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1604

Model 1604 mA 1/16 DIN Temperature Controller

PDS
1604 mA

- 4 - 20 or 0 - 20 mA Linear Control Output or Process/Setpoint Retransmit
- SMART Self-Tuning with Fuzzy Logic
- Heat/Cool Control
- Universal Inputs: RTD, TC, Voltage and Current
- Two Independent Programmable Alarms
- Soft-Start Power Limiting on Power Up
- Two Independent Setpoints Switched by Dry Contact Input

ISO 9001
APPROVED • CERT. NO. A3164

Chromalox®

Telephone: 615-793-3900 • FAX: 615-793-3563

Description

The 1604 mA builds on all of the advanced hardware design and sophisticated electronic control features of the 1604. The flexible 0-20 or 4-20 mA output signal can be a control output, or a retransmitted process value or set point. The two additional relay outputs, in addition to being used as alarm outputs, can also be configured as heating or cooling control outputs.

SMART Self-Tuning

The SMART self-tuning algorithm allows the controller to self-adjust automatically and rapidly to all process changes - load changes, setpoint changes and more.

SMART control features include:

- *Start-up and continuous in-process tuning.*
- *Continuous self-tuning without artificial upset.*
- *Proven maximum suppression of overshoot.*

Control Features

Control Parameters Configuration by front keyboard.

IP65 and NEMA 4X front faceplate.

2 Independent Relay Outputs can be programmed as Alarms or Control Outputs. The alarms are programmable as Process, Band or Deviation Alarms, with automatic or manual reset of the alarm condition. As control outputs the relays can be programmed for heating or cooling.

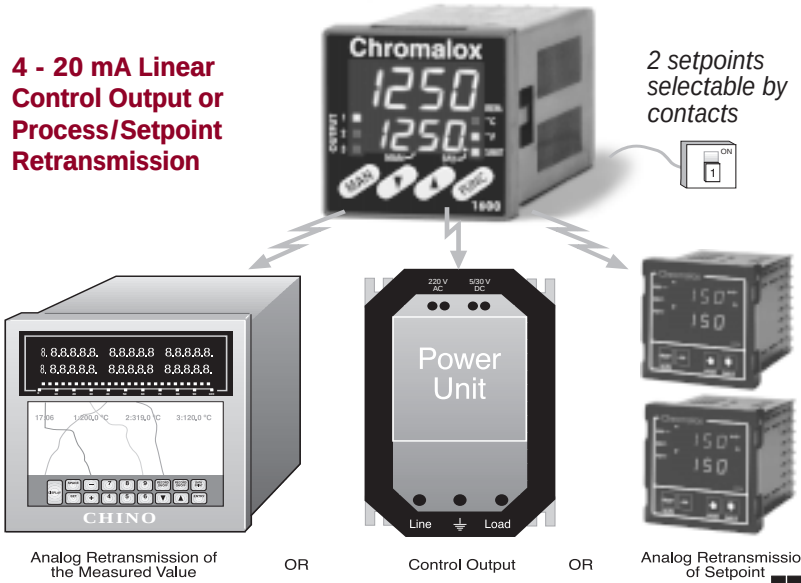
Alarm Inhibit during start up or after setpoint change.

Two Independent Ramps (up and down) for setpoint change.

Heat/Cool Control features include selection of cooling medium and overlap.

Output "Turn Off" function disables the control output and removes power from the controller load, allowing the 1604mA to continue monitoring the process even when the load is off.

4 - 20 mA Linear Control Output or Process/Setpoint Retransmission



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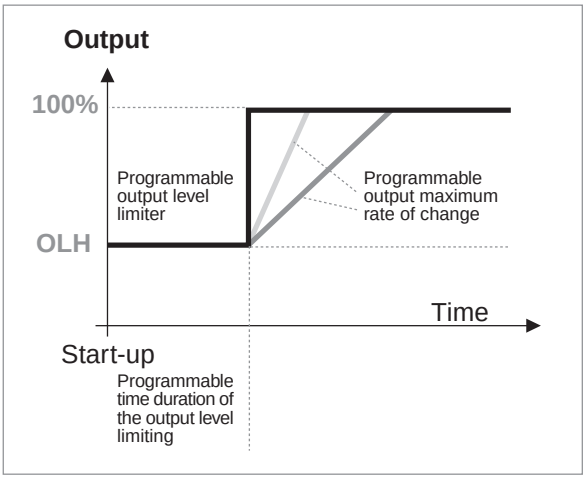
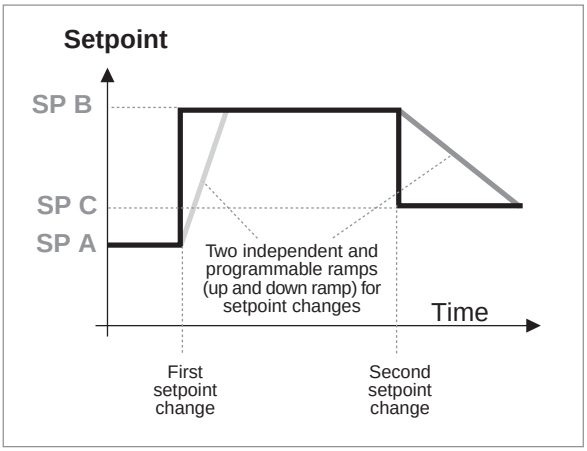
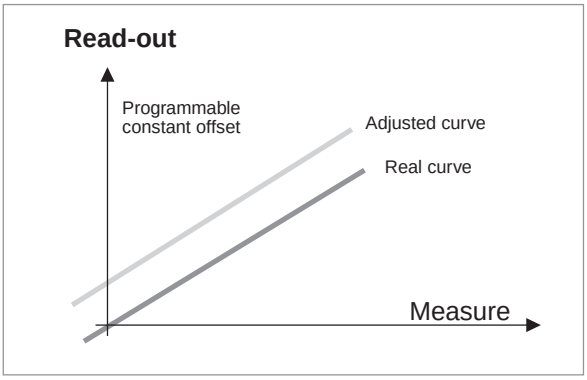
1604 mA Temperature Controller







