УНИСИСТ ®
Инженеринг ЕООД

уреди и системи за автоматизация

София 1582, Дружба 2, бул. Проф. Цветан Лазаров № 144, тел. 02/ 886 12 03, 886 05 62, 886 32 37,
Факс: 02/975 12 36, E-mail: office@unisyst.bg, http: //www.unisyst.bg

Приложение № 2

Индикативно предложение по проведени пазарна консултация №53990
с предмет "Доставка на високопрецизен цифров термометър и практическо обучение за работа"

от
„Унисист инженеринг ЕООД“
ЕИК: 121224604; адрес: 1582 София, ж.к. Дружба 2, бул. „Проф. Цветан Лазаров“ № 144;
тел.: 02/8861203; ел. поща: office@unisyst.bg; лице за контакт: Иван Йорданов; длъжност: управител

№ по ред	ID на Възложителя	Описание и технически характеристики на предлаганото изделие	М.е.	К-во	Ед. цена без ДДС	Стойност без ДДС
1.		**ISOTECH високопрецизен цифров термометър модел milliK** Входни канали: 3; Канали 1+2: SPRTs,PRTs, термистори и ТД; Канал 3: Токови сигнали 4 – 20 mA; Измервани ТД типове: B, E, J, K, L, N, R, S, T, Au-Pt Единици на дисплея: °C, °F, K, Ω, mV, mA. Измерване на температура: 1. Обхват: от минус 270 °C до 1820 °C; 2. Точност: 3. 5 mK за еталонни платинови преобразуватели (SPRTs); 4. 7 mK за платинови преобразуватели (PRTs); 5. <±0.4°C за платинови термодвойки; 6. <±0.5°C за термодвойки от базов метал; 7. Разделителна способност: 0.00001Ω.	Бр.	1	11700,00	**11700,00**

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		Измерване на съпротивление, сигнал от SPRTs/PRTs: 1. Обхват: от 0Ω до 115Ω за SPRTs, 0Ω до 460Ω за PRTs; 2. Точност SPRTs/PRTs: 5 ppm /7 ppm; 3. Разделителна способност: 0.00001Ω; 4. Ток на измерване SPRTs/PRTs: 1mA/1.428mA; 5. Метод на измерване: четирипроводна схема. Измерване на термистори: 1. Обхват: 0Ω до 500кΩ; 2. Точност: 50ppm до 150ppm; 3. Разделителна способност: 0.001Ω; 4. Измервателен ток: 5μA. Измерване на постоянно напрежение, сигнал от термоелектрични преобразуватели на температура: 1. Обхват: ±115mV; 2. Точност: • ±0.4°C за платинови термодвойки; • ±0.5°C за термодвойки от неблагороден метал; • 2 до 4μV. Измерване на постоянен ток от трансмитери: 4 – 20mA: 1. Обхват: 30mA; 2. Точност: 0.01% до 0.02%; 3. Разделителна способност: 0.001 mA. Комуникационни интерфейси: 10/100Mbit Ethernet (RJ45 socket), USB(2.0) host, 2xRS232 (9 pin D type plug, 9600 Baud) Габаритни размери: 255 x 255 x 114. Маса: 2.25Kg. **UKAS калибрационен сертификат на системата millik 909H в точките:** -80°C, -38.8°C, 0.01°C, 232°C, 419°C, 660°C.			2450,00	**2450,00**
ОПЦИЯ:		**Терминален адаптер за SPRTs и PRTs модел 956**			950,00	

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2.		**ISOTECH съпротивителен преобразувател на температура модел 909H** 1. Номинална стойност на съпротивлението: 25.5Ω; 2. Обхват: от минус 80°C до +670°C; 3. Метален корпус; 4. Диаметър: 6mm; 5. Дължина: 480mm.			8112.00	**8112.00**
3.		**Куфар за транспортиране и съхранение на високопрецизния термометър.**			175,00	**175,00**
4.		**Практическо обучение за работа с цифровия термометър на двама специалисти от „АЕЦ Козлодуй" ЕАД. Продължителността на обучението е два работни дни. Обучените ще се проведе, преди предаването на оборудването, в лабораторните помещения на фирма „Унисист инженеринг" ЕООД, намиращи се в гр. София.**			-	-
Обща стойност без ДДС (Без опцията):						**22437.00**

Срок на доставка: 5 (пет) месеца от датата на сключване на договор за доставка.

