User's Guide

Series: MBC1-TC
Mini Benchtop Temperature Controller

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Note: Continued product improvements make specifications subject to change without notice.
Check www.ImagineInstruments.com for the latest product information and updates.

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Section1 Before You Begin Using Your Unit

1.1 Symbols & Safety Information

Listed below are the International Symbols used on the product, or in this manual.

Danger: Electric Shock Hazard

Warning: Refer To Documentation and Users Guide

General Safety Guidelines

- Follow all safety guidelines outlined in this manual and marked on the unit.
- Never install or operate this product outside the specifications listed in this manual.
- Never install and operate in flammable or explosive environments.
- Install your unit in a location that is out of the reach of unauthorized personnel.
- Always install additional disconnect and safety devices to provided added protection.

Electrical Safety Guidelines

- Never attempt maintenance or service while power is connected.
- Installation and all wiring should be done by a trained professional.
- Never Install and operate without proper earth grounding.

Note: Personnel entrusted with installation, setup and operation of this product must be suitably qualified and trained. The required knowledge and experience can be gained via training courses and appropriate on-the-job instruction. Personnel must have this document available to them at all times when working with this product.

1.2 Condition of Use

Imagine Instruments LLC products are not designed, intended or authorized for use in medical applications, applications intended to sustain or support life, in any nuclear facilities or any other application where the failure of the product could create a situation where catastrophic property damage, personal injury or death may occur. In the event that the Customer purchases or uses any Imagine Instruments LLC products for any such unintended or unauthorized application, the Customer shall indemnify and hold harmless Imagine Instruments LLC and its officers, directors, employees, agents, affiliates, successors and assigns against all claims, costs, damages and expenses (including reasonable attorneys' and expert witness' fees) arising out of or in connection with, directly or indirectly, any claim for property damage, personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Imagine Instruments LLC was negligent regarding the design or manufacture of the subject product.

1.3 Unpacking

Unpack your product carefully and inspect for any shipping damage. Notify the carrier immediately if you find damage.

The following items are included with your unit:

- One Male Thermocouple Connector
- Controller Operation Manual
- This User's Guide

Section 2 Introduction

2.1 Product Description

Mini Benchtop Temperature Controller, affordable, compact design, compatible with a wide range of heating applications. Features an easy-to-use programmable digital temperature controller with dual display. Output control is accomplished by an internal, self-powered Solid State Relay (SSR).

2.2 Available Models

MBC1-TC-J	Mini Benchtop Controller, Type-J Thermocouple	32 to 1499 °F (0 to 815 °C)
MBC1-TC-K	Mini Benchtop Controller, Type-K Thermocouple	32 to 2192 °F (0 to 1200 °C)
MBC1-TC-T	Mini Benchtop Controller, Type-T Thermocouple	-238 to 752 °F (-150 to 400 °C)

