



SERIES OTC25-N/L/P

TEMPERATURE
CONTROLLER



Instruction Manual

Introduction

Congratulations on your purchase of an Athena Series OTC25 Digital Temperature Controller. It is designed for ease of use and reliability wherever accurate temperature control is required.

After following the instructions for installation, simply step through and set each of the unit's parameters using the OTC25's easy menu system.

If you still have questions or require any assistance in setting up or operating your controller, please contact your Athena representative or call 1-800-782-6776.

Features

- Type J Input (OTC25 N, OTC25 L)
- Type J or K Input (OTC25 P)
- $\pm 0.3\%$ FS Accuracy
- Large, Easy-to-Read LED Display, Selectable for Either Setpoint or Process Temperature
- Adjustable Output Hysteresis to Prevent Rapid Cycling Around Setpoint Temperature (OTC25 N)
- Adjustable Deviation Alarm Flashes Display When Measured Temperature Exceeds or Falls Below Setpoint Temperature
- NEMA 4X Front Bezel, Splash-Proof and Resistant to Dust
- Discrete Status Indicators Illuminate When Temperature Display, Setpoint Display or Heat/Cool Output is Active
- Approvals: UR, cUR, CE

Safety Warning

In addition to presenting a potential fire hazard, high voltage and high temperature can damage equipment and cause severe injury or death. When installing or using this instrument, follow all instructions carefully and use approved safety controls. Electrical connections and wiring should be performed only by suitably trained personnel.

Do not locate this instrument where it is subject to excessive shock, vibration, dirt, moisture, oil, or other liquids. The safe operating temperature range for this unit is 32° F to 140° F (0° C to 60° C).

Table of Contents

Installation	1
Mounting	2
Wiring	3
Operation	4
OTC25 N On/Off Controller	6
OTC25 L Limit Controller	10
OTC25 P PID Controller	13
Calibration	18
Error Codes	20
IEC Requirements	21
Warranty/Repair Information	22
Technical Specifications	25

Installation

Pre-Installation Instructions

1. Inspect shipping carton for obvious signs of mishandling.
2. After removing the controller from the shipping carton, inspect it carefully for damage. Never attempt to install and use a damaged unit.
3. Verify that the ordering code number indicated on the side of the controller matches what was ordered.

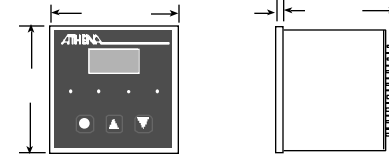
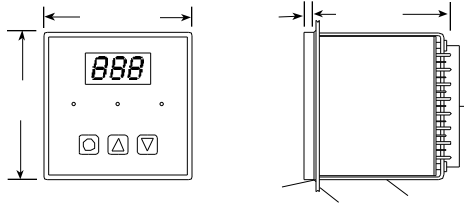


Figure 1. Case Dimensions

Prior to mounting the OTC25 in your panel, make sure that the cutout opening is of the right size, 3.622" x 3.622" (92 mm x 92 mm), and deburred to enable a smooth fit. A minimum of 5.0" (127.0 mm) of depth behind the panel is required.

Mounting

Figure 2. Mounting Diagram



Before installing OTC25, ensure gasket seats evenly around edges of unit and that there are no breaks or tears in the gasket.

Insert the OTC25 through the front panel cutout, slide mounting "U" bracket around unit and secure it with the screws provided.

Gasket should be evenly compressed around all sides to provide liquid-tight mounting.

Wiring

IMPORTANT: All electrical wiring connections should be made only by trained personnel using Class 1 wiring, and in strict accordance with the National Electrical Code and local regulations. Both of the incoming power lines should be fused with 2AG, 0.5 A maximum rated fuses.

The OTC25 controller has built-in circuitry to reduce the effects of electrical noise (RFI) from various sources; however, power and signal wires should always be kept separate. We recommend separating wires into one bundle for power (from line power and output) and one bundle for signal (from thermocouple).

The OTC25 power supply accepts 100 through 250 Vac and 120 through 250 Vdc line power without any switch settings or polarity considerations.