Условие на доставка: Франко склад на клиента.

Гаранционен срок: 24м. От датата на приемо-предавателния протокол.

Производител: Isothermal Technology Ltd – England.

Съпроводителна документация при доставка:

1. Техническа документация на оборудването, включително техническа спецификация от производителя, инструкции за експлоатация и техническо обслужване, на български език и в оригинал.
2. Доказателство за съответствие (маркировка CE, декларация на производителя, подходящи марки/знаци или копия на сертификати).
3. Свидетелство за калибриране от акредитирана лаборатория, с валиден сертификат за акредитация по EN ISO/IEC 17025.
4. Гаранционна карта.

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Документите придружаващи доставката ще се представят на хартиен носител в 1 екземпляр на оригиналния език, 1 екземпляр на български език и на електронен носител, с файлове в оригиналния формат на изготвяне на документите и pdf файлове. Сертификатите, протоколите и декларациите ще бъдат представени на оригиналния език, придружени с превод на български език.

Документ за представителство: Писмо за оторизация на „Унисист Итженеринг" ЕООД от Isothermal Technology Ltd – England

Към настоящото предложение прилагаме:

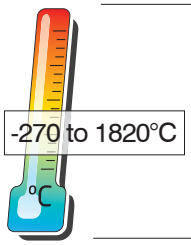
1. Техническа спецификация milliK
2. Техническа спецификация SPRTs-909
3. Ръководство за експлоатация на цифров термометър модел milliK
4. Документ за представителство издаден на „Унисист инженеринг" ЕООД

Заличено на основание ЗЗЛД

06.06.2024 г.

Управител:

/ инж. И. Йорданов /



Precision Thermometer
milliK

- Wide Range of Sensors, SPRTs, PRTs, Thermistors, Thermocouples and 4-20mA Transmitters
- High Accuracy, < ±5ppm for PRTs, ±2μV for Thermocouples and ±1μA for Transmitters
- Logs and Controls Isotech Temperature Sources Massive logging capacity - supports 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, Thermocouples and Process Instrumentation (4-20mA) over the range -270°C to 1820°C.

In addition to low uncertainty measurements from Reference Standards and Industrial sensors, 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 has two input channels for sensors and a third channel for current. It can be expanded to become a measuring system with up to 33 channels reading SPRTs, RTDs, Thermistors, or Thermocouples with the option to control calibration baths and log readings accurately.

Benefiting You

The milliK sets a new standard for value, versatility and accuracy - < ±5ppm over range for PRTs, ±2μV for Thermocouples and ±1μA for current transmitters, see table.

Supporting a wide range of sensors and functions it replaces individual devices making it 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 used in 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. Also supports lead wire correction for three wire PRTs.
- **Galvanic Isolation**
  Not only are the two sensor channels galvanically isolated, the 4 - 20mA input is also separately isolated. The benefits of the advanced 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 28μΩ equivalent to 0.00007°C (0.07mK) for PRT inputs.

Expandable

The millisKanner adds eight channels, and each can be configured individually as a SPRT, PRT, Thermistor or Thermocouple input. A maximum of four millisKanners can be added, providing up to 32 channels - all controlled from the milliK touch screen or an RS232 connection.

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 a digital temperature sensor for 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 remotely using a LAN or WAN connection. These interfaces are fitted as standard.