2.3 Controller Display Indicators and Buttons

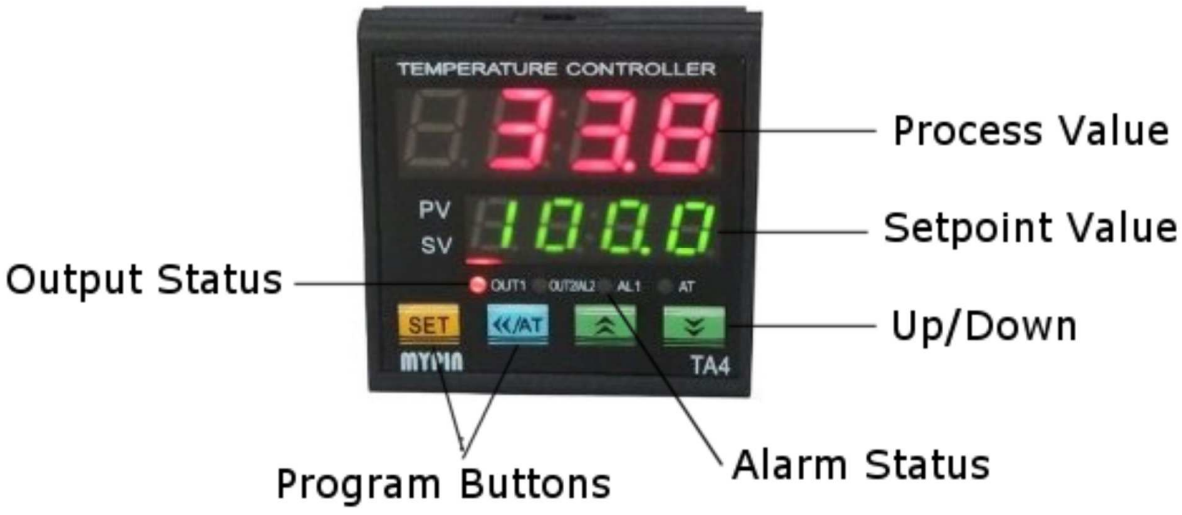


Figure 1

Section 3 Specifications

3.1 Specifications

Temperature Accuracy: ± 0.5% Full scale

Display Resolution: ± 1°

Control Model: PID Autotune

Sensor Input Connection: Mini Female Thermocouple Jack

Operating Power: PID 110-120VAC, 50/60 Hz

Power Cord: Integral 6ft, 3-prong North American Plug

Control Outputs / Capacity: One, 110-120VAC, 8A Max

Control Type: Self Powered SSR

Fusing: One FB, 5 x 20mm, 8A

Alarm Relay: 3A

Operating Temperature: 32 to 130 ºF (0 to 50 ºC)

Enclosure: Painted Steel Body, Aluminum Panels

Dimensions: 2.6 H x 5.5 W x 6.7" L

3.2 Environmental Operating Conditions

This product has been designed to provide performance and durability over its life time. To keep this product working correctly it should be handled with care and only operated within the following recommended environmental operating conditions.

- A ambient operating temperature range of 32 to130 ºF (0 to 50 ºC)
- A relative humidity of 0-70% Non-condensing
- For Indoor use only

3.3 Regulatory Approvals & Export Compliance

Statement of CE Conformity

Imagine Instruments LLC is committed to compliance with the laws and regulations in each country into which we ship our products. Please contact us to learn the current status of CE compliance for the product you have purchased.

Export Compliance Policy

Customer shall not, directly or indirectly, export, re-export, transfer, furnish or ship Products in violation of any applicable export control laws or regulations of any country having jurisdiction over the Products, including any and all US law or US Government export controls. Customer agrees, at Customer's own expense, to comply with all applicable export laws and will, in accordance with the indemnification provisions of these Terms and Conditions, indemnify, defend and hold Company

harmless from any claim against Company due to Customer's violation or alleged violation of any export laws.

Currently we restrict the sale and shipment of our products to only USA & Canada. Re-sale or re-shipment of Imagine Instruments LLC products outside the USA or Canada must not be done without written approval by us and the United States Government.

Section 4 Installation

4.1 General Guidance

Your Benchtop Temperature Controller must be installed and maintained as described in this guide to ensure reliable safe operation of the unit. Confirm the voltage and current draw of your connected load is consistent with the design specifications of this product and your application will not exceed the maximum capacity listed.

4.2 Mounting and Area Environment

This product has been designed for Benchtop use. Insure that the unit has sufficient surface area to be used in a level upright position as to where the unit will not fall from the bench during use.

This product has been designed for indoor use only. The area the controller is used in should be free of moisture, oil, dirt or any other contaminant.

********** CAUTION **********

Never operate this product in areas where flammable liquids, gases or any other flammable materials are, or might be present. Never operate this product if the unit is damp or wet, or in areas with high levels of humidity.

Section 5 Setup & Wiring

5.1 Powering Your Unit

For proper operation and safety your system must always be earth grounded.