Control Features

Soft Start function

This function preheats the controlled process gradually, increasing heater life and avoiding thermal shock.
When this function is enabled, the operator can program the power output to be used during preheating and its time duration.
The alarm inhibiting function assures that no false indications will occur during preheat.
Another feature of the 1604 mA is the ability to transform the soft start function in a continuous power output limiting function (infinite duration). This assures that the process will always operate safely.
In addition, the output power maximum rate of change may be programmed in order to avoid thermal shock during operation.

Two independent ramps (ramp up and ramp down) for set point changes

Some processes require a ramp to reach a new set point value and, when possible, with different rate of rise applicable to a higher or a lower new set point. For example, a process may need a fast heating period and a slow cooling period.
The 1604 mA allows the operator to program a ramp for increasing to a new set point value and a ramp for decreasing to a lower set point value.

***NOTE:** The two independent ramps can also be applied to the SP-SP2 transfer.*

OFFSET of the measured value

In many applications it is difficult to locate the sensor in the ideal position for temperature measurement and in some cases the sensor is located far away from the ideal position.
Incorrect sensor position may produce a measured value that is not a true representation of the process value.
The 1604 mA gives the operator the capability to program a constant offset in order to re-align the measured value with the value of the process.

Control Outputs

The 1604 mA is equipped with 3 independent outputs programmable as follows:

OUT 1 linear (mA)	OUT 2 relay	OUT 3 relay
Heating	AL1	AL2
Heating	Cooling	AL2
Heating	AL1	Cooling
Cooling	AL1	AL2
Cooling	Heating	AL2
Cooling	AL1	Heating
Retransm.	Heating	AL2
Retransm.	AL1	Heating
Retransm.	Cooling	AL2
Retransm.	AL1	Cooling
Retransm.	Heating	Cooling
Retransm.	Cooling	Heating
Retransm.	AL1	AL2

1604 mA Temperature Controller

Specifications

Control Modes ..... Field Selectable — On/Off, PID, SMART
Manual — Bumpless, Balanceless transfer with Proportional Control

Control Adjustments .....

Control Set Point	Instrument sensor range
Deadband	0.1 to 10.0% of sensor input range
Proportional Band	0.1% to 100.0% of span
Automatic Reset	20 seconds to 20 minutes
Integral Pre-Load	Programmable
Rate	0 to 10.00 minutes
Output Cycle Time	1 to 200 seconds

Heat/Cool Parameters .....

Relative Gain	0.20 to 1.00, select air, oil or water
Overlap	-20% to 50% of Proportional Band

Outputs

Output #1 ..... One (1) Heat, Cool or Retransmission of Process Value or Active Setpoint
0-20 mA or 4-20mA, Optoisolated, programmable

Output #2 ..... One (1) Heat, Cool or Alarm Output
Normally open SPST relay contact rated 2 Amps at 250 Vac (resistive load)

Output #3 ..... One (1) Heat, Cool or Alarm Output
One (1) SPST relay 2 Amps at 250 Vac (resistive load)

Alarm Features

Functions ..... Field Selectable — Process, Deviation or Band Alarm

Types ..... Field Selectable — High / Low for Process Alarm
Outside / Inside for Band Alarm
Inhibit on Start-up and Setpoint changes
Latching / Non-latching (Manual / Automatic Reset)
Normally Energized / Normally De-Energized

