FAST-CAL SERIES
TEMPERATURE CALIBRATOR
User Maintenance Manual/Handbook

Isothermal Technology Limited, Pine Grove, Southport, PR9 9AG, England
Tel: +44 (0)1704 543830 Fax: +44 (0)1704 544799 Internet: www.isotech.co.uk E-mail: info@isotech.co.uk

CONTENTS

CE EMC INFORMATION 4

ELECTRICAL SAFETY 4
Environmental Ratings 4

HEALTH AND SAFETY INSTRUCTIONS 5

'DO'S AND DON'TS' 6

GUARANTEE 7

CAUTIONARY NOTE 8

UNPACKING AND INITIAL INSPECTION 9

ELECTRICITY SUPPLY 9

INTRODUCTION 10

COMPARISON CALIBRATION 10
Basic 10
Site or Self-contained Calibrators 10
External Standards + Basic 10

MODE OF OPERATION 11

FAST-CAL HTM 2010 11

FAST-CAL 11
How to measure the true temperature inside the block 11
How to measure the true temperature inside the block 11
The Controller 11
The Reference Thermometer 12
The Industrial Thermometer 12

SPECIFICATIONS (HTM 2010 & LOW MODELS) 13

SPECIFICATIONS (MEDIUM & HIGH MODELS) 14

OPERATING THE FAST-CAL 15

FRONT PANEL LAYOUT 15
The Temperature Controller 15
Altering the Setpoint 15

ADVANCED CONTROLLER FEATURES 15
Setpoint Ramp Rate 15
Instrument Address 16

MONITORING THE CONTROLLER STATUS 16
Units 16

THE TEMPERATURE INDICATOR (SITE (S) MODELS ONLY) 16

Setting the Input Type 16

ENABLING/DISABLING CUSTOM CALIBRATION 17

INSTRUMENT ADDRESS 17

MONITORING THE INDICATOR STATUS 18
Units 18

ADVANCED INDICATOR OPERATION 18

CALIBRATION DATA EXAMPLE 19

CONNECTING A CURRENT TRANSMITTER (UP TO 20MA) 19

TESTING THERMAL SWITCHES WITH FAST-CAL 20

USING THE PC INTERFACE 21

CONNECTIONS 21

CAL NOTEPAD 22

DEVELOPMENT 22

HOW TO INSTALL CAL NOTEPAD 23

PROTOCOL 23

DIAGNOSTIC ALARMS 24

INITIAL TESTING 25
IMPORTANT NOTICE 25

MAINTENANCE 26

APPENDIX 1: TROUBLE SHOOTING 27
Unit fails to operate 27
Unit unstable 27
Cannot establish PC Communications 27

APPENDIX 2: INDICATOR CONFIGURATION (REFERENCE ONLY) 28
Input 28
Calibration 28
Comms 28

APPENDIX 3: ACCESSORIES PARTS LIST 29

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 manual)
	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 degree 2.

Environmental Ratings

Operating Temperature	0-50°C
Relative Humidity	5-95%, non condensing

⚠ HEALTH AND SAFETY INSTRUCTIONS

1. Read this entire manual 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.

‘DO’S AND DON’TS’

DO ensure that after use the equipment is returned to ambient temperature and allowed to reach with 10°C of this temperature before transporting the equipment or returning to its carrying case.

DO NOT handle the accessories when they are very hot or very cold.

DO NOT place hot or cold accessories back in the carrying case.

DO use that pocket for pre-warming, pre-cooling or storage.

DO NOT rely on the controller to tell you the temperature of the block. Its job is only to provide an isothermal volume. It is the calibrated working standard that is used to measure actual temperature.

DO NOT calibrate very large sensors in the Fast-Cal units unless you can accept large immersion errors. We have larger products for larger sensors.

DO NOT try to straighten the working standard, it is deliberately bent so that it does not interfere with the sensors you are calibrating.

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

RECOMMENDATION

The life of your **ISOTECH** Instrument will be prolonged if regular maintenance and cleaning to remove general dust and debris is carried out.

ISOTHERMAL TECHNOLOGY LTD.
PINE GROVE, SOUTHPORT
PR9 9AG, ENGLAND

TEL: +44 (0) 1704 543830/544611
FAX: +44 (0)1704) 544799

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.