The milliK includes a PC lead and 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 (Basic & Site only), 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*

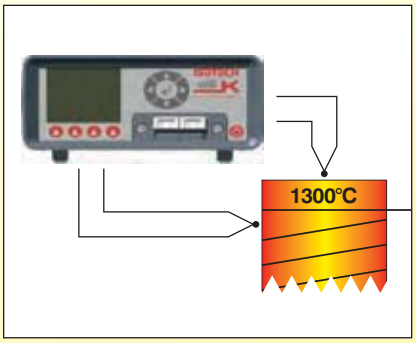
The milliK can use Standard Reference probes and read from industrial sensors being calibrated, including 4 - 20mA transmitters - all to high accuracy.

3 *Expandable*

The milliK can be expanded to have a maximum of 33 high accuracy channels. The millisKanner has eight expansion channels, with each channel configurable for SPRT, PRT, Thermistor or Thermocouple input type.

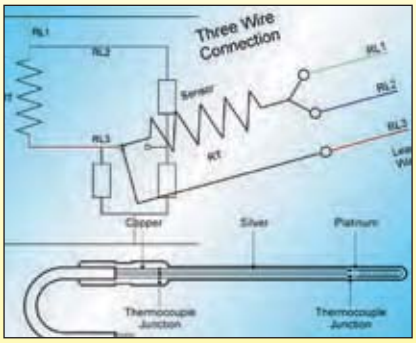
4 *Logs*

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



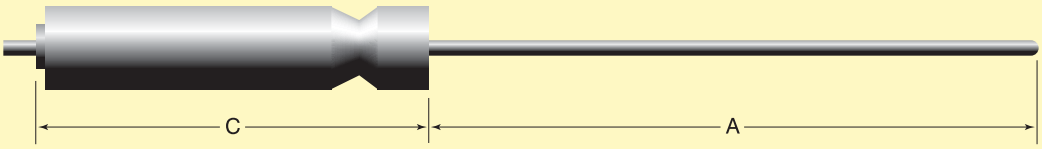
5 *Safety*

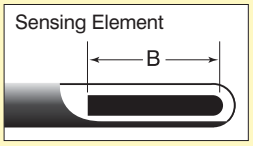
The milliK inputs are galvanically isolated, with the 4 - 20mA input separately isolated avoiding problems with high voltage pick up common when using thermocouples in high temperature furnaces.



6 *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.





■ **Recommended** Probes (Fit milliK Case)

Model	Maximum Range	Diameter	Length (A)	Sensing Length (B)	Handle (C)	Cable	Application
935-14-61/TTI	-50°C to 250°C	4mm	300mm	6mm	19 x 120mm	2m PTFE	Fast Response, Low Stem Conduction
935-14-116/TTI	-100°C to 450°C	6mm	350mm	25mm	19 x 120mm	2m PTFE	General Purpose

For further options and details, see Reference Probes - Semi Standards, pages 76-81.
For laboratory standard thermometers we recommend for SPRTs the Isotech Model 909Q and for thermocouples the Model 1600 Type R, see Catalogue 1: Solutions from Primary & Secondary Laboratories.

Optional Carrying Case
Part number: 931-22-102

- The choice for high accuracy temperature measurement - expandable for multi-channel operation
- Higher Accuracy than DAQ Systems
- Ideal for industrial sensor calibration alongside Dry Block and Liquid Baths.
- Expandable to 33 channels with no loss of accuracy

milliK shown with optional channel expander

UKAS Calibration available for these systems - *International Traceability - Best Practice*

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:	0-500kΩ
	Thermocouples:	±115mV
	4-20mA:	0-30mA
Display Units	°C, °F, K, Ω, mV, mA	

Accuracy	Initial	Over 1 year
SPRTs/PRTs:	5ppm	7ppm
Thermistors:	50ppm	150ppm
Thermocouples:	2μV	4μV
4-20mA:	0.01%	0.02%

Temperature Accuracy	Initial	Over 1 year
SPRTs/PRTs (at 0°C):	3mK	4mK
(over full range):	5mK	7mK
Thermistors:	50ppm	150ppm

