

# TECSource™

# 5200 SERIES

## USER'S MANUAL



**TEMPERATURE  
CONTROLLER**

 arroyo instruments

## Introduction

Thank you for choosing the **TECSource** from Arroyo Instruments. Your **TECSource** is a combination of leading edge technology combined with years of experience in the field of temperature control.

With a crystal clear VFD display, both RS232 and USB computer interfaces, and small footprint, the **TECSource** will fit into almost any temperature control application.

Unlike other temperature controllers in its class which use inexpensive 7-segment LED displays, the **TECSource** takes advantage of its large VFD display to simultaneously display set point temperature, actual temperature, current, and voltage.

The user interface of the **TECSource** is engineered to make using the instrument straightforward. With its text-based menus, there is never any confusion over which setting is being changed, and parameters are displayed in clear English (no cryptic numbers or LEDs to decode).

The **TECSource** offers all the features you would expect from a modern temperature controller, including:

- 0.004°C short term temperature stability
- 0.01°C resolution for both set point and actual temperatures
- 3A / 4.5V (13.5W maximum) output power

### What's in the Box

Along with the **TECSource** itself, a CD with electronic copies of this manual, the **Computer Interfacing Manual**, and USB drivers are included. For USA customers, a power cord is included. For non-USA customers, an IEC-60320-C13 rated AC power cord must be provided.

### Accessories

Arroyo Instruments also sells several accessories designed to work with the **TECSource**. These include:

- **TECSource Cable, 2m (p/n 1260)**  
This cable has DB-15 male/female connectors for interfacing to the LaserMount or other connectorized fixtures.
- **TECSource Cable, 2m, Pigtailed (p/n 1261)**  
This cable has a female DB-15 connector for plugging into the **TECSource** and tinned leads for wiring into custom solutions.

- **2U Rack Mount Kit, 2 Bay (p/n 1400-RM)**  
For installing your **TECSource** or **LaserSource** into a standard 19" rack. The rack mount kit has space for two instruments, but if you plan to only install a single instrument, also order a **1 Bay Blank (p/n 1400-BL)** to fill the unused opening.
- **10k $\Omega$  Thermistor (p/n 1600)**  
Accurate to  $\pm 0.2^{\circ}\text{C}$ .
- **RS-232 NULL Cable, 3m (p/n 1200-NULL)**
- **USB Cable, 3m (p/n 1201)**

## Safety Terms and Symbols

The following safety-related terms are used in this manual:

- **Warnings** (noted by the WARNING heading) explain dangers that could result in physical injury or death;
- **Cautions** (noted by the CAUTION heading) explain conditions that could result in damage to the instrument, other equipment, or your device.
- **Notes** (noted by the NOTES heading) are *not* safety-related, and are intended simply to point out important information.

If, at any time, any of the following conditions exist, or are suspected of existing, discontinue use of the unit until it can be inspected by qualified service personnel:

- Visible damage to the unit, including damage or stress caused during product shipment;
- Storage of the unit outside the standard storage temperature or humidity rating, or prolonged storage under harsh conditions;
- Failure to operate properly.

If needed, contact your distributor or Arroyo Instruments for service or repair to ensure the safety of the product is maintained.

### Symbols



Power Off



Power On



Caution, refer to manual



Earth ground



Caution, risk of electric shock

### General Warnings

#### WARNING

This instrument is intended for use by qualified personnel who understand the shock and laser hazards and are familiar with safety procedures required to avoid injury. Read this manual completely before attempting to use this product.

#### WARNING

To avoid electrical shock, ensure a 3-prong power cord is used, and is plugged into a earth-grounded receptacle. Failure to do so can result in severe injury or death.

#### CAUTION

There are no user-serviceable parts inside. All service and repair work shall be done by Arroyo Instruments or personnel authorized by Arroyo Instruments. Modifications done by non-authorized personnel will void the warranty. Please see the Service section later in this manual for instructions on how to obtain service for this instrument.

## Quick Start

The **TECSource** was designed with ease of use in mind, and you will likely have little need for this manual for almost all of the features the unit offers. This section will show how you can quickly get the unit up and running in almost no time.