⚠ 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.

UNPACKING AND INITIAL INSPECTION

Our Packing Department uses custom designed packaging to send out your unit, but as accidents can still happen in transit, you are advised, after unpacking the unit, to inspect it for any sign of shipping damage, and confirm that your delivery is in accordance with the packing note. If you find any damage or that part of the delivery is missing notify us or our agent, and the carrier immediately. If the unit is damaged you should keep the packing for possible insurance assessment.

ELECTRICITY SUPPLY

Before connecting to the electricity supply please familiarize yourself with the parts of the manual relevant to your model.

Your unit's supply voltage requirement is specified on a plate on the instrument along with the serial number. All Fast-Cal units will work on an electricity supply frequency of 50Hz or 60Hz. The apparatus is provided with an approved power cord. If the plug is not suitable for your location then the plug should be removed and replaced with an appropriate plug.

Take care to ensure the old plug is disposed safely.

The cable is colour coded as follows:

COLOUR	FUNCTION
Green/yellow	Earth (Ground)
Brown	Live (line)
Blue	Neutral

Please ensure that your unit is correctly connected to the electricity supply.

THE APPARATUS MUST BE CORRECTLY EARTHED (GROUNDED)

The units' on/off switch is located on the power inlet. Take care NOT to switch the unit off when it is hot - allow to cool first.

INTRODUCTION

The Fast-Cal units allow flexibility for the calibration of temperature sensors.

COMPARISON CALIBRATION

By definition, one compares industrial thermometers to a calibrated standard.

There are 3 methods commonly used.

Basic

Using the controller as the "calibrated standard" this method means that the complete bath is calibrated by comparing the controller reading to a calibrated standard placed in the bath.

This is a common method but is unsafe since the control sensor is inaccessible

For these reasons it fails to satisfy ISO9000 and gives large uncertainties.

Site or Self-contained Calibrators

In these an Indicator and external calibrated sensor are used to measure the temperature of the block. This arrangement gives good accurate and reliable results. To recalibrate however it does mean sending the whole calibrator back to the calibration laboratory. This, the calibrator is self-contained, self sufficient and meets ISO9000 requirements.

External Standards + Basic

Here a separate indicator and calibrated sensor are used to measure the block temperature. This can give the most accurate and reliable results, depending on the indicator.

It means that the calibrator does not need calibrating only the indicator and it's calibrated sensor need re-calibration, but this option is more bulky, expensive and less portable than 2) above. It also meets ISO9000 requirements.

MODE OF OPERATION

FAST-CAL HTM 2010

The metal block function of the Fast-Cal HTM 2010 is well suited for fast, convenient, mess free calibration of temperature sensors.

The thermometers under test are placed into suitable holes in the block.

For the S models a calibrated reference probe should be placed into the block and the actual temperature can be read from the temperature indicator.

For the B models an external temperature indicator should be used.

For traceable calibration the actual value of the insert temperature should be recorded along with the values from the sensors under test.

FAST-CAL

The metal block function of the Fast-Cal is well suited for fast, convenient, mess free calibration of temperature sensors.

The Fast-Cal metal insert is placed into the calibration well.

The thermometers under test are placed into suitable holes in the metal insert.

For the S models a calibrated reference probe should be placed into the block and the actual temperature can be read from the temperature indicator.

For the B models an external temperature indicator should be used.

For traceable calibration the actual value of the insert temperature should be recorded along with the values from the sensors under test.

How to measure the true temperature inside the block

The controller of the Fast-Cal HTM 2010 controls and reads the temperature of the calibration volume.

How to measure the true temperature inside the block

The controller of the Fast-Cal controls and reads the temperature of the block surrounding the 25mm diameter x 148mm deep calibration well.

Remember the following:-

The Controller

The controller is used to set a constant temperature and create an Isothermal environment for the comparison calibration of temperature sensors.

The Reference Thermometer

The Reference Thermometer is placed in the insert and measures the True Temperature inside the block.

The Industrial Thermometer

The Industrial Thermometer is placed in the calibration volume and is compared to the True Temperature as indicated by the Reference Thermometer. An insert will typically have a 1% immersion error. For more details see - Depths of Immersion. Tavener J. P. Volume 9.2. Isotech Journal of Thermometry pages 79-87.

