

**HOT BOX TEMPERATURE
REFERENCE UNIT
MODEL 830**
User Maintenance Manual/Handbook

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The company is always willing to give technical advice and assistance where appropriate. Equally, because of the programme of continual development and improvement we reserve the right to amend or alter characteristics and design without prior notice. This publication is for information only.



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CE EMC INFORMATION

This product meets the requirements of the European Directive on Electromagnetic Compatibility (EMC) 89/336/EEC as amended by EC Directive 92/31/EEC and the European Low Voltage Directive 73/25/EEC, amended by 93/68/EEC. To ensure emission compliance please ensure that any serial communications connecting leads are fully screened.

The product meets the susceptibility requirements of EN 50082-1, criterion B.

Symbol Identification	Publication	Description
	ISO3864	Caution (refer to handbook)
	IEC 417	Caution, Hot Surface

ELECTRICAL SAFETY

This equipment must be correctly earthed.

This equipment is a Class I Appliance. A protective earth is used to ensure the conductive parts can not become live in the event of a failure of the insulation.

The protective conductor of the flexible mains cable which is coloured green/yellow **MUST** be connected to a suitable earth.

The blue conductor should be connected to Neutral and the Brown conductor to Live (Line).

Warning: Internal mains voltage hazard. Do not remove the panels.

There are no user serviceable parts inside. Contact your nearest Isotech agent for repair.

Voltage transients on the supply must not exceed 2.5kV.

Conductive pollution, e.g. Carbon dust, must be excluded from the apparatus. EN61010 pollution degrees 2.

HEALTH AND SAFETY INSTRUCTIONS

1. Read this entire handbook before use.
2. Wear appropriate protective clothing.
3. Operators of this equipment should be adequately trained in the handling of hot and cold items and liquids.
4. Do not use the apparatus for jobs other than those for which it was designed, i.e. the calibration of thermometers.
5. Do not handle the apparatus when it is hot (or cold), unless wearing the appropriate protective clothing and having the necessary training.
6. Do not drill, modify or otherwise change the shape of the apparatus.
7. Do not dismantle the apparatus.
8. Do not use the apparatus outside its recommended temperature range.
9. If cased, do not return the apparatus to its carrying case until the unit has cooled.
10. There are no user serviceable parts inside. Contact your nearest Isotech agent for repair.
11. Ensure materials, especially flammable materials are kept away from hot parts of the apparatus, to prevent fire risk.

GUARANTEE

This instrument has been manufactured to exacting standards and is guaranteed for twelve months against electrical break-down or mechanical failure caused through defective material or workmanship, provided the failure is not the result of misuse. In the event of failure covered by this guarantee, the instrument must be returned, carriage paid, to the supplier for examination and will be replaced or repaired at our option.

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

ISOTECH

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 **CAUTIONARY NOTE**

ISOTECH PRODUCTS ARE INTENDED FOR USE BY TECHNICALLY TRAINED AND COMPETENT PERSONNEL FAMILIAR WITH GOOD MEASUREMENT PRACTICES.

IT IS EXPECTED THAT PERSONNEL USING THIS EQUIPMENT WILL BE COMPETENT WITH THE MANAGEMENT OF APPARATUS WHICH MAY BE POWERED OR UNDER EXTREMES OF TEMPERATURE, AND ARE ABLE TO APPRECIATE THE HAZARDS WHICH MAY BE ASSOCIATED WITH, AND THE PRECAUTIONS TO BE TAKEN WITH, SUCH EQUIPMENT.

INTRODUCTION

The thermocouple reference junction units are precisely controlled ovens providing a stable reference temperature for multi-channel thermocouple systems. They eliminate the need for ice baths or other cold junction compensation.

THERMOCOUPLE REFERENCING

It cannot be emphasised too strongly that thermocouple outputs are dependent upon emfs generated by temperature differentials along individual conductors and not upon the presence of junctions in the circuitry. However, access to an emf of this type, for measurement purposes, requires the connection of additional conductors, and these ineluctably introduce their own characteristic thermo-emfs into the circuit. The resultant nett emf will be the algebraic sum of the individual emfs corresponding to the respective temperatures of the end-points of each conductor, i.e., of the junctions present in the measuring circuit. Indeed, it is this principle that governs the practical application of thermocouples, although it should be noted that nett emfs are functions of actual temperatures and are not uniquely determined by temperature differences. In other words, the Seebeck coefficient (which is defined as the emf generated per unit temperature difference) for a given material is, itself, a function of temperature and, moreover, the uniqueness of its value at any given temperature is conditional upon physical and chemical homogeneity of that material.

