

Zesta  
Engineering  
Limited



# Temperature Controller

Auto-tune PID  
Safe, Simple, Reliable

*Temperature/Power Controllers*

## Features

- Easy-to-use
- Fuzzy modified PID heat & cool control
- Fast A-D sampling rate (5 times/sec)
- 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 or RS-232 interface
- Programming port provided on board
- Supports manual control & auto-tune function
- Wide variety of programmable alarm modes
- Operator lockout protection
- Bumpless transfer feature
- Soft-start ramp and dwell timer
- Bright display stabilized with digital filter
- Front panel sealed to NEMA 4X & IP65 (for ZEL-C21)
- UL/CSA/CE approval
- High performance with low cost

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ISO 9001 2000

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

The ZEL-C21 is a 1/32 DIN size panel mount controller. The ZEL-C91 is a 1/16 DIN size panel mount controller. These units are powered by 11-26 VAC/VDC or 90-250 VAC supply. The base model incorporates a 2-amp control relay output as a standard. The second output may be configured as a cooling control or as an alarm. Both outputs can select AC triac, 5 VDC logic, linear current or linear voltage to drive an external device. There are six types of alarms, plus a dwell timer that may be configured for a second output. The units are fully programmable for PT100 DIN as well as thermocouple types J, K, T, E, B, R, S, N and L. The input signal is digitized using an 18-bit A to D converter. The high-speed sampling rate of the A to D converter allows precise control of rapidly changing processes.

Digital communications such as RS-485 or RS-232 (for ZEL-C21) are available as an additional option. The digital communication feature allows the units to be interfaced with supervisory control systems and software. A programming port is available for automatic configuration, calibration and testing without the need to access the control via the front keypad directly.

# Specifications

## Power

90-250 VAC, 47-63 Hz, 10 VA, 5 W maximum  
11-26 VAC / VDC, 10 VA, 5 W maximum

## Signal Input

**Resolution** : 18-bits  
**Sampling Rate** : 5 times / second  
**Maximum Rating** : -2 VDC minimum, 12 VDC maximum (1 minute for mA input)  
**Temperature Effect** : +/- 1.5 uV/°C for all inputs except mA input +/- 3.0 uV/°C for mA input  
**Sensor Break Detection** :  
Sensor open for TC, RTD and mV inputs,  
Sensor short for RTD input,  
below 1 mA for 4-20 mA input,  
below 0.25 V for 1 - 5 V input,  
unavailable for other inputs.

## Characteristics

Type	Range
J	-120°C-1000°C (-184°F-1832°F)
K	-200°C-1370°C (-328°F-2498°F)
T	-250°C-400°C (-418°F-752°F)
E	-100°C-900°C (-148°F-1652°F)
B	0°C-1800°C (32°F-3272°F)
R	0°C-1767.8°C (32°F-3214°F)
S	0°C-1767.8°C (32°F-3214°F)
N	250°C-1300°C (-418°F-2372°F)
L	-200°C-900°C (-328°F-1652°F)
PT100 <sup>DM</sup>	-210°C-700°C (-346°F-1292°F)
PT100 <sup>JIS</sup>	-200°C-600°C (-328°F-1112°F)
mV	-8 mV - 70 mV
mA	-3 mA - 27 mA
V	-1.3 V - 11.5 V

## Output 1/Output 2

**Relay Rating** : 2 A/240 VAC, 200,000 cycles for resistive load.

**Pulsed Voltage** : Source Voltage 5 V, 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	10 KΩ min.
1-5 V	0.9-1 V	5-5.25 V	10 KΩ min.
0-10 V	0 V	10-10.5 V	10 KΩ min.