SPECIFICATIONS (HTM 2010 & LOW MODELS)

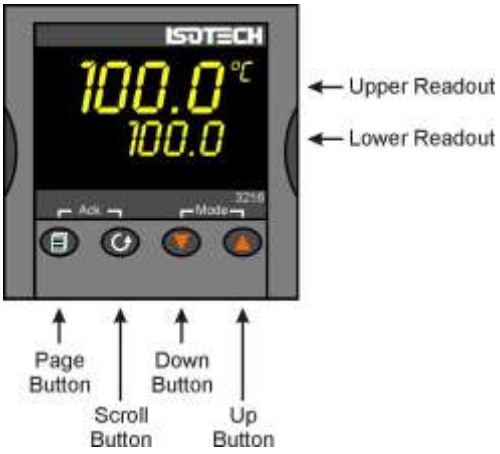
	HTM 2010	LOW
Voltage	230VAC **or** 115VAC see ratings plate	230VAC **or** 115VAC see ratings plate
Power	150W	150W
Supply Frequency	50/60Hz	50/60Hz
Maximum Operating Temperature	140°C	140°C
Minimum Operating Temperature	-55°C below ambient	-55°C below ambient
Stability (Absolute over 30 minutes) Basic / Site	0.02°C	0.02°C
Accuracy - Basic - Site	±0.2°C ±0.15°C	±0.2°C ±0.15°C
Calibration Volume	5 x 148mm wells	25mm dia x 148mm
Standard Block Hole Dimensions:	1 x 8.0mm dia + 1 x 6.50mm dia + 3 x 4.50mm dia (Fixed Block)	1 x 8.0mm dia + 1 x 6.50mm dia + 2 x 4.50mm dia
Dimensions (not including handle)	Height 228mm Width 248mm Depth 143mm	Height 228mm Width 248mm Depth 143mm
Weight	6.60Kg	6.60Kg

SPECIFICATIONS (MEDIUM & HIGH MODELS)

	MEDIUM	HIGH
Voltage	230VAC **or** 115VAC see ratings plate	230VAC **or** 115VAC see ratings plate
Power	750W	750W
Supply Frequency	50/60Hz	50/60Hz
Maximum Operating Temperature	350°C	650°C
Minimum Operating Temperature	30°C	35°C
Stability (Absolute over 30 minutes) Basic / Site	0.03°C	0.03 to 0.5°C
Accuracy - Basic - Site	±0.3°C ±0.2°C	±1°C (500°C) ±2°C (6 50°C) ±0.5°C
Calibration Volume	25mm dia x 148mm	25mm dia x 148mm
Standard Block Hole Dimensions:	1 x 8.0mm dia + 1 x 6.50mm dia + 2 x 4.50mm dia	1 x 8.0mm dia + 1 x 6.50mm dia + 2 x 4.50mm dia
Dimensions (not including handle)	Height 228mm Width 248mm Depth 143mm	Height 228mm Width 248mm Depth 143mm
Weight	6.35Kg	6.35Kg

OPERATING THE FAST-CAL

FRONT PANEL LAYOUT



The Temperature Controller

The controller has a dual display, the upper display indicates the nominal block temperature, and the lower display indicates the desired temperature or setpoint.

Altering the Setpoint

To change the setpoint of the controller simply use the UP and DOWN keys to raise and lower the setpoint to the required value. The lower display changes to indicate the new setpoint.

ADVANCED CONTROLLER FEATURES

Setpoint Ramp Rate

By default the Dry Blocks are configured to heat and cool as quickly as possible. There may be some calibration applications where it is advantageous to limit the heating or cooling rate.

An example might be when testing bimetallic thermostats; by forcing the Dry Block to heat at a controlled rate it is easier to determine the temperature at which the thermostat changes state.

The Dry Block can have its heating rate limited with the Setpoint Ramp Rate feature. This feature is accessed from the Scroll key. Depress the key until the display shows,

SP.RAT
The upper display will show the current value, and is adjustable from OFF to 999.9. The units are °C/min and are adjustable via the UP/DOWN keys.
When the SP.RAT is active the lower setpoint display will now automatically update with the current value, known as the working setpoint. The setpoint can be seen by pressing either the UP and DOWN key.

