

Precision Thermometry Bridges

Isotech have a range of innovative precision thermometers to match the calibration requirements of all labs, from most demanding of National Metrology Institutes through to the needs of those calibrating industrial sensors.

Precision Thermometry Bridges

The microK instruments and the matching microK channel expander can be used with the best of Standard Platinum Resistance Thermometers, Thermistors and Thermocouples with uncertainties of better than 0.0001°C.

The microK family has unrivalled convenience and flexibility with performance that was previously only attainable with the best of the AC Resistance Bridges.

Precision Thermometers

This range includes two high accuracy bench top thermometers. The TTI-22 offer performance to 1mK at a ground breaking new price. The milliK can be used with SPRTs, PRTs, Thermistors, Thermocouples and Current Transmitters.



Selection Guide

Model	SPRTs	PRTs	Thermistors	Thermocouples	Accuracy at 0°C	Application	Features
Precision Thermometry Bridges							
microK 70	■	■	■	■	0.017ppm	Primary	Three Input Channels Touch Screen Adjustable Current Source
microK 125	■	■	■	■	0.03ppm	Primary	Keep Warm Currents Touch Screen
microK 250	■	■	■	■	0.06ppm	Secondary	
microK 500	■	■	■	■	0.125ppm	Secondary	
Precision Thermometers							
milliK	■	■	■	■	0.003°C	Secondary	Current Input
TTI-22	■	■			0.001°C	Secondary	Sets new Standard for Price to Performance
Scanners							
microKanner							Add up to 90 Channels to microK family Plug and Play Operation
Model 954							8 Channel PRT Switch for TTI-22 and TTI-7 PLUS
Model 958							8 Channel Thermocouple Switch for TTI-22 and TTI-7 PLUS

Resistors

To enable the smallest of measurements Standard Resistors are used, and in the Primary Lab these resistors require to be kept at a precise and constant temperature. Isotech can supply and calibrate Standard Resistors to uncertainties less than 0.08ppm.

Resistor Selection Guide			
Model	SRA & SRB	456	455
			
Values	SRA: 1, 10, 25 and 100 Ohm 400 Ohm to special order SRB: 1000 and 10,000 Ohms	10, 25, 100, 1000, 10,000 Ohm	Standard Resistor Maintenance Bath
Application	Primary and Secondary Lab microK	Affordable Resistors with inbuilt temperature control	Precisely Maintains SRA Primary Resistors at Fixed Temperature

RBC: Resistance Bridge Calibrator

The RBC is designed for quick and simple, in-house calibrations of AC and DC thermometry bridges, with an accuracy of better than 0.1 ppm at 100 Ω. The calibrators are supported by software for analysis of the results.



<http://www.isotech.co.uk>



-200 to 1800°C

Precision Thermometer microK

- Ratio Accuracy to <math><0.02\text{ppm}</math> (20ppb) with Zero Drift
- SPRTs, PRTs, RTDs, Thermistors and Thermocouples
- Reliable 21st Century 100% Solid State Design

The microK family of precision thermometry bridges use a completely new measurement technique to achieve accuracies to better than 0.02ppm.

There are four models to suit all levels of temperature metrology from National Measurement Institutes to those wanting a solution to make low uncertainty temperature measurements in a range of applications.

In addition to making the best resistance measurements, the microK makes high accuracy thermocouple measurements with a voltage uncertainty of <math><0.25\mu\text{V}</math>. The microK can be used with all standard thermometer types including SPRTs, Standard Thermocouples, Industrial PRTS and thermistors.

First introduced in 2006 the microK is rapidly becoming the instrument of choice at the world's leading NMIs and many commercial laboratories. All microK models now include IEEE-488 General Purpose Interface Bus as well as RS232 and USB. The microK 70 and microK 125 also feature an Ethernet port and can be monitored and controlled across a LAN.

Performance by Design - Drift Free

"Performance by Design" was the mantra and passion behind the development of the microK. On Day 1 a decision was made, "no tweak pots" (such as used on AC Bridges to correct for flux leakage), no software adjustment, no "self-calibration" but performance by design. The microK achieves its resistance ratio accuracy by design, not adjustment and is uniquely drift free.



Unequalled combination of accuracy, stability and versatility.

To be clear, as a ratio bridge the microK is drift free. This is a benefit of the substitution topology used and provides one of the microK's most exciting features, it is inherently drift free.