After unpacking the unit, ensure that the voltage selection on the Input Power Connector (IPC) on the back of the unit is set to the correct voltage. This is critical, as incorrect voltages can damage the unit. The **TECSource** is shipped in the 120V configuration from the factory. Change the voltage as needed. For more information, refer to the IPC section below.

Once the voltage selection has been completed, plug the AC cord into the unit and into the wall outlet. Turn on the power switch located on the IPC, and the unit will power up, displaying the model information and firmware version number.

Press the MENU button to enter the menu, and using the knob, turn to the right until the **I Lim** setting is displayed. Press the knob to edit the setting, and adjust the limit as appropriate to your Peltier. Press the knob again to save the value. Make the same adjustments to the high and low temperature limits (**T-High Lim** and **T-Low Lim**), as appropriate for your application.

The unit comes pre-programmed for the BetaTHERM 10K3A1 thermistor. If the **TECSource** is being connected to a LaserMount, no changes need to be made, as this is the thermistor used in the mount. However, if you are using manufacturer's thermistor or a different BetaTHERM thermistor, you will need to verify the Steinhart-Hart coefficients are set correctly. Navigate to the **Steinhart** sub-menu, pressing the knob to enter the sub-menu. Adjust the constants to reflect the values for your thermistor.

Once you have made all your adjustments, press the MENU button to exit the menu (in the future, if you're only changing one value, you do not need to press the knob --- pressing the MENU button while changing a value will save the value and exit).

Next, connect the cable between your LaserMount or other fixture and the Output connector of the **TECSource**. We recommend using our cables as they have been designed to work well with the **TECSource**. If using your own cables, ensure they have been properly wired according to the pin-out of the **TECSource** and your fixture.

Finally, set the set point to an appropriate temperature and press the **Output** button. The output will turn on and you will see the voltage and current begin

driving the fixture to the set point you have chosen. Depending on the thermal size of your fixture, it may take seconds or several minutes to reach the set point.

If you notice the temperature is oscillating around the set point and not stabilizing, you may need to adjust the **Gain** setting in the menu. If the temperature is quickly jumping up and down, the **Gain** will typically need to be reduced. If the temperature is slowly moving up and down, try a higher **Gain**. You may need to experiment with several gain settings to find the ideal value.

It's that simple. For more detailed operating and installation instructions, read on.

## Installation

Installation of the **TECSource** is very straightforward, as the quick start section above illustrated. This section will provide additional details and considerations for installing your **TECSource**.

After unpacking the unit, make sure all packing materials have been removed and nothing obscures the ventilation ports on the back and bottom of the unit.

### Changing the Voltage Selection

Before powering on the unit, ensure that the voltage selection on the IPC is set correctly. Improper voltage selection can easily damage the unit. Changing the voltage selection requires that you remove the selection tumbler from the IPC.



**Input Power Connector (IPC)**

Remove the power cord from the unit. Using a small flat blade screwdriver, open the fuse panel. Remove the voltage selection printed circuit board on the right side of the IPC (you may need needle nose pliers to do this).

**CAUTION**

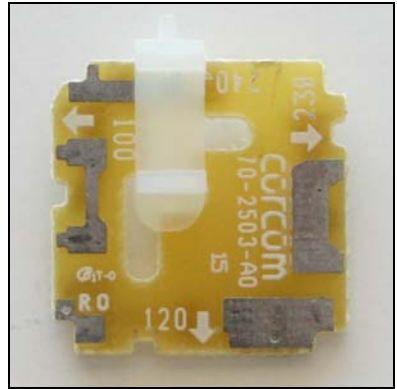
**Do not exceed 250VAC on the line input.**

It is critical to select the proper voltage selection prior to applying power to the unit. If the actual voltage exceeds the voltage selection by +/-10%, damage to the unit may occur.

