



INFORMATION

C21 is a 1/32 DIN size panel mount electronic temperature controller. This temperature control unit is powered by 11-26 or 90-250 VDC/VAC supply, incorporating a 2 amp. control relay output as standard. The second output can be used as cooling control, an alarm or dwell timer. Its fast sampling rate allows the unit to control fast processes. The C21 model is widely applied in the following industries: plastic/rubber injection molding, vacuum furnace equipment, semiconductor temperature process control program, ceramic sintering furnace, fiber dyeing and drying, etc.

The Fuzzy Logic plus PID microprocessor-based temperature controllers, incorporate one bright, easy to read 4-digit LED display, indicating process value and set point value. The Fuzzy Logic technology enables a process to reach a predetermined set point in the shortest time, with the minimum of overshoot during power-up or external load disturbance.

FEATURES

- Easy-to-use
- Fuzzy modified PID heat & cool control
- Fast A-D sampling rate (5 times/s)
- Universal input (PT100, thermocouple)with high accuracy 18-bit A-D
- Analog output (linear current or voltage)uses high accuracy 15-bit D-A
- RS-485 RS-232 interface
- Programming port provided on board
- Support manual control & auto-tune function
- Wide variety of alarm mode selection
- Lockout protection control
- Bumpless transfer during failure mode
- Soft-start ramp and dwell timer
- Bright display stabilized with digital filter
- Front panel sealed to NEMA 4X & IP65(model C21)
- UL/CSA/CE approval
- High performance with low cost

STANDARD SPECIFICATIONS

POWER

Power Supply	90 – 250 VAC, 47 – 63 Hz, 10VA, 5W maximum
Power Consumption	11 – 26 VAC / VDC, SELV, Limited Energy, 10VA, 5W maximum

SIGNAL INPUT

Input 1	Characteristics
Resolution	18 bits
Sampling Rate	5 times / second
Maximum Rating	-2 VDC minimum, 12 VDC maximum(1 minute for mA input)
Temperature Effect	$\pm 1.5 \text{ uV/ } ^\circ\text{C}$ for all inputs except mA input $\pm 3.0 \text{ uV/ } ^\circ\text{C}$ for mA input
Sensor Lead Resistance Effect	T/C: 0.2uV/ohm 3-wire RTD: 2.6 $^\circ\text{C/ohm}$ of resistance difference of two leads 2-wire RTD: 2.6 $^\circ\text{C/ohm}$ of resistance sum of two leads
Burn-out Current	200nA
Common Mode Rejection Ratio (CMRR)	120dB
Normal Mode Rejection Ratio (NMRR)	55dB
Sensor Break Detection	Sensor open for TC, RTD and mV inputs, below 1 mA for 4-20 mA input, below 0.25V for 1 – 5 V input, unavailable for other inputs.
Sensor Break Responding Time	Within 4 seconds for TC, RTD and mV inputs, 0.1 second for 4-20 mA and 1 – 5 V inputs.

Input 1			
Type	Range	Accuracy @ 25 $^\circ\text{C}$	Input Impedance
J	-120 ~ 1000 $^\circ\text{C}$ (-184 ~ 1832 $^\circ\text{F}$)	$\pm 2 \text{ } ^\circ\text{C}$	2.2M Ω
K	-200 ~ 1370 $^\circ\text{C}$ (-328 ~ 2498 $^\circ\text{F}$)	$\pm 2 \text{ } ^\circ\text{C}$	2.2M Ω
T	-250 ~ 400 $^\circ\text{C}$ (-418 ~ 752 $^\circ\text{F}$)	$\pm 2 \text{ } ^\circ\text{C}$	2.2M Ω
E	-100 ~ 900 $^\circ\text{C}$ (-148 ~ 1652 $^\circ\text{F}$)	$\pm 2 \text{ } ^\circ\text{C}$	2.2M Ω
B	0 ~ 1820 $^\circ\text{C}$ (32 ~ 3308 $^\circ\text{F}$)	$\pm 2 \text{ } ^\circ\text{C}$ (200 $^\circ\text{C}$ – 1820 $^\circ\text{C}$)	2.2M Ω
R	0 ~ 1768 $^\circ\text{C}$ (32 ~ 3214 $^\circ\text{F}$)	$\pm 2 \text{ } ^\circ\text{C}$	2.2M Ω
S	0 ~ 1768 $^\circ\text{C}$ (32 ~ 3214 $^\circ\text{F}$)	$\pm 2 \text{ } ^\circ\text{C}$	2.2M Ω
N	-250 ~ 1300 $^\circ\text{C}$ (-418 ~ 2372 $^\circ\text{F}$)	$\pm 2 \text{ } ^\circ\text{C}$	2.2M Ω
L	-200 ~ 900 $^\circ\text{C}$ (-328 ~ 1652 $^\circ\text{F}$)	$\pm 2 \text{ } ^\circ\text{C}$	2.2M Ω
PT100 (DIN)	-210 ~ 700 $^\circ\text{C}$ (-346 ~ 1292 $^\circ\text{F}$)	$\pm 0.4 \text{ } ^\circ\text{C}$	1.3K Ω

PT100 (JIS)	-200 ~ 600 °C (-328 ~ 1112 °F)	±0.4°C	1.3KΩ
mV	-8 ~ 70mV	±0.05%	2.2MΩ
mA	-3 ~ 27mA	±0.05%	70.5Ω
V	-1.3 ~ 11.5V	±0.05%	302KΩ

OUTPUT 1 / OUTPUT 2

Relay Rating	2A/240 VAC, life cycles 200,000 for resistive load
Pulsed Voltage	Source Voltage 5V, current limiting resistance 66Ω .