It doesn't have compensation or adjustment circuits, it doesn't have software offsets, it doesn't self-calibrate, it never needs adjusting, never needs a service engineer, in ratio measurement it is drift free by design.

For more details read, "Using a Substitution Measurement Topology to Eliminate the Effect of Common Mode Errors in Resistance Measurements used in Temperature Metrology" available on the Isotech Website which also explains why the performance of the microK is superior to DC potentiometric instruments.

Accuracy

Model	Ratio Accuracy	Accuracy (Whole Range)
	ppm*	ppm
microK 70	0.017	0.07
microK 125	0.03	0.125
microK 250	0.06	0.25
microK 500	0.125	0.5

* At Ratio: 0.95 to 1.05

Key Features

- **Resistance Thermometry**
 - 0.1Ω, 0.25Ω, 1Ω, 10Ω, 25.5Ω, 100Ω
 - SPRTs
 - Industrial PRTs
 - Thermistors
- **Voltage Measurement**
 - Laboratory Standards: Platinum / Rhodium, Platinum / Gold and Base Metal, Accuracy to 0.25μV
- **Display Modes**
 - Numeric and Graphical
 - Ratio, Resistance, Voltage, °C, °F, K
- **Stable**
 - ZERO drift in ratio measurement
- **Three Input Channels**
 - Best Practice Ready
 - Expandable to 92
- **Ease of Use**
 - Intuitive Touch Screen Operation, Store all Standard Thermometer and Standard Resistors internally
 - Log to internal memory or USB Memory Drive
- **Reliable**
 - 21st Century Solid State Design, no moving parts

Performance by Design - More Advantages

In making ratio measurements other benefits by design include:-

- **Zero Hysteresis**
There is no hysteresis effect by design
- **Zero Channel to Channel Variation**
Even with a microsKanner, as the channel expander duplicates the front end of the microK for each input rather than just being a switch box
- **Zero Temperature Coefficient**
Temperature Coefficient is 0ppm/°C, another benefit of the substitution technique. No need for warm up or stabilisation periods.
- **Complete Line Frequency Rejection**
Total rejection of 50 and 60Hz line frequency

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 0.25µV, equivalent to 0.01°C for a Platinum / Gold thermocouple at 1000°C.

ADC

The microK realises its superior linearity and low noise through a number of novel approaches, including a new noise reduction technique, new solid state switching, new guarding arrangements and a sophisticated substitution topology to achieve zero drift.



Keep Warm Currents

The microK includes keep-warm current sources to maintain the power in a PRT when it is not being measured, eliminating uncertainty resulting from power coefficients. Each channel, whether on the microK or a microsKanner can be individually programmed.

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, this feature is available on the microK 70 and 125 models.

Low Noise

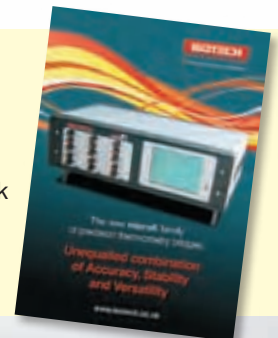
The new ADC, together with the low noise pre-amplifiers used in the microK, means you achieve a lower measurement uncertainty in a shorter time.

Parallel Processing Technology

The microK 70 and 125 incorporate additional technology (compared to the micro 250 and 500) to deliver superior performance for the Primary Laboratory. A new technique of Analogue Parallel Processing is used to lower noise to a level that previously could only be achieved by the best AC Bridges. These models also feature an Ethernet port