WARNING: Electrical Shock Hazard

All wiring should be done by a qualified suitably trained person only.

CAUTION: Insure all control output connections are well insulated.

CAUTION: Additional fusing is recommended in series with control and alarm outputs.

5.2 Control Output Wiring

********** CAUTION **********

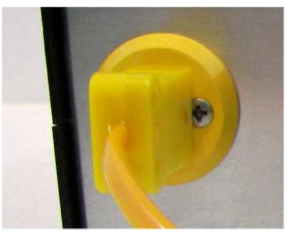
Make sure the voltage and current draw of the heating device you plug into the control output does not exceed this products maximum capacity as stated in this document.

The control output connection located on the rear panel will accept a standard 3-Prong male plug. The output is self-powered. That means that you do not need to provide power at this connection. Just connect your heating device as shown. Always use an earth grounded power cord.

The internal pre-wired SSR inside this unit provides a switched on/off control output power of 110-120 VAC.

Figure 2.

5.3 Connecting a Thermocouple Sensor



The thermocouple jack located on the rear panel will accept any industry standard miniature male thermocouple plug. Make sure you use the same thermocouple type plug as the factory-installed jack. The plug and jack colors should match each other.

Figure 3. (Type-K Shown)

North American Thermocouple Wiring

Black Connectors = Type-J Thermocouple + (positive wire) White, - (negative wire) Red
Yellow Connectors = Type-K Thermocouple + (positive wire) Yellow, - (negative wire) Red
Blue Connectors = Type-T Thermocouple + (positive wire) Blue, - (negative wire) Red

5.4 Alarm Relay Wiring

The controller includes an internal alarm relay rated at 3 Amps Max. The alarm trip setting is user selectable, see the separate controller manual for instructions on how to set the alarm value. The alarm connection on the rear panel is normally open and closes when an alarm condition is present.

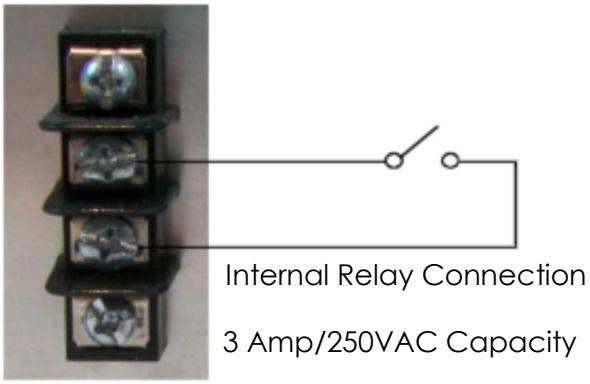


Figure 4. Internal Relay Connection 3 Amp/250VAC Capacity

Section 6 Controller Operation

6.1 Power On/Off Switch

The unit is turned on by placing the On/Off switch on the front panel into the "I" position. The unit is turned off by placing the On/Off switch into the "O" position.

6.2 Controller Operation

********** CAUTION **********

Your unit has been factory wired and configured to operate as a dedicated sensor type. Insure when making changes to your unit you do not change the "sensor type" pre-programmed at the factory. Changes to the programed sensor type can result in error readings and incorrect control operation. Incorrect control can cause your process to overheat causing damage and risk of fire and/or personal harm.

Setting Your Desired Control Setpoint

The temperature range supported by you unit depends on the model you purchased.
1. Press the <</AT button once and release
2. Continue pressing & releasing the <</AT button until the digit you want to change is flashing
3. Change that digit's value by pressing the green UP or green DOWN button
4. Press & release the <</AT button until the next digit you want to change is flashing
5. Change that digit's value by pressing the green UP or green DOWN button
6. Press the SET button when you are done.