## Triac (SSR) Output

**Rating** : 1 A / 240 VAC

Your Authorized Zesta Distributor Is :

## Alarm (Output 2)

**Alarm Relay** : Form A, Max. rating 2 A/240 VAC, 200,000 cycles 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

## Analog Retransmission

**Output Signal** : 4-20 mA, 0-20 mA, 0-5 V, 1-5 V, 0-10 V

**Resolution** : 15-bits

**Accuracy** : +/-0.05% of span +/-0.0025%/°C

**Load Resistance** : 0-500 ohms (for current output)

10 K ohms minimum (for voltage output)

**Output Regulation** : 0.01% for full load change

## User Interface

**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 - 1000 seconds

Derivative time 0 - 360.0 seconds

**Cycle Time** : 0.1 - 90.0 seconds

**Manual Control** : Heat (MV1) and cool (MV2)

**Auto-tuning** : Cold start and warm start

**Failure Mode** : Auto-transfer to manual mode when sensor breaks or A-D converter damage

**Ramping Control** : 0 - 900.0°F/minute or 0 - 900.0°F/hour ramp rate

## Digital Filter

**Function** : PV dampening

**Time Constant** : 0, 0.2, 0.5, 1, 2, 5, 10, 20, 30, 60 seconds programmable

## Environmental & Physical

**Operating Temperature** : -10°C to 50°C

**Storage Temperature** : -40°C to 60°C

**Humidity** : 0 to 90% RH (non-condensing)

**Altitude** : 2000 m maximum

**Pollution** : Degree 2

**Insulation Resistance** : 20 M ohms min. (at 500 VDC)

**Dielectric Strength** : 2000 VAC, 50/60 Hz for 1 minute  
**Vibration Resistance** : 10 - 55 Hz, 10 m/s<sup>2</sup> for 2 hours

**Shock Resistance** : 200 m/s<sup>2</sup> (20 g)

**Molding** : Flame retardant polycarbonate

**Dimensions** :

ZEL-C21 ---50 mm(W) X 26.5 mm(H) X 110.5 mm(D), 98 mm depth behind panel

ZEL-C91 ---48 mm(W) X 48 mm(H) X 94 mm(D), 86 mm depth behind panel

## Approval Standards

**Safety** : UL61010C-1

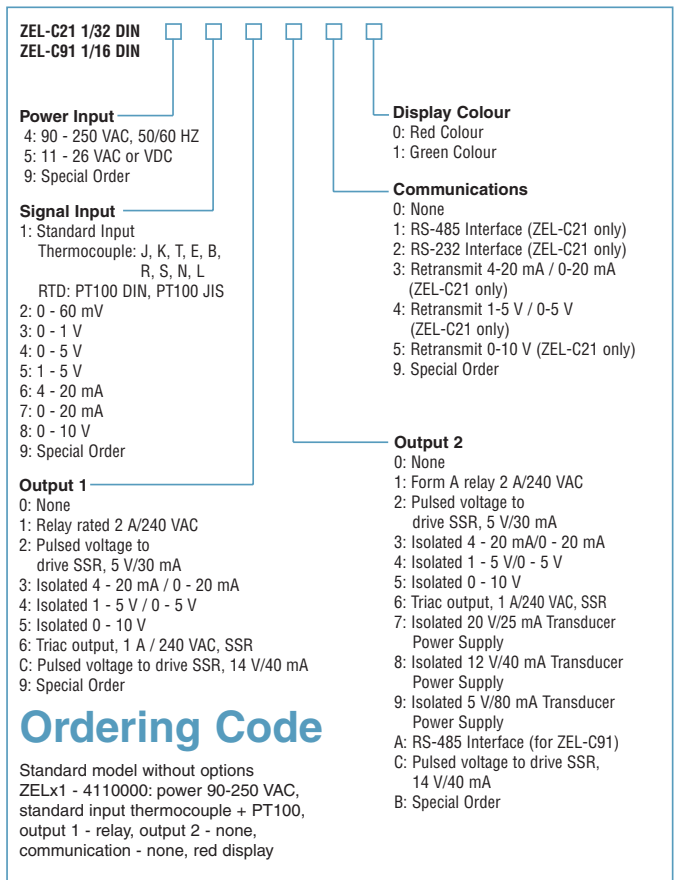
CSA C22.2 No. 24-93

EN61010-1 (IEC1010-1)

**Protective Class** : NEMA 4X & (IP65) front panel for ZEL-C21, IP30 front panel for ZEL-C91, IP20 housing & terminals with protective cover.

All indoor use.

**EMC** : EN61326



## Ordering Code

Standard model without options  
ZELx1 - 4110000: power 90-250 VAC, standard input thermocouple + PT100, output 1 - relay, output 2 - none, communication - none, red display



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