Learn more

Download the 12 page brochure at www.isotech.co.uk/microk



microK with microsKanner

microK Universal Specifications

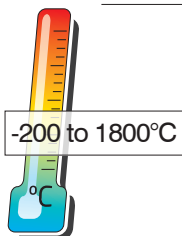
Accuracy - Thermocouples	Voltage uncertainty: Range 0-20mV 250nV. Equivalent to 0.01°C for Gold Platinum thermocouples at 1000 °C	Expandable	Add up to 90 expansion channels
Measurement Time (Per Channel)	Resistance: <2s (1s using the RS232 or GPIB interface) Voltage: < 1s (0.5s using the RS232 or GPIB interface)	Probes Supported	PRT's, Thermistors & Thermocouples
Temperature Conversions	PRTs: ITS-90, Callendar-van Dusen. Thermocouples: IEC584-1 1995 (B, E, J, K, N, R, S, T), L and gold-platinum. Thermistors: Steinhart-Hart	Units	Ratio, V, Ω, °C, °F, K
Cable Length	Limited to 10Ω per core and 10nF shunt capacitance (equivalent to 100m of RG58 coaxial cable)	Switching Technology	Solid state
Input Connectors	Cable Pod™ connector accepting: 4mm plugs, spades or bare wires Contact material: gold plated tellurium copper	Sensor Current	0 – 10mA in 3 Ranges 0 – 0.1mA ±0.4% Value ±70nA (Resolution 28 nA) 0.1 – 1mA ±0.4% Value ±0.7µA (Resolution 280nA) 1– 10mA ±0.4% Value ±7µA (Resolution 2.8 µA)
Interfaces	RS232 (9600 baud), USB (1.1) - host, IEEE-488 GPIB	Keep Warm Current	Adjustable 0-10mA Each Channel Adjustable 0-10mA ±0.4% Value ±7µA (Resolution 2.8 µA)
Ratio Range	Unlimited	Internal Data Storage	2Gb: For > 4 years storage (Timed Stamped Measurements)
Display	163mm / 6.4" VGA (640 x 480) Colour TFT LCD	Operating Conditions	For Full Specification: 15 - 30°C 10 - 80% RH Operational: 0 - 40°C 0 - 95% RH
Channels	3	Supply	88-264 Vac, 47-63Hz
Cold Junction Mode	External and Remote with PRT	Size W x D x H	520mm x 166mm x 300mm / 20.5" x 6.6" x 11.9" (19" Rack Mountable)

microK Specifications (Specifications are subject to change without prior notice)



Parameter	microK 70	microK 125	microK 250	microK 500
Accuracy Whole Range (SPRT $R_o \geq 2.5\Omega$) ^[1]	0.07ppm	0.125ppm	0.25ppm	0.5ppm
Accuracy Ratio 0.95 to 1.05 ^[2]	0.017ppm	0.03ppm	0.06ppm	0.125ppm
Equivalent Temperature Accuracy ^[2]	0.017mK	0.03mK	0.06mK	0.125mK
Resolution	0.001mK	0.001mK	0.01mK	0.01mK
Resolution Voltage	10nV	10nV	10nV	10nV
Stability	0ppm/yr ^[3]	0ppm/yr ^[3]	0ppm/yr ^[3]	0ppm/yr ^[3]
TC (resistance ratio) ^[4]	0ppm/°C ^[3]	0ppm/°C ^[3]	0ppm/°C ^[3]	0ppm/°C ^[3]
Resistance Range	0 - 100 kΩ	0 - 100 kΩ	0 - 500 kΩ	0 - 500 kΩ
Voltage Range (Thermocouple)	± 125mV	± 125mV	± 125mV	± 125mV
Internal Resistance Standards	25, 100, 400Ω	25, 100, 400Ω	1, 10, 25, 100, 400Ω	1, 10, 25, 100, 400Ω
Internal Standard Resistor Stability	TCR <0.05ppm/°C Annual Stability <2ppm/year		1, 10Ω <0.6ppm/°C <5ppm/year 25,100,400 <0.3ppm/°C <5ppm/year	
Interfaces	RS232, GPIB & USB & Ethernet		RS232, GPIB, USB	
Power	25W maximum, 1.5A (RMS) maximum		20W maximum, 1.5A (RMS) maximum	
Weight	13.3kg	13.3kg	12.4kg	12.4kg

Notes: 1. Over whole range of SPRT, -200°C to 962°C. For $R_o=0.25\Omega$ increased by a factor of 2.5
 2. E.g.: 25Ω SPRT with 25Ω standard resistor at water triple point or with direct comparison of similar SPRTs.
 3. The microK 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.



Channel Expander microKanner

- Expandable to 90 channels
- Supports PRTs, thermocouples & thermistors
- Plug-and-play operation

The microKanner can be used with any member of the microK family to add further channels, up to a maximum of 90 expansion channels.

Easy to Use: The use of plug-and-play technology means that the extra channels appear automatically on your microK bridge when connected to a microKanner. You can configure the new input channels in exactly the same way as any of the microK's existing inputs (through the microK's touch screen or a PC, via an RS232 connection). You just plug in a microKanner and immediately gain the benefit of the additional channels, making this the easiest channel expansion system of its type.