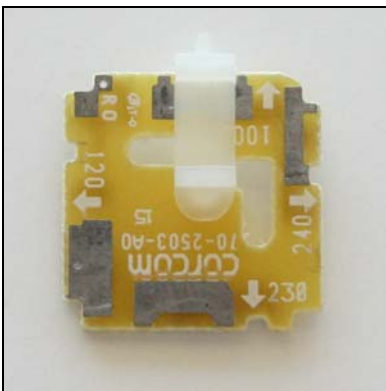
Change the plastic guide to select the appropriate voltage. The selection is counter-intuitive: you must place the plastic piece opposite the edge marked with the voltage you wish to select:



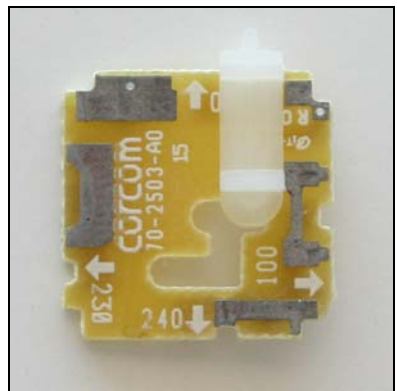
**100V Setting**



**120V Setting**



**230V Setting**



**240V Setting**

Reinsert the voltage selector and replace the fuse cover.

## Powering Up the Unit

Once the correct voltage selection has been made, connect the AC power cord to the unit.

Turn the power switch, located on the IPC, into the on (|) position. The unit will display the current firmware revision, go through a quick power-up self-test, and return to the last known operating state.

## Ventilation

The **TECSource** has vent holes on the rear and bottom of the unit. You must not block these vent holes, or overheating may occur, causing damage to the unit.

### CAUTION

Do not operate the unit above +40°C ambient, and ensure the instrument is properly ventilated, or the unit may overheat and possible damage to the instrument may occur.

## Rack Mounting

A rack mount kit (**p/n 1400-RM**) for standard 19" racks is available for the **TECSource**, and supports the rack mount of one or two units in a 2U (3.5") high opening. The rack mount kit provides sufficient clearance below the units for ventilation, so units can be rack mounted immediately above other equipment (no rack spacers required). Because the unit draws air from the bottom, and therefore inside the rack housing, be sure that the internal rack ambient temperature (which will typically be several degrees higher than room ambient) does not exceed the unit's operating temperature. If only racking one instrument, you will also need a bay blank (**p/n 1400-BL**) to cover the second opening in the rack mount kit.

## Warm-up and Environmental Considerations

In order to achieve the highest level of accuracy, the **TECSource** should be powered on for at least one hour prior to taking measurements. In addition, ensure that the unit is not operating outside the ambient temperature range or humidity conditions.

## Operation

### The Front Panel

Operation of the **TECSource** is very straightforward. The sections below will help familiarize you with the front panel, the display, and the menu structure.



The front panel is designed for simplicity in operation. There are three buttons on the front panel: **Output**, **Menu**, and the adjustment knob.

The **Output** button is used to turn the output on and off. Whenever the output is on, the blue Output On LED will be lit.

The **Menu** button is used to enter the **TECSource** menu. When in remote mode, it acts as a Local button, returning the instrument to local mode.

The large adjustment knob located on the right hand side of the unit is used to change the set point or parameters in the menu. It also acts as a push button, primarily as an enter button, when making changes in the menu.

There are four LEDs: a green power LED that is lit whenever the AC power is turned on; the blue Output On LED that indicates the **TECSource** is actively controlling the temperature; a red Error LED that indicates an error has occurred; and a yellow Remote LED that indicates the unit is being controlled via a computer.

Whenever an error is generated, the red Error LED will light, and the error will be displayed on the VFD display. There may be one or more errors, but only the first error will be displayed. To display the next error, press **Menu** button. To clear all errors, press the knob. A list of error codes can be found in the **Error Messages** section below.

When the unit is in remote mode, the yellow Remote LED will be lit. More information about how the instrument behaves in remote mode can be found in the Remote Mode Operation section below.

## Control Modes

The **TECSource** offers two temperature control modes: constant temperature mode (T Mode), and constant resistance mode (R Mode).

Changing the control mode is done through the menu by changing the **Mode** parameter to either **T Mode** or **R Mode**.

Constant temperature mode uses the Steinhart-Hart constants to calculate the resistance of the thermistor at the desired or actual temperature.

While most users will only need the temperature control mode, the constant resistance mode allows you to bypass the Steinhart-Hart equation and directly select the thermistor resistance set point. This can be useful when only the desired resistance is known, or when the Steinhart-Hart values are not available for your thermistor.