For practicability as a measuring device, the principal implication for a thermocouple is that it must contain two junctions, one (the measuring junction) held at the temperature required to be determined and the other (the reference junction) maintained at a known (reference) temperature. Connections to the terminals of a measuring instrument potentially constitute thermocouple junctions and care must be taken in arranging circuitry to eliminate their contribution or to compensate for any influences thereby introduced. Qualitative acknowledgement, from a thermoelectric point of view, of the presence of every element in a composite circuit has led to a variety of arrangements to eliminate unwanted components of emf from thermocouple measurements. However, the practical necessity remains of providing some means of temperature referencing.

Some instruments involve the use of their terminals as reference junctions, for application with a specified type of thermocouple that possesses one other junction only (the measuring junction). Such instruments usually incorporate a facility for (electronic) "cold junction compensation", thus indicating an emf relative to 0°C or, possibly, a direct reading of temperature. However, a fundamentally more satisfactory procedure is to form reference junctions using the conductors themselves and to employ an isothermal environment at a known temperature (typically 0°C) into which these junctions can be immersed. Several Isotech products are dedicated to the provision of such environments; it is interesting to note, also, the application of another thermoelectric phenomenon, Peltier cooling, to establish the working conditions of those Isotech units designed to provide a reference temperature of 0°C.

TEMPERATURE CONTROL

Set in the underside of the block is a platinum resistance thermometer (PRT), which is used to control the heat function.

A Eurotherm 3216 PID Controller is used to give excellent stability and accuracy at the desired temperature.

OPERATING INSTRUCTIONS

Connect thermocouple inputs and outputs to the desired channel terminals. Be certain that polarity and materials are correctly connected.

Connect the mains lead to a suitable fused plug and check that the supply corresponds with that stated in the unit Serial Number label (or selector switch when fitted).

Switch on and allow the unit to reach stabilisation.

SPECIFICATIONS

Thermocouple Wire	To A.S.T.M. (E230 Special and BS 1041 Specification.
Junctions	2 welded junctions per referenced channel e.g. Junction 1 - Ni/Cr to Cu + ve Junction 2 - Ni/Al to Cu - ve
Size	Height: 600mm Width: 600mm Depth: 300mm
Weight	40kg
Power Consumption	250 watts
Reference Temperature	50°C
Accuracy	±0.1°C
Long Term Stability	±0.05°C per 1000 hours or better
Temperature Gradient	±0.1° between junctions (max)
Capacity	Up to 100 Channels
Operating Temperature Range	Up to 45°C
Stabilisation Time	Within 2 hours
Power Supply	240Volt, 50Hz

KEY TO INPUT/OUTPUT TERMINATIONS

Incoming Thermocouple wires will be colour coded to correspond with British Standard requirements in most cases e.g.

