BrainChild

Industrial Automation

Full Range Catalogs

202101

BrainChild

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About BrainChild

BrainChild Electronic Co., Ltd. was established in 1977. Presently we are the largest TemperatureController manufacturer in Taiwan and the only manufacturer of the paperless recorder in Taiwan.
The factory has a full automatic SMT production line. TUV Rheinland certifies our ISO9001 once a year. Besides we have a well equipped and CSA certified laboratory to do CSA, UL and CE tests. A strong and experienced R&D team allows us to offer customers innovative and state-of-art industrial instruments for various FA solutions. We have won a good reputation by supplying quality instruments with better features at competitive prices. It is our philosophy in pursuit of perfection through continuous improvement.

C22

C62

C82

C83

High Performance Process & Temperature Controllers

C72

C42

R22

Features

01. Multi Color LCD Display	02. High Accuracy 18 Bit A-D Input and 15 Bit D-A Output
03. 200 msec Sampling Rate	04. Universal Inputs of Thermocouple, RTD, mA, VDC
05. Fuzzy+ PID Control and Auto-Tuning	06. Soft-Start Function
07. Possibility of both RS-485 and Analog Retransmission	08. Ramp & Soak Profiler
09. CT Inputs for Heater-Break Detection	10. Bumpless Transfer
11. Remote Setpoint and Up to 6 Event Inputs	12. Bidirectional Menu Navigation
13. Lockout Protection	14. Approvals: UL, cUL, CE, RoHS, WEEE

Specifications

Model


C22


C62


C82


C83


C72


C42


R22

Power Supply	90 to 250 VAC, 47–63 Hz ; 11 to 40 VDC / 20 to 28 VAC, 47–63 Hz
Power Consumption	C22/R22: 8VA, 4W maximum, C62: 10VA, 5W maximum, C72/C82/C83/C42: 12VA, 6W maximum

Signal Input				
Type	Thermocouple (J, K, T, E, B, R, S, N, L, U, P, C, D), RTD (PT100 (DIN), PT100 (JIS)), Current (mA), Voltage (V,mV)			
Resolution	18 Bits			
Sampling Rate	5 Times / Second (200 msec)			
Maximum Rating	-2 VDC minimum, 12 VDC maximum			
Input Characteristics	**Type**	**Range**	**Accuracy @ 25℃**	**Input Impedance**
	J	-120℃ to 1,000.0℃ (-184 ℉ to 1,832 ℉)	±2℃	2.2 MΩ
	K	-200℃ to 1,370.0℃ (-328 ℉ to 2,498 ℉)	±2℃	2.2 MΩ
	T	-250℃ to 400.0℃ (-418 ℉ to 752 ℉)	±2℃	2.2 MΩ
	E	-100℃ to 900.0℃ (-148 ℉ to 1,652 ℉)	±2℃	2.2 MΩ
	B	0℃ to 1,820.0℃ (32 ℉ to 3,308 ℉)	±2℃ (200℃ to 1,800℃)	2.2 MΩ
	R	0℃ to 1,767.8℃ (32 ℉ to 3,214 ℉)	±2℃	2.2 MΩ
	S	0℃ to 1,767.8℃ (32 ℉ to 3,214 ℉)	±2℃	2.2 MΩ
	N	-250℃ to 1,300.0℃ (-418 ℉ to 2,372 ℉)	±2℃	2.2 MΩ
	L	-200℃ to 900.0℃ (-328 ℉ to 1,652 ℉)	±2℃	2.2 MΩ
	U	-200℃ to 600.0℃ (-328 ℉ to 1,112 ℉)	±2℃	2.2 MΩ
	P	0℃ to 1,395.0℃ (32 ℉ to 2,543 ℉)	±2℃	2.2 MΩ
	C	0℃ to 2,300.0℃ (32 ℉ to 4,172 ℉)	±2℃	2.2 MΩ
	D	0℃ to 2,300.0℃ (32 ℉ to 4,172 ℉)	±2℃	2.2 MΩ
	PT100 (DIN)	-200℃ to 850.0℃ (-328 ℉ to 1,562 ℉)	±0.4℃	1.3 KΩ
	PT100 (JIS)	-200℃ to 600.0℃ (-328 ℉ to 1,112 ℉)	±0.4℃	1.3 KΩ
	mA	-3 mA to 27 mA	±0.05%	2.5 Ω
	VDC	-1.3 VDC to 11.5VDC	±0.05%	1.5 MΩ
	mV	0 to 50 mV	±0.05%	2.2 MΩ
Temperature Effect	1.5 μV/℃ for all inputs except mA input, 3.0 μV/℃ for mA			
Sensor Lead Resistance Effect	Thermocouple : 0.2 μV/Ω ; 3-wire RTD : 2.6℃/Ω of Difference of Resistance of two leads ; 2-wire RTD : 2.6℃/Ω of Sum of Resistance of two leads			
Burn-out Current	200 nA			
Common Mode Rejection Ratio (CMRR)	120 dB			
Normal Mode Rejection Ratio (NMRR)	55 dB			
Sensor Break Detection	Sensor open for Thermocouple and RTD inputs, sensor short for RTD input, below 1 mA for 4–20mA input, below 0.25 VDC for 1–5VDC input, not available for other inputs			
Sensor Break Responding Time	Within 4 seconds for Thermocouple and RTD inputs, 0.1 second for 4–20mA and 1–5VDC inputs			

Model	C22	C62	C82	C83	C72	C42	R22
							

Remote Set Point Input							
Type	Linear Current, Linear Voltage						
Range	-3 mA to 27 mA, -1.3 VDC to 11.5 VDC						
Accuracy	±0.05 %						
Remote Set Point Option	Not Available	Not Available	Available	Available	Available	Available	Not Available
Input Impedance	Current：2.5 Ω, Voltage：1.5 MΩ						
Resolution	18 Bits						
Sampling Rate	1.66 Times / Second						
Maximum Rating	280 mA maximum for Current Input, 12 VDC maximum for Voltage Input						
Temperature E□ect	±1.5 µV / ℃ for Voltage Input, ±3.0 µV / ℃ for Current Input						
Sensor Break Detection	Below 1 mA for 4 – 20mA input, below 0.25 VDC for 1 – 5VDC input, not available for other inputs						
Sensor Break Responding Time	0.1 Seconds						

Event Input							
Number of Event Input	1	2	6	6	2	6	2
Logic Low	-10 VDC minimum, 0.8VDC maximum						
Logic High	2 VDC minimum, 10VDC maximum						
Function	Refer to user manual						

CT Input	
CT Type	CT98-1
Accuracy	±5 % of Full Scale Reading, ±1 digit maximum
Input Impedance	294 Ω
Measurement Range	0 to 50 A VAC
Output of CT	0 to 5 VDC
CT Mounting	Screw Mounting
Sampling Rate	1 Time / Second

Output 1 / Output 2	
Type	Relay, Pulsed Voltage, Linear Voltage and Linear Current
Relay Rating	2 A, 240 VAC, 200,000 Life Cycles for Resistive Load
Pulsed Voltage	Source Voltage 5 VDC, Current Limiting Resistance 66Ω
Linear Output Resolution	15 Bits
Linear Output Regulation	0.02 % for full load change
Linear Output Settling Time	0.1 Second (Stable to 99.9 %)
Isolation Breakdown Voltage	1,000 VAC
Temperature E□ect	±0.01% of Span / ℃
Load Capacity of Linear Output	Linear Current：500 Ω maximum, Linear Voltage：10 KΩ minimum
Linear Output Ranges	0-22.2mA (0 - 20mA/4 - 20mA), 0-5.55VDC (0 - 5VDC, 1 - 5VDC), 0 - 11VDC (0 - 10VDC)

Alarm	
Relay Type	Form A
Maximum Rating	2 A, 240 VAC, 200,000 Life Cycles for Resistive Load
Alarm Function	Dwell Timer, Deviation Low, Deviation High, Deviation Band Low, Deviation Band High, Process High, Process Low, Range Low, Range High, Range High Low, Heater Break, Heater Short, Profile End, Profile Holdback
Alarm Mode	Latching, Holding, Normal, Latching / Holding, Set Point Holding
Dwell Timer	0.1 to 4,553.6 Minutes

Data Communication	
Interface	RS-485
Protocol	Modbus RTU (Slave Mode)
Address	1 to 247
Baud Rate	2.8 KBPS to 115.2 KBPS
Parity Bit	None, Even or Odd
Stop Bit	1 or 2 Bits
Data Length	7 or 8 Bits
Communication Bu□er	160 Bytes

Analog Retransmission	
Output Signal	4 – 20mA, 0 – 20mA, 0 – 10VDC
Resolution	15 Bits
Accuracy	±0.05 % of Span ±0.0025% / ℃
Load Resistance	0 to 500 Ω for Current Output, 10 KΩ minimum for Voltage Output
Output Regulation	0.01 % for full load change
Output Setting Time	0.1 Second (Stable to 99.9 %)
Isolation Breakdown	1,000 VAC minimum
Integral Linearity Error	±0.005 % of Span

Model





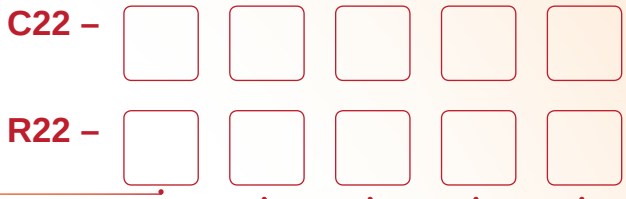


C22 C62 C82 C83 C72 C42 R22

Analog Retransmission							
Temperature Effect	±0.0025% of Span / °C						
Saturation Low	0 mA or 0 VDC						
Saturation High	22.2 mA or 5.55 VDC, 11.1 VDC minimum						
Linear Output Range	0 – 22.2mA (0 – 20mA / 4 – 20mA), 0 – 5.55VDC (0 – 5VDC / 1 – 5VDC), 0 – 11.1VDC (0 – 10VDC)						
User Interface							
Keypad	4 Keys						
Display Type	4 Digit LCD Display						
Number of Display	2	2	3	3	3	3	2
Upper Display Size	0.4" (10 mm)	0.58" (15 mm)	0.7" (17.7 mm)	0.7" (17.7 mm)	0.58" (15 mm)	0.98" (25 mm)	0.31" (8 mm)
Lower Display Size	0.19" (4.8 mm)	0.3" (7.8 mm)	0.4" (11.2 mm)	0.4" (11.2 mm)	0.32" (8.3 mm)	0.55" (14 mm)	0.25" (6.5 mm)
Programming Port							
Interface	Micro USB						
PC Communication Function	Parameter Configuration and Firmware Upgrade						
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	0.1~50.0℃ (0.1~ 90.0 ℉) hysteresis control (P band = 0)						
P or PD	0 – 100.0 % offset adjustment						
PID	Fuzzy logic modified Proportional band 0.1~500.0℃(0.1~900.0℉), Integral time 0 – 3,600 Seconds, Derivative time 0 – 360.0 Seconds						
Cycle Time	0.1 to 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	0~500.0℃ (0~900.0℉) / Minute or 0~500.0℃ (0~900.0℉) / 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							
Availability	No	No	Option	Option	Option	Option	No
No of Programs	N/A	N/A	4 / 2 / 1	4 / 2 / 1	4 / 2 / 1	4 / 2 / 1	N/A
Number of Segments / Program	N/A	N/A	4 / 8 / 16	4 / 8 / 16	4 / 8 / 16	4 / 8 / 16	N/A

Environmental and Physical Specifications							
Operating Temperature	-10 ℃ to 50 ℃						
Storage Temperature	-40 ℃ to 60 ℃						
Humidity	0 to 90 % RH (Non - Condensing)						
Altitude	2,000 Meters maximum						
Pollution	Degree II						
Insulation Resistance	20 MΩ minimum (@ 500 VDC)						
Dielectric Strength	2,000 VAC, 50 / 60 Hz for 1 Minute						
Vibration Resistance	10 to 55 Hz, 10 m / s^2 for 2 Hours						
Shock Resistance	200 m / s^2 (20 g)						
Molding	Flame Retardant Polycarbonate						
Mounting	Panel	Panel	Panel	Panel	Panel	Panel	DIN Rail
DIN Size	1/32	1/16	1/8	1/8	9/64	1/4	
Dimensions (W*H*D) (mm)	48*24*92	48*48*59	48*96*59	96*48*59	72*72*59	96*96*59	22.5*96*83
Depth Behind Panel (mm)	84	50	50	50	50	50	-
Cut Out Dimensions (mm)	45*22.2	45*45	45*92	92*45	68*68	92*92	-
Weight (grams)	120	160	220	220	190	290	160
Approval Standards							
Safety	UL61010-1, CSA 22.2 No.61010-1-12, EN61010-1(IEC1010-1), RoHS, REACH						
Protective Class	IP50 for panel, IP20 for terminals and housing, all indoor use						
EMC	EN61326						

Ordering Code



Power Input

4： 90 to 250VAC, 47–63Hz

5： 11 to 40VDC / 20 to 28VAC, 47–63Hz

Output 1

1： Form A Relay

2： SSRD, 5VDC / 30mA

3： Isolated 4–20mA / 0–20mA (OM98-3)

5： Isolated 0–10VDC (OM98-5)

C： SSRD, 14VDC / 40mA (OM94-7)

Output 2/Alarm 1

0： None

1： Form A Relay

2： SSRD, 5VDC / 30mA

3： Isolated 4–20mA / 0–20mA (OM98-3)

5： Isolated 0–10VDC (OM98-5)

C： SSRD, 14VDC / 40mA (OM94-7)

Option 1

0： None

1： RS-485

2： 1 Event Input (EI1)

3： 1 CT Input (CT1)

Option 2

0： None

1： Retransmit 4–20mA / 0–20mA (OM98-3)

2： Retransmit 0–10VDC (OM98-5)

3： Alarm 2 (Form A relay)

4： 1 Event Input **(EI2 only for R22)**

5： 1 CT Input **(CT2 only for R22)**

Accessories for All Models

OM94-7 = 14VDC / 40mA SSR Drive Module

OM98-3 = Isolated 4–20mA / 0–20mA Analog Output Module

OM98-5 = Isolated 0–10VDC Analog Output Module

CM98-3 = Isolated 4–20mA / 0–20mA Retransmission Module for all models except C22 & R22

CM98-5 = Isolated 0–10VDC Retransmission Module for all models except C22 & R22

CT98-1 = Current Transformer 0-50A

PA98-1 = USB Programming Adaptor

CC98-1 = Programming Port Cable (1.5M)

BC-SET = Configuration Software

Related Products

SNA10A = Smart Network Adaptor for third party software, which converts 255 channels of RS-485 or RS-422 to RS-232 Network

C62 – □ □ □ □ □ □ □ □

Power Input

4： 90 to 250VAC, 47–63Hz

5： 11 to 40VDC / 20 to 28 VAC, 47–63Hz

Output 1

1： Form A Relay

2： SSRD, 5VDC / 30mA

3： Isolated 4–20mA / 0–20mA (OM98-3)

5： Isolated 0–10VDC (OM98-5)

C： SSRD, 14VDC / 40mA (OM94-7)

Output 2/Alarm 1

0： None

1： Form A Relay

2： SSRD, 5VDC / 30mA

3： Isolated 4–20mA / 0–20mA (OM98-3)

5： Isolated 0–10VDC (OM98-5)

C： SSRD, 14VDC / 40mA (OM94-7)

Alarm 2

0： None

1： Form A Relay

Option 1

0： None

1： RS-485

Option 2

0： None

1： 2 Event Inputs

2： 1 Event Input and 1 CT Input

3： 2 CT Inputs

Option 3

0： None

1： Retransmit 4–20mA / 0–20mA (CM98-3)

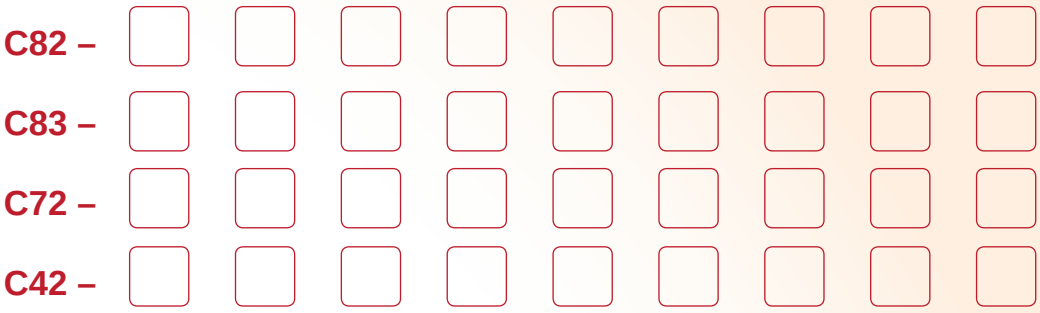
2： Retransmit 0–10VDC (CM98-5)

3： Alarm 3 (Form A Relay)

Option 4

0： None

1： Terminal Cover



Power Input

4： 90 to 250VAC, 47–63Hz

5： 11 to 40VDC / 20 to 28VAC, 47–63Hz

Output 1

1： Form A Relay

2： SSRD, 5VDC / 30mA

3： Isolated 4–20mA / 0–20mA (OM98-3)

5： Isolated 0–10VDC (OM98-5)

C： SSRD, 14VDC / 40mA (OM94-7)

Output 2/Alarm 1

0： None

1： Form A Relay

2： SSRD, 5VDC / 30mA

3： Isolated 4–20mA / 0–20mA (OM98-3)

5： Isolated 0–10VDC (OM98-5)

C： SSRD, 14VDC / 40mA (OM94-7)

Alarm 2 to 3

0： None

1： Form A Relay on Alarm 2

2： Form A Relay on Alarm 2 to 3

Event Inputs

0： None

1： 6 Event Inputs **(2 Event Inputs for C72)**

Option 1

0： None

1： RS-485 and Remote Setpoint

Option 2

0： None

1： 1CT Input and Remote Setpoint

2： 2CT Inputs and Remote Setpoint

Option 3

0： None

1： Retransmit 4–20mA / 0–20mA (CM98-3) and Remote Setpoint

2： Retransmit 0–10V (CM98-5) and Remote Setpoint

3： Alarm 4 (Form A Relay) and Remote Setpoint

4： Alarm 4 (Form A Relay), Retransmit 4-20 mA / 0-20mA (CM98-3) and Remote Setpoint **(Unavailable for C72)**

5： Alarm 4 (Form A Relay), Retransmit 0-10VDC (CM98-5) and Remote Setpoint **(Unavailable for C72)**

Option 4

0： None

1： Terminal Cover

2： Ramp & Soak Profiler

3： Terminal cover and Ramp & Soak Profiler

Fuzzy + PID
Process / Temperature Controller

FEATURES

- High accuracy 18-bit input A-D
- High accuracy 15-bit output D-A
- 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

BrainChild

BTC-4300 BTC-8300 BTC-9300 BTC-2500

Overview

The Fuzzy Logic plus PID microprocessor-based controller series, incorporates a 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.

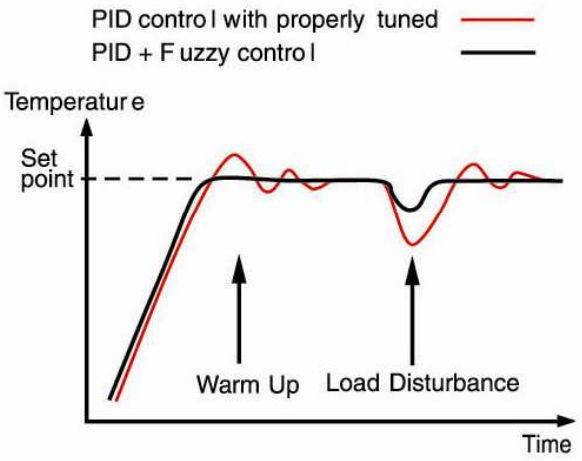
BTC-9300 is a 1/16 DIN size panel mount controller,
BTC-2500 is a 1/32 DIN size panel mount controller,
BTC-8300 is a 1/8 DIN size panel mount controller
and BTC-4300 is a 1/4 DIN size panel mount controller.