## Main Display Screen

On the main display you will find the set point and two or three measurements, depending on the configuration you have chosen. An example display is shown below:



Sample Display

The set point will depend on the control mode you have selected. When in T Mode, the set point will be temperature. When in R Mode, the set point will be in ohms.

## Measurements

The second line of the display contains the measurements appropriate for the control mode. In T Mode, the actual temperature, current, and voltage can be displayed, depending on the display mode. In R Mode, the actual resistance is displayed instead of the actual temperature.

## Removing the Set Point Error

Because of the limitations of control-loop calibration, you may find that the 5230 will settle a few hundredths of a degree off from the measured temperature.

Because the measurement of the temperature is highly accurate, you can use a function within the 5230 called temperature set point null, or simply Tnull, to remove this error, by internally calibrating the set point to the temperature measurement. To Tnull, the temperature must be stable to less than 0.02°C for at least 20 seconds, then press the **MENU** button, select the **Tnull** entry, and press the knob. The instrument will null the set point immediately. Press **MENU** to exit.

## Settings and Menus

All parameters of the **TECSource** can be viewed and changed within the menu. The menus are constructed with the most used parameters first. To change any setting, press **Menu** to enter the menu then rotate the knob to select the parameter to change. Press the knob to begin changing the value. As a visual indication that you are in edit mode, you will see an asterisk appear next to the value. Once you have made your change, press the knob or **Menu** button to store the value. Pressing the **Menu** button will store and exit the menu, while pressing the knob will store the value but leave you in the menu to make additional changes.

Some settings are contained inside a sub menu, such as communications settings. To access the sub menu, simply press the knob to enter the sub menu when its name is displayed.

Below is a complete list of available settings:

Menu	Description	Factory Default
<b>Root Menu</b>	<b>Top Level Menu</b>	
<b>Gain</b>	<b>Gain</b> controls the response of the temperature controller. A higher gain value will cause the controller to respond more quickly to the difference between the set point and the actual temperature, while a lower value will cause it to respond more slowly. Read more on setting gain below.	30
<b>I Lim</b>	<b>I Lim</b> sets the current limit of the temperature controller. The limit should be set to a value that is suitable for your Peltier device.	3A

Menu	Description	Factory Default
<b>T-Low Lim</b>	<b>T-Low Lim</b> is the lower temperature limit. If operating in T Mode and the actual temperature drops below this value, the set point will be turned off. (WARNING: this can be disabled in software)	-99°C
<b>T-High Lim</b>	<b>T-High Lim</b> is the upper temperature limit. If operating in T Mode and the actual temperature rises above this value, the set point will be turned off. (WARNING: this can be disabled in software)	125°C
<b>R-Low Lim</b>	<b>R-Low Lim</b> is the thermistor resistance limit. If operating in R Mode and the actual thermistor resistance below this value, the set point will be turned off. (WARNING: this can be disabled in software)	10Ω
<b>R-High Lim</b>	<b>R-High Lim</b> is the upper thermistor resistance limit. If operating in R Mode and the actual thermistor resistance rises above this value, the set point will be turned off. (WARNING: this can be disabled in software)	50kΩ
<b>Mode</b>	This set the operating mode (T Mode or R Mode) of the temperature controller.	T Mode
<b>Tol Time</b>	Tolerance time is the amount of time, in seconds, that the actual temperature must be within the set point temperature +/- the Tol Temp value for the unit to be considered in tolerance.	5 seconds
<b>Tol Temp</b>	Tolerance temperature is a temperature band (in °C) around the set point temperature. When the actual temperature is within this band for longer than the Tol Time setting, then the unit is considered to be in tolerance.	0.1°C

