

1/16 DIN Autotune Temperature Controllers



CN63100-R1 shown smaller than actual size.

- ✓ PID Control With Reduced Overshoot
- ✓ On-Demand Auto-Tuning of PID Control Settings
- ✓ NEMA 4X (IP65) Bezel
- ✓ Dual LED Displays for Simultaneous Indication of Temperature and Setpoint
- ✓ Status Indicators for Outputs and Control Modes
- ✓ Thermocouple or RTD Inputs
- ✓ Optional Dual Alarm Inputs
- ✓ Optional Linear DC Output, Control or Retransmission (0 to 10V, 0/4 to 20 mA)
- ✓ Manual/Automatic Control Modes
- ✓ Setpoint Ramping For Process Startup
- ✓ Sensor Error Compensation (Offset) and Break Detection
- ✓ Heating and Optional Cooling Outputs
- ✓ Parameter Security Via Programmable Lockouts
- ✓ Field-Replaceable Output Board
- ✓ Optional RS485 Serial Communications

The CN63100 Series controller accepts signals from a variety of temperature sensors (thermocouple or RTD), precisely displays the process temperature, and provides an accurate output control signal (time proportional or linear DC) to maintain the process at the desired temperature. The controller comprehensive yet simple programming allows it to meet a wide variety of application requirements. The controller operates in the PID control mode for both heating and cooling, with on-demand auto-tune, which will establish the tuning constants. The PID tuning constants may be fine-tuned by the operator at any time and then locked-out from further modification. The controller employs a unique overshoot suppression feature, which allows the quickest response without excessive overshoot. The unit can be transferred to operate in the manual mode, providing the operator with direct control of the output. The controller may also be programmed to operate in the "ON/OFF" control mode with adjustable hysteresis. A second

setpoint is available on select models to allow quick selection of a different setpoint setting. Dual 4-digit displays allow viewing of the process temperature and setpoint simultaneously. Front panel indicators inform the operator of the controller and output status. On many models the main control output and the alarm outputs are field replaceable.

Optional alarm(s) can be configured to activate according to a variety of actions (absolute high or low, deviation high or low, band in or out, with adjustable hysteresis. A standby feature suppresses the alarm during power-up until the temperature stabilizes outside the alarm region. The second alarm can be configured as a secondary PID output (heat/cool applications).

Specifications

Display: Dual 4-digit

Upper Temperature Display: 10.2 mm H (0.4") red LED

Lower Auxiliary Display: 7.6 mm H (0.3") green LED

Power:

AC Versions: 85 Vac minimum to 250 Vac maximum, 50 to 60 Hz, 8 VA maximum

Low Voltage:

DC Power: 18 to 36 Vdc; 7 W

AC Power: 24 Vac, ±10%; 50 to 60 Hz, 9 VA

Controls: Four front panel push buttons for modification and setup of controller functions and one external input user for parameter lockout or other functions

Memory: Nonvolatile E²PROM retains all programmable parameters and values

Main Sensor Input:

Sample Period: 100 ms

Response Time: Less than 300 ms typical, 400 ms max (to within 99% of final value w/step input; typically, response is limited to response time of probe)

Failed Sensor Response:

Main Control Output(s):

Programmable preset output

Display: "OPEN"

Alarms: Upscale drive

Normal Mode Rejection: 40 dB @

50/60 Hz (improves with increased digital filtering)

Common Mode Rejection: Greater than 120 dB, DC to 60 Hz

Protection: Input overload 120 Vac maximum for 15 seconds maximum

Thermocouple Inputs

Types: T, E, J, K, R, S, B, N, linear mV and software selectable

Input Impedance: 20 MΩ all types

Lead Resistance Effect: 0.25 μV/Ω

Cold Junction Compensation: Less than ±1°C ±(1.5°C maximum) error over 0 to 50°C maximum (32 to 122°C) ambient temperature range, defeated for linear mV indication mode

Resolution: 1° for types or 0.1° for T, E, J, K and N only

Thermocouple Type	Range
T	-200 to 400°C -328 to 752°F
E	-200 to 750°C -328 to 1382°F
J	-200 to 760°C -328 to 1400°F
K	-200 to 1250°C -328 to 2282°F
R	0 to 1768°C 32 to 3214°F
S	0 to 1768°C 32 to 3214°F
B	149 to 1820°C 300 to 3308°F
N	-200 to 1300°C -328 to 2372°F
mV	-5.00 to 56.00

RTD Inputs

Input: 2- or 3-wire, 100 Ω platinum, alpha = 0.00385 (DIN 43760), alpha = 0.0039162

Excitation: 150 μA typical

Resolution: 1 or 0.1°

Lead Resistance: 15 Ω maximum per input lead

RTD Type	Range
385	-200 to 600°C -328 to 1100°F
392	-200 to 600°C -328 to 1100°F
Ω	1.0 to 320.0

Indication Accuracy: ±0.3% of span 1°C) includes NIST conformity, cold-junction effect and A/D conversion errors at 23°C after 20 minute warm-up