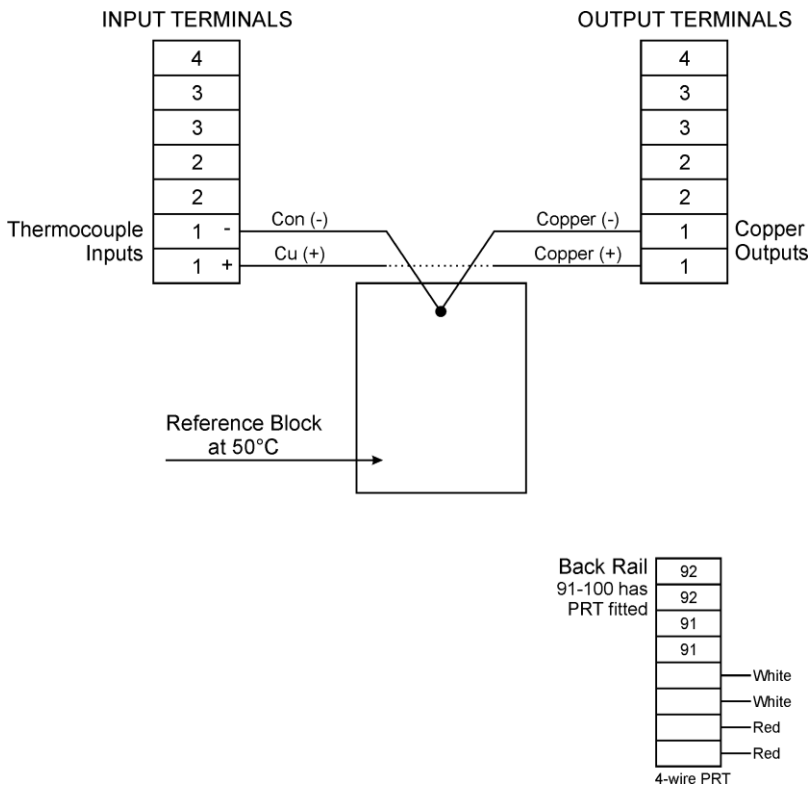
- Copper - Brown
- Constantan - Blue

Note: We deviate from these colours for our internal thermocouple loom because certain elements have the same colour coding, i.e. Nickel/Aluminium and constantan.

Output terminations are usually coded red and blue, positive and negative respectively.

The unit has internal thermocouple looms. The incoming thermocouple wires are both referenced (double junction referencing only). This technique reduces sources of error from intermediate junctions at terminals.

Special Thermocouple Connection Wiring Diagram - Showing Connections for Copper/Constantan Thermocouple (Serial No. 28257/I Type T Thermocouple with 100 x Single Junctions)



Back rail 91-100 has PRT Fitted

SUPPLY

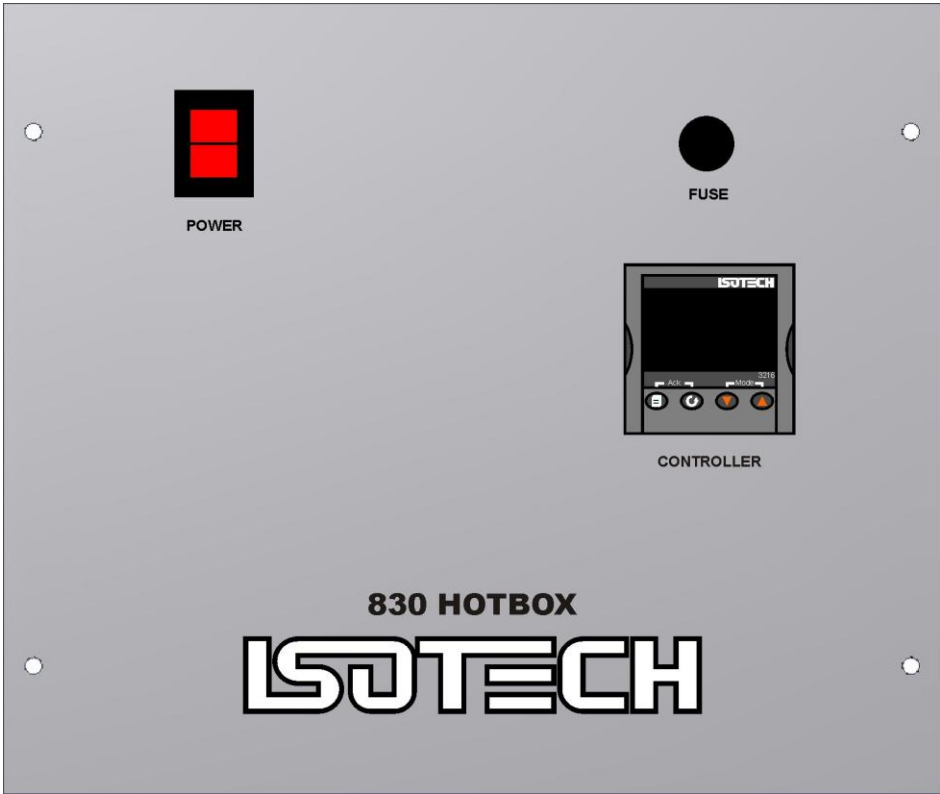
The colour convention for the mains-supply cable is:

LIVE	BROWN
NEUTRAL	BLUE
EARTH	YELLOW AND GREEN

MAINTENANCE

No maintenance is required.

HOT BOX FRONT PLATE



HOT BOX SPARES PARTS LIST

DESCRIPTION	PART NUMBER
Heater	935-13-08
PRT	935-14-33
Eurotherm 3216 Controller	935-06-116
Over-temp Thermostat	935-31-19
Mains Input Suppressor	935-15-16
10Amp Relay	935-21-12A
Power-on Switched Neon	935-27-04
Fuse 5Amp (F)	935-12-17