Menu	Description	Factory Default
<b>Tnull</b>	The Tnull function is used to remove the set point error of the instrument. Tnull is not editable, but shows the amount of temperature set point null in ohms.	0 $\Omega$
<b>Comm Menu</b>	<b>Communications Menu</b>	
<b>Baud</b>	This sets the baud rate for the RS232 serial port. See the <b>Computer Interfacing Manual</b> which is included on the CD that accompanied this product.	9600
<b>Err While Rmt</b>	To turn off the display of errors while in remote mode, set this value to "No". To display errors while in remote mode, set this value to "Yes".	Yes
<b>Terminal Mode</b>	Terminal mode simply echoes any characters received over the serial or USB interfaces.	No
<b>Msg Term</b>	This controls the output message termination, and can be set to CR/LF, CR, LF, or None.	CR/LF
<b>Sys Menu</b>	<b>System Settings Menu</b>	
<b>Brightness</b>	The vacuum florescent display can be set to one of eight brightness levels.	100%
<b>Audible Beep</b>	This setting controls when the unit produces audible feedback. Set to No to prevent sound, or Yes or audible alerts such an error messages.	Yes
<b>Lockout Knob</b>	Lockout knob allows you to disable knob operation from the main display. This prevents accidental changes of the set point. The knob will always work in the menus regardless of this setting.	No
<b>Steinhart</b>	<b>Steinhart-Hart Equations Menu</b>	
<b>A</b>	The A term in the equation.	1.129241E-03
<b>B</b>	The A term in the equation.	2.341077E-04
<b>C</b>	The A term in the equation.	0.877546E-07

## Remote Mode Operation

Remote mode operation is when the **TECSource** is being controlled by a computer over the USB or RS232 interfaces. When in remote mode, the **TECSource** behaves differently, preventing you from affecting the operation of the instrument. Some of the primary differences are you will not be able to change the set point, you cannot enter the menu, and the knob is disabled.

You can exit remote mode at any time by pressing the MENU button, which has a secondary function to return the **TECSource** to local operation when in remote mode.

While in remote mode, the Remote LED also acts as an activity indicator, and will flash whenever there is communication with the computer.

Details on how to communicate with the **TECSource** can be found in a separate **Computer Interfacing Manual** which is included on the CD that accompanied this product.

## Installing the USB Drivers

Using the **TECSource** via USB is just as simple as using the serial port. In fact, once you have installed the USB drivers, the instrument will appear as a virtual serial port that you can use just like a normal serial port.

To install the drivers, simply plug in the instrument to your computer. When the Add New Hardware wizard appears, insert the CD you received with the **TECSource** and follow the on-screen instructions.

During the installation you may receive a dialog that warns the driver is not Windows certified. If you do, click **Continue Anyway**.

Once the drivers are installed, to determine the COM port number, go to **Control Panel** and select **System**. Once the **System Properties** dialog appears, choose the **Hardware** tab then click on the **Device Manager** button. When the **Device Manager** appears, click on the plus sign to the left of **Ports**. The port identified as an **Arroyo Instruments Virtual COM Port** is the **TECSource**. In the event you have multiple **TECSource** instruments plugged in simultaneously, you will need to experiment to see which instrument was assigned to which port. For example, you could change the set point when the output was off to see which unit's set point changed.

## Rear Panel

In addition to the input power connector described above, there are three connectors and one push button on the rear panel of the **TECSource**: Output connector, reset button, USB connector, and RS232 connector.



**TECSource Rear Panel**

### TEC Output Connector

The Output connection is a female DB-15, and has the following pin-out:

DB-15 Pin	Description
1 & 2	TE (+)
3 & 4	TE (-)
5 & 6	Earth Ground
7	Thermistor
8	Thermistor
9 thru 15	No connection

#### Output Connector (DB-15 Female)

Arroyo Instruments has followed industry conventions for TEC DB-15 connections, and is likely compatible with pin-outs from other vendors.

### Reset Button

The reset button is not normally used, but if the unit fails to respond after power cycling, pressing the reset button while applying power will cause the unit to reset to factory defaults. Calibration will not be affected, but all settings will be returned to their factory default values.

### USB Connector

The USB connector is a standard Type B female connector, and can be plugged into any USB 1.1 or USB 2.0 port. For more information on using the USB interface, see the **Computer Interfacing Manual** which is included on the CD that accompanied this product.

### RS232 Connector

The RS232 connection is male DB-9 connector wired in a NULL modem configuration.

Pin	Description
2	Receive
3	Transmit
5	Ground
1,4,6	Commoned together
7,8	Commoned together
9	No connection
Shell	Earth ground

**RS232 Connector (DB-9 Male)**

For more information on using the RS232 interface, see the **Computer Interfacing Manual** which is included on the CD that accompanied this product.