These units are powered by 11-26 VDC or 90-264 VAC supply, incorporating a 2 amp. control relay output as standard. Alternative output options include triac, 5V logic output, linear current and linear voltage. The units are fully programmable for PT100 and thermocouple types J, K, T, E, B, R, S, N, L with no need to modify the unit. The input signal is digitized by using a 18-bit A to D converter. Its fast sampling rate allows the unit to control fast processes.

Digital communications RS-485 or RS-232 are available as an additional option. These options allow the units to be integrated with supervisory control system and software.

A programming port is available for loading the configuration data with no need to use the keypads on front panel.

By using proprietary Fuzzy modified PID technology, the control loop will minimize the overshoot and undershoot in the shortest time. The following diagram is a comparison of results with and without Fuzzy technology.



High Accuracy

The series are manufactured with custom designed ASIC (Application Specific Integrated Circuit) technology which contains a 18-bit A to D converter for high resolution measurement (true 0.1˚F resolution for thermocouple and PT100) and a 15-bit D to A converter for linear current or voltage control output. The ASIC technology provides improved operating performance, low cost, enhanced reliability and higher density.

Fast Sampling Rate

The sampling rate of the input A to D converter reaches 5 times/second. The fast sampling rate allow sthis series to control fast processes.

Fuzzy Control

The function of Fuzzy control is to adjust PID parameters from time to time in order to making manipulation output value more flexible and adaptive to various processes. The results is to enable a process to reach a predetermined set point in the shortest time, with the minimum of overshoot and undershoot during power-up or external load disturbance.

Digital Communication

The units are equipped with RS-485 or RS-232 interface card to provide digital communication. By using the twisted pair wires there are at most 247 units can be connected together via RS-485 interface to a host computer.

Programming Port

A programming port is used to connect the unit to a PC for quick configuration, also can be connected to an ATE system for automatic testing & calibration.

Auto-tune

The auto-tune function allows the user to simplify initial setup for a new system. A clever algorithm is provided to obtain an optimal set of control parameters for the process, and it can be applied either as the process is warming up (cold start) or as the process has been in steady state (warm start).

Lockout Protection

The parameters can be locked to prevent from being changed by using either Hardware lockout or Remote lockout or both.

Bumpless Transfer

Bumpless transfer allows the controller to continue to control by using its previous value as the sensor breaks. Hence, the process can be well controlled temporarily as if the sensor is normal.

Soft-start Ramp

The ramping function is performed during power up as well as any time the set point is changed. It can be ramping up or ramping down. The process value will reach the set point with a predetermined constant rate.

Digital Filter

A first order low pass filter with a programmable time constant is used to improve the stability of process value. This is particularly useful in certain application where the process value is too unstable to read.

SEL Function

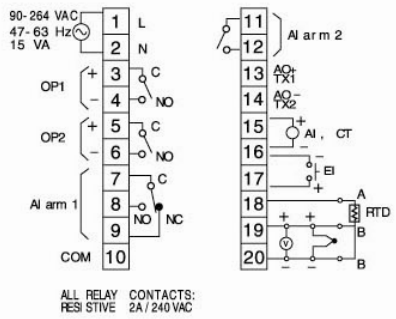
The units have the flexibility for user to select those parameters which is most significant to him and put these parameters in the front of display sequence. There are at most 5 parameters can be selected to allow the user to build his own display sequence.

Pump Control

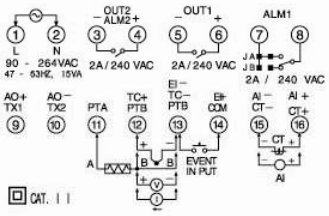
Only the superior noise rejection capability in addition to the fast sampling rate owned by this series of controllers can control the water pressure in a pump system which is driven by a variable speed motor.

Connection Diagrams

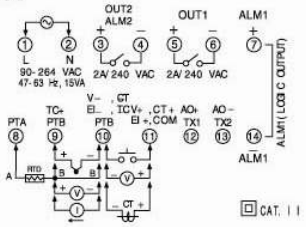
BTC-4300, BTC-8300



BTC-9300



BTC-2500



Specifications

Power

90 - 264 VAC, 47 63 Hz, 15VA, 7W maximum
11 - 26 VAC / VDC, 15VA, 7W maximum

Input 1

Characteristics :

Type	Range	Accuracy @25°C	Input Impedance
J	-120°C -1000°C (-184°F -1832°F)	±2°C	2.2M
K	-200°C -1370°C (-328°F -2498°F)	±2°C	2.2M
T	-250°C -400°C (-418°F -752°F)	±2°C	2.2M
E	-100°C -900°C (-148°F -1652°F)	±2°C	2.2M
B	0°C -1820°C (32°F -3308°F)	±2°C (200°C - 1820°C)	2.2M
R	0°C -1767.8°C (32°F -3214°F)	±2°C	2.2M
S	0°C -1767.8°C (32°F -3214°F)	±2°C	2.2M
N	-250°C -1300°C (-418°F -2372°F)	±2°C	2.2M
L	-200°C -900°C (-328°F -1652°F)	±2°C	2.2M
PT100 (DIN)	-210°C -700°C (-346°F -1292°F)	±0.4°C	1.3K
PT100 (JIS)	-200°C -600°C (-328°F -1112°F)	±0.4°C	1.3K
mV	-8mV -70mV	±0.05%	2.2M
mA	-3mA -27mA	±0.05%	70.5
V	-1.3V -11.5V	±0.05%	302K

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 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 2

Resolution : 18 bits
Sampling Rate : 1.66 times / second
Maximum Rating : -2 VDC minimum, 12 VDC maximum
Emperature 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
Characteristics :

Type	Range	Accuracy @25°C	Input Impedance
CT94-1	0-50.0 A	±2% of Reading ±0.2 A	302 K
mA	-3mA-27mA	±0.05%	$70.5 + \frac{0.8V}{\text{input current}}$
V	-1.3V-11.5V	±0.05%	302 K

Input 3 (Event Input)

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	500 max.
0-20 mA	0 mA	20-21 mA	500 max.
0-5 V	0 V	5-5.25 V	10K min.
1-5 V	0.9-1 V	5-5.25 V	10K min.
0-10 V	0 V	10-10.5 V	10K 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 : 1000 VAC
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 : 1.5 V 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
20 V	±0.1 V	25 mA	0.2 Vp-p	500 VAC
12 V	±0.6 V	40 mA	0.1 Vp-p	500 VAC
5 V	±0.25 V	80 mA	0.05 Vp-p	500 VAC

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. 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 Band High / Low Alarm, PV2 High / Low Alarm, PV1-PV2 High /Low Alarm, Sensor Break Alarm, Deviation High / Low Alarm, PV1 High / Low Alarm, PV1 or PV2 High /Low Alarm, Loop 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
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 ohms 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/ LC
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 to 50˚C
Storage Temperature : -40˚C to 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 66 mm(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 grams
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

Ordering Code

BTC-2500- □ □ □ □ □ □

Power Input
4: 90 - 264 VAC, 50 / 60 HZ
5: 11 - 26 VAC or VDC
9: Special Order

Signal Input
1: Standard Input
Input 1-Universal Input
Thermocouple: J, K, T, E, B, R, S, N, L
RTD: PT100 DIN, PT100 JIS
Current: 4 - 20mA, 0 - 20mA
Voltage: 0 - 1V, 0 - 5V, 1 - 5V, 0-10V
Input 2-CT: 0 - 50 Amp. AC
Current Transformer
Analog Input: 0 - 1V, 0 - 5V, 1 - 5V, 0 - 10V
Event Input (EI)
9: Special Order

Output 1
0: None
1: Relay rated 2A / 240VAC
2: Pulsed voltage to drive SSR, 5V / 30mA
3: Isolated 4 - 20mA / 0 - 20mA
4: Isolated 1 - 5V / 0 - 5V
5: Isolated 0 - 10V
6: Triac output 1A / 240VAC,SSR
C: Pulsed voltage to drive SSR, 14V / 40mA
9: Special order

Output 2 / Alarm 2
0: None
1: Form A relay 2A / 240VAC
2: Pulsed voltage to drive SSR, 5V / 30mA
3: Isolated 4 - 20mA / 0 - 20mA
4: Isolated 1 - 5V / 0 - 5V
5: Isolated 0 - 10V
6: Triac output, 1A / 240VAC, SSR
7: Isolated 20V / 25 mA DC Output Power Supply
8: Isolated 12V / 40 mA DC Output Power Supply
9: Isolated 5V / 80 mA DC Output Power Supply
C: Pulsed voltage to drive SSR, 14V / 40mA
A: Special order

Alarm 1
1: 5V Logic Output
9: Special order

Communications
0: None
1: RS-485 interface
2: RS-232 interface
3: Retransmit 4 - 20 mA / 0 - 20 mA
4: Retransmit 1 - 5V / 0 - 5V
5: Retransmit 0 - 10V
9: Special order

BTC-9300- □ □ □ □ □ □

Power Input
4: 90 - 264 VAC, 50 / 60 HZ
5: 11 - 26 VAC or VDC
9: Special Order

Signal Input
1: Standard Input
Input 1-Universal Input
Thermocouple: J, K, T, E, B, R, S, N, L
RTD: PT100 DIN, PT100 JIS
Current: 4 - 20 mA, 0 - 20 mA
Voltage: 0 - 1V, 0 - 5V, 1 - 5V, 0 - 10V
Input 2-CT: 0 - 50 Amp. AC
Current Transformer
Analog Input: 4-20mA, 0-20mA, 0 - 1V, 0 - 5V, 1 - 5V, 0 - 10V
Input 3-Event Input (EI)
9: Special Order

Output 1
0: None
1: Relay rated 2A / 240VAC
2: Pulsed voltage to drive SSR, 5V / 30mA
3: Isolated 4 - 20mA / 0 - 20mA
4: Isolated 1 - 5V / 0 - 5V
5: Isolated 0 - 10V
6: Triac output 1A / 240VAC,SSR
C: Pulsed voltage to drive SSR, 14V / 40mA
9: Special order

Output 2 / Alarm 2
0: None
1: Form A relay 2A / 240VAC
2: Pulsed voltage to drive SSR, 5V / 30mA
3: Isolated 4-20mA / 0-20mA
4: Isolated 1-5V / 0-5V
5: Isolated 0-10V
6: Triac output, 1A / 240VAC, SSR
7: Isolated 20V-25mA DC Output Power Supply
8: Isolated 12V-40mA DC Output Power Supply
9: Isolated 5V-80mA DC Output Power Supply
C: Pulsed voltage to drive SSR, 14V / 40mA
A: Special order

Alarm 1
0: None
1: Form A relay 2A / 240VAC
2: Form B relay 2A / 240VAC
9: Special order

Communications
0: None
1: RS-485 interface
2: RS-232 interface
3: Retransmit 4-20 mA / 0-20mA
4: Retransmit 1-5V / 0-5V
5: Retransmit 0-10V
9: Special order

BTC-8300 -
BTC-4300 - □ □ □ □ □ □ □

Power Input
4: 90-264 VAC, 50 / 60 HZ
5: 11-26 VAC or VDC
9: Special Order

Signal Input
1: Standard Input
Input 1-Universal Input
Thermocouple: J, K, T, E, B, R, S, N, L
RTD: PT100 DIN, PT100 JIS
Current: 4 - 20mA, 0 - 20mA
Voltage: 0 - 1V, 0 - 5V, 1 - 5V, 0 -1 0V
Input 2 - CT: 0 - 50 Amp. AC Current Transformer
Analog Input: 4 - 20mA, 0 - 20mA 0 - 1V, 0 - 5V, 1 - 5V, 0 - 10V
Input 3-Event Input (EI)
9: Special Order

Output 1
0: None
1: Relay rated 2A / 240VAC
2: Pulsed voltage to drive SSR, 5V / 30mA
3: Isolated 4 - 20mA / 0 - 20mA
4: Isolated 1- 5V / 0 - 5V
5: Isolated 0 -10V
6: Triac output 1A / 240VAC,SSR
C: Pulsed Voltage to drive SSR, 14V / 40mA
9: Special order

Output 2
0: None
1: Form A relay 2A / 240VAC
2: Pulsed voltage to drive SSR, 5V / 30mA
3: Isolated 4 - 20mA / 0-20mA
4: Isolated 1 - 5V / 0-5V
5: Isolated 0 - 10V
6: Triac output, 1A / 240VAC, SSR
7: Isolated 20V / 25mA DC Output Power Supply
8: Isolated 12V / 40mA DC Output Power Supply
9: Isolated 5V / 80mA DC Output Power Supply
C: Pulsed Voltage to drive SSR, 14V / 40mA
A: Special order

Alarm 1
0: None
1: Form C relay 2A / 240VAC
9: Special order

Alarm 2
0: None
1: Form A relay 2A / 240VAC
9: Special order

Communications
0: None
1: RS - 485 interface
2: RS - 232 interface
3: Retransmit 4 - 20mA / 0 - 20mA
4: Retransmit 1-5V / 0 - 5V
5: Retransmit 0 - 10V
9: Special order

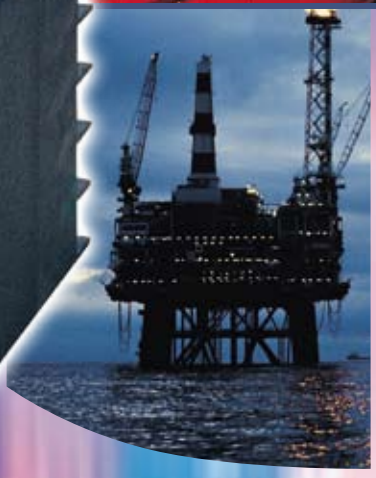
Accessories

CT94-1 = 0-50 Amp. AC Current Transformer
OM95-3 = Isolated 4-20mA / 0-20mA Analog Output Module
OM95-4 = Isolated 1 - 5V / 0-5V Analog Output Module
OM95-5 = Isolated 0 - 10V Analog Output Module
OM94-6 = Isolated 1A / 240VAC Triac Output Module (SSR)
OM94-7 = 14V / 40mA SSR Drive Module
DC94-1 = Isolated 20V / 25 mA DC Output Power Supply
DC94-2 = Isolated 12V / 40 mA DC Output Power Supply
DC94-3 = Isolated 5V / 80 mA DC Output Power Supply
CM94-1 = Isolated RS - 485 Interface Module
CM94-2 = Isolated RS - 232 Interface Module
CM94-3 = Isolated 4 - 20 mA / 0-20 mA Retransmission Module
CM94-4 = Isolated 1 - 5V / 0 - 5V Retransmission Module
CM94-5 = Isolated 0 - 10V Retransmission Module
CC94-1 = RS-232 Interface Cable (2M)
CC91-3 = Programming Port Cable

Related Products

SNA10A = Smart Network Adaptor for Third Party Software, converts 255 channels of RS-485 or RS-422 to RS-232 Network
SNA12A = Smart Network Adaptor for Programming Port to RS-232 interface
BC-Set = Configuration software

Auto-tune PID Temperature Controller



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
- SEL function allows to rearrange user menu
- UL/CSA/CE approval
- High performance with low cost

BTC-4100

BTC-7100

BTC-8100

BTC-9100

BrainChild

Overview

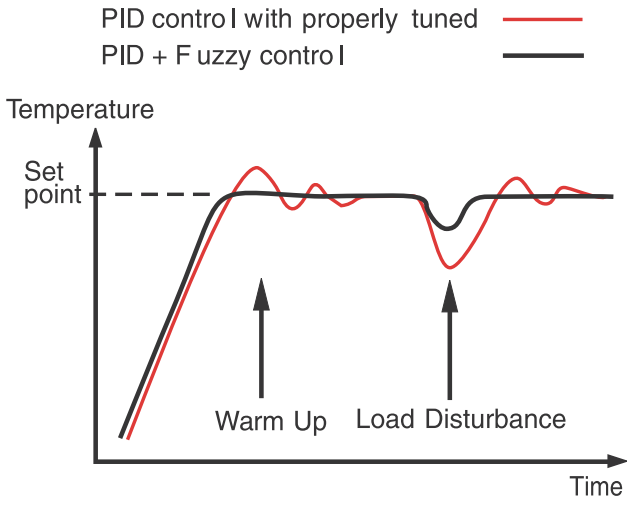
The Fuzzy Logic plus PID microprocessor-based controller series, incorporate two bright, easy to read 4-digit LED displays, indicating process value and set point value. The Fuzzy Logic technology enables a process to reach a predetermined set point in theshortest time, with the minimum of overshoot during power-up orexternal load disturbance.

BTC-9100 is a 1/16 DIN size panel mount controller. BTC-7100 is a 72X72 DIN size panel mount controller. BTC-8100 is a 1/8 DIN size panel mount controller and BTC-4100 is a 1/4 DIN size panel mount controller. These units are 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, or an alarm. Both outputs can select triac, 5V logic output, linear current or linear voltage to drive external device. There are six types of alarm plus a dwell timer can be configured for the third output. The units are fully programmable for PT100 and thermocouple types J, K, T, E, B, R, S, N, L with no need to modify the unit. The input signal is digitized by using a 18-bit A to D converter. Its fast sampling rate allows the unit to control fast processes.

Digital communications RS-485 or RS-232 (for BTC-9100, BTC-08100, BTC-4100) are available as an additional option. These options allow the units to be integrated with supervisory control system and software.

Aprogramming port is available for automatic configuration, calibration and testing without the need to access the keys on front panel.

By using proprietary Fuzzy modified PID technology, the control loop will minimize the overshoot and undershoot in a shortest time. The following diagram is a comparison of results with and without Fuzzy technology.



High Accuracy

The series are manufactured with custom designed ASIC (Application Specific Integrated Circuit) technology which contains a 18-bit A to D converter for high resolution measurement (true 0.1°F resolution for thermocouple and PT100) and a 15-bit D to A converter for linear current or voltage control output. The ASIC technology provides improved operating performance, low cost, enhanced reliability and higher density.

Fast Sampling Rate

The sampling rate of the input A to D converter reaches 5 times/second. The fast sampling rate allows this series to control fast processes.

Fuzzy Control

The function of Fuzzy control is to adjust PID parameters from time to time in order to make manipulation output value more flexible and adaptive to various processes. The results is to enable a process to reach a predetermined set point in the shortest time, with the minimum of overshoot and undershoot during power-up or external load disturbance.

Digital Communication

The units are equipped with RS-485 or RS-232 interface card to provide digital communication. By using the twisted pair wires there are at most 247 units can be connected together via RS-485 interface to a host computer.

Programming Port

A programming port is used to connect the unit to a pc for quick configuration, also can be connected to an ATE system for automatic testing & calibration.

Auto-tune

The auto-tune function allows the user to simplify initial setup for a new system. A clever algorithm is provided to obtain an optimal set of control parameters for the process, and it can be applied either as the process is warming up (cold start) or as the process has been in steady state (warm start).

Lockout Protection

According to actual security requirement, one of four lockout levels can be selected to prevent the unit from being changed abnormally.

Bumpless Transfer

Bumpless transfer allows the controller to continue to control by using its previous value as the sensor breaks. Hence, the process can be well controlled temporarily as if the sensor is normal.

Soft-start Ramp

The ramping function is performed during power up as well as any time the set point is changed. It can be ramping up or ramping down. The process value will reach the set point with a predetermined constant rate.

Digital Filter

A first order low pass filter with a programmable time constant is used to improve the stability of process value. This is particularly useful in certain application where the process value is too unstable to be read.