Alarm Deadband ..... 0.1 to 10.0% of instrument sensor range

Input Specifications

Sensor Type		*Range** ˚F	˚C	*Accuracy*
Thermocouple	J	0 to 1830	0 to 1000/0 to 400.0	0.2% of Sensor Span
	K	0 to 2190	0 to 1200/0 to 400.0	0.2% of Sensor Span
	L	0 to 1650	0 to 900	0.2% of Sensor Span
	N	0 to 2550	0 to 1400	0.2% of Sensor Span
	R	0 to 3200	0 to 1760	0.2% of Sensor Span
	S	0 to 3200	0 to 1760	0.2% of Sensor Span
	T	0 to 750	0 to 400.0	0.2% of Sensor Span
RTD	100 ohm Pt	-199.9 to 400.0	-199.9 to 400.0	0.2% of Sensor Span
	100 ohm Pt	-330 to 1470	-200 to 800	0.2% of Sensor Span
Current	0-20 mA or 4-20 mA, dc			} Range and decimal points programmable, -1999 to 4000
Voltage	0-5, 1-5, 0-10 or 2-10 Vdc, 0-60 or 12-60 mVdc			

*Field Programmable for ˚C or ˚F

Line Impedance ..... 100 ohms maximum for thermocouple input. Less than 4 ohms per wire for RTD input

Input Sampling ..... 500 milliseconds typical for TC/RTD input
250 milliseconds typical for Linear input

Instrument Power ..... 100 to 240 Vac, +10%, -15%, 50 to 60 Hz, 24 Vac or Vdc
5 VA nominal power consumption

Operating Environment ..... 30 to 120˚F (0 to 50˚C) ambient temperature with relative humidity from 20% to 85% non-condensing

Physical Specifications ..... 1/16 DIN, 1.9 x 1.9 inches (48mm x 48mm), 4.8 inches deep (122mm)
Panel cutout 1.77 x 1.77 inches (45mm x 45mm), 0.7 lbs. (300 grams)

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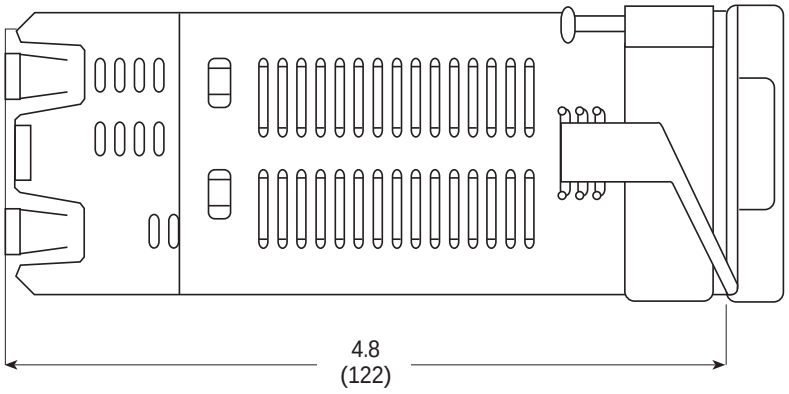
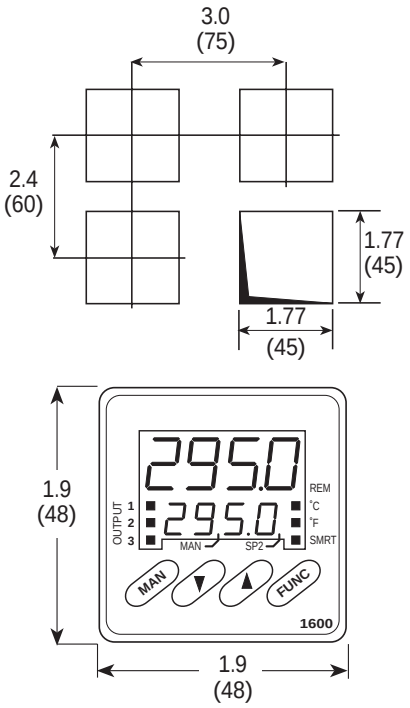
Dimensions

Dimensions in inches (mm in parenthesis)





Ordering Information

Model **1/16 DIN Temperature Controller**

1604 mA SMART Self-Tuning, 3 Outputs (Heat/Cool or Control/Alarm), Programmable Linear Output, Dual 4-Digit Display of Process and Setpoint, Field Selectable Universal Thermocouple, RTD, Voltage or Current Inputs, Auto-Manual Control, Programmable Alarms, 0.1 Degree Display Resolution, IEC 801-4 Noise Immunity, IP65 and NEMA 4X Splashproof Faceplate.

Code	Output 1 - Heat, Cool or Process/Setpoint Retransmit
7	0-20 mA or 4-20 mA (programmable), optoisolated

Code	Output 2 - Heat, Cool or Alarm
1	Relay, 2 Amps at 240 Vac

Code	Output 3 - Heat, Cool or Alarm
1	Relay, 2 Amps at 240 Vac (Resistive Load)

Code	Power Supply
3	100/240 Vac
5	24 Vac/dc

Code	
0	Add to complete model number

1604 - 7 1 1 3 0 Typical Model Number

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