Thermocouples:	Ice Point Ref		Internal CJC	
	Initial	1 Year	Initial	1 Year
Type B @ 1000°C	±0.12°C	±0.14°C	±0.12°C	±0.14°C
Type E @ 600°C	±0.02°C	±0.05°C	±0.10°C	±0.20°C
Type J @ 600°C	±0.03°C	±0.05°C	±0.12°C	±0.23°C
Type K @ 600°C	±0.04°C	±0.06°C	±0.13°C	±0.25°C
Type L @ 600°C	±0.03°C	±0.05°C	±0.12°C	±0.23°C
Type N @ 600°C	±0.04°C	±0.06°C	±0.10°C	±0.19°C
Type R @ 1000°C	±0.09°C	±0.12°C	±0.14°C	±0.21°C
Type S @ 1000°C	±0.10°C	±0.14°C	±0.16°C	±0.24°C
Type T @ 200°C	±0.02°C	±0.03°C	±0.10°C	±0.18°C
Au-Pt @ 600°C	±0.06°C	±0.08°C	±0.10°C	±0.15°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
Statistics	In Addition to Instantaneous Display user can select mean of 2 - 100 measurements with Standard Deviation	
Measurement Time	PRTs (4-wire): 0.4s (3-wire): 0.7s Thermistors: 0.4s Thermocouples (ice point): 0.4s (internal CJC): 0.7s (external CJC): 1.0s	
Cable Length	Limited to 10Ω per core and 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 Carring 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.*

-196 to 670°C

Working SPRTs
909 Family

- Three Stem Lengths
- Wide Operating Range
- Proven Design

This economically-priced Standard Platinum Resistance Thermometer, Model 909, is the workhorse of calibration laboratories all over the world. During 2007 we reviewed our range of SPRTs and now have new models in the 909 family, the 909L and 909H. The wide temperature ranges and economic pricing make this thermometer ideal for the secondary laboratory. For smaller uncertainties to suit the Primary Laboratory refer to the Model 670 SPRTs.

The resistance element is of pure platinum, coiled and mounted in a strain free construction. The former is of pure alumina material and all parts have been pre-aged to eliminate contamination and strain. All joints are welded to minimize resistance changes. The leads are brought to a handle assembly where they are connected to a low loss cable, 2M long and screened.

The 909Q has a quartz sheath while the 909L and 909H have metal sheaths. Whilst metal sheathed thermometers appear more robust than the quartz glass models it should be noted that ALL SPRTs are fragile devices and must be handled with care.

Three thermometer lengths are available, standard length 480mm, extra length 550mm or maximum length 600mm.

Quartz glass thermometers have the advantage that the internal components are visible and can be inspected and continue to be our recommended models. The low temperature models have excellent immersion characteristics and a significant cost saving when compared to the higher temperature models.

The Model 909 is supplied with a calibration certificate giving R_{TPW} and Wga. Alternatively we can provide a complete UKAS calibration certificate, see table opposite. For transportation and storage the Model 909 is supplied in its own attractive carrying case.

Model	909	
R_{TPW}	25.5Ω	100Ω
Nominal Resistance	25.5Ω at 0°C	100Ω
Recommended Max. Current mA	1	0.5
Nominal Sensitivity	0.1 Ω/°C	0.4 Ω/°C
Resistance Ratio	Wga>1.11807 as required by ITS-90	
Self-heating	1mK / 25 microwatts	
Stability	Depends upon the temperature range of use. Typical annual stability, see the table on the next page.	
Internal leads	4 wire-platinum	
External Leads	Silver-plated multi-strand wires in a low-loss insulation cable terminating in gold-plated terminals.	

How to Order

Model 909 Specify model, resistance and length.

State with UKAS Calibration or without UKAS Calibration. at Fixed Points or by Comparison.