SEL Function

The units have the flexibility for user to select those parameters which are most significant to him and put these parameters in the front of display sequence. There are at most 8 parameters can be selected to allow the user to build his own display sequence.

Specifications

Power

90-250 VAC, 47-63 Hz, 12VA, 5W maximum
11-26 VAC / VDC, 12VA, 5W 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 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,
Sensor short for RTD input,
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.

Characteristics

Type	Range	Accuracy @25°C	Input Impedance
J	-120°C-1000°C (-184°F-1832°F)	±2°C	2.2MΩ
K	-200°C-1370°C (-328°F-2498°F)	±2°C	2.2MΩ
T	-250°C-400°C (-418°F-752°F)	±2°C	2.2MΩ
E	-100°C-900°C (-148°F-1652°F)	±2°C	2.2MΩ
B	0°C-1800°C (32°F-3272°F)	±2°C (200°C-1800°C)	2.2MΩ
R	0°C-1767.8°C (32°F-3214°F)	±2°C	2.2MΩ
S	0°C-1767.8°C (32°F-3214°F)	±2°C	2.2MΩ
N	-250°C-1300°C (-418°F-2372°F)	±2°C	2.2MΩ
L	-200°C-900°C (-328°F-1652°F)	±2°C	2.2MΩ
PT100 (DIN)	-210°C-700°C (-346°F-1292°F)	±0.4°C	1.3KΩ
PT100 (JIS)	-200°C-600°C (-328°F-1112°F)	±0.4°C	1.3KΩ
mV	-8mV - 70mV	±0.05%	2.2MΩ
mA	-3mA - 27mA	±0.05%	70.5Ω
V	-1.3V - 11.5V	±0.05%	650KΩ

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	500Ωmax.
0-20 mA	0 mA	20-21 mA	500Ωmax.
0-5 V	0 V	5-5.25 V	10 KΩmin.
1-5 V	0.9-1 V	5-5.25 V	10 KΩmin.
0-10 V	0 V	10-10.5 V	10 KΩmin.

Linear Output

Resolution : 15 bits
Output Regulation : 0.02 % for full load change
Output Settling Time : 0.1 sec. (stable to 99.9 %)
Isolation Breakdown Voltage : 1000 VAC
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 : 1.5 V rms
Insulation Resistance : 1000 Mohms min. at 500 VDC
Dielectric Strength : 2500 VAC for 1 minute

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,
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 : 2.4 ~ 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 : 4-20mA, 0-20mA, 0-5V, 1-5V, 0-10V
Resolution : 15 bits
Accuracy : ±0.05% of span ±0.0025%/°C
Load Resistance : 0-500 ohm (for current output)
10K ohm minimum (for voltage output)
Output Regulation : 0.01% for full load change

User Interface

Dual 4-digit LED Displays :
BTC-4100
Upper 0.55" (14mm)
Lower 0.4" (10 mm)

BTC-8100, BTC-7100, BTC-9100
Upper 0.4" (10 mm)
Lower 0.31" (8 mm)

Keypad : 4 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 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

Environmental & Physical

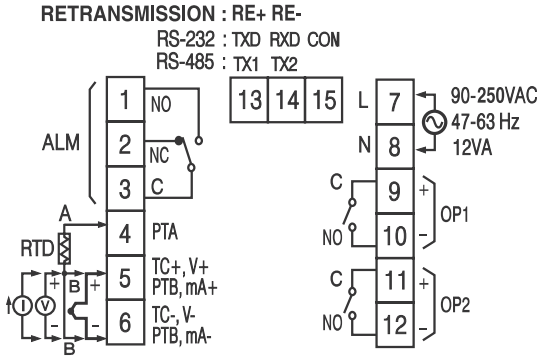
Operating Temperature : -10°C to 50°C
Storage Temperature : -40°C to 60°C
Humidity : 0 to 90 % RH (non-condensing)
Altitude : 2000m maximum
Pollution : Degree 2
Insulation Resistance : 20 Mohms min. (at 500 VDC)
Dielectric Strength : 2000 VAC, 50/60 Hz for 1 minute
Vibration Resistance : 10 - 55 Hz, 10 m/s² for 2 hours
Shock Resistance : 200 m/s² (20 g)
Moldings : Flame retardant polycarbonate
Dimensions :
BTC-4100 ---96mm(W) X 96mm(H) X 65 mm(D), 53 mm depth behind panel
BTC-7100 ---72mm(W) X 72mm(H) X 78.2 mm(D), 65 mm depth behind panel
BTC-8100 ---48mm(W) X 96mm(H) X 80mm(D), 65 mm depth behind panel
BTC-9100 ---48mm(W) X 48mm(H) X 116mm(D), 105 mm depth behind panel
Mounting:
BTC-4100 ---panel mount, cutout 92 X 92 (mm)
BTC-7100 ---panel mount, cutout 68 X 68 (mm)
BTC-8100 ---panel mount, cutout 45 X 92 (mm)
BTC-9100 ---panel mount, cutout 45 X 45 (mm)
Weight : BTC-4100 --- 250 grams
BTC-7100 --- 200 grams
BTC-8100 --- 210 grams
BTC-9100 --- 150 grams

Approval Standards

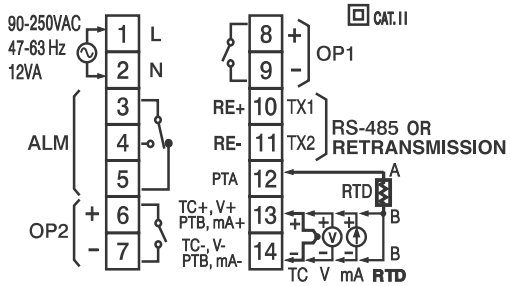
Safety : UL61010C-1
CSA C22.2 No. 24-93
EN61010-1 (IEC1010-1)
Protective Class :
IP65 front panel with additional option,
IP50 front panel without additional option,
all indoor use,
IP 20 housing and terminals with protective cover.
EMC: EN61326

Connection Diagrams

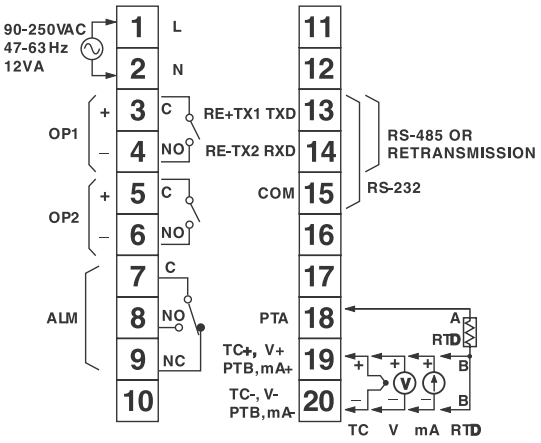
BTC-9100



BTC-7100



BTC-8100, BTC-4100



Ordering Code

BTC-9100 - □ □ □ □ □ □ □
BTC-8100 -
BTC-7100 -
BTC-4100 -

Power Input
4: 90 - 250 VAC, 50/60 HZ
5: 11 - 26 VAC or VDC
9: Special Order

Signal Input
1: Standard Input
Thermocouple: J, K, T, E, B, R, S, N, L
RTD: PT100 DIN, PT100 JIS
2: 0 - 60 mV
3: 0 - 1 V
4: 0 - 5 V
5: 1 - 5 V
6: 4 - 20 mA
7: 0 - 20 mA
8: 0 - 10V
9: Special Order

Output 1
0: None
1: Relay rated 2A/240VAC
2: Pulsed voltage to drive SSR, 5V/30mA
3: Isolated 4 - 20mA / 0 - 20mA
4: Isolated 1 - 5V / 0 - 5V
5: Isolated 0 - 10V
6: Triac output, 1A / 240VAC, SSR
C: Pulsed voltage to drive SSR, 14V/40mA
9: Special order

Options
0: Panel mount IP50 standard
1: Panel mount IP65 water resistant rubber installed
2: DIN Rail mount with IP50 (for BTC-9100 only)
3: DIN Rail mount with IP65 (for BTC-9100 only)

Communications
0: None
1: RS-485 interface
2: RS-232 interface(not available for BTC-7100)
3: Retransmit 4-20mA / 0-20mA
4: Retransmit 1-5V / 0-5V
5: Retransmit 0-10V
9: Special order

Alarm
0: None
1: Form C relay 2A/240VAC
9: Special order

Output 2
0: None
1: From A relay 2A/240VAC
2: Pulsed voltage to drive SSR, 5V/30mA
3: Isolated 4 - 20mA / 0 - 20mA
4: Isolated 1 - 5V / 0 - 5V
5: Isolated 0 - 10V
6: Triac output, 1A / 240VAC, SSR
7: Isolated 20V/25mA Transducer Power Supply
8: Isolated 12V/40mA Transducer Power Supply
9: Isolated 5V/80mA Transducer Power Supply
C: Pulsed voltage to drive SSR, 14V/40mA
A: Special order

Standard model without option
BTC-x100-4110000: power 90-250VAC, standard input thermocouple + PT100,
output 1 - relay, output 2 - none, alarm - none, communication - none, panel mount IP50 standard

Accessories

OM94-6 = Isolated 1A / 240VAC Triac Output Module (SSR)
OM94-7 = 14V / 40mA SSR Drive Module
OM96-3 = Isolated 4 - 20 mA / 0 - 20 mA Analog Output Module
OM96-4 = Isolated 1 - 5V / 0 - 5V Analog Output Module
OM96-5 = Isolated 0 - 10V Analog Output Module
CM94-1 = Isolated RS-485 Interface Module for BTC-7100 / 8100 / 4100
CM94-2 = Isolated RS-232 Interface Module for BTC-8100 / 4100
CM94-3 = Isolated 4-20mA / 0-20mA Retrans Module for BTC-8100 / 4100 / 7100
CM94-4 = Isolated 1-5V / 0-5V Retrans Module for BTC-8100 / 4100 / 7100
CM94-5 = Isolated 0-10V Retrans Module for BTC-8100 / 4100 / 7100
CM97-1 = Isolated RS-485 Interface Module for BTC-9100
CM97-2 = Isolated RS-232 Interface Module for BTC-9100
CM97-3 = Isolated 4-20mA / 0-20mA Retrans Module for BTC-9100
CM97-4 = Isolated 1-5V / 0-5V Retrans Module for BTC-9100
CM97-5 = Isolated 0-10V Retrans Module for BTC-9100
DC94-1 = Isolated 20V / 25mA DC Output Power Supply
DC94-2 = Isolated 12V / 40mA DC Output Power Supply
DC94-3 = Isolated 5V / 80mA DC Output Power Supply
CC94-1 = RS-232 Interface Cable (2M)
CC91-1 = Programming Port Cable
RK91-1 = Rail Mount kit for BTC-9100

Related Products

SNA10A = Smart Network Adaptor for third party software,
which converts 255 channels of RS-485 or RS-422
to RS-232 Network.
SNA12A = Smart Network Adaptor for programming port to
RS-232 interface.
BC-Set = Configuration Software

Low Cost

Auto-tune PID Temperature Controller

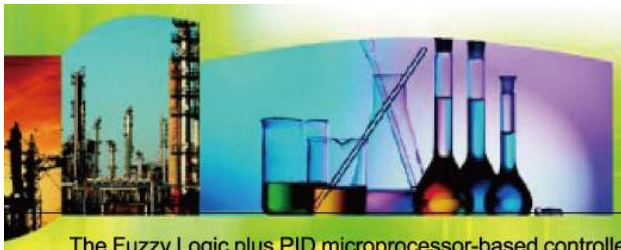
FEATURES

- 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

BrainChild

C21

C91



Overview

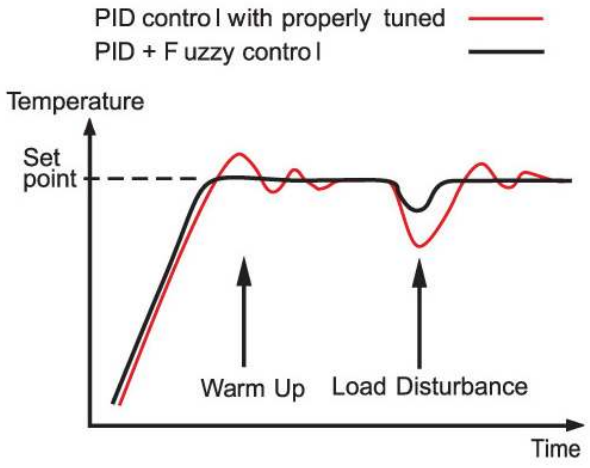
The Fuzzy Logic plus PID microprocessor-based controller series, incorporate a bright, easy to read 4-digit LED display, indicating process value or set point value. The Fuzzy Logic technology enables a process to reach a predetermined set point in the shortest time, with the minimum of overshoot during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

C21 is a 1/32 DIN size panel mount controller.C91 is a 1/16 DIN size panel mount controller. These units are 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. Both outputs can select triac, 5V logic output, linear current or linear voltage to drive external device. There are six types of alarm plus a dwell timer can be configured for the second output. The units are fully programmable for PT100 and thermocouple types J, K, T, E, B, R, S, N, L with no need to modify the unit. The input signal is digitized by using a 18-bit A to D converter. Its fast sampling rate allows the unit to control fast processes.

Digital communications RS-485 or RS-232 (for C21) are available as an additional option. These options allow the units to be integrated with supervisory control system and software.

A programmable port is available for automatic configuration, calibration and testing without the need to access the keys on front panel.

By using proprietary Fuzzy modified PID technology, the control loop will minimize the overshoot and undershoot in a shortest time. The following diagram is a comparison of results with and without Fuzzy technology.



High Accuracy

The series are manufactured with custom designed ASIC (Application Specific Integrated Circuit) technology which contains a 18-bit A to D converter for high resolution measurement (true 0.1°F resolution for thermocouple and PT100) and a 15-bit D to A converter for linear current or voltage control output. The ASIC technology provides improved operating performance, low cost, enhanced reliability and higher density.

Fast Sampling Rate

The sampling rate of the input A to D converter reaches 5 times/second. The fast sampling rate allows this series to control fast processes.

Fuzzy Control

The function of Fuzzy control is to adjust PID parameters from time to time in order to make manipulation output value more flexible and adaptive to various processes. The results is to enable a process to reach a predetermined set point in the shortest time, with the minimum of overshoot and undershoot during power-up or external load disturbance.

Digital Communication

The units are equipped with RS-485 or RS-232 interface card to provide digital communication. By using the twisted pair wires there are at most 247 units can be connected together via RS-485 interface to a host computer.

Programming Port

A programming port is used to connect the unit to a pc for quick configuration, also can be connected to an ATE system for automatic testing & calibration.

Auto-tune

The auto-tune function allows the user to simplify initial setup for a new system. A clever algorithm is provided to obtain an optimal set of control parameters for the process, and it can be applied either as the process is warming up (cold start) or as the process has been in steady state (warm start).

Lockout Protection

According to actual security requirement, one of four lockout levels can be selected to prevent the unit from being changed abnormally.

Bumpless Transfer

Bumpless transfer allows the controller to continue to control by using its previous value as the sensor breaks. Hence, the process can be well controlled temporarily as if the sensor is normal.

Soft-start Ramp

The ramping function is performed during power up as well as any time the set point is changed. It can be ramping up or ramping down. The process value will reach the set point with a predetermined constant rate.

Digital Filter

A first order low pass filter with a programmable time constant is used to improve the stability of process value. This is particularly useful in certain application where the process value is too unstable to be read.

Specifications

Power

90-250 VAC, 47-63 Hz, 10VA, 5W maximum
11-26 VAC / VDC, 10VA, 5W 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 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,
Sensor short for RTD input,
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.

Characteristics

Type	Range	Accuracy @25°C	Input Impedance
J	-120°C-1000°C (-184°F-1832°F)	±2°C	2.2MΩ
K	-200°C-1370°C (-328°F-2498°F)	±2°C	2.2MΩ
T	-250°C-400°C (-418°F-752°F)	±2°C	2.2MΩ
E	-100°C-900°C (-148°F-1652°F)	±2°C	2.2MΩ
B	0°C-1800°C (32°F-3272°F)	±2°C (200°C-1800°C)	2.2MΩ
R	0°C-1767.8°C (32°F-3214°F)	±2°C	2.2MΩ
S	0°C-1767.8°C (32°F-3214°F)	±2°C	2.2MΩ
N	-250°C-1300°C (-418°F-2372°F)	±2°C	2.2MΩ
L	-200°C-900°C (-328°F-1652°F)	±2°C	2.2MΩ
PT100 (DIN)	-210°C-700°C (-346°F-1292°F)	±0.4°C	1.3KΩ
PT100 (JIS)	-200°C-600°C (-328°F-1112°F)	±0.4°C	1.3KΩ
mV	-8mV - 70mV	±0.05%	2.2MΩ
mA	-3mA - 27mA	±0.05%	70.5Ω
V	-1.3V - 11.5V	±0.05%	650KΩ

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	500Ωmax.
0-20 mA	0 mA	20-21 mA	500Ωmax.
0-5 V	0 V	5-5.25 V	10 KΩmin.
1-5 V	0.9-1 V	5-5.25 V	10 KΩmin.
0-10 V	0 V	10-10.5 V	10 KΩmin.