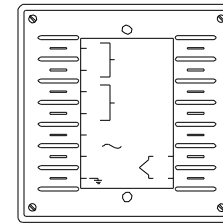


Figure 3. Wiring Connections

Operation

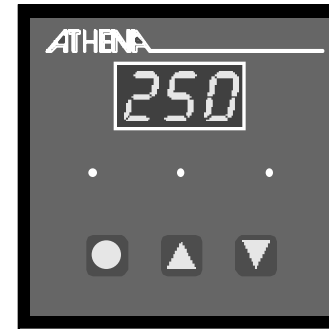
Athena Series OTC25 Digital Temperature Controller

Just a few easy steps are required before your OTC25 can be placed into service. After completing the mounting and wiring procedures as previously instructed, set each controller parameter using the simple front-panel keys as instructed.

Power On




When power is first applied to the OTC25, all segments of the LED display, as well as the discrete indicators, will be momentarily illuminated while the instrument goes through a series of diagnostic checks to verify proper operation of the unit. A software version will then be displayed, e.g., **0.11**. The last two digits of this code indicate the software revision supplied with your controller. Please provide this revision number when contacting us regarding your unit. This display is followed by a mnemonic code representing the OTC25 model type.

Operation



Three-Digit LED Display
Displays measured temperature, setpoint, or parameter labels and settings.

Figure 4. Front Panel Controls and Indicators

-  **Parameter Key**
Used to access available parameters to set or change values.
-  **Raise Key**
Used to scroll up through available parameter settings or to increase values. (Hold for fast-step progression)
-  **Lower Key**
Used to scroll down through available parameter settings or to decrease values. (Hold for fast-step progression)

Discrete LED Indicators

<u>OTC25 N</u>	<u>OTC25 L</u>	<u>OTC25 P</u>
Actual: amber	Actual: amber	Actual: amber
Setpoint: amber	Setpoint: amber	Setpoint: amber
Heat: orange	Limit: orange	Output 1: orange
		Output 2: orange

OTC25 N Operation

The Calibration High and Calibration Low selections are accessible only when the calibration jumper is installed as instructed on page 18 (Figure 6).

OTC25 N On/Off Temperature Controller

Normal Operation

The factory default display setting of the OTC25 N is for Actual Temperature **ACT**. The default display may be changed to setpoint temperature by selecting Setpoint **SP** at the Default Display **DEF** parameter selection. When the Default Display is changed to Setpoint, the setpoint temperature may be adjusted by using the Raise ▲ or Lower ▼ keys. The setpoint is adjustable from 32 to 905° F (0 to 485° C).

When the Default Display setting is "Actual" **ACT**, adjustment of the Setpoint may only be accomplished by pressing the Parameter ● Key momentarily to switch the display to Setpoint, and then using the Raise ▲ or Lower ▼ Keys to change the Setpoint Value. The display will automatically revert back to "Actual" five seconds after the last keypress.

Parameter Configuration

Your OTC25 N controller's parameter selections are explained on the next page, with default settings shown in Figure 5a. To enter the configuration menu, press and hold the Parameter key ● for 10 seconds until the display changes to the parameter mode. Press the Parameter key again to index through the available parameters. Pressing the Parameter Key for 3 seconds or allowing 60 seconds of inactivity will cause the OTC25 N to exit the menu system and return to normal operating mode.

OTC25 N Operation

Max	Range	Unit	SP	DEF	ACT	ACT
			SP	ACT	ACT	ACT
			445		0	2
			OFF		0	0
			912		20	11
			Unit		F	
			FLU		32	4
			CH1		959	515

Figure 5a. Series OTC25 N Parameters and Default Settings

Parameter Descriptions

Default Display **DEF**

This parameter determines whether the OTC25 N's display shows the Setpoint or the actual temperature by default. Regardless of the selection made here, the operator can

OTC25 N Operation

observe the other value by momentarily pressing the Parameter ● Key. This will cause the alternate value to be displayed for five seconds.

Control Hysteresis **HYS**

Control Hysteresis is adjustable between 2 and 252° F (1 to 140° C). This parameter is used by the control algorithm to prevent rapid cycling of the output around Setpoint. The default value is 4° F (2° C). This means the heat will turn OFF when the Actual Temperature exceeds the Setpoint by 2° F (1° C). Conversely, the heater will not turn ON until the Actual Temperature drops 2° F (1° C) below the Setpoint.

Display Offset **OFF**

Display Offset is adjustable from -126 to 126° F (-70 to 70° C). It can be used to provide limited adjustment of the displayed temperature as a compensation for offsets between the true temperature and the temperature seen by the thermocouple.