## Connecting to the TECSource

Arroyo Instruments carries two cable assemblies specifically designed for connecting the TECSource to temperature controlled fixtures or devices. **Part number 1260** is a two meter cable designed for use with Arroyo Instruments mounts, such as the **202** and **204 Butterfly LaserMounts**, and has DB-15 connectors on both ends, one male and one female. For custom applications, **part number 1261** is a two meter cable with a male DB-15 on one end and stripped and tinned leads on the other. Both cable assemblies common pins 1/2 and 3/4 into 18 gauge wires.

### NOTE

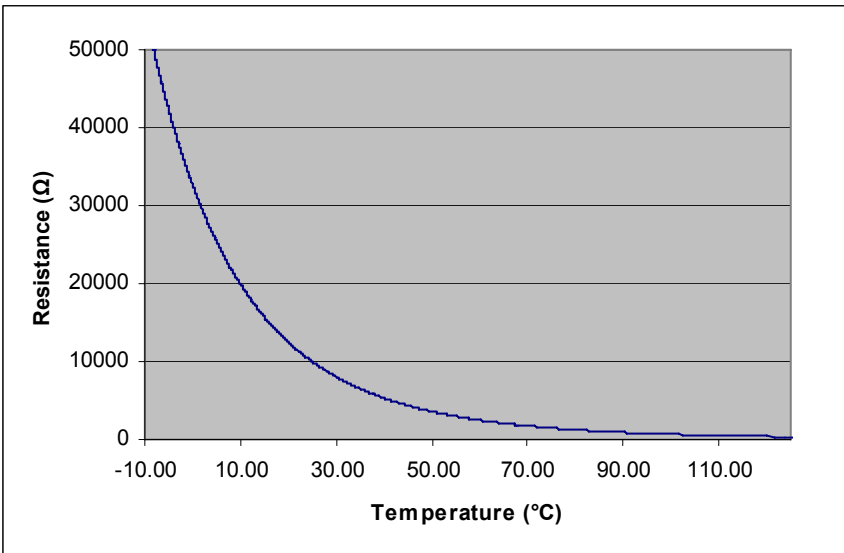
Connections to the **TECSource** and the fixture must be secure. Tighten any screws on the DB-15 connectors, and make sure all connections are in good condition.

See the manual for your fixture for additional safety and operational information.

## Working With Thermistors

The **TECSource** is designed to work with 10K $\Omega$  negative temperature coefficient (NTC) thermistors, such as the BetaTHERM 10K3A1 thermistor used in the LaserMount. A thermistor works by translating temperature into resistance, with resistance decreasing as temperature increases (hence the 'negative coefficient').

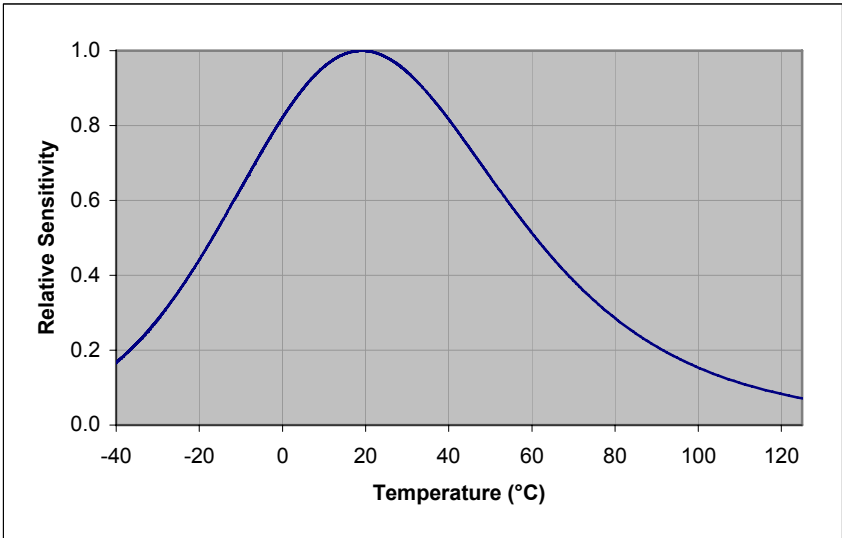
Here is a typical response curve of a thermistor:



**Typical Resistance vs. Temperature Graph**

As can be seen by the graph, the resistance of the thermistor drops very quickly. In the typical control range (0°C to 40°C), thermistors offer good sensitivity to changes in temperature, and this is the range in which most thermistors are typically used.