Linear Output

Resolution : 15 bits
Output Regulation : 0.02 % for full load change
Output Settling Time : 0.1 sec. (stable to 99.9 %)
Isolation Breakdown Voltage : 1000 VAC
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 : 1.5 V rms
Insulation Resistance : 1000 Mohms min. at 500 VDC
Dielectric Strength : 2500 VAC for 1 minute

Alarm (Output 2)

Alarm 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 : 2.4 ~ 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 : 4-20mA, 0-20mA, 0-5V, 1-5V, 0-10V
Resolution : 15 bits
Accuracy : ±0.05% of span ±0.0025%/°C
Load Resistance : 0-500 ohm (for current output)
10K ohm minimum (for voltage output)
Output Regulation : 0.01% for full load change

User Interface

Single 4-digit LED Displays : 10 mm (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 - 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

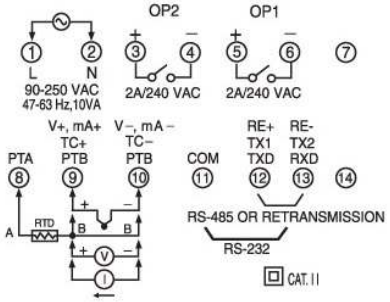
Environmental & Physical

Operating Temperature : -10°C to 50°C
Storage Temperature : -40°C to 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 :
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

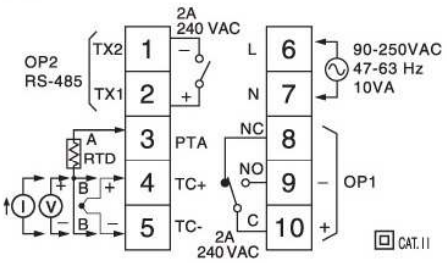
Approval Standards

Safety : UL61010C-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,
IP 20 housing and terminals
EMC: EN61326

C21



C91



Ordering Code

C21 - □ □ □ □ □ □
C91 -

Power Input
4: 90 - 250 VAC, 50/60 HZ
5: 11 - 26 VAC or VDC
9: Special Order

Signal Input
1: Standard Input
Thermocouple: J, K, T, E, B, R, S, N, L
RTD: PT100 DIN, PT100 JIS
2: 0 - 60 mV
3: 0 - 1 V
4: 0 - 5 V
5: 1 - 5 V
6: 4 - 20 mA
7: 0 - 20 mA
8: 0 - 10V
9: Special Order

Output 1
0: None
1: Relay rated 2A/240VAC
2: Pulsed voltage to drive SSR, 5V/30mA
3: Isolated 4 - 20mA / 0 - 20mA
4: Isolated 1 - 5V / 0 - 5V
5: Isolated 0 - 10V
6: Triac output 1A / 240VAC,SSR
C: Pulsed voltage to drive SSR, 14V/40mA
9: Special order

Output 2
0: None
1: Form A relay 2A/240VAC
2: Pulsed voltage to drive SSR, 5V / 30mA
3: Isolated 4 - 20mA / 0 - 20mA
4: Isolated 1 - 5V / 0 - 5V
5: Isolated 0 - 10V
6: Triac output, 1A / 240VAC, SSR
7: Isolated 20V/25mA transducer power supply
8: Isolated 12V/40mA transducer power supply
9: Isolated 5V/80mA transducer power supply
A: RS-485 interface (for C91)
C: Pulsed voltage to drive SSR, 14V/40mA
D: Retransmit 4-20mA / 0-20mA (for C91)
E: Retransmit 1-5V / 0-5V (for C91)
F: Retransmit 0-10V (for C91)
B: Special order

Communication (for C21 only)
0: None
1: RS-485 interface (for C21)
2: RS-232 interface (for C21)
3: Retransmit 4-20mA / 0-20mA (for C21)
4: Retransmit 1-5V / 0-5V (for C21)
5: Retransmit 0-10V (for C21)
9: Special order

Display Color
0: Red color
1: Green color

Standard model without option

Cx1 - 411000: power 90-250VAC, standard input thermocouple + PT100, output 1 - relay, output 2 - none, communication - none, red display

Accessories

OM94-6 = Isolated 1A / 240VAC Triac Output Module (SSR)
OM94-7 = 14V / 40mA SSR Drive Module
OM96-3 = Isolated 4 - 20 mA / 0 - 20 mA Analog Output Module
OM96-4 = Isolated 1 - 5V / 0 - 5V Analog Output Module
OM96-5 = Isolated 0 - 10V Analog Output Module
CM94-1 = Isolated RS-485 Interface Module for C21
CM94-2 = Isolated RS-232 Interface Module for C21
CM94-3 = Isolated 4-20mA / 0-20mA Retrans Module for C21
CM94-4 = Isolated 1-5V / 0-5V Retrans Module for C21
OM94-5 = Isolated 0 - 10V Retrans Module for C21
CM96-1 = Isolated RS-485 Interface Module for C91
DC94-1 = Isolated 20V / 25mA DC Output Power Supply
DC94-2 = Isolated 12V / 40mA DC Output Power Supply
DC94-3 = Isolated 5V / 80mA DC Output Power Supply
CC94-1 = RS-232 Interface Cable (2M)
CC91-1 = Programming port for C21
CC91-2 = Programming port for C91

Related Products

SNA10A = Smart network adaptor for Brainchild software *Data Acquisition Studio* or third party software, which converts 255 channels of RS-485 or RS-422 to RS-232 network

SNA12A = Smart network adapter for programming port to RS-232 interface

BC-Set = Configuration software

Data Acquisition Studio software = PC software for data logging

PC-E = RS-232/485 to Ethernet converter

PC-W = RS-232/422/485 x 2 + Ethernet x 1 converted to Ethernet wireless

1/16 DIN Microprocessor Based PID Controller BTC-9090

The BTC-9090 is a new generation miniature controller using the latest SMD technology. Assembly is fully automatic and the units are checked and configured by computer. Software has been refined over several years and offers a very logical menu structure and high noise immunity. Using an unique command called SEL, the user has some flexibility in which parameters are accessible in level 2 of the menu. This is of great value for users as it is easy to limit access to suit the application specifically.

With 4 digit resolution and fully programmable decimal point, the 9090 can be configured for linear voltage and current inputs and with the addition of a single module, with 4-20mA
control output. This is one of the most versatile units available.

Manual control of the output is possible and Offset and Shift functions allow process values to be readily corrected for instinct offsets and in-site calibrations.

FEATURES

- Full 4 digit display.
- Autotune PID.
- Input user selectable.
- 90-240 VAC supply.
- Ramp rate function.
- Timer function.
- SEL function.
- Optional 4-20 mA input.
- 4-20 mA control output version.
- Three level software access.
- Safety: UL, CSA
- EMC, LVD: CE

KEYPAD OPERATION

TOUCHKEYS	FUNCTION	DESCRIPTION
[Scroll]	Scroll Key	Advance the index display to the desired position. indexes advanced continuously and cyclically by pressing this keypad.
[Up]	Up Key	Increased the parameter.
[Down]	Down Key	Decreased the parameter.
[Return]	Return Key	Resets the controller to its normal status. Also stops auto-tuning, output percentage monitoring and manual mode operation.
Press [Scroll] longer than 6 secs.	Long Scroll	Allows more parameters to be inspected or changed.
Press [Auto] longer than 6 secs.	Auto-tuning	Executes auto-tuning function.
Press [Scroll] and [Auto]	Output Percentage Monitoring	Allows the set point display to indicate the control output value.
Press [Scroll] and [Auto] longer than 6 secs.	Manual Mode Execution	Allows the controller to enter the manual mode.

RANGE AND ACCURACY OF INPUTS

IN	Sensor	Input Type	Range (°F)	Accuracy (°F)	Range (°C)	Accuracy
0	J	Iron-Constantan	-58 to 1830°F	±3.6°F	-50 to 999°C	±2°C
1	K	Chromel-Alumel	-58 to 2500°F	±3.6°F	-50 to 1370°C	±2°C
2	T	Copper-Constantan	-454 to 752°F	±3.6°F	-270 to 400°C	±2°C
3	E	Chromel-Constantan	-58 to 1382°F	±3.6°F	-50 to 750°C	±2°C
4	B	Pt30%RH/Pt6%RH	572 to 3272°F	±5.4°F	300 to 1800°C	±3°C
5	R	Pt13%RH/Pt	32 to 3182°F	±3.6°F	0 to 1750°C	±2°C
6	S	Pt10%RH/Pt	32 to 3182°F	±3.6°F	0 to 1750°C	±2°C
7	N	Nicrosil-Nisil	-58 to 2372°F	±3.6°F	-50 to 1300°C	±2°C
8	RTD	PT100 ohms (DIN)	-328 to 752°F	±0.72°F	-200 to 450°C	±0.4°C
9	RTD	Pt100 ohms (JIS)	-328 to 752°F	±0.72°F	-200 to 450°C	±0.4°C
10	Linear	-10mV to 60mV	-1999 to 9999	±0.05%	-1999 to 9999	±0.05%

SPECIFICATIONS

INPUT

Thermocouple (T/C): type J, K, T, E, B, R, S, N.
RTD: PT100 ohm RTD (DIN 43760/BS1904 or JIS)
Linear: -10 to 60mV, configurable input attenuation.
Range: User configurable, refer to Table above.
Accuracy: Refer to Table above
Cold Junction Compensation: 0.1°C / °C ambient typical.
Sensor Break Protection: Protection mode configurable.
External Resistance: 100 ohms max.
Normal Mode Rejection: 60dB
Common Mode Rejection: 120dB
Sample Rate: 3 times / second

CONTROL

Proportion Band. 0-100% of SPAN
Reset (Integral): 0-3600 seconds
Rate (Derivative): 0-1000 seconds
Ramp Rate: 0-2000°C / Hour (0-3600°F / Hour)
Dwell: 0-3600 minutes
Anti-Reset Windup: Inhibit integral action outside P band
ON-OFF: With adjustable hysterisis (0-20% of SPAN)
Cycle Time: 0-120 seconds
Control Action: Direct (for cooling) and reverse (for heating)

INDICATION

Process Display: 0.4” red LED, 4 digits
Setpoint Display: 0.3” green LED, 4 digits
Status Indicator: Control-green LED, Alarm-red LED

POWER

Rating: 90-240VAC
50/60Hz
Consumption: Less than 5VA

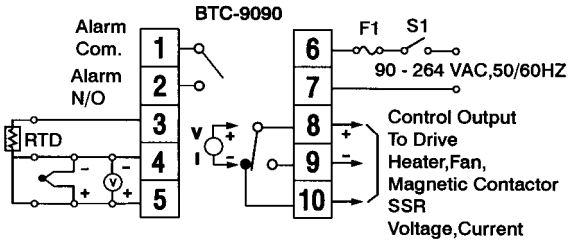
ENVIRONMENTAL & PHYSICAL

Operating Temperature: -10 to 50°C
Humidity: 0 to 90% RH (non-condensing)
Insulation: 20M ohms min. (500VDC)
Breakdown: AC2000V, 50/60Hz, 1 minute
Vibration: 10-55Hz, amplitude 1mm 200 m/
Shock: s^2 (20g)
Weight: 170 grams

DIMENSIONS

H 48mm (1.89”)
W 48mm (1.89")
D 94mm (3.7")
Depth behind panel 86mm (3.4")
Panel cutout 45 X 45mm (1.77" x 11.77")

CONNECTION DIAGRAM



ORDERING INFORMATION

Model No. □ □ □ □ □ □ □ □ □
(1) (2) (3) (4) (5) (6) (7) (8)

(1) Power Input

4	90-240VAC
5	20-32VAC-VDC
9	Other

(2) Signal Input

1	0 - 5V	3	PT100 DIN	5	TC	7	0 - 20mA
8	0 - 10V						

(3) Range Code

1	Configurable
9	Other

(4) Control Mode

3	PID / ON-OFF Control

(5) Output 1 Option

0	None
1	Relay rated 3A / 240VAC resistive
2	SSR Drive rated 20mA / 24V
3	4~20mA linear, max load 500 ohms (Module OM93-1)
4	0~20mA, linear, max. load 500 ohms (Module OM93 -2)
5	0-10V linear, min. impedance 500K ohms (Module OM93-3)
9	Other

(6) Output 2 Option

0	None

(7) Alarm Option

0	None
1	Relay rated 2A / 240VAC resistive
9	Other

(8) Communication

0	None

Temperature / Process Controllers & Programmers

PID with Time / Temperature Profiling Controllers

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)
After event 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 & 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

Overview

The Fuzzy Logic plus PID microprocessor-based profiling controller series, 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.

P91 is a 1/16 DIN size panel mount profiling controller. It can also be used for rail mount by adding a rail mount kit. P41 is a 1/4 DIN size panel mount profiling controller. These units are 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 event output or an alarm. Both outputs can select triac, logic output, linear current or linear voltage to drive external device. The units are fully programmable for PT100 and thermocouple types J, K, T, E, B, R, S, N, L, C, P with no need to modify the unit. The input signal is digitized by using a 18-bit A to D converter. Its fast sampling rate allows the unit to control fast processes.

There are more functions than the heating and cooling control could be configured for the controller outputs, these include: up tp three alarm outputs, up to three event outputs and up to two analog retransmission outputs.

Digital communications RS-485 or RS-232 are available as an additional option. These options allow the units to be integrated with supervisory control system and software.

A programming port is available for automatic configuration, calibration and testing without the need to access the keys on front panel.

By using proprietary Fuzzy modified PID technology, the control loop will minimize the overshoot and undershoot in a shortest time. The following diagram is a comparison of results with and without Fuzzy technology.

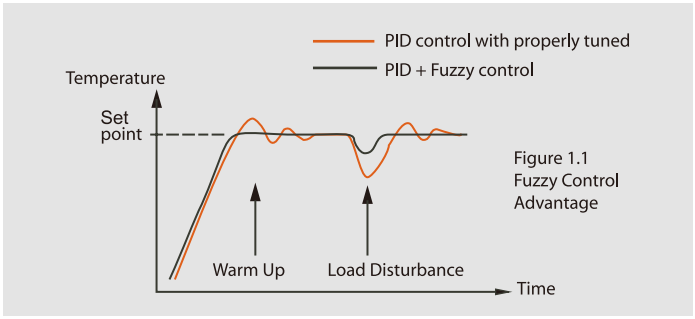


Figure 1.1
Fuzzy Control Advantage

The series can be configured as a single set point controller (static mode) or a ramp and dwell profiling controller (profile mode). The profile mode feature allows the user to program up to 9 profiles of up to 64 free-format (ramp, dwell, jump or end) segments each. The total segments available for the product is 288 segments
The profiling controllers contain the following features:

Flexible Configuration of Program

There are up to 64 segments can be defined for a profile. Each segment can be configured as a ramp or a dwell (soak) segment or defining a repeat number of cycles at arbitray location within the profile and finally terminated by an end segment. The user can edit a currently running profile.

Maximum Capacity of Program

There are at most 9 profiles can be defined and 288 segments totally available for all profiles. The profiles are divided into three kinds of length.. The short length profile contains 16 segments, the medium length profile contains 32 segments while the long length profile contains 64 segments at most.

Event Input

The event input feature allows the user to select one of eight functions:
enter profile run mode, enter profile hold mode, abort profile mode, enter manual mode, perform failure transfer, enter off mode, advance to the next segment and select second set of PID values.

Programmable Event Outputs

Up to three relays are configurable for event outputs and the state of each output can be defined for each segment and end of profile.

Analog Retransmission

The output 4 and output 5 (P41 only) of the products can be equipped with anolog output module. The output can be configured for transmitting the process value as well as set point value.

High Accuracy

The series are manufactured with custom designed ASIC(Application Specific Integrated Circuit) technology which contains a 18-bit A to D converter for high resolution measurement (true 0.1°F resolution for thermocouple and PT100) and a 15-bit D to A converter for linear current or voltage control output. The ASIC technology provides improved operating performance, low cost, enhanced reliability and higher density.

Fast Sampling Rate

The sampling rate of the input A to D converter reaches 5 times/second. The fast sampling rate allows this series to control fast processes.

Fuzzy Control

The function of Fuzzy control is to adjust PID parameters from time to time in order to make manipulation output value more flexible and adaptive to various processes. The results is to enable a process to reach a predetermined set point in the shortest time, with the minimum of overshoot and undershoot during power-up or external load disturbance.

Digital Communication

The units are equipped with RS-485 or RS-232 interface card to provide digital communication. By using the twisted pair wires there are at most 247 units can be connected together via RS-485 interface to a host computer.

Programming Port

A programming port is used to connect the unit to a hand-held programmer or a PC for quick configuration, also can be connected to an ATE system for automatic testing & calibration.

Auto-tune

The auto-tune function allows the user to simplify initial setup for a new system. A clever algorithm is provided to obtain an optimal set of control parameters for the process, and it can be applied either as the process is warming up (cold start) or as the process has been in steady state (warm start).

Lockout Protection

According to actual security requirement, a password is provided to prevent the unit from being changed abnormally.

Bumpless Transfer

Bumpless transfer allows the controller to continue to control by using its previous value as the sensor breaks. Hence, the process can be well controlled temporarily as if the sensor is normal.

Digital Filter

A first order low pass filter with a programmable time constant is used to improve the stability of process value. This is particularly useful in certain application where the process value is too unstable to be read.

SEL Function

The units have the flexibility for user to select those parameters which are most significant to him and put these parameters in the home page. There are at most 8 parameters can be selected to allow the user to build his own display sequence.

Connection Diagrams

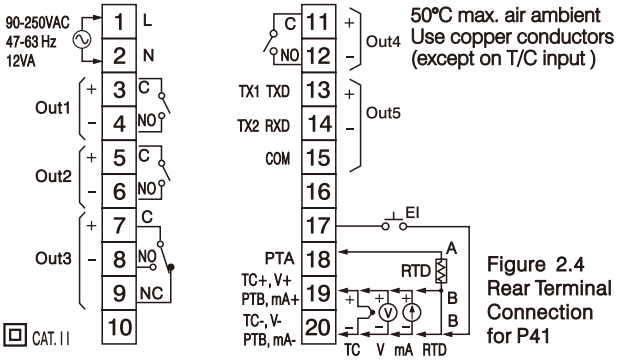


Figure 2.4
Rear Terminal
Connection
for P41

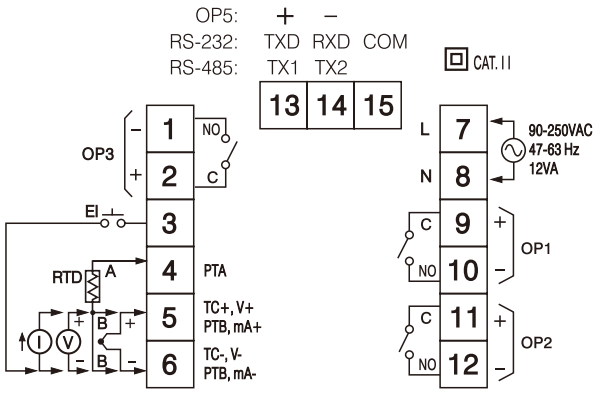


Figure 2.5
Rear Terminal
Connection
for P91

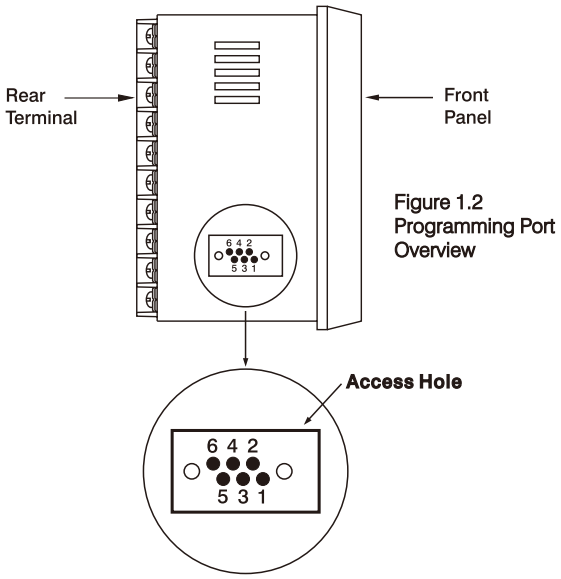
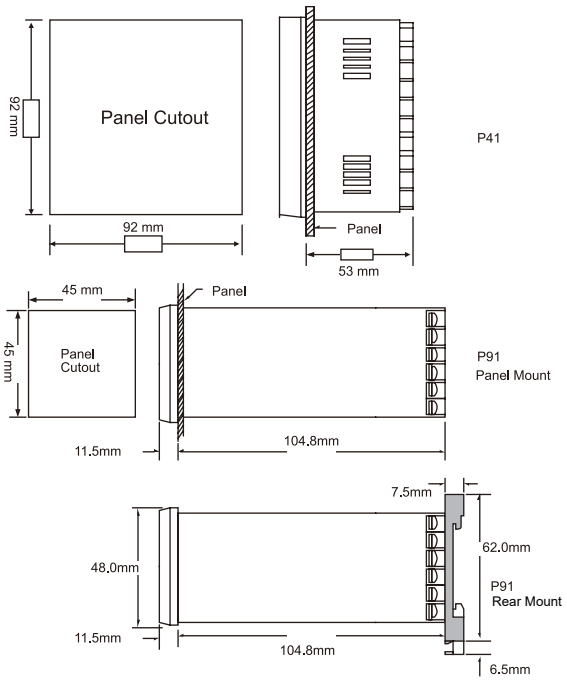


Figure 1.2
Programming Port
Overview

A special connector can be used to touch the programming port which is connected to a PC for automatic configuration, also can be connected to an ATE system for automatic calibration and testing.

The programming port is used for off-line automatic setup and testing procedures only. Don't attempt to make any connection to these pins when the unit is used for a normal control purpose.

Mounting Dimensions



Specifications

Power

90 ~ 250 VAC, 47 63 Hz, 12VA, 5W maximum
11 ~ 26 VAC / VDC, 12VA, 5W maximum

Input

Resolution : 18 bits
Sampling Rate : 5 times / second
Maximum Rating : -2 VDC minimum, 12 VDC maximum
(1 minute for mA input)
Temperature Effect : A1.5uV/ ℃ for all inputs except mA input
A3.0uV/ ℃ for mA input
Sensor Lead Resistance Effect :
T/C: 0.2uV/ohm
3-wire RTD: 2.6 ℃/ohm of resistance difference of two leads
2-wire RTD: 2.6 ℃/ohm of resistance sum of two leads
Burn-out Current: 200 nA
Common Mode Rejection Ratio (CMRR): 120dB
Normal Mode Rejection Ratio (NMRR): 55dB
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 0.25V 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.