********** WARNING **********

Make sure your thermocouple sensor is connected and making a good thermal connection to the process material you are heating. If you do not have the thermocouple located close to the heat source making good thermal contact with your process the controller will go into run-away operation and continue to provide power to the heater past when the desired temperate of the material being heated is reached. This may cause damage to your setup and possibly burn out your heating device.

Using Auto-tune Feature

This controller gives you the ability to adjust its P, I & D program parameters. The controller can also auto tune its own parameters. You should auto tune a new controller because auto-tuning sets the best parameters based on your application set-up. You should not need to perform auto tune again unless your process changes.

To Auto-Tune:
1. Start with your process ready to heat to the desired control temperature.
2. Press and hold down the <</AT button until the AT light is on
3. The PID is now in auto tune mode
4. Set the PID temperature to your normal mash temperature
5. Let the PID adjust and hold the water at mash temperature for a normal mash cycle - for most of us that's 1 hour
6. Press and hold down the <</AT button until the AT light is off

Changing Units of Measurement (The controller ships programmed for Fahrenheit).

To Change Measured Units from °F to °C:
1. Hold down the SET button until the top display shows AL1
2. Press the SET button 15 times until the top display shows C - F
3. Press the <</AT button once and release
4. The F in the lower display will start flashing
5. Press the green UP button and the display will change to flashing C
6. Press the SET button once and release and the C will stop flashing
7. Hold down the SET button until the top display displays the temperature

Setting Alarm (AL1) Value

To Change Alarm Setting:
1. Hold down the SET button until the top display shows AL1
2. Press the <</AT button once and release
3. Continue pressing & releasing the <</AT button until the digit you want to change is flashing
4. Change that digit's value by pressing the green UP or green DOWN button
5. Press & release the <</AT button until the next digit you want to change is flashing
6. Change that digit's value by pressing the green UP or green DOWN button
7. Press the SET button when you are done.

Section 7 Maintenance

7.1 Maintenance

Other than fuse replacement, this product has been designed to be maintenance free during its life time. Periodic inspection should take place to insure that the following has not occurred during use:

- Insure the unit is still mounted securely and has not become loose due to vibration.
- With power removed Insure all wiring connection are still tight and well insulated.
- Insure the unit is free of moisture, grease, dirt or any other foreign material.

If the outside of this product has become soiled, it may be wiped clean with a lightly damp cloth. Allow the unit to air dry for a least 48 hours after cleaning before use. Only clean the unit when unglued and all power is disconnected.

********** **Warning** **********

Never attempt maintenance on this product without first disconnecting power.

7.2 Fuse Replacement

The fuse holder on the rear panel provides over current protection. To replace the fuse un-screw the cap in a counter-clockwise direction. See the "Specifications" section of this manual for proper fuse size and capacity.

********** **Warning** **********

Always use the same size and capacity fuse as what's specified here in this manual.

7.3 Trouble Shooting

This table is provided to aid in troubleshooting any problem you might be having with your unit. Please contact us before attempting to open and service your unit yourself. Attempting to open and perform service on your unit during the warranty period may void your warranty.

Failure/Indication	Probable Cause	Action
Unit does power up, display is dead.	1. Check to make sure the power cord is plugged in and the outlet used is working. 2. Check the fuse to make sure the fuse has not blown.	If the power cord is connected and the fuse is good please contact us to arrange service.
Unit does not read correctly, temperature readings are off.	1. Check to make sure your unit is still set for the sensor type programmed by the factory. 2. Check to make sure you are using the correct connector and sensor type for the model you purchased.	If the unit is set correctly and you are using the correct sensor type please contact us to arrange service.
Unit does not control temperature correctly	1. Check to make sure your unit is still set for the sensor type programmed by the factory. 2. Check to make sure you are using the correct connector and sensor type for the model you purchased. 3. Check to see that you have a good thermal connection between your sensor and the material being heated.	If the unit is set correctly, you are using the correct sensor type and you have a good thermal connection between the sensor and material being heated please contact us to arrange service.