The Setpoint ramp rate operates when the bath is heating and cooling.

Instrument Address

The controller has a configurable "address" which is used for PC communications. Each instrument has an address; this allows several instruments to be connected in parallel on the same communications bus. The default value is 1. This address would only need to be changed if more than one Dry Block is connected to the same PC port.

To check the Address value press the scroll key until the lower display indicates,

ADDR

The upper display will show the current value that can be modified with the UP and DOWN keys.

MONITORING THE CONTROLLER STATUS

A row of beacons indicate the controllers status as follows,

OP1	Heat Output
OP2	Cool Output (only for models which operate below 0°C)
REM	This beacon indicates activity on the PC interface

For models fitted with cool down fans, such as the Calisto and Jupiter, the lower display will alternate between the setpoint and the message, cooling to temperature. This message is not an error but is showing that the cooling fan is operating. It will automatically switch off when the temperature is within 5°C of the setpoint.

Units

Momentary pressing of the Scroll key will show the controller units °C or °F.

THE TEMPERATURE INDICATOR (SITE (S) MODELS ONLY)

The site models include an electronic temperature indicator. The indicator can be configured for the desired sensor type, and for custom calibration data. The customer calibration data can be set ON or OFF.

Setting the Input Type

A 100 Ohm resistance thermometer can be connected to the PRT Connector or a thermocouple may be connected to the miniature TC Connector.

Ensure that only a PRT or a TC is connected at any one time. If a PRT and TC are connected simultaneously the indicator will read in error.

Check that any sensor placed into the equipment is suitable for the temperature range. Sensors can be damaged if taken outside their normal operating limits.

The desired sensor type is easily set, press the Scroll key until the lower display indicates,

In.Typ

The upper display will show the current set sensor type,

J.tc	J thermocouple
K.tc	K thermocouple
L.tc	L thermocouple
r.tc	R thermocouple (Pt/Pt13%Rh)
b.tc	B thermocouple (Pt30%Rh/Pt6%Rh)
n.tc	N thermocouple
t.tc	T thermocouple
S.tc	S thermocouple (Pt/Pt10%Rh)
PL.2	PL 2 thermocouple
rtd	100 Ohm platinum resistance thermometer.
T012	E thermocouple

Again the value can be modified with the UP and DOWN keys.

ENABLING/DISABLING CUSTOM CALIBRATION

Custom calibration allows the indicator to be programmed to suit a particular temperature sensor. This allows the indicator to automatically show the true temperature, without having to manually apply a correction.

When the Custom or User Calibration is active the indicator will show the REM beacon lit continuously. The use of User calibration can make a significant difference to the accuracy of the instrument, and this REM beacon provides a clear and continuous indication of the calibration status. Isotech will configure and set user calibration when the Dry Block is ordered with a temperature sensor.

To alter the calibration status press the Scroll key until the lower display shows,

UCAL
The upper display will indicate either,

ON for user calibration

Or
OFF for factory calibration of the indicator

Use the UP and DOWN keys to toggle between the two values.

When calibrating an unknown sensor against a calibrated probe it may be necessary to switch the calibration off for the unknown, and on for the calibrated probe.

INSTRUMENT ADDRESS

Like the controller, the indicator has a configurable "address" which is used for PC communications. Each instrument has an address; this allows several instruments to be connected in parallel on the same communications bus. The default value is 2 (The controller defaults to 1). This address would only need to be changed if more than one Dry Block is connected to the same PC port.

To check the Address value press the scroll key until the lower display indicates,

ADDR

The upper display will show the current value that can be modified with the UP and DOWN keys.

MONITORING THE INDICATOR STATUS

For the indicator the REM beacon is lit continuously when the user calibration is active, the REM beacon flashes when the PC communications port is active.

Units

Momentary pressing of the Scroll key will show the controller units °C or °F.

ADVANCED INDICATOR OPERATION

The indicator can be configured with up to five custom calibration points; the points contain "data pairs". First the temperature (point) and secondly the Error (offset) at this temperature point. Isotech Dry Block calibration certificates will show the values to suit a particular sensor.

