



INFORMATION

All Fuzzy Logic plus PID microprocessor-based thermo controller, 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.

All BTC models have programmable rate of temperature rise and an inbuilt timer that will bring a process up to temperature at a set rate and hold it for a predetermined time before switching off. We are professional and experienced in the field of high-performance and quality temperature controllers. No matter what kinds of industrial electronic temperature controls you need, we are confident to satisfy your specific requirements.

FEATURES

- Fast input sample rate (5 times / second)
- Basic & full function
- User menu configurable
- Pump control
- Fuzzy+PID microprocessor-based control
- Automatic programming
- Differential control
- Auto-tune function
- Self-tune function
- Sleep mode function
- "Soft-start" ramp and dwell timer
- Programmable inputs (thermocouple, RTD, mA, VDC)
- Analog input for remote set point and CT
- Event input for changing function & set point
- Programmable digital filter
- Hardware lockout + remote lockout protection
- Loop break alarm
- Heater break alarm
- Sensor break alarm+Bumpless transfer
- RS-485, RS-232 communication
- Analog retransmission
- Signal conditioner DC power supply
- A wide variety of output modules available
- Safety UL / CSA / IEC1010-1
- EMC / CE EN 61326

STANDARD SPECIFICATIONS

POWER

Power Supply	90 – 264 VAC, 47 – 63 Hz, 15VA, 15W maximum
Power Consumption	11 – 26 VAC / VDC, SELV, Limited Energy, 15VA, 7W 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 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

Input 2	Characteristics
Resolution	18 bits
Sampling Rate	1.66 times / second
Maximum Rating	-2 VDC minimum, 12 VDC maximum
Temperature Effect	±1.5uV/ °C for all inputs except mA input ±3.0uV/ °C for mA input
Common Mode Rejection Ratio (CMRR)	120dB
Normal Mode Rejection Ratio (NMRR)	55dB
Sensor Break Detection	Below 1 mA for 4-20 mA input, below 0.25V for 1 – 5V input, unavailable for other inputs.
Sensor Break Responding Time	0.5 second

Input 2			
Type	Range	Accuracy @ 25 °C	Input Impedance
CT94-1	0-50.0 A	±2% of Reading ±0.2A	302K
mA	-3 ~ 27mA	±0.05%	70.5 +0.8V / input current
V	-1.3 ~ 11.5V	±0.05%	302KΩ

Input 3	
Logic Low	-10V minimum, 0.8V maximum.
Logic High	2V minimum, 10V maximum
External pull-down Resistance	400 K maximum
External pull-up Resistance	1.5 M minimum
Functions	Select second set point and/or PID, reset alarm 1 and/or alarm 2, disable output 1 and/or output 2, remote lockout

OUTPUT 1 / OUTPUT 2

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

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	±0.0025 % 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	±1.0 V	25mA	0.2Vp-p	500VAC
12V	±0.6V	40mA	0.1Vp-p	500VAC
5V	±0.25V	80mA	0.05Vp-p	500VAC

ALARM 1 / ALARM 2 (OUTPUT 2)

Alarm 1 Relay	Form A or Form B for BTC-9300, Form C for BTC4300, BTC-8300, 5V Logic output for BTC-2500 Max. Rating 2A/240VAC, life cycles 200,000 for resistive load.
Alarm 2 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, PV1 High / Low Alarm, PV2 High / Low Alarm, PV1 or PV2 High /Low Alarm, PV1-PV2 High /Low Alarm, Loop Break Alarm, Sensor Break Alarm.
Alarm Mode	Normal, Latching, Hold, Latching / Hold.
Dwell Timer	0 – 6553.5 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	50 bytes

ANALOG RETRANSMISSION

Functions	PV1, PV2, PV1-PV2, PV2-PV1, Set Point,
MV1, MV2, PV-SV deviation value	Modbus Protocol RTU mode
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	Dual 4-digit LED Displays
BTC-4300	Upper 0.55" (14mm) Lower 0.4" (10 mm)
BTC-8300, BTC-9300	Upper 0.4" (10 mm) Lower 0.31" (8 mm)
BTC-2500	0.4"(10mm)
Keypad	3 keys
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 1 ~ 255% of PB
ON-OFF	0.1 – 55.6 (°C) hysteresis control (P band = 0)
P or PD	0 – 100.0 % offset adjustment
PID	Fuzzy logic modified , Proportional band 0 ~ 500.0 °C , Integral time 0 – 1000 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 ~ 500.0 °C/minute or 0 ~ 500.0 °C/hour ramp rate
Sleep Mode	Enable or Disable
Ramping Control	0 ~ 500.0 °C/minute or 0 ~ 500.0 °C/hour ramp rate
Power Limit	0 – 100 % output 1 and output 2
Pump / Pressure Control	Sophisticated functions provided
Remote Set Point	Programmable range for voltage or current input
Differential Control	Control PV1 – PV2 at set point
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)
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	BTC-4300 —96mm(W) X 96mm(H) X 66mm(D), 53 mm depth behind panel BTC-8300 —48mm(W) X 96mm(H) X 80mm(D), 65 mm depth behind panel BTC-9300 —50.7mm(W) X 50.7mm(H) X 88.5mm(D), 75mm depth behind panel BTC-2500 —50mm(W) X 26.5mm(H) X 110.5 mm(D), 98.0 mm depth behind panel
Mounting	BTC-4300 —panel mount, cutout 92 X 92 (mm) BTC-8300 —panel mount, cutout 45 X 92 (mm) BTC-9300 —panel mount, cutout 45 X 45 (mm) BTC-2500 —panel mount, cutout 45 X 22.2 (mm)
Weight	BTC-4300 — 255 grams BTC-8300 — 220 grams BTC-9300 — 150 gram BTC-2500 — 120 grams

APPROVAL STANDARDS

Safety	UL 61010C-1 , CSA C22.2 No. 24-93 , EN61010-1 (IEC1010-1)
Protective Class	BTC-8300, BTC-4300: IP 20 housing and terminals with protective covers. BTC-2500, BTC-9300: NEMA 4X(IP65) front panel , IP 20 housing and terminals
EMC	EN61326