Please note: A service charge will required for any product returned for service that is found to be operating correctly. Please call us to help determine if your unit is defective.

Section 8 Warranty & Liability

8.1 Warranty/Product Returns

All Product orders are subject to written acceptance by Company by a duly authorized agent of Company. This product is covered by a Limited Warranty for a period of 5 years from the date of purchase which applies to defective Products only. COMPANY EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES OF ANY KIND, WHETHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Company will only accept the return of defective Products. Such returns must be pre-approved by Company in writing and an RMA (Return Material Authorization) number must be issued by Company before Company will accept such return. Return shipments not pre-approved by Company will be refused. Company will inspect pre-approved returns to determine whether they are defective, which determination by Company is final. Products must be returned in the same or equivalent container and packaging materials in which they were originally shipped. Customer retains title to any Products returned. Return freight cost is the responsibility of Customer. If Company determines a Product is defective, it may repair or replace the defective Product.

8.2 Limitation of liability

COMPANY'S LIABILITY ON ANY CLAIM OF ANY KIND, INCLUDING NEGLIGENCE, FOR ANY LOSS OR DAMAGE ARISING OUT OF, CONNECTED WITH, OR RESULTING FROM THE MANUFACTURE, SALE, DELIVERY, RESALE, REPAIR OR USE OF ANY PRODUCTS COVERED BY OR FURNISHED HEREUNDER, SHALL IN NO CASE EXCEED THE LESSER OF THE COST OF REPAIRING OR REPLACING PRODUCTS FAILING TO CONFORM TO THE WARRANTIES CONTAINED HEREIN, IF ANY, OR THE PRICE OF THE PRODUCTS OR PART THEREOF WHICH GIVES RISE TO THE CLAIM. IN NO EVENT WILL COMPANY BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL OR CONTINGENT DAMAGES, INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF PROFITS, GOODWILL, USE OR OTHER INTANGIBLE LOSS (EVEN IF COMPANY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES), RESULTING FROM: (I) THE USE OR THE INABILITY TO USE PRODUCTS PURCHASED FROM COMPANY; (II) THE COST OF PROCUREMENT OF SUBSTITUTE PRODUCTS RESULTING FROM ANY PRODUCTS PURCHASED OR OBTAINED FROM COMPANY; OR (III) ANY OTHER MATTER RELATING TO PRODUCTS PURCHASED FROM COMPANY.

Additional "Terms & Conditions" apply. Please visit www.imagineinstruments.com to read the complete Imagine Instruments LLC "Terms & Conditions" statement.

Section 9 Repair & Service

9.1 Repair / Service

A RMA (Return Merchandise Authorization) number must be obtained before the product is returned to us. Please call us to obtain an RMA number. Any product received without a RMA will be returned to the customer. The cost and method of shipping the product back to us is the sole responsibility of the customer. We recommend a track-able form of shipping to guarantee your package arrives to us. If a package is sent without proof of delivery, Imagine Instruments LLC is not responsible for proving receipt of the package.

All products come with a minimum one year warranty unless otherwise noted on the products data sheet. Warranty replacements must have an RMA issued and be returned to imagine Instruments LLC prior to us sending the replacement. The return cost of insurance and shipping is the sole responsibility of the customer. Imagine Instruments LLC will pay for the return shipping of the replacement and chooses the method of delivery.

After receiving your RMA number, please ship your unit to the Product Return address listed in section 9.2 below. Make sure you write the RMA number on the mailing label.

9.2 Contact Information

General Mail:
Imagine Instruments LLC
4500 Williams Drive
Ste 212-318
Georgetown, TX 78633

Product Returns:
Imagine Instruments LLC
21 County Road 200
Building A
Liberty Hill, TX 78642

Phone Numbers:
Local: (512) 778-6850
Toll Free: (855) 574-6243

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General Information – info@imagineinstruments.com
Sales Department – sales@imagineinstruments.com
Customer Service: help@imagineinstruments.com