These values can be inspected, and modified with the following procedure,

Hold the PAGE key down until the display indicates,

CONF
GOTO

then

0
CODE

Set the Code to 2 with the UP key

The display reads,

CONF

Press the Page Key until the controller shows

CAL

Now use the Scroll key to examine the data pairs. The values Pnt 1- Pnt 5 and Ofs 1 to Ofs 5 can be modified with the UP and DOWN keys.

To exit this mode hold the Page key until the top display shows,

CONF
GOTO

And then set the upper display to Lev 1. While in this mode take care not to modify other parameters.

CALIBRATION DATA EXAMPLE

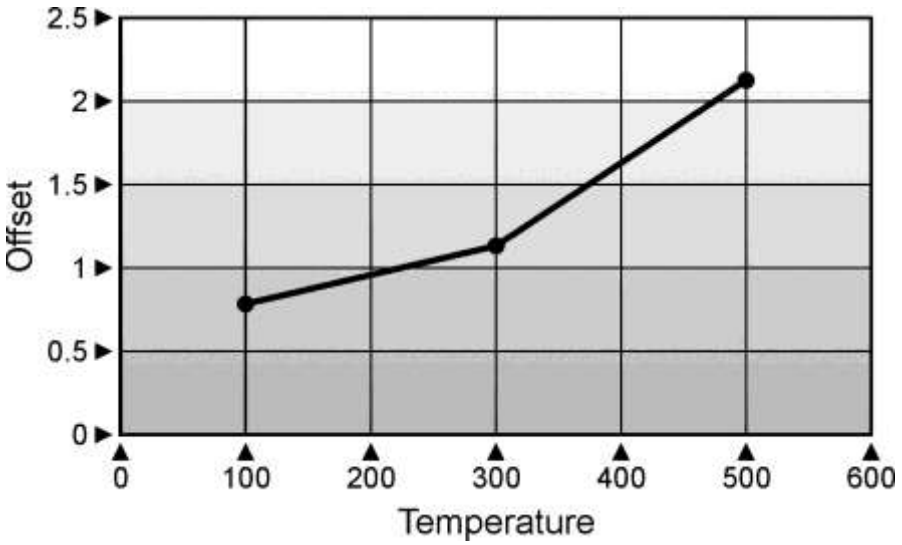
A maximum of five points may be entered, shown as Pnt 1 to Pnt 5 for the temperature point and Ofs 1 to Ofs 5 for the offset values.

The Pnt values must be entered in ascending order.

Set a Pnt to a value lower than the previous point to disable it.

The indicator would be programmed with the following data:

Pnt 1 100	Ofs 1 0.8
Pnt 2 300	Ofs 2 1.1
Pnt 3 500	Ofs 3 2.1
Pnt 4 -999	Ofs 4 0
Pnt 5 -999	Ofs 5 0



CONNECTING A CURRENT TRANSMITTER (UP TO 20MA)

The transmitter should be powered externally, a 2.49Ohm current sense resistor is fitted internally and this allows the indicator to read mA.

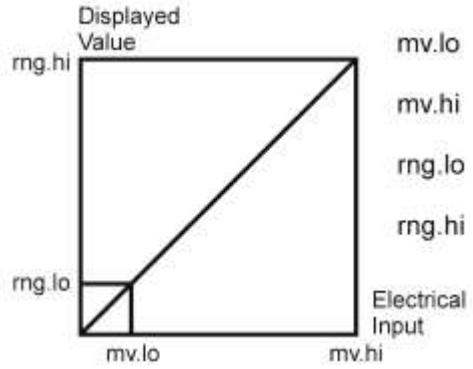
To scale the Linear input:

1 From the input type menu select “mV”.
2 The scaling can be configured in the CAL menu, accessed as described above..
3 Access the Input sub-menu by pressing the Page button
4 Set the input type to mV
5 Press again to enter the mv.hi value
6 Press again to enter the mv.lo value
7 Press again to enter the rng.hi value
8 Press again to enter the rng.lo value
9 To exit press Page and Scroll buttons together and select level 1 using the up/down buttons

EXAMPLE: From the input menu iP set the mv.hi, mv.lo, rng.hi and rng.lo parameters to suit see table below:

Linear Input Scaling - The next 4 parameters only appear if a linear input is chosen

e.g. 4 to 20mA = 0 to 100°C

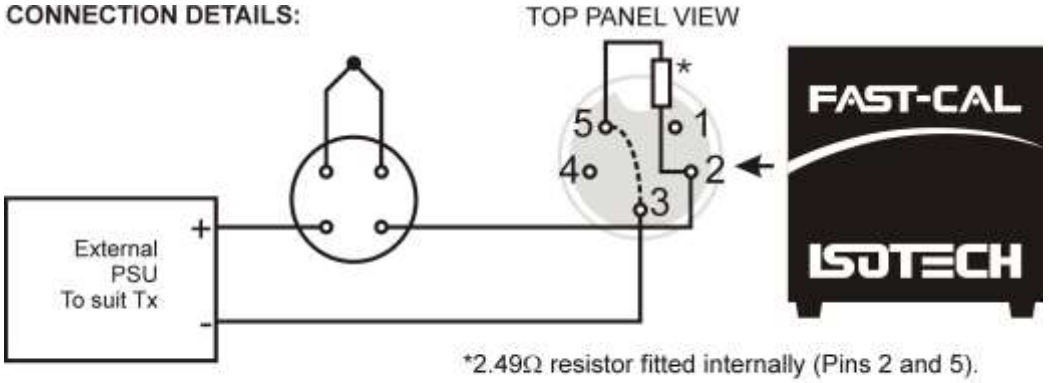


mv.lo	Input value low	i.e. 4mA set 9.96
mv.hi	Input value high	i.e. 20mA set 49.8
rng.lo	Displayed reading low	0°C
rng.hi	Displayed reading high	100°C

E.g. 4-20mA = 0 to 100°C

mv.lo	=	9.96 (mV)	(4mA x 2.49Ω)
mv.hi	=	49.8 (mV)	(20mA x 2.49Ω)
rng.lo	=	0 (°C)	
rng.hi	=	100 (°C)	

CONNECTION DETAILS:



*2.49Ω resistor fitted internally (Pins 2 and 5).

Link Pins 3 and 5 for transmitter inputs.
Remove link for PRT's.

Socket Pins shown from Panel View

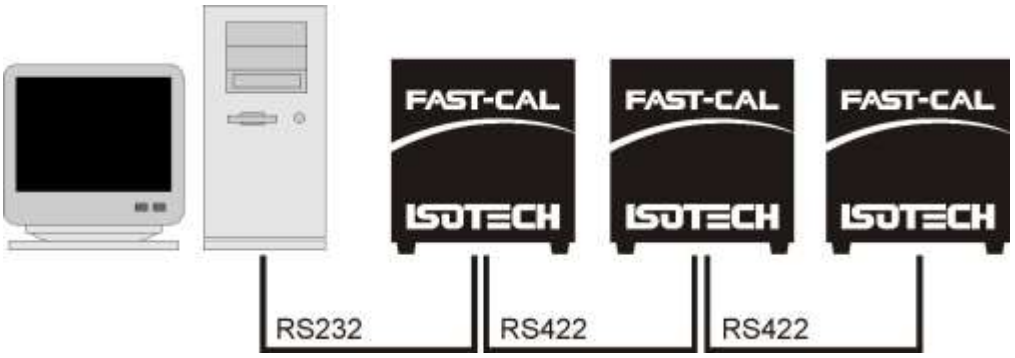
TESTING THERMAL SWITCHES WITH FAST-CAL

The site Model Fast-Cal's include a switch test facility which is used in conjunction with the supplied Cal Notepad Software. See Cal Note Pad manual or instructions on how to use this.

USING THE PC INTERFACE

The Fast-Cal units include an RS422 PC interface and a special converter cable that allows use with the standard RS232 port. When using the bath with an RS232 port it is essential that this converter cable is used. Replacement cables are available from Isotech, part number ISO-232-432. A further lead is available as an option, Part Number ISO-422-422 lead which permits up to 5 instruments to be daisy chained together.

The benefit of this approach is that a number of calibration baths may be connected together in a "daisy chain" configuration - and then linked to a single RS232, see diagram.



Note: The RS 422 standard specifies a maximum lead length of 1200M (4000ft). A true RS422 port will be required to realise such lead lengths. The Isotech conversion leads are suitable for maximum combined lead lengths of 10M that is adequate for most applications.