Accurate: The microKanner replicates the input system of the microK bridge for all 10 of its input channels. Measurements made with a microKanner are therefore to the same accuracy as the microK bridge it is connected to. By adding further scanners the microK system can be expanded to 92 channels without losing measurement performance.

Versatile: Like the microK bridge, the microKanner works with PRTs, thermocouples and thermistors giving you unparalleled flexibility.

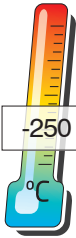
Keep-Warm Currents: The microKanner has 10 individually programmable keep-warm current sources to maintain the power in PRTs when they are not being measured, eliminating uncertainty caused by power coefficients.

Cable Pod™ Connector System: The connectors accept 4mm plugs, spades or bare wires. The standard 3/4" separation is compatible with standard 4mm to BNC adaptors, so you can use thermometers with any standard termination type. The Cable Pod™ connector system uses gold-plated, tellurium-copper to give the lowest possible thermal EMF and the best measurement uncertainty.

Reliable: Like the microK, the microKanner uses the latest semiconductor technology for channel selection and signal routing. This completely solid-state design therefore provides the highest possible reliability.



Model	microKanner
Channels	10
Keep-Warm Currents	0-10mA \pm 0.4% of value, \pm 7 μ A, resolution 2.5 μ A
Input connectors	Cable Pod™ connector accepting: 4mm plugs, spades or bare wires
Contact material	Gold plated tellurium copper
Interface	RS232 (9600 baud)
Operating conditions	15-30°C / 50-85°F, 10-90% RH (for full specification) 0-50°C / 32-120°C, 0-99% RH (operational)
Power	88-264V (RMS), 47-63Hz (Universal) 10W maximum, 1.2A (RMS) maximum
Size	520mm x 166mm x 300mm / 20.5" x 6.6" x 11.9" (W x D x H)
Weight	12.6kg / 28lb



-250 to 962°C

True Temperature Indicator

TTI - 22

- No mechanical relays, long life
- Warns if calibration due date exceeded
- Accuracy to 0.001°C, 1mK

Quite simply the Isotech TTI-22 High Accuracy Thermometer sets new standards in the price to performance ratio for industrial and secondary resistance thermometry. If you need high accuracy at an affordable price you have to look at the TTI-22.

The TTI-22 has an accuracy of 0.001°C and a resolution of 0.0001°C (0.00004 Ohms). It has two input channels, is lightweight (1.8kg) and will operate for more than 10 hours from two small AA cells. It has both RS232 and Ethernet ports.

Simple to use, supporting both Industrial 100 Ohm probe and SPRTs to ITS-90, 25.5 and 100 Ohm. Up to 30 probe calibrations can be stored along with the calibration expiry date so the instrument can warn when the calibration time has been exceeded.

Built in statistics calculation can show you both the measured and average values along with the standard deviation over previous measurements.

The Isotech TTI-22 is ideal as a reference standard alongside liquid calibration baths, for the smallest uncertainty calibration with Dry Blocks or for demanding stand alone measurement applications.

Previously this level of performance was confined to specialist laboratories with expensive thermometry bridges; TTI-22 delivers 5 to 10 times the performance of comparably priced instruments.

- The TTI-22 uses the same patented measurement technique as the earlier TTI-2.
- Each measurement performs a zero point and gain correction.
- The switched polarity DC measuring current (0.4mA) eliminates thermal EMFs.
- Surface mount construction ensures long term reliability.



Simple to use
High Accuracy
High Resolution

Model	TTI-22
Inputs	2 channel Pt100 (BS EN 60751 / IEC 751) or 25.5/100Ω SPRT to ITS-90
Measuring Current	0.41mA
Self Heating Test Current	0.29mA (0.41mA / √2)
Measuring Time	1.44 seconds for both channels
Measuring Range	-250 to 960°C (0 to 440 Ohm)
Resolution	Temperature: 0.0001°C, 0.1mK Resistance: 0.00004Ω, 40 μΩ
Uncertainty of Measurement	Temperature: 0.001°C, 1mK 100 Ohm PRT Resistance: 0.4mΩ @ 20°C <i>Instrument only, uncertainty with sensor dependant on range and sensor type.</i>
Reference Resistor	Internal 380Ω TCR ±0.3ppm / °C Stability ±5ppm / year
Interface	RS232, Ethernet, built-in web server provides simple temperature display
Ambient Temp. Range	10°C to 30°C
Power Supply	7.5VDC, 250mA power adaptor or 2 x AA batteries (typically > 10 hours operating time)
Case Dimensions	Width: 190mm Height: 112mm Depth: 240mm Weight: 1.8kg