OTC25 N Operation

Deviation Band Alarm **RLr**

A Deviation Band is a pre-set number of degrees, plus and minus, around the Setpoint Value, ex. $\pm 10^{\circ}$ F. A Deviation Band Alarm provides an indication to the operator that the Actual Temperature has either exceeded or dropped below the chosen deviation. This parameter can be turned off **OFF** or adjusted from 1 to 252° F (1 to 140° C). When the process variable is outside the deviation band, the alarm is indicated by flashing the display (regardless of whether setpoint or actual temperature is displayed) and the optional alarm output is activated.

Display Units **Unit**

This allows the operator to have the display indicate either degrees Fahrenheit or degrees Celsius.

OTC25 L Operation

Limit Setpoint **LSP**

The Limit Setpoint determines the temperature at which the limit output will become inactive, interrupting power to the process. It is operator-selectable from 32° to 905° F (0° to 485° C).

Automatic Startup Reset **ASr**

The automatic startup reset feature allows the limit output to be automatically reset at startup or to be latched at startup. In the latter condition, the limit output will have to be manually reset before the limit output will be activated (relay closed allowing power to flow to process heaters or coolers).

Display Units **UnE**

This allows the operator to have the display indicate either degrees Fahrenheit or degrees Celsius.

OTC25 P Operation

OTC25 P PID Temperature Controller

Normal Operation

The factory default display setting of the OTC25 P is for Actual Temperature **ACT**. The default display may be changed to setpoint temperature by selecting Setpoint **SP** at the Default Display **DEF** parameter selection. When the Default Display is changed to Setpoint, the setpoint temperature may be adjusted by using the Raise **▲** or Lower **▼** keys. The setpoint is adjustable from 0 to 999° F (-17 to 537° C).

When the Default Display setting is "Actual" **ACT**, adjustment of the Setpoint may only be accomplished by pressing the Parameter **●** Key momentarily to switch the display to Setpoint, and then using the Raise **▲** or Lower **▼** Keys to change the Setpoint Value. The display will automatically revert back to "Actual" five seconds after the last keypress.

Parameter Configuration

Your OTC25 P controller's parameter selections are explained on the next page, with default settings shown in Figure 5c. To enter the configuration menu, press and hold the Parameter key **●** for 10 seconds until the display changes to the parameter mode. Press the Parameter key again to index through the available parameters. Pressing the Parameter Key for 3 seconds or allowing 60 seconds of inactivity will cause the OTC25 P to exit the menu system and return to normal operating mode.

Param	Range	Unit	Set	SP	ACT	ACT
Def			DEF	SP	ACT	ACT
Off			OFF		0	0
Phd			Phd		OFF	OFF
HL			HL		0	0
r5b			r5b		0	0
CEH			CEH		0	0
CEC			CEC		0	0
ALr			ALr		OFF	OFF
DEC			DEC	PI d	PI d	PI d
Unit			Unit	F		
Int			Int	CH		

chart continued on next page

			CLD		32	0
			CH		959	519
					986	530

Figure 5c. Series OTC25 P Parameters and Default Settings

Parameter Descriptions

Default Display **DEF**

This parameter determines whether the OTC25 P's display shows the Setpoint or the actual temperature by default. Regardless of the selection made here, the operator can observe the other value by momentarily pressing the Parameter ● Key. This will cause the alternate value to be displayed for five seconds.

Display Offset **OFF**

Display Offset is adjustable from -126 to 126° F (-70 to 70° C). It can be used to provide limited adjustment of the displayed

OTC25 P Operation

temperature as a compensation for offsets between the true temperature and the temperature seen by the thermocouple.

Proportional Band **Pbd**

Proportional Band is a PID parameter that represents the amount of deviation of the controlled variable required to move through the full range, expressed in % of span or degrees of temperature. This parameter can also be expressed as "Gain" (the wider the band, the lower the gain).

Rate **rRE**

Rate is a PID parameter (Derivative Action) that produces a corrective signal proportional to the rate at which the controlled variable is changing. It is used to correct for overshoot and undershoot.

Reset **rSE**

Reset is a PID parameter (Integral Action) that produces a corrective signal proportional to the length of time and magnitude that the controlled variable has been off setpoint. It is used to accommodate load changes.

Heat Cycle Time **EtH**

Heat Cycle Time is displayed in seconds, and can be set from 0 to 120 seconds. A setting of zero represents a heat cycle time of 300 milliseconds.

Cool Cycle Time **EtC**

Cool Cycle Time is displayed in seconds, and can be set from

OTC25 P Operation

0 to 120 seconds. A setting of zero represents a cool cycle time of 300 milliseconds. This menu parameter will only be displayed if output 2 is configured to be a cool output.