The **TECSource** design differs from many conventional temperature controller designs because it does not rely on a fixed current source (such as 10 $\mu$ A or 100 $\mu$ A) to create a voltage across the thermistor. Instead, the thermistor operates in a ratio-metric configuration that changes the thermistor sensitivity, as shown in the graph below.



**Relative Sensitivity vs. Temperature**

By using this ratio-metric design, the sensitivity of the instrument is improved, providing typically twice the sensitivity to temperature at temperatures above 50°C as compared to fixed current source designs. In addition, there is no needed to change the current source when you operate in the sub-zero temperature range.

**The Steinhart-Hart Equation**

As can be seen from the temperature versus resistance graph above, resistance varies inversely with temperature in a non-linear fashion. This relationship can be accurately modeled by polynomial equations, and one such being the Steinhart-Hart equation:

$$\frac{1}{T} = A + B * \ln(R) + C * \ln(R)^3$$

The coefficients A, B, and C can usually be obtained from the thermistor manufacturer. The **TECSource** defaults to the coefficients for the BetaTHERM 10K3A1 thermistor. You can change the coefficients under the Steinhart menu.

## Specifications

Description	Specification
<b>TEMPERATURE CONTROL</b>	
Range (°C)	-99.00 to 200.00
Resolution (°C)	0.01
Accuracy ( $\pm$ °C at 25 °C)	0.1
Short Term Stability (1hr) ( $\pm$ °C @25C)	0.004
Long Term Stability (24hr) ( $\pm$ °C @25C)	0.01
<b>CURRENT</b>	
Range (A)	3
Compliance Voltage (V)	> 4.5
Max Power (W)	13.5
Noise/Ripple (mA, rms)	< 1
Transients ( $\mu$ A)	< 100
<b>MEASUREMENT CHANNELS</b>	
<b>TEMPERATURE</b>	
Range (°C)	-99.00 to 200.00
Resolution (°C)	0.01
Accuracy (+/- °C)	0.2
<b>THERMISTOR RESISTANCE</b>	
Range (k $\Omega$ )	0.10 – 500.00
Resolution (k $\Omega$ )	0.01
<b>CURRENT</b>	
Resolution (A)	0.01
Accuracy (+/- mA)	50
<b>VOLTAGE</b>	
Resolution (V)	0.01
Accuracy (+/- mV)	100
<b>LIMITS</b>	
<b>TEMPERATURE LIMIT</b>	
Resolution (°C)	0.1
<b>CURRENT LIMIT</b>	
Resolution (A)	0.1
Accuracy (+/- A)	0.1
<b>GENERAL</b>	
Display Type	2x20 VFD
TEC Connector	DB-15, female
Computer Interface	USB 2.0 Full Speed RS-232 (DB-9, male)
Power (50/60 Hz)	100V / 120V / 230V / 240V
Size (H x W x D) [inches (mm)]	1.82(47) x 8.5(215) x 11(280)
Operating Temperature	+10°C to +40°C
Storage Temperature	-20°C to +60°C

