P41

INFORMATION

The Fuzzy Logic plus PID microprocessor-based profiling controller with many segments of ramp and dwell, incorporate two bright, easy to read 4-digit LED displays, 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

- Total 9 profiles, a profile with 16, 32 or 64 segments at most
- Each segment to be configured as a ramp or dwell(soak)
- Fast A-D sampling rate (5 times/s)
- After an event the process goes to run, hold, abort, manual, failure transfer, off mode, next segment or select the second PID values
- High accuracy of 18-bit A to D input, and 15-bit D to A output
- The fast sample rate of 200 msec
- Fuzzy control to reach set point at the least overshooting ans less time
- Up to three relays are configurable for event output
- Analog retransmission of process value & set point value
- Optional RS-485 or 232 communications
- Programmable port for easy configuration or calibration
- Lockout protection for security requirement
- Bumpless transfer of safely control while sensor breaks
- Digital filter to improve the stability of process value
- SEL function for easy operation

STANDARD SPECIFICATIONS

POWER

Power Supply	90 – 250 VAC, 47 – 63 Hz, 12VA, 5W maximum
Power Consumption	11 – 26 VAC / VDC, SELV, Limited Energy, 12VA, 5W maximum

SIGNAL INPUT

Input	Characteristics
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 Lead Resistance Effect	T/C: 0.2uV/ohm 3-wire RTD: 2.6 °C/ohm of resistance difference of two leads 2-wire RTD: 2.6 °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			
Type	Range	Accuracy @ 25 °C	Input Impedance
J	-120 ~ 1000 °C (-184 ~ 1832 °F)	±2 °C	2.2MΩ
K	-200 ~ 1370 °C (-328 ~ 2498°F)	±2 °C	2.2MΩ
T	-250 ~ 400°C (-418 ~ 752°F)	±2 °C	2.2MΩ
E	-100 ~ 900 °C (-148 ~ 1652 °F)	±2 °C	2.2MΩ
B	0 ~ 1820 °C (32 ~ 3308 °F)	±2 °C (200°C – 1820°C)	2.2MΩ
R	0 ~ 1768 °C (32 ~ 3214 °F)	±2 °C	2.2MΩ
S	0 ~ 1768 °C (32 ~ 3214 °F)	±2 °C	2.2MΩ
N	-250 ~ 1300 °C (-418 ~ 2372 °F)	±2 °C	2.2MΩ
L	-200 ~ 900 °C (-328 ~ 1652 °F)	±2 °C	2.2MΩ
PT100 (DIN)	-210 ~ 700 °C (-346 ~ 1292 °F)	±0.4°C	1.3KΩ

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 .

OUTPUT

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

DC Voltage Supply Characteristics (Installed at Output 2)				
Type	**Tolerance**	**Max. Output Current**	**Ripple Voltage**	**Isolation Barrier**
20V	±1 V	25 mA	0.2 Vp-p	500 VAC
12V	±0.6 V	40 mA	0.1 Vp-p	500 VAC
5V	±0.25 V	80 mA	0.05 Vp-p	500 VAC

ALARM

Alarm Relay	Form C,Max. rating 2A/240VAC, life cycles 200,000 for resistive load.
Alarm Functions	Dwell timer, Deviation High / Low Alarm, Deviation Band High / Low Alarm PV 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	2.4 ~ 38.4 Kbits/sec
Parity Bit	None, Even or Odd
Stop Bit	1 or 2 bits
Communication Buffer	64 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
Output Settling Time	0.1 sec. (stable to 99.9 %)
Isolation Breakdown Voltage	1000 VAC min.
Integral Linearity Error	±0.005 % of span
Temperature Effect	±0.0025 % of span/ °C

Saturation Low	0 mA (or 0V)
Saturation High	22.2 mA (or 5.55V, 11.1V min.)
Linear Output Range	0 – 22.2mA(0-20mA or 4-20mA), 0 – 5.55V (0 – 5V, 1 – 5V), 0 – 11.1 V (0 – 10V)

USER INTERFACE

Keypad	4 keys
Programming Port	For automatic setup, calibration and testing
Communication Port	RS-232 and RS-485

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 while sensor break or A-D converter damage
Ramping Control	0 ~ 900.0°F/minute or 0 ~ 900.0 °F/hour ramp rate

DIGITAL FILTER

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

PROFILER

Number of profiles	9
Number of Segment per profile	Profile 1,2,3,4 : 16 Profile 5,6,7 : 32 Profile 8,9 : 64
Event Outputs	3

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/s² for 2 hours
Shock Resistance	200 m/s² (20 g)
Moldings	Flame retardant polycarbonate
Dimensions	P41 —96mm(W) X 96mm(H) X 65mm(D), 53 mm depth behind panel P91 —48mm(W) X 48mm(H) X 116mm(D), 105 mm depth behind panel
Weight	P41 — 250 grams P91 — 150 grams
Approval Standards	Safety : UL 61010C-1 , CSA C22.2 No. 24-93 , EN61010-1 (IEC1010-1)

APPROVAL STANDARDS

Safety	UL 61010C-1 , CSA C22.2 No. 24-93 , EN61010-1 (IEC1010-1)
Protective Class	IP65 front panel with additional option, IP50 front panel without additional option, all indoor use, IP 20 housing and terminals with protective cover.
EMC	EN61326