RBC software in use: the data is input on the left and the results of the analysis are seen in the right-hand windows.

The RBC in use

Can you trust your bridge?

In the paper "A Method for Calibrating Resistance Thermometry Bridges" D. R. White evaluated 38 Bridges. He found significant faults with 15% of those tested, but "like the walking wounded" they continued to provide a plausible reading.

The RBC allows easy verification and calibration of your bridge ensuring measurements are accurate and traceable, use it to Restore Bridge Confidence.

MANUAL Specifications

Accuracy:	<0.1 ppm at 100Ω (For DC and AC to 400 Hz)
Temperature Coefficient:	< ±0.3 ppm / °C.
Maximum Sensing Current:	RBC100M: 10 mA RBC400M: 5 mA
Resistance Range:	RBC100M: 16Ω to 127Ω RBC400M: 43Ω to 346Ω
Power Supply:	None - the RBC is completely Passive
Connections:	Four-terminal coaxial using separate BNC for the current and voltage leads
Case Dimensions:	Width 215mm Height 105mm Depth 200mm (2U height by half rack width)
Weight:	2.5 kg

AUTOMATIC Specifications

Accuracy:	<0.01 ppm at 100Ω (For DC and AC to 400 Hz. When RBC is temperature controlled)
Temperature Coefficient:	< ±0.3 ppm / °C.
Maximum Sensing Current:	RBC100A: 5 mA RBC400A: 3 mA
Resistance Range:	RBC100A: 16Ω to 127Ω RBC400A: 43Ω to 346Ω
Power Supply:	5V, via the USB cable. Idle current typically less than 5 mA, switching currents less than 200 mA.
Connections:	Signal: Five-terminal guarded dc, spade lugs. Digital control: USB.
Case Dimensions:	Width 88mm Height 140mm Identical to Tinsley type standard resistors.
Weight:	1.25 kg

Software

Tabular and graphical representation of data Least-squares fit to determine model of bridge error
Tabular summary of data and results
Print calibration report

Compatible with Microsoft Windows XP to Windows 11 platforms