User Input: Internally pulled up to 5 Vdc, 1 MΩ

V_{IN} Max: 5.25 Vdc

V_{IL}: 0.85V maximum

V_{IH}: 3.65V minimum

I_{OFF}: 1μA maximum

Response Time: 120 ms maximum

Functions: Program lock, integral action lock, auto/manual mode select, setpoint ramp enable, reset alarms, setpoint 1/setpoint 2 select, local/remote setpoint select serial block print

Control and Alarm Outputs (Heating, Cooling or Alarm) Relay Outputs with Form "A" Contacts

Contact Rating: 3 A @ 250 Vac or 30 Vdc (resistive load) 1/10 HP @ 120 Vac (inductive load)

Life Expectancy: 100,000 cycles at max load rating (decreasing load and/or increasing cycle time, increases life expectancy)

DC Pulse Outputs:

Rating: 45 mA @ 4V minimum, 7V nominal

Output Range**	Accuracy* (18 to 28°C)	Accuracy* (0 to 50°C)	Compliance	Resolution
0 to 10V	0.10% of FS + 1/2 LSD	0.30% of FS + 1/2 LSD	10 kΩ minimum	1/3500
0 to 20 mA	0.10% of FS + 1/2 LSD	0.30% of FS + 1/2 LSD	500Ω maximum	1/3500
4 to 20 mA	0.10% of FS + 1/2 LSD	0.30% of FS + 1/2 LSD	500Ω maximum	1/2800

* Accuracies are expressed as ± percentages after 20 minutes warm-up. The controller's accuracy is specified in 2 ways: accuracy over an 18 to 28°C (64 to 82°F) range at 10 to 75% RH environment; and accuracy over a 0 to 50°C (32 to 122°F) range at 0 to 85% RH (non-condensing) environment. Accuracy over the wide sensor range reflects the coefficient of the internal circuitry.

** Outputs are independently jumper selectable for either 10V or 20 mA. The output range may be field-calibrated to yield approximately 10% over-range and a small underrange (negative) signal.

Remote Setpoint Input

Input Type: 0/4 to 20 mA

Input Resistance: 10 Ω

Overrange: -5% to 105%

Overload: 100 mA (continuous)

Scale Range: -999 to 9999 degrees or -99.9 to 999.9 degrees

Resolution: 1 part in 10,000.

Accuracy:

25°C: ±0.1% of FS + 1/2 LSD

0 to 50°C (32 to 122°F) Range:

0.2% of FS + 1/2 LSD

Reading Rate: 10/s

Setpoint Filtering: Programmable digital

Setpoint Ramping: Programmable, 0.1 to 999.9 degrees/minute

Serial Communications (Optional)

Type: RS485 multipoint, balanced interface

Baud Rate: 300 to 9600

Data Format: 7O1, 7E1, 7N2, 8N1

Node Address: 0 to 99, maximum of 32 units per line

Main Control:

Control: PID or "ON/OFF"

Output: Time proportioning or linear DC

Cycle Time: Programmable

Auto-Tune: When selected, sets proportional band, integral time, and derivative time values

Probe Break Action: Programmable

Alarms: 1 or 2 alarms

Modes: Absolute high-acting, absolute low-acting, deviation high-acting, deviation low-acting, inside band acting, outside band acting

Reset Action: Programmable, automatic or latched

Standby Mode: Programmable, enable or disable

Hysteresis: Programmable

Probe Break Action: Upscale

Cooling: Software selectable (overrides alarm 2)

Control: PID or ON/OFF

Output: Time Proportioning

Cycle Time: Programmable

Proportional Gain Adjust: Programmable

Heat/Cool Deadband Overlap: Programmable

Linear DC Output: Control or re-transmission, programmable update rate from 0.1 to 250 seconds

Transmit Delay: 2 to 100 ms or 100 to 200 ms

Data Encoding: ASCII

Isolation W.R.T Main Input Common:

500 Vrms for 1 min (50V working) (not isolated W.R.T. remote setpoint or heater current inputs, or analog output common)

Note: RS485 and the analog output commons are not internally isolated within the controller. The terminating equipment of these outputs must not share the same common (i.e. earth ground).

Environmental Conditions

Operating Range: 0 to 50°C (32 to 122°F)

Storage Range: -40 to 80°C (-40 to 176°F)

Span Drift (Maximum): 130 ppm/°C, main input

Zero Drift (Maximum): 1μV/°C, main input

Operating and Storage Humidity:

85% maximum relative humidity (non-condensing) from 0 to 50°C

Altitude: Up to 2000 meters

Isolation Breakdown Ratings:

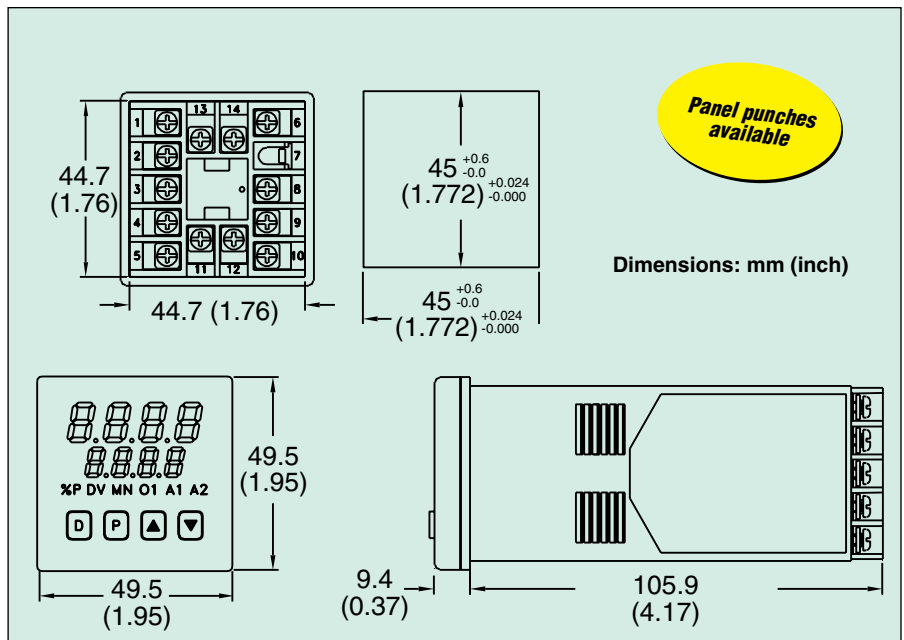
AC Line With Respect to All Inputs and Outputs: 250V working (2300V for 1 minute)

Main Input with Respect to Analog Outputs, Remote Setpoint Input, Heater Current Input: 50V working (2300V for 1 minute)

All Other Inputs and Outputs with Respect to Relay Contacts: 2000 Vac (not isolated between analog outputs or remote setpoint commons)

Connection: Wire-clamping screw terminals

Construction: Black plastic alloy case and collar style panel latch, panel latch can be installed for vertical or horizontal instrument stacking, 1-piece tinted plastic bezel, bezel assembly with circuit boards can be removed from the case to change the output board without removing the case from the panel or disconnecting wiring, unit meets NEMA 4X (IP65) requirements for indoor use, when properly installed; Installation Category II, Pollution Degree 2



To Order	
Model No.	Description
Standard Power Models, 85 to 250 Vac, 50 to 60 Hz, 8 VA Max	
CN63100-R1	Single output, relay
CN63100-R1-R2-AL	Dual output, relay/relay, alarm
CN63100-R1-R2-AL-RSP	Dual output, relay/relay, alarm, remote setpoint
CN63100-DC1	Single output, DC pulse
CN63100-DC1-R2-AL	Dual output, DC pulse/relay, alarm
CN63100-R1-R2-AL-C4	Dual output, relay/relay, alarm, RS485
CN63100-DC1-R2-AL-C4	Dual output, DC pulse/relay, alarm, RS485
CN63100-R1-R2-F3	Dual output, relay/relay, analog control or re-transmission
CN63100-R1-R2-F3-RSP	Dual output, relay/relay, analog control or re-transmission, remote setpoint
CN63100-R1-R2-F3-C4	Dual output, relay/relay, analog control or re-transmission, RS485
Low-Voltage Models, 18 to 36 Vdc; 7 W	
CN63100-R1-LV	Single output, relay
CN63100-R1-R2-AL-LV	Dual output, relay/relay, alarm
CN63100-R1-R2-AL-RSP-LV	Dual output, relay/relay, alarm, remote setpoint
CN63100-DC1-LV	Single output, DC pulse
CN63100-DC1-R2-AL-LV	Dual output, DC pulse/relay, alarm
CN63100-R1-R2-AL-C4-LV	Dual output, relay/relay, alarm, RS485
CN63100-DC1-R2-AL-C4-LV	Dual output, DC pulse/relay, alarm, RS485
CN63100-R1-R2-F3-LV	Dual output, relay/relay, analog control or re-transmission
CN63100-R1-R2-F3-RSP-LV	Dual output, relay/relay, analog control or re-transmission, remote setpoint
CN63100-R1-R2-F3-C4-LV	Dual output, relay/relay, analog control or re-transmission, RS485

Comes complete with operator's manual.

For "-C4" RS485 option, software is a free download from **omega**

Ordering Examples: CN63100-R1-R2-AL, 85 to 250 Vac, dual output, relay/relay, with alarm.

CN63100-R1-LV, 18 to 36 Vdc, single output, relay.

Accessories (Field-Installable)

Model No.	Description
CN6-48100	Single relay output module
CN6-48111	Dual relay/relay output module
CN6-48200	Single DC pulse output module
CN6-48211	Dual output, DC pulse/relay output module
CN6-RBDLA210	Output module, single output, Form-C relay, 1 alarm
CNQUENCHARC	Noise suppression RC snubber (2 leads), 110 to 230 Vac