The TTI-22 continually compares the connected sensor to a highly stable precision internal reference resistor. For a Pt100 at 0°C the annual stability for absolute measurement is typically $\pm 1.3\text{mK}$ ($5\text{ppm} \times 100\Omega = 0.5\text{m}\Omega / 1.3\text{mK}$).

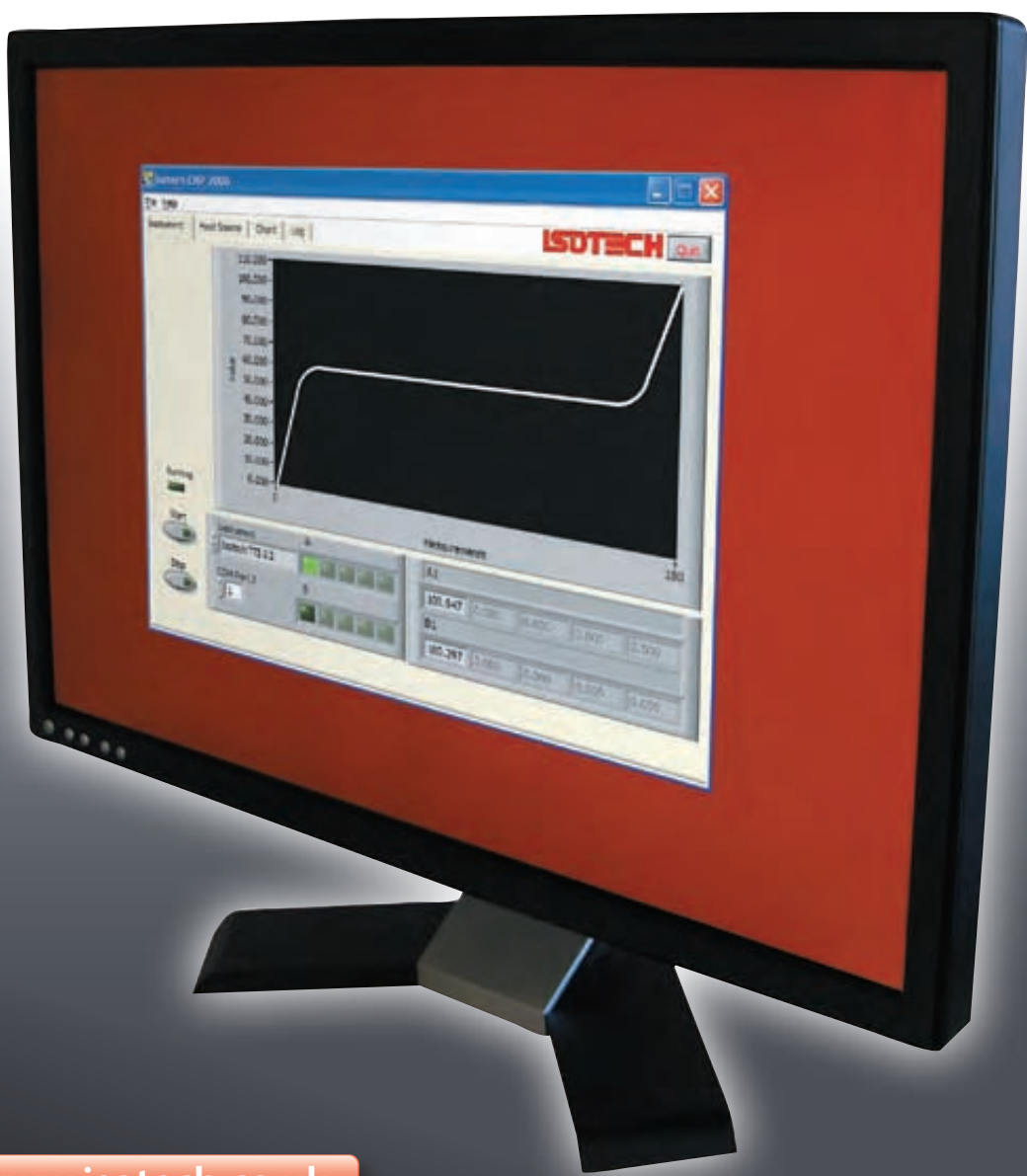
For comparison calibration, when a reference probe is compared to a calibrated standard, the long term stability is not important as any change of value is cancelled in the comparison. The temperature coefficient is $0.3\text{ppm} / ^\circ\text{C}$ and the measuring time, for both channels, is just 1.44 seconds.