SPRT Calibration with ITS-90 Fixed Points: Standard Service
ISOTECH UKAS Calibration Uncertainties (*k*=2)

Suitable for Primary and Working SPRTS - Isotech 670 & 909 families and other SPRTS of similar stability

FIXED POINT **Fixed Point**	°C	Range 1	Range 2	Range 3	Range 4	Range 5	Range 6
				Typical Uncertainties ±			
BP Nitrogen	-195.798	5mK		5mK	5mK	5mK	5mK
TP Mercury	-38.8344	1mK	1mK	1mK	1mK	1mK	1mK
TP Water	0.01	0.5mK	0.5mK	0.5mK	0.5mK	0.5mK	0.5mK
MP Gallium	29.7646		1mK				
FP Indium	156.5985			2mK	2mK		
FP Tin	231.928				3mK	3mK	3mK
FP Zinc	419.527					3.5mK	3.5mK
FP Aluminium	660.323						6mK

Note: TP = Triple Point MP = Melting Point
FP = Freezing Point BP = Boiling Point

Note: The 100Ω 909 has a maximum temperature of 550°C and so cannot be UKAS certified over Range 6. Please contact Isotech if calibration is required above Zinc.

The latest schedule can be found on the Isotech website or at www.ukas.org.

UKAS CALIBRATION
0175

Model	Range (°C)	Ratio Wga	Outer Sheath	Construction	Nominal Diameter	Stem Length	Sensor Length	Notes
909Q 25.5Ω	-200 to 670	>1.11807	Quartz	Sealed with dry oxygen / argon mix	7.5mm	480mm 550mm 600mm	65mm	Isotech recommended secondary standard SPRT
909Q 100Ω	-200 to 550	>1.11807	Quartz	Sealed with dry oxygen / argon mix	7.5mm	480mm 550mm 600mm	65mm	100 Ohm secondary standard SPRT
909H 25.5Ω	-80 to 670	>1.11807	Metal	Sealed	6mm	480mm 550mm 600mm	65mm	Internal alumina tube protects sensor from contamination
909H 100Ω	-80 to 550	>1.11807	Metal	Sealed	6mm	480mm 550mm 600mm	65mm	Internal alumina tube protects sensor from contamination
909L 25.5Ω	-200 to 165	>1.11807	Metal	Sealed with dry oxygen / argon mix	6mm	480mm 550mm 600mm	65mm	Optimised for low temperatures, less stem conduction due to internal construction
909L 100Ω	-200 to 165	>1.11807	Metal	Sealed with dry oxygen / argon mix	6mm	480mm 550mm 600mm	65mm	Optimised for low temperatures, less stem conduction due to internal construction

THE QUEEN'S AWARDS FOR ENTERPRISE: INNOVATION

ISOTECH
The Source for Calibration Professionals

03 June 2024
Re: Delivery of High Precision Digital Thermometer

MANUFACTURER'S AUTHORIZATION FORM

To whom it may concern;

We, **Isothermal Technology Limited,** having factory/office at **Pine Grove, Southport, Merseyside, PR9 9AG, England** who are manufacturers of Temperature Measurement Calibration Equipment and UKAS Calibration Services do hereby authorize **Unisyst Engineering Ltd, 144 prof Tsvetan Lazarov Blvd, Druzba 2, Sofia 1582, Bulgaria** to submit a bid, and subsequently negotiate and sign the Contract with you against the tender for delivery of High Precision Digital Thermometer for the goods manufactured by us.

We confirm that the above equipment supplied under the contract shall be brand-new and compliant with all performance specification specified in the Isotech technical documents. The warranty period of the equipment supplied under the contract shall be 12 months from the date of supply. Fragile ceramic and/or glass parts are not covered by this guarantee. Interference with; or failure to properly maintain this instrument may invalidate this guarantee.

If during the warranty period, the equipment is found damaged, defected or uncompleted any claim must be made directly to Isotech after which a decision will be made as to how the repair and or replacement is to be effected. Isotech's RMA terms apply, no equipment is to be returned without prior agreement from Isotech.

Best regards,

Заличено на основание ЗЗЛД

David Southworth,
Sales & Marketing Director.