Characteristics:

Type	Range	Accuracy @ 25°C	Input Impedance
J	-120°C~1000°C (-184°F~1832°F)	±2°C	2.2 MΩ
K	-200°C~1370°C (-328°F~2498°F)	±2°C	2.2 MΩ
T	-250°C~ 400°C (-418°F~752°F)	±2°C	2.2 MΩ
E	-100°C~ 900°C (-148°F~1652°F)	±2°C	2.2 MΩ
B	0°C~ 1800°C (32°F~3272°F)	±2°C (200°C~1800°C)	2.2 MΩ
R	0°C~ 1767.8°C (32°F~3214°F)	±2°C	2.2 MΩ
S	0°C~ 1767.8°C (32°F~3214°F)	±2°C	2.2 MΩ
N	-250°C~ 1300°C (-418°F~2372°F)	±2°C	2.2 MΩ
L	-200°C~ 900°C (-328°F~ 1652°F)	±2°C	2.2 MΩ
C	0°C~ 2315°C (32°F~ 4199°F)	±2°C	2.2 MΩ
P	0°C~ 1395°C (32°F~ 2543°F)	±2°C	2.2 MΩ
PT100 (DIN)	-210°C~ 700°C (-346°F~ 1292°F)	±0.4°C	1.3 MΩ
PT100 (JIS)	-200°C~ 600°C (-328°F~ 1112°F)	±0.4°C	1.3 MΩ
mV	-8mV~70mV	±0.05 %	2.2 MΩ
mA	-3mA~27mA	±0.05 %	70.5 MΩ
V	-1.3V~11.5V	±0.05 %	650 KΩ

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	Span Tolerance
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.

Linear Output

Resolution : 15 bits
Output Regulation : 0.02 % for full load change
Output Settling Time : 0.1 sec. (stable to 99.9 %)
Isolation Breakdown Voltage : 1000 VAC
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 : 1.5 V 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
20 V	±1 V	25 mA	0.2 Vp-p	500 VAC
12 V	±0.6 V	40 mA	0.1 Vp-p	500 VAC
5 V	±0.25 V	80 mA	0.05 Vp-p	500 VAC

Alarm

Alarm Relay : Form C 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, 0-5V, 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 ohms 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
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 to 50°C
Storage Temperature : -40°C to 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 : 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 : UL61010C-1
CSA C22.2 No.24-93
EN61010-1 (IEC1010-1)

Protective Class :

IP65 for panel with additional option
IP50 for panel without additional option
IP20 for terminals and housing with protective cover.
All indoor use.

EMC: EN61326

Ordering Code

P41- □ □ □ □ □ □ □ □
P91- □ □ □ □ □ 0 □ □

Power Input
4: 90 - 250 VAC, 47-63 Hz
5: 11 - 26 VAC or VDC, SELV, Limited Energy

Signal Input
1: Standard Input
Thermocouple:
J, K, T, E, B, R, S, N, L, C, P
RTD: PT100 DIN, PT100 JIS
Voltage: 0-60mV
5: 0-10V, 0-1V, 0-5V, 1-5V
6: 0-20/4-20 mA
9: Special Order

Output 1
0: None
1: Relay rated 2A/240VAC
2: Pulsed voltage to drive SSR, 5V/30mA
3: Isolated 4 - 20mA / 0 - 20mA
4: Isolated 1 - 5V / 0 - 5V/0 - 10V
6: Triac output 1A / 240VAC,SSR
C: Pulsed voltage to drive SSR, 14V/40mA
9: Special order

Output 2
0: None
1: Relay rated 2A/240VAC
2: Pulsed voltage to drive SSR, 5V/30mA
3: Isolated 4 - 20mA / 0 - 20mA
4: Isolated 1 - 5V / 0 - 5V/0 - 10V
6: Triac output 1A / 240VAC,SSR
7: Isolated 20V/25mA transducer power supply
8: Isolated 12V/40mA transducer power supply
A: Isolated 5V/80mA transducer power supply
C: Pulsed voltage to drive SSR, 14V/40mA
9: Special order

Output 3
0: None
1: Relay rated 2A/240VAC
2: Pulsed voltage to drive SSR, 5V/30mA
6: Triac output 1A / 240VAC,SSR
7: Isolated 20V/25mA transducer power supply
8: Isolated 12V/40mA transducer power supply
A: Isolated 5V/80mA transducer power supply
C: Pulsed voltage to drive SSR, 14V/40mA
9: Special order

Output 4
0: None
1: Relay rated 2A/240VAC
2: Pulsed voltage to drive SSR, 5V/30mA
3: Retransmit 4 - 20mA / 0 - 20mA
4: Retransmit 1 - 5V / 0 - 5V/0 - 10V
6: Triac output 1A / 240VAC,SSR
7: Isolated 20V/25mA transducer power supply
8: Isolated 12V/40mA transducer power supply
A: Isolated 5V/80mA transducer power supply
C: Pulsed voltage to drive SSR, 14V/40mA
9: Special order

Output 5
0: None
3: Retransmit 4 - 20mA / 0 - 20mA
4: Retransmit 1 - 5V / 0 - 5V/0 - 10V
7: Isolated 20V/25mA transducer power supply
8: Isolated 12V/40mA transducer power supply
A: Isolated 5V/80mA transducer power supply
D: Isolated RS-485 interface
E: Isolated RS-232 interface

Options
0: Panel mount IP50 standard
1: Panel mount IP65 water resistant rubber installed
2: DIN rail mount with IP50 (for P91 only)
3: DIN rail mount with IP65 (for P91 only)




Accessories

OM94-6 = Isolated 1A / 240VAC Triac Output Module (SSR)
OM94-7 = 14V / 40mA SSR Drive Module
OM98-3 = Isolated 4 - 20 mA / 0 - 20 mA Analog Output Module
OM98-5 = Isolated 0 -10V Analog Output Module
CM94-1 = Isolated RS-485 Interface Module for P41 Output 5
CM94-2 = Isolated RS-232 Interface Module for P41 Output 5
CM94-3 = Isolated 4-20mA/0-20mA Retrans Module for P41 Output 5
CM94-5 = Isolated 0-10V Retrans Module for P41 Output 5
CM97-1 = Isolated RS-485 Interface Module for P91 Output 5
CM97-2 = Isolated RS-232 Interface Module for P91 Output 5
CM97-3 = Isolated 4-20mA/0-20mA Retrans Module for P91 Output 5
CM97-5 = Isolated 0-10V Retrans Module for P91 Output 5
DC94-1 = Isolated 20V/25mA DC Output Power Supply
DC94-2 = Isolated 12V/40mA DC Output Power Supply
DC94-3 = Isolated 5V/80mA DC Output Power Supply
DC97-1 = Isolated 20V/25mA DC Output Power Supply for P91 Output 5
DC97-2 = Isolated 12V/40mA DC Output Power Supply for P91 Output 5
DC97-3 = Isolated 5V/80mA DC Output Power Supply for P91 Output 5
CC94-1 = RS-232 Interface Cable (2M)
CC91-1 = Programming Port Cable
RK91-1 = Rail Mount kit for BTC-9100 / P91
DC21-1 = Isolated 20V/25mA DC Output Power Supply for P41 Output 5
DC21-2 = Isolated 12V/40mA DC Output Power Supply for P41 Output 5
DC21-3 = Isolated 5V/80mA DC Output Power Supply for P41 Output 5

Related Products

SNA10A = Smart network adaptor for Brainchild software *DAQ Studio* or third party software, which converts 255 channels of RS-485 or RS-422 to RS-232 network.
SNA12A = Smart network adapter for programming port to RS-232 interface
BC-Set = Configuration software
DAQ Studio software = PC software for data logging
PC-E = RS-232/485 to Ethernet converter
PC-W = RS-232/422/485 x 2 + Ethernet x 1 converted to Ethernet wireless

L41 / L91 Temperature Limit Controller

L41

L91

CE SA FM APPROVED UL LISTED RoHS

The L41 / L91 is a microprocessor based specially designed limit controller to protect the equipment from high temperature and low temperature. A latched relay cuts power to the process if safe values are exceeded. These units must be reset before the process continues. The temperature controller takes an input from the universal input which is fully programmable for PT100, thermocouple types J, K, T, E, B, R, S, N, L, C, P and 0~60mV. The controller equipped with 2 Amp form C relay as limit control output and equipped with the optional RS-232 or RS-485 communication, retransmission output and transmitter power supply.

Features

- Fastest Sampling Rate of 200 msec
- Universal Input
- High or Low or High / Low Limit
- Normal / Latching Alarm Output
- Limit Annunciator
- Remote Reset / Remote Lock via Event Input
- PV /SP Retransmission
- Connect with HMI for Alarm Monitoring
- Network up to 247 Controllers on RS-485 (Modbus Protocol)
- FM, UL, CSA, CE, RoHS, REACH Approval
- Available in ¼ DIN and 1/16 DIN Size

Specifications

Specification	L41	L91
Power Supply	90-250 VAC, 47-63 Hz, 11-26 VAC/VDC, SELV, Limited Energy	
Power Consumption	10VA, 5W Maximum	
Over Voltage Category	II	
Signal Input		
Type	Thermocouple: J, K, T, E, B, R, S, N, L, P(L41 only), C(L41 only); RTD: PT100 DIN, PT100 JIS; mV: 0~60 mV; Current: 0~20mA; Voltage: 0~1 V, 0~10V	
Resolution	18 Bits	
Sampling Rate	5 Times / Second (200 msec)	

Input Characteristics	Type	Range	Accuracy @ 25° C	Input Impedance
	J	-120° C to 1000° C (-184° F to 1832° F)	± 2° C	2.2 MΩ
	K	-200° C to 1370° C (-328° F to 2498° F)	± 2° C	2.2 MΩ
	T	-250° C to 400° C (-418° F to 752° F)	± 2° C	2.2 MΩ
	E	-100° C to 900° C (-148° F to 1652° F)	± 2° C	2.2 MΩ
	B	0° C to 1820° C (- 32° F to 3308° F)	± 2° C (200° C to 1800° C)	2.2 MΩ
	R	0° C to 1767.8° C (- 32° F to 3214° F)	± 2° C	2.2 MΩ
	S	0° C to 1767.8° C (- 32° F to 3214° F)	± 2° C	2.2 MΩ
	N	-250° C to 1300° C (-418° F to 2372° F)	± 2° C	2.2 MΩ
	L	-200° C to 900° C (-328° F to 1652° F)	± 2° C	2.2 MΩ
	P (L41 only)	0° C to 1395° C (32° F to 2543° F)	± 2° C	2.2 MΩ
	C (L41 only)	0° C to 2315° C (32° F to 4199° F)	± 2° C	2.2 MΩ
	PT100(DIN)	-210° C to 700° C (-346° F to 1292° F)	± 0.4° C	1.3 KΩ
	PT100(JIS)	-200° C to 600° C (-328° F to 1112° F)	± 0.4° C	1.3 KΩ
	mV	-8mV to 70mV	± 0.05%	2.2 MΩ
	mA	-3mA to 27mA	± 0.05%	L41: 70.5 Ω, L91: 100Ω
	VDC	-1.3VDC to 11.5VDC	± 0.05%	L41: 302 KΩ, L91: 510 KΩ

Temperature Effect	1.5μV /° C
Sensor Lead Resistance Effect	**Thermocouple:** 0.2 μV /° Ω **3-wire RTD:** 2.6° C /Ω of Difference of Resistance of two leads **2-wire RTD:** 2.6° C /Ω of Sum of Resistance of two leads
Burn-out Current	200nA
CMRR	120 dB
NMRR	55dB
Sensor Break Detection	Sensor open for Thermocouple, RTD, mV inputs, Below 1mA for 4 to 20mA, Below 0.25V for 1 to 5V
Sensor Break Response Time	Within 4 seconds for TC, RTD and mA inputs, 0.1 second for 4-20 mA and 1-5V inputs

Specifications

Specification	L41		L91	
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 Ω			
Triac Output	Rating: 1A / 240 VAC, Inrush current: 20A for 1 cycle, Minimum Load Current: 50 mA rms, Max. Off-state Leakage: 3 mA rms, Max. On-state Voltage: 1.5 V rms, Insulation Resistance: 1000 MΩ min. at 500 VDC, Dielectric Strength: 2500 VAC for 1 minute			
Limit Control Function	High Limit, Low limit and High / Low Limit programmable			
Alarm Function	Process Value High, Process Value Low			
Alarm Mode	Normal, Latching			
Transmitter Power Supply (Output 2)				
Transmitter Power Supply Output Characteristics	Type	Tolerance	Maximum Output Current	Ripple Voltage	Isolation Barrier
	20V	± 1V	25mA	0.2Vp-p	500 VAC
	12V	± 0.6V	40mA	0.1Vp-p	500 VAC
	5V	± 0.25V	80mA	0.05Vp-p	500 VAC
Digital Filter				
Function	First Order			
Time Constant	0, 0.2, 0.5, 1, 2, 5, 10, 20, 30, 60 Seconds, Programmable			
Event Input				
Logic Low	-10V minimum, 0.8V maximum			
Logic High	2V minimum, 10V maximum			
Event Input Functions	Remote reset, remote lockout			
Data Communication				
Interface	RS-485 or RS-232			
Protocol	Modbus RTU (Slave Mode)			
Address	1 to 247			
Baud Rate	2.8KBPS to 115.2KBPS			
Parity Bit	None, Even or Odd			
Stop Bit	1 or 2 Bits			
Data Length	7 or 8 Bits			
Communication Buffer	50 Bytes			
Analog Retransmission				
Output Signal	4 - 20mA, 0 - 20 mA, 0 - 10VDC, 0 - 5VDC, 1 - 5VDC			
Resolution	15 Bits			
Accuracy	± 0.05% of Span ± 0.0025% / ° C			
Load Resistance	0 to 500Ω for current output, 10KΩ minimum for Voltage Output			
Output Regulation	0.01% for full load change			
Output Setting Time	0.1 second (stable to 99.9%)			
Isolation Breakdown	1000VAC min			

Specifications

Specification	L41	L91
Analog Retransmission		
Integral Linearity Error	± 0.005% of span	
Temperature Effect	± 0.0025% of span / ° C	
Saturation Low	0mA or 0VDC	
Saturation High	22.2mA or 5.55V, 11.1V min	
Linear Output Ranges	0 - 22.2mA (0 - 20mA / 4 - 20mA), 0 - 5.55VDC (0 - 5VDC / 1 - 5VDC), 0 - 11.1VDC (0 - 10VDC)	
User Interface		
Keypad	4 Keys	
Display Type	4 Digit LCD Display	
No of Display	2	1
Upper Display Size	0.55”（14mm)	0.4”（10mm)
Lower Display Size	0.55”（14mm)	N.A.
Environmental and Physical Specifications		
Operating Temperature	-10° C to 50° C	
Storage Temperature	-40° C to 60° C	
Humidity	0 to 90 % RH (Non - Condensing)	
Altitude	2000 Meters Maximum	
Pollution	Degree II	
Insulation Resistance	20MΩ Minimum (@500V DC)	
Dielectric Strength	2000VAC, 50/60 Hz for 1 Minute	
Vibration Resistance	10 to 55 Hz, 10m/s2 for 2 Hours	
Shock Resistance	200 m/s2(20g)	
Housing	Flame Retardant Polycarbonate	
Mounting	Panel Mounting	
DIN Size	1 / 4	1/16
Dimensions (W*H*D) (mm)	96*96*65 mm	48*48*94 mm
Mounting (W*H) (mm)	92*92 mm	45*45 mm
Depth behind Panel	53 mm	86 mm
Weight (grams)	250 grams	150 grams
Approval Standards		
Safety	FM Class 3545 (Oct. 1998), UL61010C-1, CSA C22.2 No. 24-93, EN61010-1 (IEC1010-1), RoHS, REACH	
Protective Class	IP65 for panel with additional option, IP50 for panel without additional option, IP20 for terminals and housing with protective cover. All indoor use	IP30 front panel, indoor use, IP20 housing and terminals (with protective cover)
EMC	EN61326	

L41 Ordering Code

L41 – □ □ □ □ □ □

Power Input

4: 90-250 VAC, 47-63 HZ
5: 11-26 VAC or VDC,
SELV, Limited Energy

Signal Input

1: Standard Input
Thermocouple: J, K, T, E, B, R, S, N, L, C, P
RTD: PT100 DIN, PT100 JIS
mV: 0~60 mV
2: Voltage: 0-1 V
3: Voltage: 0-10 V
4: Current: 0-20mA
5: Voltage: 0-5 V
9: Special Order

Output 1

0: None
1: Form C relay rated 2A / 240VAC
2: Pulsed voltage to drive SSR, 5V / 30mA
6: Triac Output 1A / 240VAC, SSR
C: Pulsed voltage to drive SSR, 14V / 40mA
9: Special Order

Output 2

0: None
1: Form C Relay 2A / 240VAC
2: Pulsed voltage to drive SSR, 5V / 30mA
6: Triac Output, 1A / 240VAC, SSR
7: Isolated 20V / 25mA DC Output Power Supply
8: Isolated 12V / 40mA DC Output Power Supply
9: Isolated 5V / 80mA DC Output Power Supply
C: Pulsed voltage to drive SSR, 14V / 40mA
H: Special Order

Communication

0: None
1: RS-485 Interface
2: RS-232 Interface
3: Retransmit 4-20mA / 0-20mA
4: Retransmit 1-5V / 0-5V
5: Retransmit 0-10V
9: Special Order

Options

0: IP50 Standard
1: IP65 Water Resistant Rubber Installed

L91 Ordering Code

L91 – □ □ □ □

Power Input

4: 90-250 VAC, 47-63 HZ
5: 11 - 26 VAC or VDC,
SELV, Limited Energy

Signal Input

1: Standard Input
Thermocouple: J, K, T, E, B, R, S, N, L, C, P
RTD: PT100 DIN, PT100 JIS
mV: 0~60 mV
2: Voltage: 0-1 V
3: Voltage: 0-10 V
4: Current: 0-20mA
5: Voltage: 0-5 V
9: Special Order

Output 1

0: None
1: Form C relay rated 2A/240VAC
2: Pulsed voltage to drive SSR, 5V/30mA
6: Triac Output 1A / 240VAC, SSR
C: Pulsed voltage to drive SSR, 14V/40mA
9: Special Order

Output 2

0: None
1: Form C Relay 2A/240VAC
2: Pulsed voltage to drive SSR, 5V / 30mA
6: Triac Output, 1A / 240VAC, SSR
7: Isolated 20V / 25mA DC Output Power Supply
8: Isolated 12V / 40 mA DC Output Power Supply
9: Isolated 5V / 80mA DC Output Power Supply
A: RS-485
B: Event Input
H: Special Order
C: Pulsed voltage to drive SSR, 14V/40mA
D: Retransmit 4-20mA / 0-20mA
E: Retransmit 1-5V / 0-5V
F: Retransmit 0-10V