The instrument can be configured to measure ratio of the measured resistance of the two input channels, a technique familiar to users of older style thermometry bridges.

The overall uncertainty of the instrument and probe together will be determined by the model of probe and the temperature range. For the majority of applications the contribution of the instrument uncertainty will be negligible compared to the uncertainty of the calibrated probe.

Recommended probes include the Isotech 909/100 and 670SQ /100, 935-14-16, 935-14-95L and H.

The TTI-22 includes Cal Notepad software for easy monitoring and logging of data. It is fully compatible with Isotech I-Cal Easy which can automate comparison calibration.



<http://www.isotech.co.uk>





-270 to 1820°C

Precision Thermometer milliK

- Wide Range of Sensors, SPRTs, PRTs, Thermistors, Thermocouple and 4 - 20mA
- High Accuracy, < ± 5 ppm for PRTs, $\pm 2\mu V$ for Thermocouples and $\pm 1\mu A$ Transmitters
- Logs - Controls Isotech Temperature Sources
Massive logging capacity – controls Dry Blocks and Liquid Baths

The milliK Precision Thermometer from Isotech sets a new standard for the high accuracy measurement and calibration of Platinum Resistance Thermometers, Thermistors, Thermocouple and Process Instrumentation (4-20mA) over the range -270°C to 1820°C.

In addition to low uncertainty measurements from Reference Standards and Industrial sensor measurement the milliK can control Isotech temperature sources, sequencing through a programmable list of temperature set points and log data to internal memory or a USB drive.

The milliK forms the hub of a measurement system, reading SPRTs, RTDs, Thermistors, Thermocouples and 4 - 20mA current inputs with the option to control calibration baths and log readings accurately.

Benefiting You

The milliK sets a new standard for value, versatility and accuracy - < ± 5 ppm over range for PRTs, $\pm 2\mu V$ for Thermocouples and $\pm 1\mu A$ for current transmitters, see table.

Supporting a wide range of sensors and functions it replaces individual devices making a cost effective calibration solution.

A robust design and operation from AC or DC power allows the milliK to be used in the laboratory, test room or out in the field.

The milliK can display in °C, °F, K, Ohms, mV and mA with numeric and graphical display modes. The large back lit display makes configuring the instrument and setting the scrolling strip charts intuitive. The USB port allows for the use of a mouse, keyboard or USB Drive.

Built on World Leading Technology

In 2006 Isotech launched the microK range of thermometry bridges which quickly established themselves as the instrument of choice for National Metrology Institutes and Primary Laboratories with innovative features, accuracy and versatility.

In response to industry demands for greater accuracy, the milliK now brings the same design philosophy of the microK to those outside the Primary Laboratory. Users calibrating industrial sensors in the laboratory, pharmaceutical plants, food and beverage plants, aerospace, power industries and service companies will welcome the milliK as a solution to increase measurement confidence, ensure high accuracy traceable calibration, improve quality as well as ensure safety and lower energy consumption.



*The Isotech milliK
High Accuracy Measurement
Controls Calibration Baths
Logs Data*

No Compromise Design

The design team have considered industrial users and applications in order to avoid measurement errors and problems encountered in some instruments from other manufacturers:

- **Eliminates Thermal EMF Errors in PRTS**
Fast current reversal technology and solid state switching eliminate thermal EMF effects avoiding the errors that occur with fixed DC instruments.
- **Lead Wire Correction**
PRT lead wire errors are eliminated for up to 30m of four core screened cable.
- **Galvanic Isolation**
Not only are the two sensor channels galvanically isolated, the 4 - 20mA input is also separately isolated. The benefits of the advance design are no ground loops, improved safety and noise immunity.