CONNECTIONS

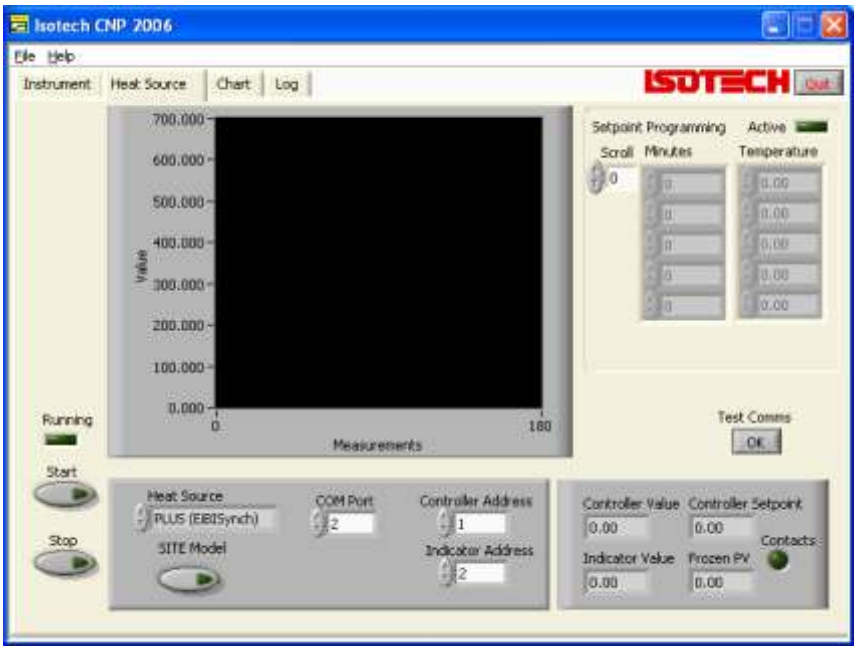
For RS232 use simply connect the Isotech cable, a 9 to 25 pin converter is included to suit PCs with a 25 pin serial converter.

RS422 Connections

Pin	Connection
4	Tx+ A
5	Tx- B
8	Rx+ A
9	Rx- B
1	Common

CAL NOTEPAD

Cal Notepad can be used can be used to log and display values from the Dry Blocks and an optional temperature indicator such as the milliK or TTI-10. The software requires Windows 9X, XP, a minimum of 5Mb of free hard drive space and free serial ports for the instruments to be connected.



DEVELOPMENT

Cal NotePad was developed by Isothermal Technology using LabVIEW from National Instruments. The license details are shown on the download page and in the Cal Notepad manual.

HOW TO INSTALL CAL NOTEPAD

1. Download the ZIP from http://www.isotech.co.uk/downloads (7.6Mb)

2. Extract the files to a temporary folder

3. Run setup.exe

4. Follow the prompts which will install the application, a user manual with setup information and the necessary LabVIEW run time support files.

5. Should you ever need to uninstall the software then use the Add/Remove Programs option from the Control Panel.

PROTOCOL

The instruments use the "Modbus Protocol"

If required, e.g. for writing custom software the technical details are available from our Document Library at http://www.isotech.co.uk

DIAGNOSTIC ALARMS

Diagnostic alarms indicate a possible fault within the controller or connected devices.

Display shows	What it means	What to do about it
E.Conf	A change made to a parameter takes a finite time to be entered. If the power to the controller is turned off before the change has been entered then this alarm will occur. Do not turn the power off to the controller while ConF is flashing	Enter configuration mode then return to the required operating mode. It may be necessary to re-enter the parameter change since it will not have been entered in the previous configuration.
E.CaL	Calibration error	Re-instate Factory calibration, refer to Isotech
E2.Er	EEPROM error	Return to Isotech for repair
EE.Er	Non-vol memory error	Note the error and contact Isotech.
E.Lin	Invalid input type. This refers to custom linearisation which may not have been applied correctly or may have been corrupted.	Go to the INPUT list in configuration level and set a valid thermocouple or input type
Emod	IO1, OP2, or OP3 has been changed	If this has been field changed by the installation of a new board, enter config level, then exit back to operator level. If the message occurs at any other time return to factory for repair.