## Error Messages

Error Code	Description	Cause
<b>E-100</b>	General Error	The error code is non-specific, and is generally used when no other error code is suitable.
<b>E-102</b>	Message too long	The message is too long to process (USB/Serial only).
<b>E-123</b>	Path not found	The message used an invalid path command (USB/Serial only).
<b>E-124</b>	Data mismatch	The message contained data that did not match the expected format (USB/Serial only).
<b>E-201</b>	Data out of range	The message attempted to set a value that was outside the allowable range (USB/Serial only).
<b>E-202</b>	Invalid data type	When trying to parse the message, the data was in an invalid format (USB/Serial only).
<b>E-204</b>	Suffix not valid	An invalid number base suffix (radix) was encountered when parsing a number (USB/Serial only).
<b>E-402</b>	Sensor open, output turned off	A sensor open circuit was detected and the output was turned off.
<b>E-403</b>	Module open, output turned off	A Peltier module open circuit was detected and the output was turned off.
<b>E-404</b>	I limit, output turned off	A current limit was detected and the output was turned off.
<b>E-405</b>	V limit, output turned off	A voltage limit was detected and the output was turned off.
<b>E-406</b>	Thermistor resistance limit, output turned off	The thermistor resistance limit (high or low) was exceeded and the output was turned off.
<b>R-407</b>	Temperature limit, output turned off	The temperature limit (high or low) was exceeded and the output was turned off.
<b>R-410</b>	Temperature was out of tolerance, output turned off	The temperature went out of tolerance and the output was turned off.
<b>R-415</b>	Sensor short, output turned off	A sensor short circuit was detected and the output was turned off.
<b>R-419</b>	TEC not stable	The TEC is considered stable if the temperature has changed less than 0.02°C for more than 20 seconds.
<b>R-998</b>	Command not supported	A command was received that is not supported by this instrument.

## Maintenance and Service, and Calibration

### Maintenance

The **TECSource** requires no regular maintenance other than product calibration. To clean the instrument, use cotton cloth that is only damp (not wet) with a light solution of soap and water.

### Fuses

Under normal operation, you should never need to replace a fuse. However, if either fuse does blow, use only T 250V, 1.0A, IEC 60127-2 5x20mm metric fuses as replacements.

If, after replacing the fuse, it continues to blow, immediately discontinue use of the instrument and contact service for support.

### Service

Service and repair for the **TECSource** can be obtained by contacting the distributor from where you purchased the instrument, or directly from Arroyo Instruments. A complete list of distributors is available on the Arroyo web site.

You can contact Arroyo Instruments through one of these methods:

By mail:                    Arroyo Instruments  
                                 373 Front Street, Suite B  
                                 Grover Beach, CA 93433  
                                 USA

By phone:                +1 (805) 481-6684

By fax:                    +1 (805) 481-6628

By email:                support@arroyoinstruments.com

On the web:             <http://www.arroyoinstruments.com>

In all cases, Arroyo Instruments requires a return materials authorization (RMA) number. You must contact Arroyo Instruments and obtain an RMA number prior to returning your instrument, or the shipment may be rejected and sent back to you.

## European Community Declaration of Conformity

### EC Declaration of Conformity



I/We

**Arroyo Instruments**

of

373 Front Street, Suite B  
Grover Beach, CA 93433  
USA

declare that

**5230 TECSource Temperature Controller**

In accordance with the following directives

**EMC Directive: 89/336/EEC**

**Low Voltage Directive: 73/23/EEC**

**RoHS Directive: 2002/95/EC89/336/EEC**

has been designed and manufactured to the following specifications:

#### **EMC Directive Test Standards**

EN 61326 Electrical Equipment for Measurement, Control and Laboratory Use EMC Requirements. This encompasses 10 individual Tests

#### **Low Voltage Directive Test Standards**


EN 61010 Electrical Equipment for Measurement, Control and Laboratory Use Safety Requirements.

This Certificate is the Manufacturer's Declaration which states that the **5230 TECSource Temperature Controller** is Compliant to the above noted EU Directives and are therefore, eligible to bear the CE MARK. This Declaration is further validated by an Investigation and Testing conducted by **Garwood Laboratories Inc.**, an Independent and Competent 3rd Party Test Lab with facilities in San Clemente, California, USA. The Evaluations and Test Data are documented in the Technical Construction File, **AI 070501-1** which is available on request. This equipment, as of the listed Date of Manufacture, is technically exempted from the RoHS Directive Requirements, not being classified as consumer electronics equipment.

I hereby declare that the equipment named above has been designed to comply with the relevant sections of the above referenced specifications. The unit complies with all essential requirements of the Directives.

Paul Corr

(NAME OF AUTHORIZED PERSON)



(SIGNATURE OF AUTHORIZED PERSON)

President

(TITLE OF AUTHORIZED PERSON)

3 May 2007

(DATE OF ISSUE)

Notes:



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