High Resolution

The display resolution is 0.0001°C (0.1mK) made possible by using a powerful Sigma Delta Analogue to Digital converter to achieve a true measuring resolution of just 28 $\mu\Omega$ equivalent to 0.00007°C (0.07mK) for PRT inputs.

Automation

The milliK is compatible with I-cal EASY and the Isotech range of PRT and Thermocouple Selector Switches, enabling users to build fully automatic calibration systems for up to 32 temperature sensors with the ability to calculate coefficients and print tables and certificates.

Reliable

Like the award winning microK range, the milliK is all solid state. There are no mechanical relays, switches or potentiometers which would reduce reliability.

Input Connectors

No compromise design ruled out lower cost problematic connectors and the SPRT / PRT inputs are via the highest quality gold plated push / pull self latching circular connectors overcoming the problems seen elsewhere where thermometers have been designed to a budget.

Outstanding CJC Performance and Flexibility

Again, the no compromise design philosophy led to a specially developed rugged thermocouple connector made from alumina and incorporating the same type of platinum sensor as used in Isotech precision probes ensuring optimal cold junction accuracy.

Three CJC modes allow thermocouple operation with internal automatic compensations, external 0°C reference

systems or the milliK can measure the junction with a probe on an unused channel, useful for automated systems.

21st Century Design

Utilising a powerful internal operating system and fast 32 Bit processor the milliK has the power and capacity to overcome the memory limitations of older instruments.

Store Probe Data

There is sufficient memory for an almost unlimited number of standard probes, allowing the storing of calibration data for both resistance thermometers and thermocouples. The digital matching of probe data allows the instrument to show the true temperature. The instrument will warn if a probes calibration time has expired.

Data Logging

Older instruments are limited to a maximum number of logged data points, the milliK is limited only by storage space. The internal memory can store more than six months of data, and with a low cost USB Memory stick the milliK can log continuously for a lifetime

Data Management

Probe data and logged measurements can be exported to a USB Memory drive at the push of a button. Additionally the instrument is future proof with future software updates applied from a USB drive.

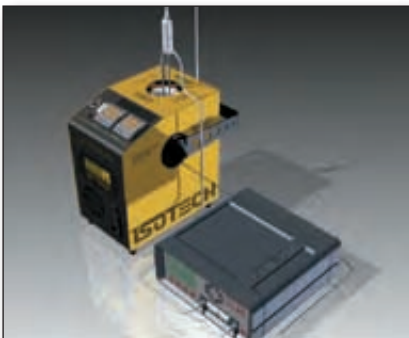
Connectivity and Communications

With USB host, two serial interfaces and Ethernet it is easy to communicate with the milliK whether it is on the bench next to a PC or remote by using a LAN or WAN connection. These interfaces are fitted as standard.

The milliK includes a PC lead and Cal Notepad software.

Open Calibration

The milliK is readily calibrated against resistance and voltage standards. There are no internal adjustments and the calibration commands are simply sent via RS232 or from the front panel (password protected). The procedure is open and fully documented unlike some other instruments where there is no choice but to return to the manufacturer.



1 The milliK can connect to Isotech temperature sources

Dry Blocks, Liquid Baths and Furnaces Can cycle the bath through a series of temperatures logging the data - all without a PC.



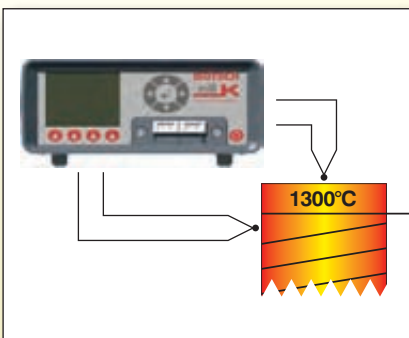
2 Wide range of sensors

The milliK can use Standard Reference probes and read from industrial sensors being calibrated, including 4 - 20mA transmitters - all to high accuracy.



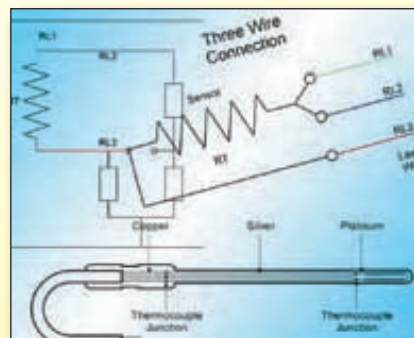
3 Logs

The milliK can record time stamped data to internal memory or a USB Memory Drive.