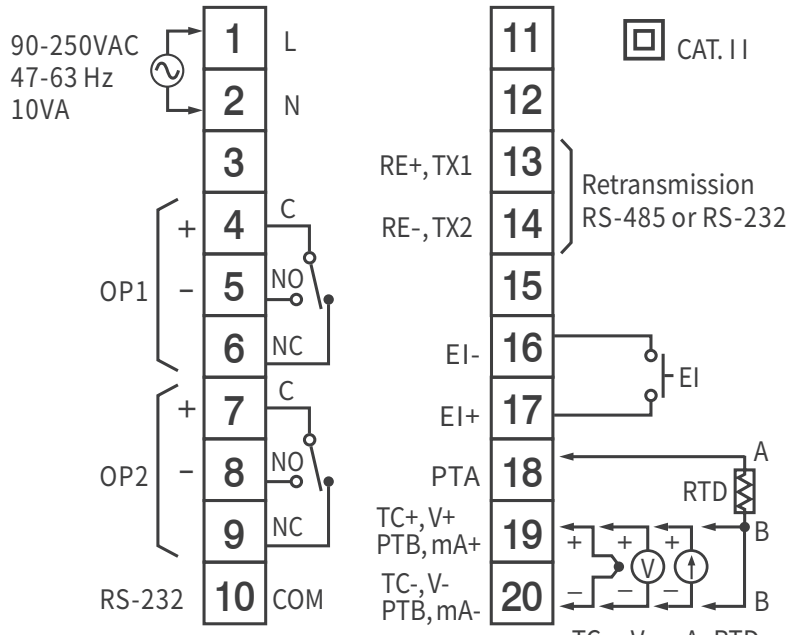
Accessories

OM94-6 = Isolated 1A/240VAC Triac Output Module (SSR)
OM94-7 = 14V/40mA SSR Drive Module
DC94-1 = Isolated 20V / 25mA DC Output Power Supply
DC94-2 = Isolated 12V / 40mA DC Output Power Supply
DC94-3 = Isolated 5V / 80mA DC Output Power Supply
CM94-1 = Isolated RS-485 Interface Module for L41
CM94-2 = Isolated RS-232 Interface Module for L41
CM94-3 = Isolated 4-20mA / 0-20mA Retransmission Module for L41
CM94-4 = Isolated 1-5V / 0-5V Retransmission Module for L41
CM94-5 = Isolated 0-10V Retransmission Module for L41
CC91-3 = Programming Port Cable for L41
CM96-1 = Isolated RS-485 Interface Module for L91
CM96-3 = Isolated 4-20mA / 0-20mA Retransmission Module for L91
CM96-4 = Isolated 1-5V / 0-5V Retransmission Module for L91
CM96-5 = Isolated 0-10V Retransmission Module for L91
EI96-1 = Event Input Module for L91
CC91-2 = Programming Port Cable for L91

Related Products

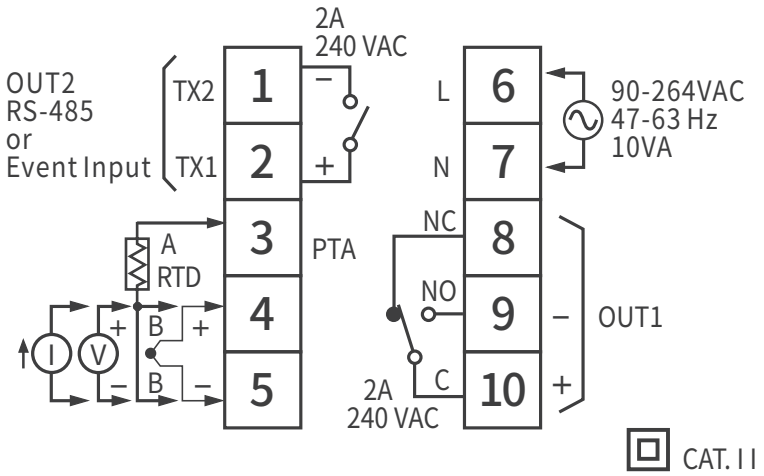
» SNA-10A = Smart Network Adaptor for Third Party Software, Converts 255 channels of RS-485 or RS-422 to RS-232 Network
» SNA-12A = Smart Network Adaptor for programming port to RS-232 Interface
» BC-SET= Configuration Software

L41

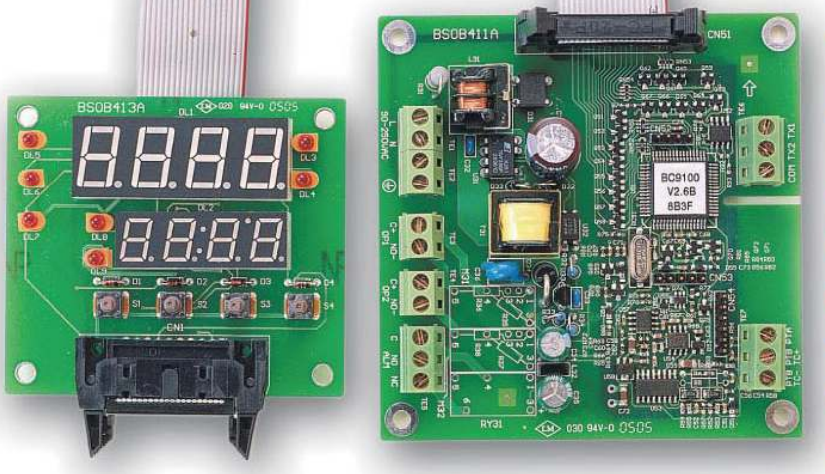


50LC max. air ambient
Use copper conductors (except on T/C input)

L91



B41 BOARD PID
TEMPERATURE CONTROLLER



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
- SEL function allows to rearrange user menu
- Meets UL/CSA/CE standards
- High performance at low cost

BrainChild

Overview

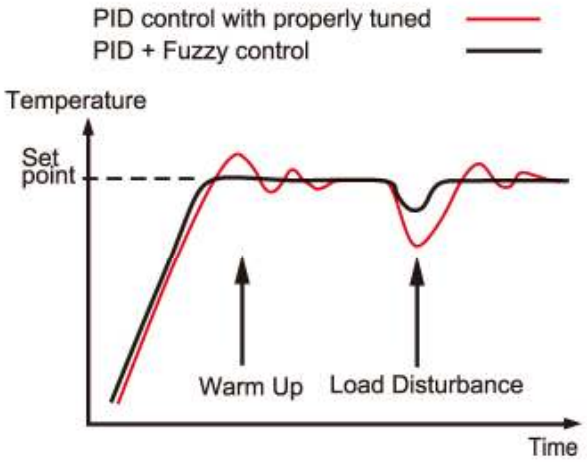
The Fuzzy Logic plus PID microprocessor-based controller series, incorporates a bright, easy to read 4-digit LED display, indicating process value and set point value. The Fuzzy Logic technology enables a process to reach a predetermined set point in the shortest time, with the minimum of overshoot during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

This 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. Both outputs can select triac, 5V logic output, linear current or linear voltage to drive external device. The units are fully programmable for PT100 and thermocouple types J, K, T, E, B, R, S, N, L and no need to modify the unit. The input signal is digitized by using a 18-bit A to D converter. Its fast sampling rate allows the unit to control fast processes.

Digital communications RS-485 or RS-232 are available as an additional option. These options allow the units to be integrated with supervisory control system and software.

A programming port is available for automatic Configuration, calibration and testing without pressing the keys on front panel.

By using proprietary Fuzzy modified PID technology, the control loop will minimize the overshoot and undershoot in a shortest time. The following diagram is a comparison of results with and without Fuzzy technology.



High Accuracy

This unit is manufactured with custom designed ASIC (Application Specific Integrated Circuit) technology which contains a 18-bit A to D converter for high resolution measurement (true 0.1 BF resolution for thermocouple and PT100) and a 15-bit D to A converter for linear current or voltage control output. The ASIC technology provides improved operating performance, low cost, enhanced reliability and higher density.

Fast Sampling Rate

The sampling rate of the input A to D converter reaches 5 times/second. The fast sampling rate allows this series to control fast processes.

Fuzzy Control

The function of Fuzzy control is to adjust PID parameters from time to time in order to make manipulation output value more flexible and adaptive to various processes. The results is to enable a process to reach a predetermined set point in the shortest time, with the minimum of overshoot and undershoot during power-up or external load disturbance.

Digital Communication

The units are equipped with RS-485 or RS-232 interface card to provide digital communication. By using the twisted pair wires there are at most 247 units can be connected together via RS-485 interface to a host computer.

Programming Port

A programming port is used to connect the unit to a smart network adaptor and PC for quick configuration, also can be connected to an ATE system for automatic testing & calibration.

Auto-tune

The auto-tune function allows the user to simplify initial setup for a new system. A clever algorithm is provided to obtain an optimal set of control parameters for the process, and it can be applied either as the process is warming up (cold start) or as the process has been in steady state (warm start).

Lockout Protection

According to actual security requirement, one of four lockout levels can be selected to prevent the unit from being changed abnormally.

Bumpless Transfer

Bumpless transfer allows the controller to continue to control by using its previous value as the sensor breaks. Hence, the process can be well controlled temporarily as if the sensor is normal.

Soft-start Ramp

The ramping function is performed during power up as well as any time the set point is changed. It can be ramping up or ramping down. The process value will reach the set point with a predetermined constant rate.

Digital Filter

A first order low pass filter with a programmable time constant is used to improve the stability of process value. This is particularly useful in certain application where the process value is too unstable to be read.

SEL Function

The units have the flexibility for user to select those parameters which is most significant to him and put these parameters in the front of display sequence. There are at most 8 parameters can be selected to allow the user to build his own display sequence.

Specifications

Power

90-250 VAC, 47-63 Hz, 10VA, 5W maximum
11-26 VAC / VDC, 12VA, 5W 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/ BC for all inputs except mA input
±3.0 uV/ BC 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 : 200 nA
Common Mode Rejection Ratio (CMRR): 120dB
Normal Mode Rejection Ratio (NMRR): 55dB

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 0.25V 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.

Characteristics:

Type	Range	Accuracy @ 25 BC	Input Impedance
J	-120 ˚C~1000 ˚C (-184 ˚F~1832 ˚F)	±2 ˚C	2.2 M Ω
K	-200 ˚C~1370 ˚C (-328 ˚F~2498 ˚F)	±2 ˚C	2.2 M Ω
T	-250 ˚C~400 ˚C (-418 ˚F~752 ˚F)	±2 ˚C	2.2 M Ω
E	-100 ˚C~900 ˚C (-148 ˚F~1652 ˚F)	±2 ˚C	2.2 M Ω
B	0 ˚C~1820 ˚C (32 ˚F~3308 ˚F)	±2 ˚C (200 ˚C ~ 1820 ˚C)	2.2 M Ω
R	0 ˚C~1767.8 ˚C (32 ˚F~3214 ˚F)	±2 ˚C	2.2 M Ω
S	0 ˚C~1767.8 ˚C (32 ˚F~3214 ˚F)	±2 ˚C	2.2 M Ω
N	-250 ˚C~1300 ˚C (-418 ˚F~2372 ˚F)	±2 ˚C	2.2 M Ω
L	-200 ˚C~900 ˚C (-328 ˚F~1652 ˚F)	±2 ˚C	2.2 M Ω
PT100 (DIN)	-210 ˚C~700 ˚C (-346 ˚F~1292 ˚F)	±0.4 ˚C	1.3 K Ω
PT100 (JIS)	-200 ˚C~600 ˚C (-328 ˚F~1112 ˚F)	±0.4 ˚C	1.3 K Ω
mV	-8mV ~70mV	±0.05 %	2.2 M Ω
mA	-3mA ~27mA	±0.05 %	70.5 Ω
V	-1.3V ~11.5V	±0.05 %	302 K Ω

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 Ω.

Linear Output Characteristics

4-20 mA	3.6-4 mA	20-21 mA	500 Ωmax.
0-20 mA	0 mA	20-21 mA	500 Ωmax.
0 ~5 V	0 V	5 ~ 5.25 V	10 K Ωmin.
1 ~5 V	0.9 ~1 V	5 ~ 5.25 V	10 K Ωmin.
0 ~10 V	0 V	10 ~10.5 V	10 K Ωmin.

Linear Output

Resolution :15 bits
Output Regulation : 0.02 % for full load change
Output Settling Time : 0.1 sec. (stable to 99.9 %)
Isolation Breakdown Voltage : 1000 VAC
Temperature Effect : ±0.01 % of SPAN / LC

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 : 1.5 V rms
Insulation Resistance : 1000 Mohms min. at 500 VDC
Dielectric Strength : 2500 VAC for 1 minute

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,
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 : 2.4 ~ 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, 0-20mA, 0-5V, 1-5V, 0-10V
Resolution: 15 bits
Accuracy: ±0.05% of span ±0.0025% / ˚C
Load Resistance: 0-500 ohm (for current output)
10K 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/ LC
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)

Dual 4-digit LED Displays :
Upper 0.55" (14mm)
Lower 0.4" (10mm)

Keypad : 4 keys
Programming Port : For automatic setup, calibration and testing
Communication Port : Connection to PC for supervisory control

User Interface

Control Mode

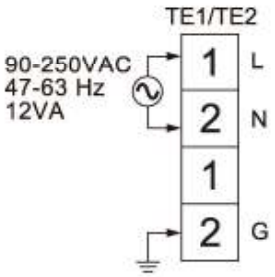
Output 1 : Reverse (heating) or direct (cooling) action
Output 2 : PID cooling control, cooling P band 50~300% of PB, dead band -36.0~36.0% of PB
ON-OFF : 0.1 - 90.0 (˚F) hysteresis control (P band = 0)
P or PD : 0 - 100.0 % offset adjustment
PID : Fuzzy logic modified
Proportional band 0.1 ~ 900.0 ˚F.
Integral time 0 - 3600 seconds
Derivative time 0 - 360.0 seconds
Cycle Time : 0.1 - 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

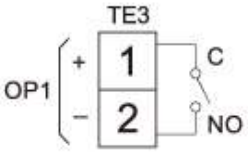
Digital Filter

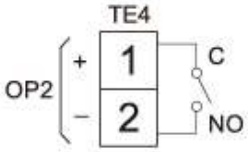
Function : First order
Time Constant : 0, 0.2, 0.5, 1, 2, 5, 10, 20, 30, 60 seconds programmable

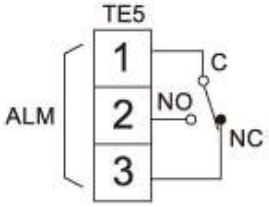
Environmental & Physical

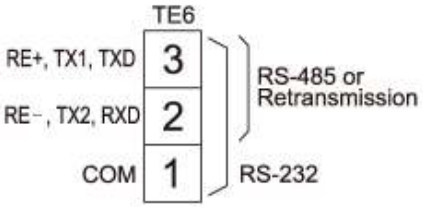
Operating Temperature : -10 ˚C to 50 ˚C
Storage Temperature : -40 ˚C to 60 ˚C
Humidity : 0 to 90 % RH (non-condensing)
Altitude: 2000m maximum
Pollution: Degree 2
Insulation Resistance : 20 Mohms min. (at 500 VDC)
Dielectric Strength : 2000 VAC, 50/60 Hz for 1 minute
Vibration Resistance : 10 - 55 Hz, 10 m/s for 2 hours
Shock Resistance : 200 m/s²(20 g)
Safety: UL61010C-1
CSA C22.2 No.24-93
EN61010-1 (IEC1010-1)
EMC: EN61326

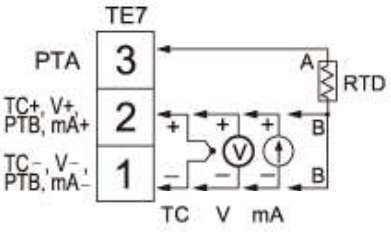




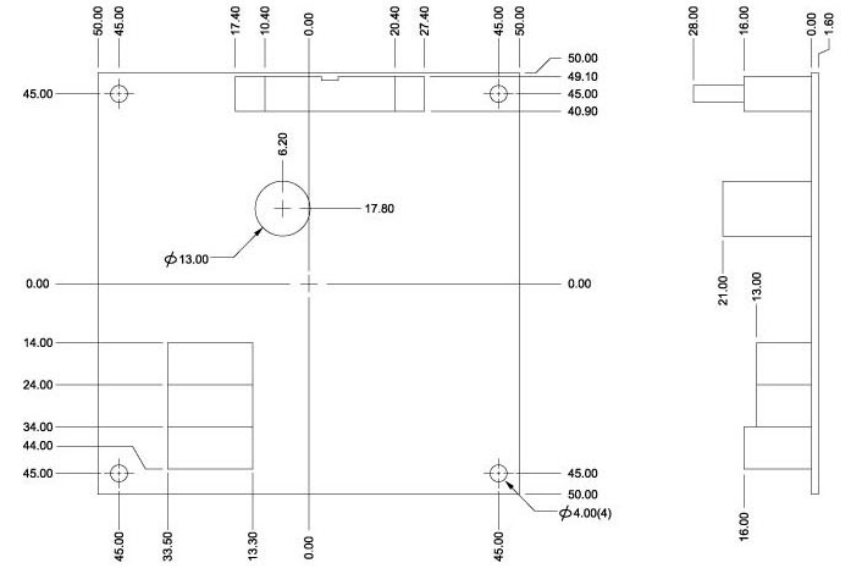




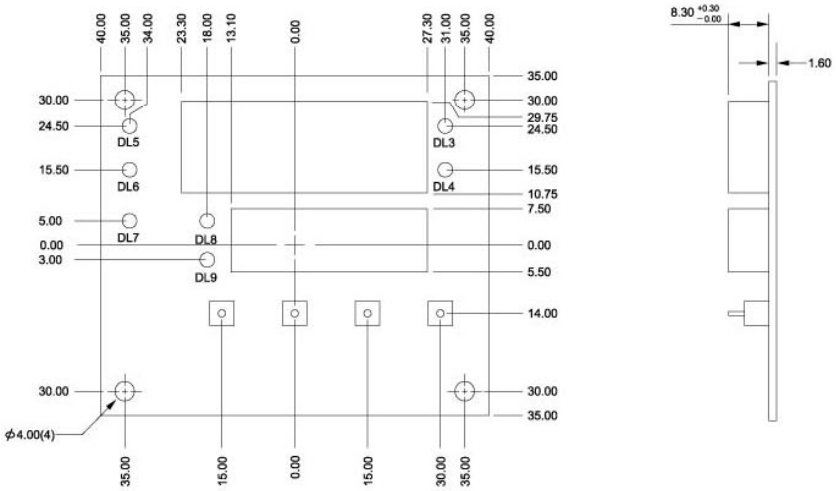




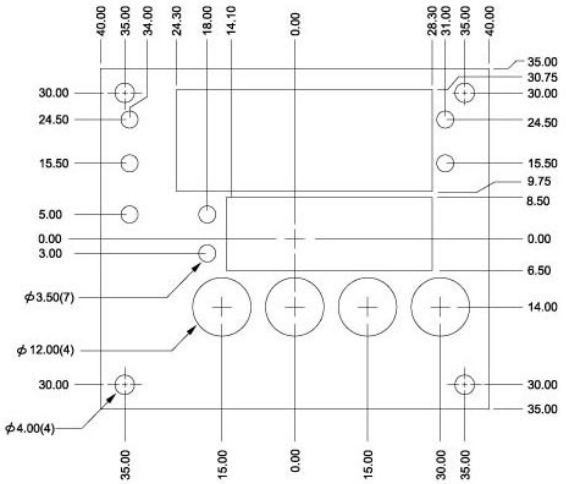
Dimension of Control Board



Dimension of Display Board



Dimension of Mounting Plate for Display Board



Accessories

OM94-6 = Isolated 1A / 240VAC Triac Output Module (SSR)
OM94-7 = 14V / 40 mA SSR Drive Module
OM95-3 = Isolated 4 - 20 mA / 0 - 20 mA Analog Output Module
OM95-4 = Isolated 1 - 5V / 0 - 5V Analog Output Module
OM95-5 = Isolated 0 - 10V Analog Output Module
CM94-1 = Isolated RS-485 Interface Module
CM94-2 = Isolated RS-232 Interface Module
CM94-3 = Isolated 4 - 20 mA / 0 - 20 mA Retrans Module
CM94-4 = Isolated 1 - 5V / 0 - 5V Retrans Module
CM94-5 = Isolated 0 - 10V Retrans Module
DC94-1 = Isolated 20V/25mA DC Output Power Supply
DC94-2 = Isolated 12V/40mA DC Output Power Supply
DC94-3 = Isolated 5V/80mA DC Output Power Supply
CC94-1 = RS-232 Interface Cable (2M)
CC91-2 = Programming Port Cable

