

# 1600

## Model 1603 1/16 DIN Temperature Controller

- Dual 3-Digit Display of Process and Setpoint
- SMART Self-Tuning with Fuzzy Logic
- NEMA 4X Faceplate
- Heat/Cool Control Capability
- Soft Start Power Limiting on Power-Up
- Universal Inputs TC, RTD
- Switching Power Supply from 100 to 240V, 50/60 Hz
- IEC 801-4 Noise Immunity
- CSA Pending
- 3-Year Warranty



# Chromalox®

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### Description

The fully field configurable Chromalox model 1603 1/16 DIN controller combines advanced hardware design and sophisticated electronic control technology into a compact, reliable 1/16 DIN package.

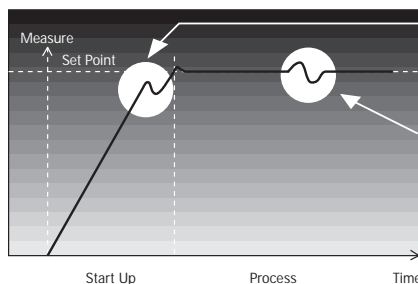
### Easy to Install and Operate

The 1603 plug-in design requires only panel cutout, instrument mounting, setpoint and alarm setpoint adjustment to set up.

### SMART Self-Tuning

The model 1603 meets the application needs of operators with or without skills in temperature processes and PID control. SMART self-tuning automatically adjusts the controller to rapidly respond to all process changes. Sophisticated control features include:

- Start-up and continuous in-process tuning
- Continuous self-tuning without artificial upset
- Proprietary control algorithm using fuzzy logic/artificial intelligence concepts
- Proven maximum suppression of overshoot



### Special Control Features

- Heat/Cool Control Features Selection of Cooling Medium and Overlap
- Soft Start-Timed Output Power Limit on Start-Up
- Control Output "Turn Off" Via Pushbuttons
- Programmable offset of Process Temperature

### Applications

- Rubber production, polymerization and synthetic fibers plants
- Packaging and packing equipment
- Extrusion lines, coextrusion lines, plastic films and injection presses
- Fermentation equipment, reactors for chemical and pharmaceutical industries
- Food industries
- Environmental chambers and refrigeration

### During Start-Up

the SMART self-tuning function calculates the control parameters to optimize the rise to setpoint.

### During Process

SMART updates the control parameters as needed to respond to setpoint changes or a load change.



# 1603 Temperature Controller

## ISO 9001 Certified

### Quality Construction and Reliability

Manufactured with SMT and verified with long burn-in times and temperature cycling, the 1603 is guaranteed for reliability and long, maintenance-free service.

### Lower Display (3 Orange 7-Segment LEDs)

For set point value. During configuration, shows the code of the selected parameter.

**Indicators** Red LEDs  
**ALM** Alarm condition exists  
**OUT** Load output is on

**NEMA 4X Splashproof**  
Front Faceplate

**Upper Display**  
(3 Green 7-Segment LEDs)  
For process temperature. During configuration, shows the programmed value of selected parameter.

**Indicators** Red LEDs  
**SMART** SMART tuning is active

### Programming Security Levels

Access to programmed parameters is protected by 4 security levels:

- Level 1 Set point and SMART self-tuning
- Level 2 All control parameters and alarm setpoint
- Level 3 Main configuration level
- Level 4 Special functions configuration

### Large Target Pushbuttons Simplify Operator Adjustments



Enables SMART self-tuning. During configuration, scrolls back parameters without storing them.



Decrease/Increase Parameter Values



Scrolls parameter display forward and stores previous parameter value.

## Features

### Output Disable Function

Simple front panel operation to turn off control output.

- Applications where it is desirable to disconnect load power during set-up
- Applications that require temperature monitoring only, no control needed

### Programmable Advanced Alarm Functions for Each Alarm

- Alarm inhibit on power-up or setpoint change
- High, Low, Band or Deviation alarm modes
- Adjustable deadband
- Normally Energized/Normally De-Energized

### Soft Start on Power-Up

Allows you to program a "warm up period" to protect the process and avoid thermal shock on startup.

- Limits control output power 0 to 100%
- The limit is activated below a threshold setpoint temperature
- Program the soft start time interval 1 to 100 minutes or infinite

### Control Output Maximum Rate of Change

Slows the output signal response when process demands change significantly, avoiding overshoot and undershoot.