4 Safety

The milliK inputs are galvanically isolated, with the 4 - 20mA input separately isolated avoiding problems with high voltage pick up common when using thermocouples in high temperature furnaces.



5 Designed to eliminate and protect against real world problems

The milliK eliminates thermal EMF errors, compensates for lead wire resistance and warns if a probe is out of calibration.



6 High accuracy

For demanding industrial and laboratory applications, the milliK features probe matching for all sensor types, self heating test, exceptional CJC performance and high stability internal standards.

Specifications

Input Channels	3	
Channels 1+2	SPRTs, PRTs, Thermistor and Thermocouples	
Channel 3	Process Inputs 4 - 20mA Isolated 24VDC Power Supply Included	
Ranges	SPRTs:	0-115Ω
	PRTs:	0-460Ω
	Thermistors:	0-32kΩ, 0-130kΩ, 0-490kΩ
	Thermocouples:	±115mV
	4-20mA:	0-30mA
Units	°C, °F, K, Ω, mV, mA	
Accuracy	Initial	Over 1 year
SPRTs/PRTs:	5ppm	7ppm
Thermistors:	50ppm	150ppm
Thermocouples:	2μV	4μV
4-20mA:		0.002mA
Temperature Accuracy	Initial	Over 1 year
SPRTs/PRTs (at 0°C):	3mK	4mK
(over full range):	5mK	7mK
Thermistors:	50ppm	150ppm
Thermocouples:		
Type B:	±0.23°C	±0.46°C
Type E:	±0.03°C	±0.06°C
Type J:	±0.04°C	±0.07°C
Type K:	±0.05°C	±0.10°C
Type L:	±0.04°C	±0.07°C
Type N:	±0.06°C	±0.12°C
Type R:	±0.17°C	±0.34°C
Type S:	±0.19°C	±0.38°C
Type T:	±0.05°C	±0.09°C
Au-Pt:	±0.12°C	±0.23°C
Resolution	Resistance (PRTs):	0.00001Ω
	(Thermistors):	0.001Ω
	Voltage:	0.00001mV
	Current:	0.001mA
	Temperature:	0.0001°
Temperature Conversions	PRTs:	IEC60751 (2008), Callendar-van Dusen, ITS90
	Thermocouples:	IEC584-1 1995 (B,E,J,K,N,R,S,T), L, Au-Pt
	Thermistors:	Steinhart-Hart, polynomial
Sensor Currents	SPRTs/PRTs:	1mA and 1.428mA ±0.4% (reversing)
	Thermistors:	5μA (reversing)
Keep-Warm Current	SPRTs/PRTs:	1mA and 1.428mA

Input Connectors	SPRTs/PRTs:	LemoEPG.1B.306. HLN 6-pin gold plated contacts
	Thermocouples:	Miniature Thermocouple socket (ASTM E 1684-05)
	4-20mA:	4mm sockets
Interfaces	10/100MBit Ethernet (RJ45 socket) USB (2.0) host 2 x RS232 (9-pin D-type plug, 9600 Baud)	
Display	89mm / 3.5" QVGA (320 x 240) colour TFT LCD with LED backlight	
Operating Conditions	Operating:	0-45°C / 32-113°F, 0-99% humidity
	Full Specification:	15-30°C / 50-85 °F, 10-90% humidity
Display Units	°C, °F, K, Ohms, mV and mA	
Statistics	In Addition to Instantaneous Display user can select mean of 2 - 100 measurements with Standard Deviation	
Measurement Time	950mS	
Cable Length	Limited to 10Ω per core or 10nF shunt capacitance (equivalent to 100m of typical 4-core screened PTFE cable)	
Logging	Capacity to store > 180 Days of time stamped measurements to internal memory	
Recommended Probes	Isotech Semi Standard PRTs Isotech Model 909 SPRT	
Power	88-264V (RMS), 47-63Hz (universal), 6W maximum or 4 x AA cells	
Dimensions	255mm x 255mm x 114mm / 10" x 10" x 4.5" (W x D x H)	
Weight	2.25kg / 5lb	
Optional Carrying Case	931-22-102	



NOTE: Due to our program of continual development and improvement, we reserve the right to amend or alter characteristics and design without prior notice.