Related Products

SNA10A = Smart network adaptor for Brainchild software *DAQ Studio* or third party software, which converts 255 channels of RS-485 or RS-422 to RS-232 network.
SNA12A = Smart network adapter for programming port to RS-232 interface
BC-Set = Configuration software
DAQ Studio software = PC software for data logging
PC-E = RS-232/485 to Ethernet converter
PC-W = RS-232/422/485 x 2 + Ethernet x 1 converted to Ethernet wireless

Ordering Code

B41 - □ □ □ □ □ □ □

Power Input
4: 90 - 250 VAC, 50/60 HZ
5: 11 - 26 VAC or VDC

Signal Input
1: Standard Input
Thermocouple: J, K, T, E, B, R, S, N, L
RTD: PT100 DIN, PT100 JIS
2: 0 - 60 mV
3: 0 -1 V
4: 0 - 5 V
5: 1 - 5 V
6: 4 - 20 mA
7: 0 - 20 mA
8: 0 - 10 V

Output 1
0: None
1: Relay rated 2A/240VAC
2: Pulsed voltage to drive SSR, 5V/30mA
3: Isolated 4 - 20mA / 0 - 20mA
4: Isolated 1 - 5V / 0 - 5V
5: Isolated 0 - 10V
6: Triac output 1A / 240VAC,SSR
C: Pulsed voltage to drive SSR, 14V/40mA

Output 2
0: None
1: Form A relay 2A/240VAC
2: Pulsed voltage to drive SSR, 5V / 30mA
3: Isolated 4 - 20mA / 0 - 20mA
4: Isolated 1 - 5V / 0 - 5V
5: Isolated 0 - 10V
6: Triac output, 1A / 240VAC, SSR
7: Isolated 20V/25mA transducer power supply
8: Isolated 12V/40mA transducer power supply
9: Isolated 5V/80mA transducer power supply
C: Pulsed voltage to drive SSR, 14V/40mA

Alarm
0: None
1: Form C relay 2A/240VAC

Communications
0: None
1: RS-485 interface
2: RS-232 interface
3: Retransmit 4-20mA / 0-20mA
4: Retransmit 1-5 V / 0-5V
5: Retransmit 0-10V

Display board and Cable
0: Without display board and without cable
3. With display board and with 300 mm cable
4. With display board and with 1000 mm cable

* Standard model without option
B41-4110003: Power 90-250 VAC, standard input thermocouple + Pt100, output 1- relay, output 2 - none, alarm - none, communication - none, with display board and with 300 mm cable

FEATURES

- Build-in Laser Trim ASIC
- Easy to change range
- ON-OFF or time proportional selectable
- Compact, only 65mm in depth
- Wide selection of control output option
- Wide selection of ranges
- Sensor break protection
- Alarm option (BTC-404, BTC-402 Only)
- Low cost
- Safety: UL, CSA
- EMC, LVD: CE

SPECIFICATIONS

INPUT

Thermocouple (T/C) : Type J, K
RTD : 3-wires PT 100 ohms, DIN or JIS
Range : See ordering information
Accuracy : ±2% of span (BTC-402, BTC-401), ±1% of span (BTC-404)
Cold Junction Compensatin : ±0.1°C / 1°C
Rejection of RTD Lead Resistance = (0.1°C -0.025% of PV reading) / ohm
Sensor Break Protection : Upscale
External Resistance : 100 ohms max.
Normal Mode Rejection : 60 dB
Common Mode Rejection : 120 dB
Sample Rate : 3 times / second

CONTROL

Proportional Band : 2.2% of span
ON-OFF Hysteresis : 1% of span
Cycle Time : 20 seconds for relay output,
1 second for pulsed voltage output,
0.02 second for linear current or voltage output.
Control Action : Reverse action

OUTPUT

Control : Relay : 5A/240V max. resistive load
Pulsed Voltage : 20mA / 32VDC max.
Current : 4-20mA, 0-20A, max. load 500 ohms.
Voltage : 0-10V, min. load 500k ohms
Alarm : Relay output, 2A / 240VAC max. resistive load

ADJUSTMENT

Set point : Single turn wirewound potentiometer
Alarm : Deviation alarm, adjustable ±10% of span
Manuel Reset : Adjustable 2.6% of span (BTC-404, 402 only)
Resolution of set point : 0.2% of span
Accuracy of set point : ±2% of span
Repeatabillity of set point : ±0.1% of span

INDICATION

Process Indicator : BTC-402 : Deviation meter
BTC-404: 0.5” red 3-1/2 dight LED display
Status Indicator : ON (red) LED Lamp
Alarm Indicator : ON (red) LED Lamp

POWER

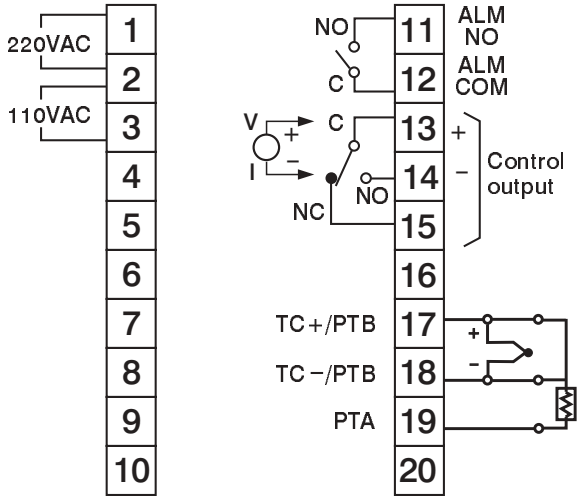
Rating: BTC-402, BTC-401: 100-130VAC or 200-240VAC, 50 / 60Hz
BTC-404: 90-264VAC, 50 / 60 Hz
Consumption: Less than 5VA

ENVIRONMENTAL & PHYSICAL

Operating Temperature : 0-50°C
Humidity : 0-90% RH (non-condensing)
Insulation : 20M ohms min. (500VDC)
Breakdown : AC 2000V, 50/60Hz, 1minute
Vibration : 10-50Hz, amplitude 1mm
Shock : 200M/S^2 (20g)
Weight : BTC-404: 280 grams, BTC-402: 360 grams,
BTC-401: 330 grams.
Dimension: 96(W) X 96(H) X 53 mm (depth behind panel)
Panel cutout: 92 X 92 mm

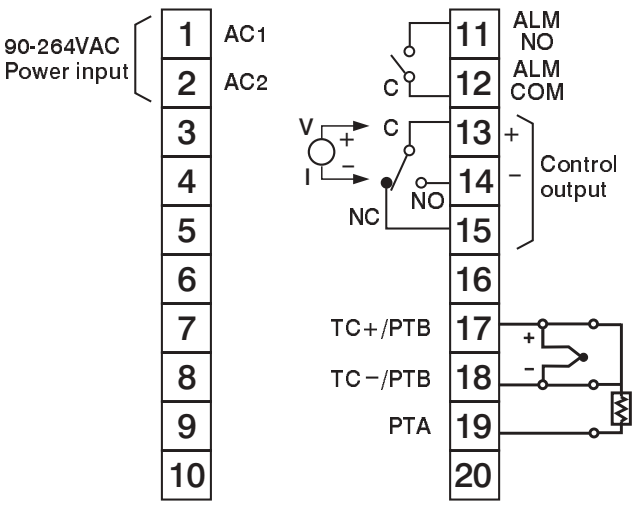
CONNECTION DIAGRAM

BTC-402, 401



Note: For 401 pin11 & pin12 are not used

BTC-404



ORDERING INFORMATION

Model No. — □ □ □ □ □ □ □ □
(1) (2) (3) (4) (5) (6) (7) (8)

(1) Power Input

BTC-402, BTC-401

3	100-130VAC, 50/60Hz / 200-240VAC, 50/60Hz
9	Other

BTC-404

4	90-264 VAC
5	20-32 VDC/VAC
9	Other

(2) Signal Input

1	Type J thermocouple	4	PT100 ohm JIS
2	Type K thermocouple	9	Other
3	PT100 ohm DIN		

(3) Range Code

Code	Range	Code	Range	Selected Solder GAP
2	0 ~ 100 °C	A	50 ~ 20 °F	J3
3	0 ~ 200 °C	B	50 ~ 40 °F	J4
4	0 ~ 300 °C	C	50 ~ 55 °F	J5
5	0 ~ 400 °C	D	50 ~ 750 °F	J6
		E	50 ~ 850 °F	J7
6	0 ~ 600 °C	F	50 ~ 1100 °F	J8
7	0 ~ 800 °C	G	50 ~ 1400 °F	J9
8	0 ~ 1200 °C	H	*0 ~ 2200 °F	J10
9	Other	K	50 ~ 199.9 °F	
		L	0 ~ 99.9 °C	
		M	0 ~ 199.9 °C	

* Range K, L, M available for BTC-404 only

(4) Control Mode

Code	Mode	J11
1	ON-OFF	Short
2	P (proportional)	Open

(5) Output I

1	Relay, rated 5A/240VAC resistive
2	Pulsed voltage to drive SSR, rated 20mA/24V
3	4-20mA linear, max. load 500 ohms
4	0-20mA linear, max. load 500 ohms
5	0-10V linear, min. load 500K ohms
9	Other

(6) Output II

0	None

(7) Alarm

0	None
1	Deviation alarm relay output, rated 2A/240vac max. resistive load

(8) Communication

0	None

* Please refer detailed conversion from full technical information

FUNCTION OF SOLDER GAP J1~J11

Location	Short	Open	Function
J1	o		T/C Type J or K
“		o	PT 100 ohms DIN or JIS
J2		o	Reverse Control
“	o		Forward control
J3	o		100°C span
J4	o		200°C span
J5	o		300°C span
J6	o		400°C span
J7	o		460°C span
J8	o		600°C span
J9	o		800°C span
J10	o		1200°C span
J11	o		ON-OFF control
“		o	Time proportional control

FUNCTION OF SOLDER GAP J12-J13

J12	J13	Cycle time	Function
Short	Short	20 Secs.	Relay output
Open	Short	1 Sec.	SSR drive
Open	Open	0.02 Sec.	Linear current or voltage outpul

1/4 DIN Digital Setting Temperature Controller BTC-405

FEATURES

- Build-in Laser Trim ASIC
- Easy to change range
- ON-OFF or time proportional selectable
- Compact, only 53mm in depth
- Wide selection of control output option
- Wide selection of ranges
- Sensor break protection
- Alarm option
- Low Cost
- Safety : UL, CSA
- EMC, LVD: CE

SPECIFICATIONS

INPUT

Thermocouple (TIC) : Type J, K
RTD : 3-wires PT 100 ohms, DIN or JIS
Range : See ordering information
Accuracy : ±1% of span
Cold Junction Compensation : ±0.1°C / 1°C
Rejection of RTD Lead Resistance =
(0.1°C -0.025% of PV reading) ohm
Sensor Break Protection : Upscale
External Resistance : 100 ohms max.
Normal Mode Rejection : 60 dB
Common Mode Rejection : 120 dB
Sample Rate : 3 times / second

CONTROL

Proportional Band : 2.2% of Span
On-off Hysteresis : 1% of Span
Cycle Time : 20 seconds for relay output, 1 second for pulsed voltage output, 0.02 second for linear current or voltage output.
Control Action : Reverse action

OUTPUT

Control : Relay : 5A / 240V max. resistive load
Pulsed voltage : 20rnA / 32VDC max.
Current : 4-20mA, 0-20mA, max. load 500 ohms
Voltage: 0-10V, min. load 500k ohms
Alarm: Relay output, 2A / 240VAC max. resistive load

ADJUSTMENT

Set point : 3-digit or 4-digit switch
Alarm : Deviation alarm, adjustable 1 10% of span
Manual Reset : Adjustable 2.6% of span
Resolution of set point : 1 LSD (Least Significant Digit)
Accuracy of set point : ±1% of span
Repeatability of set point: ±1 LSD

INDICATION

Process Indicator : 05" red 3-1 / 2 digit LED display
Status Indicator : ON red LED Lamp
Alarm Indicator : ON red LED Lamp

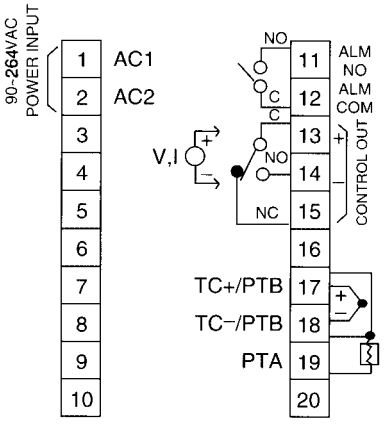
POWER

Rating : 90-240VAC, 50Hz / 60Hz
Consumption : Less than 5VA

ENVIRONMENTAL & PHYSICAL

Operating Temperature : 0-50°C
Humidity : 0-90% RH (non-condensing)
Insulation : 20M ohms min. 500VDC
Breakdown : AC 2000V, 50 / 60Hz, 1 minute
Vibration : 10-55Hz. amplitude lmm
Shock : 200M/S^2 (20g)
Weight : 250grams
Dimension : 96(W) x 96(H) X 53mm (depth behind panel)
Panel cutout : 92 x 92mm

CONNECTION DIAGRAM



ORDERING INFORMATION

Model No. — □ □ □ □ □ □ □ □
(1) (2) (3) (4) (5) (6) (7) (8)

(1) Power Input

4	90-264 VAC, 50/60Hz
5	20-32 VDC/VAC
9	Other

(2) Signal Input

1	Type J thermocouple	4	PT100 ohm JIS
2	Type K thermocouple	9	Other
3	PT100 ohm DIN		

(3) Range Code

Code	Range	Code	Range
2	-199 ~ 199 °C	K	-399 ~ 399 °F
3	-99.9 ~ 99.9 °C	L	-199 ~ 199 °F
4	-99 ~ 99 °C	M	-99.9 ~ 99.9 °F
5	-49.9 ~ 49.9 °C	N	-99 ~ 99 °F
6	0 ~ 49.9 °C	P	0 ~ 99 °F
7	0 ~ 99 °C	Q	0 ~ 99.9 °F
8	0 ~ 99.9 °C	R	0 ~ 199 °F
A	0 ~ 199 °C	S	0 ~ 399 °F
B	0 ~ 199.9 °C	T	0 ~ 599 °F
C	0 ~ 299 °C	U	0 ~ 799 °F
D	0 ~ 399 °C	V	0 ~ 999 °F
E	0 ~ 499 °C	W	0 ~ 1999 °F
F	0 ~ 599 °C	Y	0 ~ 499 °F
G	0 ~ 799 °C	Z	0 ~ 1200 °F
H	0 ~ 999 °C		
J	0 ~ 1200 °C		

(4) Control Mode

Code	Mode	J11
1	ON-OFF	Short
2	P (proportional)	Open

(5) Output I

1	Relay, rated 5A/240VAC resistive
2	Pulsed voltage to drive SSR, rated 20mA/24V
3	4-20mA linear, max. load 500 ohms
4	0-20mA linear, max. load 500 ohms
5	0-10V linear, min. load 500K ohms
9	Other

(6) Output II

0	None

(7) Alarm

0	None
1	Deviation alarm relay output, rated 2A/240vac max. resistive load

(8) Communication

0	None

FUNCTION OF SOLDER GAP J1~J11

Location	Short	Open	Function
J1	o		T/C Type J or K
"		o	PT 100 ohms DIN or JIS
J2		o	Reverse control
"	o		Forward control
J3	o		100 °C span
J4	o		200 °C span
J5	o		300 °C span
J6	o		400 °C span
J7	o		460 °C span
J8	o		600 °C span
J9	o		800 °C span
J10	o		1200 °C span
J11	o		ON-OFF control
"		o	Time proportional control

FUNCTION OF SOLDER GAP J12~J13

J12	J13	Cycle time	Function
Short	Short	20 Secs.	Relay output
Open	Short	1 Sec.	SSR drive
Open	Open	0.02 Sec.	Linear current or voltage output

FUNCTION OF SOLDER GAP J14~J15

J14	J15	Function
Short	Open	Positive Setting
Open	Open	Positive and Negative setting
Open	Short	Negative setting

72 X 72MM Analog Setting Temperature Controller BTC-704, BTC-702, BTC-701

FEATURES

- Build-in Laser Trim ASIC
- Easy to change range
- ON-OFF or time proportional selectable
- Compact, only 65mm in depth
- Wide selection of control output option
- Wide selection of ranges
- Sensor break protection
- Alarm option (BTC-704, BTC-702 Only)
- Low cost
- Safety: UL, CSA
- EMC, LVD: CE

SPECIFICATIONS

INPUT

Thermocouple (T/C) : Type J, K
RTD : 3-wires PT 100 ohms, DIN or JIS
Range : See ordering information
Accuracy : ±2% of span (BTC-701, BTC-702),
±1% of span (BTC-704)
Cold Junction Compensatin : 0.1°C / 1°C
Rejection of RTD Lead Resistance =
(0.1°C - 0.025% of PV reading ohm)
Sensor Break Protection : Upscale
External Resistance : 100 ohms max.
Normal Mode Rejection : 60 dB
Common Mode Rejection : 120 dB
Sample Rate : 3 times / second
CONTROL
Proportional Band : 2.2% of span
ON-OFF Hysteresis : 1 % of span
Cycle Time : 20 seconds for relay output,
1 second for pulsed voltage output,
0.02 second for linear current or voltage output.
Control Action : Reverse action

OUTPUT

Control : Relay : 5A/240V max. resistive load
Pulsed Voltage : 20rnA / 32VDC max.
Current : 4-20mA, 0-20A, max. load 500 ohms.
Voltage : 0-10V, min. load 500k ohms
Alarm : Relay output, 2A / 240VAC max. resistive load

ADJUSTMENT

Set point : Single turn wirewound potentiometer
Alarm : Deviation alarm, adjustable 10% of span
Manuel Reset : Adjustable 2.6% of span (BTC-702, 704 only)
Resolution of set point : 0.2% of span
Accuracy of set point : ±2% of span
Repeatabillity of set point : ±0.1% of span

INDICATION

Process Indicator : BTC-702 : Deviation meter
BTC-704: 10mm red 3-1/2 dight LED
display
Status Indicator : ON (red) LED Lamp
Alarm Indicator : ON (red) LED Lamp

POWER

Rating: 90~240VAC, 50/60Hz
Consumption: Less than 5VA

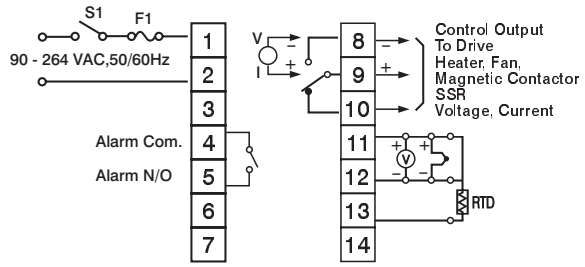
ENVIRONMENTAL & PHYSICAL

Operating Temperature : 0-50°C
Humidity : 0-90% RH (non-condensing
Insulation : 20M ohms min. (500VDC)
Breakdown : AC 2000V, 50/60Hz, 1 minute
Vibration : 10-55Hz. amplitude 1 mm

Shock : 200M/S^2 (20g)
Weight : BTC-701: 290 grams, BTC-702: 320 grams,
BTC-704: 240 grams.
Dimension: 72(W) X 72(H) X 65 mm (depth behind panel)
Panel cutout: 68 X 68 mm

CONNECTION DIAGRAM

BTC-704, BTC-702/701



ORDERING INFORMATION

Model No. — □ □ □ □ □ □ □ □
(1) (2) (3) (4) (5) (6) (7) (8)