- Control output rate of change may be set from 1% to 10% per second

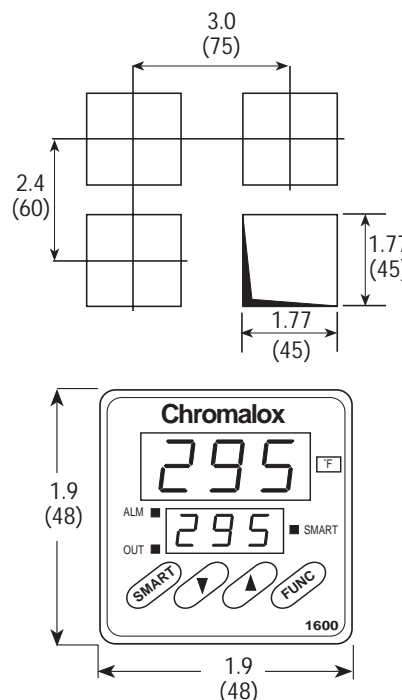
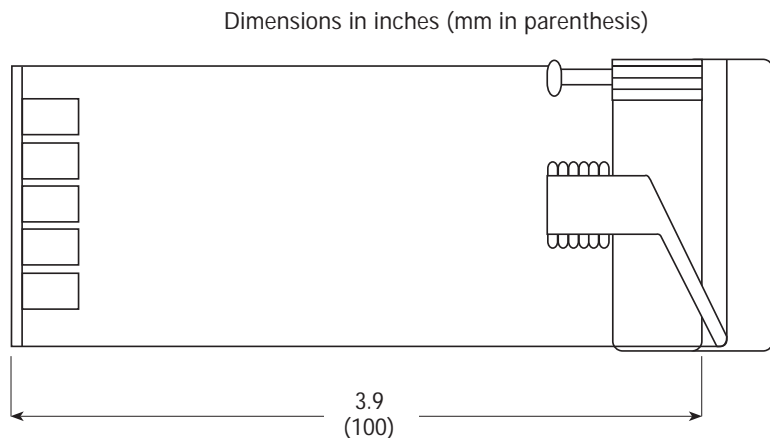
# 1603 Temperature Controller

## Specifications

<b>Control Modes</b> .....	Field Selectable	On/Off PID SMART		
<b>Control Adjustments</b> .....	Control Set Point	Instrument sensor range		
	Deadband	0.1 to 10.0% of sensor input range		
	Proportional Band	1.0 to 99.9% of sensor input range (1.5% to 99.9% if Heat/Cool control, 0.0% if On/Off control)		
	Automatic Reset/Integral	1.2 seconds to 20 minutes		
	Rate/Derivative	0 to 9 minutes, 59 seconds		
	Output Cycle Time	1 to 200 seconds		
<b>Heat/Cool Parameters</b> .....	Relative Gain	0.20 to 1.00 (Air, Water or Oil)		
	Overlap	-20 to 50% of Proportional Band		
<b>Outputs</b>				
Output #1 .....	One (1) Heat or Cool Output Relay	Normally open SPDT contact rated 3.0 Amps at 250 Vac (resistive load)		
	SSR Drive	Transistor output of 24 Vdc max at 1 mA, 14Vdc +/- 20% at 20 mA. Maximum load 700 ohms protected against accidental short circuit		
Output #2 .....	One (1) Cool or Alarm Output Relay	Normally open SPST contact rated 1.0 Amps at 250 Vac (resistive load)		
<b>Alarm Features</b>				
Alarm Functions .....	Field Selectable	Process Alarm Deviation Alarm Band Alarm		
Alarm Types .....	Field Selectable	High / Low for Process Alarm Outside / Inside for Band Alarm Inh bit on Power-Up and Set Point Changes		
Relay Action (Programmable) .....	Normally energized or normally de-energized			
Alarm Deadband .....	0.1 to 10.0% of instrument sensor range			
<b>Input Specifications</b>				
Sensor Type	Range*	Accuracy (@ 25°C)		
	°F	°C		
Thermocouple	J	0 to 999	0 to 800	±0.3% of sensor span
	K	0 to 999	0 to 999	±0.3% of sensor span
	L	0 to 999	0 to 800	±0.3% of sensor span
	N	0 to 999	0 to 999	±0.3% of sensor span
RTD	100 ohm Pt	-	-19.9 to 99.9	±0.3% of sensor span
	100 ohm Pt	-199 to 999	-199 to 500	±0.3% of sensor span
*Field Programmable for °C or °F				
Line Impedance .....	100 ohms maximum for thermocouple input. Less than 20 ohms per wire for RTD input			
Input Sampling .....	500 milliseconds typical			
<b>Instrument Power</b> .....	100 to 240 Vac, +10%, -15%, 50 to 60 Hz, 24 Vac or Vdc 5 VA nominal power consumption			
<b>Operating Environment</b> .....	30 to 130°F (0 to 55°C) ambient temperature with relative humidity from 20% to 85% non-condensing			
<b>Physical Specifications</b> .....	1/16 DIN, 1.89 x 1.89 inches (48mm x 48mm), 3.9 inches deep (100mm) Panel cutout 1.77 x 1.77 inches (45mm x 45mm), 0.5 lbs. (200 grams)			

# 1603 Temperature Controller

## Dimensions



## Ordering Information

### Model 1/16 DIN Temperature Controller

1603 SMART Self-Tuning, 2 Outputs (Heat/Cool or Control/Alarm), Dual 3-Digit Display of Process and Setpoint, Field Selectable Universal Thermocouple or RTD Inputs, Programmable Alarms, IEC 801-4 Noise Immunity, NEMA 4X Splashproof Faceplate.

#### Code Output 1 - Heat or Cool

- 1 Relay, 3 Amps at 250 Vac (Resistive)
- 6 SSR Drive, 14 Vdc at 20 mA

#### Code Output 2 - Cool or Alarm

- 1 Relay, 1 Amp at 250 Vac (Resistive Load)

#### Code

- 0 Add to Complete Model Number

#### Code Power Supply

- 3 100 to 240 Vac
- 5 24 Vac/dc

#### Code

- 0 Add to complete model number

1603 - 6 1 0 3 0 Typical Model Number