LINEAR OUTPUT CHARACTERISTICS

Type	Zero Tolerance	Span Tolerance	Load Capacity
4-20 mA	3.6-4 mA	20-21 mA	500Ω max.
0-20 mA	0 mA	20-21 mA	500Ω max.
0-5 V	0 V	5-5.25 V	10KΩ min.
1-5 V	0.9-1 V	5-5.25 V	10KΩ min.
0-10 V	0 V	10-10.5 V	10KΩ min.

LINEAR OUTPUT

Resolution	15 bits
Output Regulation	0.01 % for full load change
Output Settling Time	0.1 sec. (stable to 99.9 %)
Isolation Breakdown Voltage	1000VAC
Temperature Effect	±0.01 % of SPAN / °C

TRIAC (SSR) OUTPUT

Rating	1A / 240 VAC
Inrush Current	20A for 1 cycle
Min. Load Current	50 mA rms
Max. Off-state Leakage	3 mA rms
Max. On-state Voltage	1.5V rms
Insulation Resistance	1000 Mohms min. at 500 VDC
Dielectric Strength	2500 VAC for 1 minute

ALARM (OUTPUT 2)

Alarm 1 Relay	Form A,Max. rating 2A/240VAC, life cycles 200,000 for resistive load.
Alarm Functions	Dwell timer, Deviation High / Low Alarm, Deviation Band High / Low Alarm Process High / Low Alarm
Alarm Mode	Normal, Latching, Hold, Latching / Hold.
Dwell Timer	0.1 – 4553.6 minutes

DATA COMMUNICATION

Interface	RS-232 (1 unit), RS-485 (up to 247 units)
Protocol	Modbus Protocol RTU mode
Address	1 – 247
Baud Rate	0.3 ~ 38.4 Kbits/sec
Data Bits	7 or 8 bits
Parity Bit	None, Even or Odd
Stop Bit	1 or 2 bits
Communication Buffer	160 bytes

ANALOG RETRANSMISSION

Output Signal	4-20 mA, 0-20 mA, 0-1V, 0-5V, 1-5V, 0-10V
Resolution	15 bits
Accuracy	± 0.05 % of span ± 0.0025 %/ °C
Load Resistance	0 – 500 ohms (for current output), 10 K ohm minimum (for voltage output)
Output Regulation	0.01 % for full load change
Load Resistance	0 – 500 ohms (for current output), 10 K ohm minimum (for voltage output)
Output Regulation	0.01 % for full load change

USER INTERFACE

Single 4-digit LED Displays	10mm (C21, C91)
Keypad	3 keys(C21), 4 keys(C91)
Programming Port	For automatic setup, calibration and testing
Communication Port	Connection to PC for supervisory control

CONTROL MODE

Output 1	Reverse (heating) or direct (cooling) action
Output 2	PID cooling control, cooling P band 50 ~ 300% of PB, dead band -36.0 ~ 36.0% of PB
ON-OFF	0.1 – 90.0 (°F) hysteresis control (P band = 0)
P or PD	0 – 100.0 % offset adjustment
PID	Fuzzy logic modified , Proportional band 0.1 ~ 900.0°F , Integral time 0 – 3600 seconds , Derivative time 0 – 360.0 seconds
Cycle Time	0.1 – 100.0 seconds
Manual Control	Heat (MV1) and Cool (MV2)
Auto-tuning	Cold start and warm start
Failure Mode	Auto-transfer to manual mode while sensor break or A-D converter damage
Ramping Control	0 ~ 900.0°F/minute or 0 ~ 900.0 °F/hour ramp rate
Sleep Mode	Enable or Disable
Ramping Control	0 ~ 500.0 °C/minute or 0 ~ 500.0 °C/hour ramp rate

DIGITAL FILTER

Function	First order
Time Constant	0, 0.2, 0.5, 1, 2, 5, 10, 20, 30, 60 seconds programmable

ENVIRONMENTAL & PHYSICAL

Operating Temperature	-10°C ~ 50°C
Storage Temperature	-40°C ~ 60°C
Humidity	0 to 90 % RH (non-condensing)
Altitude	2000m maximum
Pollution	Degree 2
Insulation Resistance	20 Mohms min. (at 500 VDC)
Dielectric Strength	2000 VAC, 50/60 Hz for 1 minute
Vibration Resistance	10 – 55 Hz, 10 m/s ² for 2 hours
Shock Resistance	200 m/s ² (20 g)
Moldings	Flame retardant polycarbonate

Dimensions	C21 —50mm(W) X 26.5mm(H) X 110.5mm(D), 98.0 mm depth behind panel C91 —48mm(W) X 48mm(H) X 94mm(D), 86 mm depth behind panel
Mounting	C21 —panel mount, cutout 22 X 45(mm) C91 —panel mount, cutout 45 X 45 (mm)
Weight	C21 — 120 grams C91 — 140 grams

APPROVAL STANDARDS

Safety	UL 61010C-1 , CSA C22.2 No. 24-93 , EN61010-1 (IEC1010-1)
Protective Class	NEMA 4X (IP65) front panel for C21, IP30 front panel for C91, all indoor use, IP20 housing and terminals
EMC	EN61326