Deviation Band Alarm **RLr**

A Deviation Band is a pre-set number of degrees, plus and minus, around the Setpoint Value, ex. $\pm 10^{\circ}$ F. A Deviation Band Alarm provides an indication to the operator that the actual temperature has either exceeded or dropped below the chosen deviation. This parameter can be turned off **OFF** or adjusted from 1 to 252° F (1 to 140° C). When the process variable is outside the deviation band, the alarm is indicated by flashing the display (regardless of whether setpoint or actual temperature is displayed and activating an output, if configured as such).

Output 2 Configuration **O2C**

Output 2 may be configured as either a control output or as an alarm output for the deviation band alarm. When configured for control, output 2 acts as a cool PID output. When configured for an alarm, output 2 is activated when the deviation alarm is active and deactivated when the deviation alarm is inactive.

Display Units **Unit**

This allows the operator to have the display indicate either degrees Fahrenheit or degrees Celsius.

Input Type **Int**

Sensor input type may be either a Type J or Type K thermocouple.

Calibration

The Calibration High and Calibration Low selections are accessible only when the calibration jumper is installed (Figure 6).

Calibration **CLO**, **CHI**

Calibration of the OTC25 controller requires the operator to apply two separate fixed and specific signals (Calibration Low and Calibration High) from a reference source (thermocouple calibrator) to the controller. The Raise ▲ Key “tells” the controller to read the applied signal and use it as a reference point.



Figure 6. Location of Calibration Jumper.

Calibration



Calibration Procedure

1. Prior to applying power to the unit, install the calibration jumper on the microprocessor board as shown in Figure 6.
2. With the instrument still unpowered, connect a calibration reference source to the thermocouple input terminals on the OTC25.
3. Apply power. Allow at least 15 minutes for the controller to warm up before continuing.
4. Using the Parameter ● Key, index to the Calibration Low **CLO** parameter. The display will alternately flash this mnemonic and the number “32” (“0” for Celsius units).
5. Adjust the reference source to output a voltage equivalent to that generated by a “J” or “K” (OTC25 P) thermocouple at 32° F (0° C). Allow reference to settle for 10 seconds before proceeding.
6. Press the Raise key ▲ once to set this reference point. The display will stop flashing momentarily while the controller self-calibrates (approx. 3 seconds), and then resume flashing.
7. Press the Parameter ● Key, index to the Calibration High **CHI** parameter. The display will alternately flash this mnemonic and the temperature value it expects to see.

Calibration

8. Adjust the reference source to output a voltage equivalent to that generated by a "J" or "K" (OTC25 P) thermocouple at the temperature flashing on the display. (Allow reference to settle for 10 seconds before proceeding.)
9. Repeat Step 6 for this reference point.
10. Press the Parameter ● Key for 10 seconds or allow 60 seconds of inactivity.
11. Adjust the reference source to output a voltage equivalent to that generated by a "J" or "K" (OTC25 P) thermocouple at 32° F (0° C). Verify that (after settling), the OTC25 indicates a measured temperature of 32° F (0° C).
12. Repeat Step 11 for the upper reference point.

Error Codes

Display	Problem	Possible Solution
	Broken thermocouple lead wire or defective sensor.	Verify wiring. Replace sensor.
	Input Signal is below calibration of unit.	Verify Input Signal; check calibration.

IEC Requirements



USE OF THIS EQUIPMENT IN A MANNER NOT SPECIFIED BY THE MANUFACTURER MAY IMPAIR PROTECTION PROVIDED BY THE EQUIPMENT!

The maximum supply current is line voltage dependent:

60 mA for an 100-250 Vac input fuse rating: 2AG, 0.5 A

Output Specifications

Output 1 Type	Max current	Voltage	Leakage
T (Triac)	2 A	400 Vpk	1 mA
B (Relay)	5 A	380 V	—

Output 2 Type	Max current	Voltage	Leakage
T (SSR)	0.5 A	400 Vpk	1 mA
B (Relay)	5 A	380 V	—

CLEANING INSTRUCTIONS

1. Remove power from the unit prior to any cleaning operation.
2. Use a cotton cloth to gently and sparingly apply isopropyl alcohol only. Do not use cleaners or other solvents as they may damage the unit.
3. Allow the unit to dry completely prior to reapplying power.