Additional Information;

1. If the input is too high HHHHH will be displayed.
2. If the input is too low LLLLL will be displayed.

INITIAL TESTING

This unit was fully tested before despatch to you but please check its operation as outlined below.

After connecting the Fast-Cal to the electricity supply, the temperature controller display will show the temperature of the block and the last set-point value. The S controller and indicator both go through a self-test sequence first. The fan on the front panel should be heard running.

Change the set-point to 50°C and observe that the block temperature rises and settles to this value. For the S; place a thermometer into the block and connect it to the suitably configured indicator. Confirm that the indicator agrees within ±2°C of the controller.

Your unit should have performed as described above and can now be used for calibration.

If any problems or faults arise during these tests please contact us or our agents for help and advice.

IMPORTANT NOTICE

The controller's function settings are preset and will not require adjustment.

The Medium and High models incorporate a built in insert holder. In addition to the convenient storage of a second insert it can be used to speed up the calibration cycle by allowing a warm insert to be replaced with a cool one from the insert holder. The forced air cooling cools the block and insert rapidly from high temperatures. As the temperature of the block and insert approach ambient the rate of cooling reduces and it is at this stage that it can be useful to swap inserts.

IMPORTANT - To protect the safety of the operator and the integrity of the equipment inserts must not be removed from the block while above 70°C. Use appropriate protective gloves when handling warm inserts.

MAINTENANCE

Maintenance is limit to keeping the apparatus and the calibration volume clean and free from debris.

There are no internal user serviceable parts.

Repair and maintenance must be carried out by Isothermal Technology Limited or an approved agent.

APPENDIX 1: TROUBLE SHOOTING

Unit fails to operate

Check fuse, if fuse blows repeatedly consult Isotech or local agent.

Unit unstable

Control parameters have been interfered with - consult your local agent.

Cannot establish PC Communications

For RS232 you must use the Isotech adaptor cable.
Ensure the addresses of the controller and indicator match those set in Cal Notepad.
Ensure each controller and indicator is set to a unique address.
Refer to 'Using the PC Interface' section and the Cal Notepad manual for further details.

APPENDIX 2: INDICATOR CONFIGURATION (Reference Only)

Input

Name	Description	Value
Type	Input Type	RTD
Units	Display Units	°C (0)
DecimalPoints	Decimal Point Position	NN.NN
RangeHigh	Range High Limit	850.00
RangeLow	Range Low Limit	-200.00
CJCType	CJC Type	EXT

Calibration

Name	Description	Value
CalPhase	Calibration Phase	NONE (0)
UserCal	User Calibration	OFF (0)
Point1	Adjust Point 1	0.00
Point2	Adjust Point 2	0.00
Point3	Adjust Point 3	0.00
Point4	Adjust Point 4	0.00
Point5	Adjust Point 5	0.00
Offset1	Adjust Offset 1	0.00
Offset2	Adjust Offset 2	0.00
Offset3	Adjust Offset 3	0.00
Offset4	Adjust Offset 4	0.00
Offset5	Adjust Offset 5	0.00
CalibrationSerialNumberHi	Calibration serial number (high)	0
CalibrationSerialNumberLo	Calibration serial number (low)	0

Comms

Name	Description	Value
Id	Comms Identity	R422 (3)
Address	Comms Address	2
Baud	Baud Rate	9600 (0)
Parity	Parity setting	NONE (0)
Delay	TX Delay time	OFF (0)
CommRetrans	Transmitted parameter	NONE (0)
CommsRetransAd	Destination address	0

APPENDIX 3: ACCESSORIES PARTS LIST

Semi-Standard PRT (HTM 2010 and Low)	935-14-82/DB
Semi-Standard PRT (Medium)	935-14-98/DB
Semi-Standard PRT (High)	935-14-72/DB
Semi-Standard T/C (High)	935-14-63/DB
Standard Insert (Low and Medium)	907-02-03
Blank Insert (Low and Medium)	907-02-03b
Special Insert (Low and Medium)	907-02-03c
Standard Insert (High only)	907-02-03d
Blank Insert (High only)	907-02-03f
Special Insert (High only)	907-02-03g
Carrying Case	931-22-72