Model 1601 1/16 DIN Temperature Controller

- 3-Digit Display
- SMART Self-Tuning with Fuzzy Logic
- NEMA 4X Faceplate
- 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
- 3-Year Warranty
- CSA Pending

Description
The fully field configurable Chromalox model 1601 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 1601 plug-in design requires only panel cutout, instrument mounting, setpoint and alarm setpoint adjustment to set up.

SMART Self-Tuning
The model 1601 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
- 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
- Fermentation equipment, reactors for chemical and pharmaceutical industries
- Food industries
- Environmental chambers and refrigeration

Measure
Set Point

Start Up Process Time

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.
ISO 9001 Certified
Quality Construction and Reliability
Manufactured with SMT and verified with long burn-in times and temperature cycling, the 1601 is guaranteed for reliability and long, maintenance-free service.

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

**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

**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
Specifications

**Control Modes**
- Field Selectable
  - On/Off
  - PID
  - SMART

**Control Adjustments**
- 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
- Automatic Reset/Integral
  - 1.2 seconds to 20 minutes
- Rate/Derivative
  - 0 to 9 minutes, 59 seconds
- Output Cycle Time
  - 1 to 200 seconds

**Outputs**
- Output #1
  - One (1) Heat or Cool Output
  - 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
  - Alarm Output
  - Normally open SPST contact rated 1.0 Amps at 250 Vac (resistive load)

**Alarm Features**
- Alarm Functions
  - Field Selectable
    - Process Alarm
    - Deviation Alarm
    - Band Alarm
- Alarm Types
  - Field Selectable
    - High / Low for Process Alarm
    - Outside / Inside for Band Alarm
    - Inhibit 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

**Input Specifications**

<table>
<thead>
<tr>
<th>Sensor Type</th>
<th>Range°F</th>
<th>Range°C</th>
<th>Accuracy(@ 25°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermocouple J</td>
<td>0 to 999</td>
<td>0 to 800</td>
<td>±0.3% of sensor span</td>
</tr>
<tr>
<td>K</td>
<td>0 to 999</td>
<td>0 to 999</td>
<td>±0.3% of sensor span</td>
</tr>
<tr>
<td>L</td>
<td>0 to 999</td>
<td>0 to 800</td>
<td>±0.3% of sensor span</td>
</tr>
<tr>
<td>N</td>
<td>0 to 999</td>
<td>0 to 999</td>
<td>±0.3% of sensor span</td>
</tr>
<tr>
<td>RTD 100 ohm Pt</td>
<td>19.9 to 99.9</td>
<td>±0.3% of sensor span</td>
<td></td>
</tr>
<tr>
<td>100 ohm Pt</td>
<td>-199 to 999</td>
<td>-199 to 500</td>
<td>±0.3% of sensor span</td>
</tr>
</tbody>
</table>

*Field Programmable for °C or °F

<table>
<thead>
<tr>
<th>Field Programmable for °C or °F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linear Impedance .................. 100 ohms maximum for thermocouple input. Less than 20 ohms per wire for RTD input</td>
</tr>
<tr>
<td>Input Sampling .................... 500 milliseconds typical</td>
</tr>
</tbody>
</table>

**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 130°F (0 to 55°C) ambient temperature with relative humidity from 20% to 85% non-condensing

**Physical Specifications**
- 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)
1601 Temperature Controller

Dimensions

Dimensions in inches (mm in parenthesis)

Ordering Information

Model 1/16 DIN Temperature Controller

1601 SMART Self-Tuning, 2 Outputs (Control/Alarm), 3-Digit Display, Field Selectable Universal Thermocouple or RTD Inputs, Programmable Alarms, IEC 801-4 Noise Immunity, NEMA 4X Faceplate.

<table>
<thead>
<tr>
<th>Code</th>
<th>Output 1 - Heat or Cool</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Relay, 3 Amps at 250 Vac (Resistive)</td>
</tr>
<tr>
<td>6</td>
<td>SSR Drive, 14 Vdc at 20 mA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Output 2 - Alarm</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Relay, 1 Amp at 250 Vac (Resistive Load)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Power Supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>100 to 240 Vac</td>
</tr>
<tr>
<td>5</td>
<td>24 Vac/dc</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Add to complete model number</th>
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<tbody>
<tr>
<td>0</td>
<td></td>
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</tbody>
</table>

1601 - 6 1 0 3 0 Typical Model Number