Warranty/Repair Information

Two-Year Limited Warranty

THIS EQUIPMENT IS WARRANTED TO BE FREE FROM DEFECTS OF MATERIAL AND WORKMANSHIP. IT IS SOLD SUBJECT TO OUR MUTUAL AGREEMENT THAT THE LIABILITY OF ATHENA CONTROLS, INCORPORATED IS TO REPLACE OR REPAIR THIS EQUIPMENT AT ITS FACTORY, PROVIDED THAT IT IS RETURNED WITH TRANSPORTATION PREPAID WITHIN TWO (2) YEARS OF ITS PURCHASE.

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Warranty/Repair Information

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Warranty/Repair Information

Unit Repairs

It is recommended that units requiring service be returned to an authorized service center. Before a controller is returned for service, please consult the service center nearest you. In many cases, the problem can be cleared up over the telephone. When the unit needs to be returned, the service center will ask for a detailed explanation of problems encountered and a Purchase Order to cover any charge. This information should also be put in the box with the unit. This should expedite return of the unit to you.

This document is based on information available at the time of its publication. While efforts have been made to render accuracy to its content, the information contained herein does not purport to cover all details or variations in hardware, nor to provide for every possible contingency in connection with the installation and maintenance. Features may be described herein which are not present in all hardware. Athena Controls assumes no obligation of notice to holders of this document with respect to changes subsequently made.

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Technical Specifications

Operating Limits	
Ambient Temperature	32° F to 140° F (0° C to 60° C)
Relative Humidity	
Tolerance	20% to 95%, Non-Condensing
Power	85 to 250 V \pm 10%, 50/60 Hz (Single-Phase) 120 to 250 Vdc
Sensor Range	
Type J Thermocouple	OTC25 N/L: 6 to 926° F (-14 to 496° C) OTC25 P: 32 to 999° F (0 to 537° C)
Type K Thermocouple	OTC25 P: 0 to 999° F (-17 to 537° C)
Performance	
Accuracy	\pm 0.3% of Full Scale (\pm 0.10% Typical), \pm 1 Digit
Setpoint Resolution	1° F/C
Repeatability	\pm 1 Count
Temperature Stability	5 μ V /° C (Maximum)
TC Cold-End Tracking	0.05° C /° C Ambient
Noise Rejection	100 dB Common Mode, 70 dB Series Mode
Temperature Sampling	3.7 Hz (270 ms)
Control Characteristics	
Control Hysteresis	2 to 252° F (1 to 140° C)
Display Offset	-126 to 126° F (-70 to 70° C)

Technical Specifications

Mechanical Characteristics

Display	7-segment LED, alphanumeric: 3 digits
Display Height	0.56" (14.22 mm)
Color	Orange
Front-Panel Cutout	3.622" x 3.622" (92 mm x 92 mm)
Bezel Outside Dimensions	3.780" x 3.780" (96 mm x 96 mm)
Bezel Height	0.250" (6.35 mm)
Case Depth	3.515" (89.28 mm)
Weight	< 15 oz (425 g)
Connections	7
Contacts	"Fast-On" .250" (6.35 mm)

Input Source (Temperature Sensor)

		Thermocouple Range:
Type J	OTC25 N/L:	6 to 926° F (-14 to 496° C)
	OTC25 P:	32 to 999° F (0 to 537° C)
Type K	OTC25 N/L:	N/A
	OTC25 P:	0 to 999° F (-17 to 537° C)

Technical Specifications

Output Source (Power to Heater)

Solid-State Relay (Output 1)	120/250 Vac, Zero-Voltage Switched, 2 A Continuous/ 10 A Surge @ 25° C
Solid-State Relay (Output 2)	120/250 Vac, Zero-Voltage Switched, 0.5 A Continuous/ 10 A Surge @ 25° C
Electromechanical Relay	5 A, 250 Vac/5 A, 30 Vdc Max Switching Capacity, 150 W

*For Technical Assistance in the U.S.,
Call Toll Free: 1-800-782-6776*



CORPORATE HEADQUARTERS

Athena Controls, Inc.
5145 Campus Drive
Plymouth Meeting, PA 19462 U.S.A.
Tel: (610) 828-2490
Fax: (610) 828-7084
Toll-Free in U.S.: 1-800-782-6776
Internet: www.athenacontrols.com

EUROPE

Athena Controls, Ltd.
Capitol Business Centre
60 Bramhall Lane South
Bramhall, Stockport
Cheshire, SK7 2DU, England
Tel: +44 (0) 161 440 2522
Fax: +44 (0) 161 440 9322
E-mail: AthenaUK@aol.com