(1) Power Input

4	90-264VAC, 50/60Hz
9	Other

(2) Signal Input

1	Type J thermocouple	4	PT100 ohm JIS
2	Type K thermocouple	9	Other
3	PT100 ohm DIN		

(3) Range Code

Code	Range	Code	Range	Selected Solder GAP
2	0 ~ 100 °C	A	50 ~ 20 °F	J3
3	0 ~ 200 °C	B	50 ~ 40 °F	J4
4	0 ~ 300 °C	C	50 ~ 55 °F	J5
5	0 ~ 400 °C	D	50 ~ 750 °F	J6
		E	50 ~ 850 °F	J7
6	0 ~ 600 °C	F	50 ~ 1100 °F	J8
7	0 ~ 800 °C	G	50 ~ 1400 °F	J9
8	0 ~ 1200 °C	H	*0 ~ 2200 °F	J10
9	Other	K	50 ~ 199.9 °F	
		L	0 ~ 99.9 °C	
		M	0 ~ 199.9 °C	

(4) Control Mode

Code	Mode	J11
1	ON-OFF	Short
2	P (proportional)	Open

(5) Output I

1	Relay, rated 5A/240VAC resistive
2	Pulsed voltage to drive SSR, rated 20mA/24V
3	4-20mA linear, max. load 500 ohms
4	0-20mA linear, max. load 500 ohms
5	0-10V linear, min. load 500K ohms
9	Other

(6) Output II

0	None

(7) Alarm

0	None
1	Deviation alarm relay output, rated 2A/240vac max. resistive load

(8) Communication

0	None

FUNCTION OF SOLDER GAP J1~J11

Location	Short	Open	Function
J1	o		T/C Type J or K
"		o	PT 100 ohms DIN or JIS
J2		o	Reverse control
"	o		Forward control
J3	o		100 °C span
J4	o		200 °C span
J5	o		300 °C span
J6	o		400 °C span
J7	o		460 °C span
J8	o		600 °C span
J9	o		800 °C span
J10	o		1200 °C span
J11	o		ON-OFF control
"		o	Time proportional control

FUNCTION OF SOLDER GAP J12~J13

J12	J13	Cycle time	Function
Short	Short	20 Secs.	Relay output
Open	Short	1 Sec.	SSR drive
Open	Open	0.02 Sec.	Linear current or voltage output

* Please refer detailed conversion from full technical information

72 X 72mrn Digital Setting Temperature Controller BTC-705

FEATURES

- Build-in Laser Trim ASIC
- Easy to change range
- ON-OFF or time proportional selectable
- Compact, only 65mm in depth
- Wide selection of control output option
- Wide selection of ranges
- Sensor break protection
- Alarm option
- Low Cost
- Safety: UL, CSA
- EMC, LVD: CE

SPECIFICATIONS

INPUT
Thermocouple (TIC) : Type J, K
RTD : 3-wires PT 100 ohms, DIN or JIS
Range : See ordering information
Accuracy : ±2% of span (BTC-703), ±1% of span (BTC-705)
cold Junction Compensation : ±0.1°C / 1°C
Rejection of RTD Lead Resistance =
(0.1°C - 0.025% of PV reading) /ohm
Sensor Break Protection : Upscale
External Resistance : 100 ohms max.
Normal Mode Rejection : 60 dB
Common Mode Rejection : 120 dB
Sample Rate : 3 times / second

CONTROL
Proportional Band : 2.2% of Span.
ON-OFF Hysteresis : 1% of Span
Cycle Time : 20 seconds for relay output, 1 second-for pulsed voltage output, 0.02 second for linear current or voltage output.
Control Action : Reverse action

OUTPUT
Control: Relay : 5A / 240V max. resistive load
Pulsed voltage : 20mA / 32VDC max.
Current : 4-20mA, 0-20mA, max, load 500 ohms
Voltage : 0- 10V, min. load 500k ohms
Alarm : Relay output, 2A / 240VAC max. resistive load

ADJUSTMENT
Set point : 3-digit or 4-digit switch
Alarm : Deviation alarm, adjustable f 10% of span
Manual Reset : Adjustable 2.6% of span
Resolution of set point : 1 LSD (Least Significant Digit)
Accuracy of set point : ±1 % of span
Repeatability of set point : ±1 LSD

INDICATION
Process Indicator : 10mm red LED display
Status Indicator : ON (red) LED Lamp
Alarm Indicator : ON (red) LED Lamp

POWER
Rating : 90-240VAC, 50 / 60Hz
Consumption : Less than 5VA

ENVIRONMENTAL & PHYSICAL
Operating Temperature : 0-50°C
Humidity : 0-90% RH (non-condensing
Insulation : 20M ohms min. (50OVIDC)
Breakdown : AC 2000V, 50/60Hz,1 minute
Vibration : 10-55Hz. amplitude 1 mm
Shock : 200M/S2 (20g)
Weight : 210 grams
Dimension : 72 (W) X 72 (H) X 65mm (depth behind panel)
Panel cutout : 68 X 68mm

1/8 DIN Digital Setting Temperature Controller BTC-805, BTC-803

FEATURES

- Build-in Laser Trim ASIC
- Easy to chang range
- ON-OFF or time proportional selectable
- Compact, only 65mm in depth
- Wide selection of control output option
- Wide selection of ranges
- Sensor break protection
- Alarm option
- Low cost
- Safety: UL, CSA
- EMC, LVD: CE

SPECIFICATIONS

INPUT

Thermocouple (TIC) : Type J, K
RTD : 3-wires PT 100 ohms, DIN or JIS
Range : See ordering information
Accuracy : ±2% of span (BTC-803),
±1% of span (BTC-805)
Cold Junction Compensation : ±1℃ / ℃
Rejection of RTD Load Resistance =
(0.1℃ - 0.025% of PV reading) / ohm
Sensor Break Protection : Upscale
External Resistance : 100 ohms max.
Normal Mode Rejection : 60 dB
Common Mode Rejection : 120 dB
Sample Rate : 3 times / second

CONTROL

Proportional Band : 2.2% of span
ON-OFF Hysteresis : 1% of span
Cycle Time : 20 seconds for relay output, 1 second for pulsed voltage output, 0.02 second for linear current or voltage output.
Control Action : Reverse action

OUTPUT

Control : Relay : 5A 240V max. resistive load
Pulsed Voltage : 20mA / 32VDC max.
Current : 4-20mA, 0-20mA, max. load 500 ohms
Voltage : 0- 10V, min. load 500k ohms
Alarm : Relay output, 2A / 240VAC max. resistive load

ADJUSTMENT

Set Point : 3-digit or 4-digit switch
Alarm : Deviation alarm, adjustable ±10% of span
Manuel Reset : Adjustable 2.6% of span
Resolution of set point : 1 LSD (Least Significant Digit)
Accuracy of set point : ±1 % of span
Repeatability of set point : ±1 LSD

INDICATION

Process Indicator : BTC-803: Deviation meter
BTC-805: 0.4" red LED display
Status Indicator : ON red LED Lamp
Alarm Indicator : ON red LED Lamp

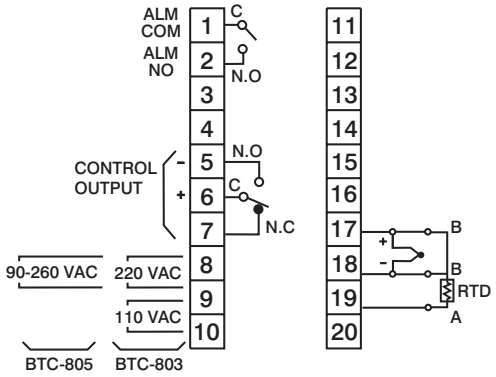
POWER

Rating : BTC-803 : 100-130VAC , 50 / 60Hz or 200-240VAC, 50/60Hz
BTC-805 : 90-240VAC, 50/60Hz
Consumption : Less than 5VA

ENVIRONMENTAL & PHYSICAL

Operating Temperature : 0-50℃
Humidity : 0-90% RH (non-condensing)
Insulation : 20M ohms min. (50OVDC)
Breakdown : AC 200OV, 50 / 60Hz, 1 minute
Vibration : 10-55Hz. amplitude l mm
Shock : 200M/S^2 (20g)
Weight : BTC-803: 270 grams, BTC-805: 220 grams
Dimension : 48 (W) X 96 (H) X 65mm (depth behind panel)
Panel Cutout : 45 X 92mm

CONNECTION DIAGRAM



ORDERING INFORMATION

Model No. — □ □ □ □ □ □ □ □
(1) (2) (3) (4) (5) (6) (7) (8)

(1) Power Input

For BTC-803

3	100-130VAC, 50/60Hz / 200-240VAC, 50/60Hz
9	Other

For BTC-805

4	90-264VAC, 50/60Hz
9	Other

(2) Signal Input

1	Type J thermocouple	4	PT100 ohm JIS
2	Type K thermocouple	9	Other
3	PT100 ohm DIN		

(3) Range Code

Code	Range	Code	Range
2	-199 ~ 199 °C	K	-399 ~ 399 °F
3	-99.9 ~ 99.9 °C	L	-199 ~ 199 °F
4	-99 ~ 99 °C	M	-99.9 ~ 99.9 °F
5	-49.9 ~ 49.9 °C	N	-99 ~ 99 °F
6	0 ~ 49.9 °C	P	0 ~ 99 °F
7	0 ~ 99 °C	Q	0 ~ 99.9 °F
8	0 ~ 99.9 °C	R	0 ~ 199 °F
A	0 ~ 199 °C	S	0 ~ 399 °F
B	0 ~ 199.9 °C	T	0 ~ 599 °F
C	0 ~ 299 °C	U	0 ~ 799 °F
D	0 ~ 399 °C	V	0 ~ 999 °F
E	0 ~ 499 °C	W	0 ~ 1999 °F
F	0 ~ 599 °C	Y	0 ~ 499 °F
G	0 ~ 799 °C	Z	0 ~ 1200 °F
H	0 ~ 999 °C		
J	0 ~ 1200 °C		

(4) Control Mode

Code	Mode	J11
1	ON-OFF	Short
2	P (proportional)	Open

(5) Output I

1	Relay, rated 5A/240VAC resistive
2	Pulsed voltage to drive SSR, rated 20mA/24V
3	4-20mA linear, max. load 500 ohms
4	0-20mA linear, max. load 500 ohms
5	0-10V linear, min. load 500K ohms
9	Other

(6) Output II

0	None

(7) Alarm

0	None
1	Deviation alarm relay output, rated 2A/240vac max. resistive load

(8) Communication

0	None

FUNCTION OF SOLDER GAP J1~J11

Location	Short	Open	Function
J1	o		T/C Type J or K
"		o	PT 100 ohms DIN or JIS
J2		o	Reverse control
"	o		Forward control
J3	o		100 °C span
J4	o		200 °C span
J5	o		300 °C span
J6	o		400 °C span
J7	o		460 °C span
J8	o		600 °C span
J9	o		800 °C span
J10	o		1200 °C span
J11	o		ON-OFF control
"		o	Time proportional control

FUNCTION OF SOLDER GAP J12~J13

J12	J13	Cycle time	Function
Short	Short	20 Secs.	Relay output
Open	Short	1 Sec.	SSR drive
Open	Open	0.02 Sec.	Linear current or voltage output

FUNCTION OF SOLDER GAP J14~J15

J14	J15	Function
Short	Open	Positive Setting
Open	Open	Positive and Negative setting
Open	Short	Negative setting

* Please refer detailed conversion from full technical information

1/16 DIN Analog Setting Temperature Controller BTC-901, BTC-902

FEATURES

- Build-in Laser Trim ASIC
- Easy to change range
- ON-OFF or time proportional selectable
- Compact, only 86mm in depth
- Wide selection of control output option
- Wide selection of ranges
- Sensor break protection
- Low cost
- Safety: UL, CSA
- EMC, LVD: CE

SPECIFICATIONS

INPUT

Thermocouple (T/C) : Type J, K

RTD : 3-wires PT 100 ohms, DIN or JIS

Range : See ordering information

Accuracy : ±2% of span

Cold Junction Compensatin : ±0.1°C / 1°C

Rejection of RTD Lead Resistance =

(0.1°C - 0.025% of PV reading) / ohm

Sensor Break Protection : Upscale External

Resistance : 100 ohms max. Normal Mode

Rejection : 60 dB

Common Mode Rejection : 120 dB Sample

Rate : 3 times / second

CONTROL

Proportional Band : 2.2% of span

ON-OFF Hysteresis : 1 % of span

Cycle Time : 20 seconds for relay output, 1 second for pulsed voltage output, 0.02 second for linear current or voltage output.

Control Action : Reverse action

OUTPUT

Control : Relay 5A / 240V max. resistive load

Pulsed Voltage: 20mA / 32VDC max.

Current: 4-20mA, 0-20mA, max. load 500 ohms

Voltage: 0- 10V, min. load 500k ohms

ADJUSTMENT

Set point : Single turn wirewound potentiometer

Resolution of set point : 0.2% of span

Accuracy of set point : ±2%of span

Repeatability of set point : ±0.1 span

INDICATION

Process Indicator : BTC-902 : HI/LO LED indicators

BTC-901 : None

Status Indicator : ON (red) LED Lamp, OFF (green) LED Lamp

POWER

Rating : 100-130VAC or 200-240VAC, 50/60Hz

Consumption : Less than 5VA

ENVIRONMENTAL & PHYSICAL

Operating Temperature : 0-50°C

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

Insulation : 20M ohms min. (500VDC)

Breakdown : AC 2000V, 50 / 60Hz, 1 minute

Vibration : 10-55Hz. amplitude 1 mm

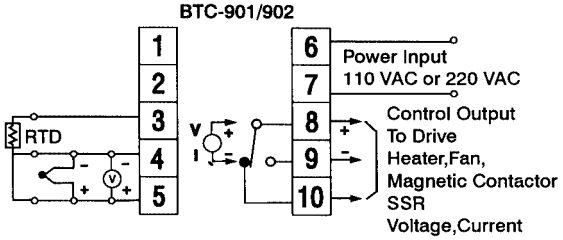
Shock : 200m/s^2 (20g)

Weight: BTC-901: 240 grams, BTC-902: 270 grams

Dimension: 48(W)X48(H)X86mm (depth behind panel)

Panel cutout: 45 X 45mm

CONNECTION DIAGRAM



ORDERING INFORMATION

Model NO. □ □ □ □ □ □ □ □
(1) (2) (3) (4) (5) (6) (7) (8)

(1) Power Input

1	100-130VAC, 50Hz/60Hz
2	200-240VAC, 50Hz/60Hz

(2) Signal Input

1	Type J thermocouple	4	PT 100 ohm JIS
2	Type K thermocouple	9	Other
3	1 PT100 ohm DIN		

(3) Range Code

Code	Range	Code	Range	Selected Solder GAP
2	0 ~ 100°C	A	50 ~ 200°F	J3
3	0 ~ 200°C	B	50 ~ 400°F	J4
4	0 ~ 300°C	C	50 ~ 550°F	J5
5	0 ~ 400°C	D	50 ~ 750°F	J6
		E	50 ~ 850°F	J7
6	0 ~ 600°C	F	50 ~ 1100°F	J8
7	0 ~ 800°C	G	50 ~ 1400°F	J9
8	0 ~ 1200°C	H	*0 ~ 2200°F	J10
9	Other			

(4) Control Mode

Code	Mode	J11
1	ON-OFF	Short
2	P (proportional)	Open

(5) Output I

1	Relay, rated 5A/240VAC resistive
2	Pulsed voltage to drive SSR, rated 20mA/24V
3	4-20mA linear, max. load 500 ohms
4	0-20mA linear, max. load 500 ohms
5	0-10V linear, min. load 500k ohms
9	Other

(6) Output II

0	None

(7) Alarm

0	None

(8) Communication

0	None

FUNCTION OF SOLDER GAP J1~J11

Location	Short	Open	Function
J1	o		T/C Type J or K
“		o	PT 100 ohms DIN or JIS
J2		o	Reverse Control
“	o		Forward control
J3	o		100□C span
J4	o		200□C span
J5	o		300□C span
J6	o		400□C span
J7	o		460□C span
J8	o		600□C span
J9	o		800□C span
J10	o		1200□C span
J11	o		ON-OFF control
“		o	Time proportional control

FUNCTION OF SOLDER GAP J12-J13

J12	J13	Cycle time	Function
Short	Short	20 Secs.	Relay output
Open	Short	1 Sec.	SSR drive
Open	Open	0.02 Sec.	Linear current or voltage output

* Please refer detailed conversion from full technical information

1/16 DIN Digital Setting Temperature Controller/Indicator BTC-905, BTC-900

FEATURES

- Build-in Laser Trim ASIC
- Easy to change range
- ON-OFF or time proportional selectable
- Compact, only 86mm in depth
- Wide selection of control output option
- Wide selection of ranges
- Sensor break protection
- Low cost
- Safety: UL, CSA
- EMC, LVD: CE

SPECIFICATION

INPUT

Thermocouple (T/C): Type J, K

RTD : 3-wires PT 100 ohms, DIN or JIS

Range : See ordering information

Accuracy : ±1% of span

Cold Junction Compensatin : 0.1°C / °C

Rejection of RTD Lead Resistance =

(0.1°C - 0.025% of PV reading) / ohm

Sensor Break Protection : Upscale

External Resistance : 100 ohms max.

Normal Mode Rejection : 60 dB

Common Mode Rejection : 120 dB

Sample Rate : 3 times / second

CONTROL

Proportional Band : 2.2% of span

ON-OFF Hysteresis : 1 % of span

Cycle Time : 20 seconds for relay output, 1 second for pulsed voltage output, 0.02 second for linear current or voltage output.

Control Action : Reverse action

OUTPUT

Control : Relay 5A / 240V max. resistive load

Pulsed Voltage: 20mA / 32VDC max.

Current: 4-20mA, 0-20mA, max. load 500 ohms

Voltage: 0-10V, min. load 500k ohms

ADJUSTMENT

Set point: 3-dight or 4-dight switch

Manual Reset: Adjustable 2.6% of span (BTC-905 only)

Resolution of set point: 1 LSD (Least Significant Digit)

Accuracy of set point: ±1% of span

Repeatability of set point: ±1 LSD

INDICATION

Process Indicator: 3-1 / 2 digit, 0.4" red LED display

Status Indicator: Red LED Lamp

POWER

Rating: 90-240VAC, 50Hz / 60Hz

Consumption: Less than 5VA

ENVIRONMENTAL & PHYSICAL

Operating Temperature: 0-50°C

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

Insulation: 20M ohms min. (500VDC)

Breakdown: AC 2000V, 50 / 60Hz, 1 minute

Vibration: 10-55Hz. amplitude 1 mm

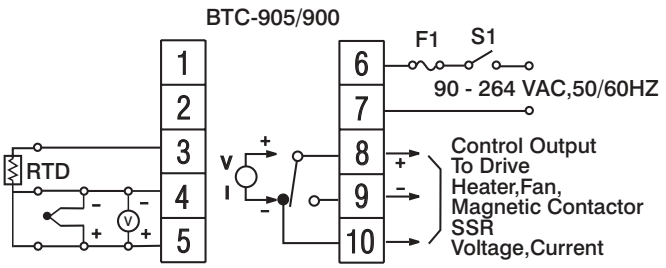
Shock: 200m/s^2 (20g)

Weight: BTC-905: 190 grams, BTC-900: 140 grams

Dimension: 48(W)X48(H)X86mm (depth behind panel)

Panel cutout: 45 X 45mm

CONNECTION DIAGRAM



For BTC-900 pin 8, pin 9 and pin 10 are not used.

ORDERING INFORMATION

Model No. — □ □ □ □ □ □ □ □
(1) (2) (3) (4) (5) (6) (7) (8)

(1) Power Input

4	90-264 VAC, 50/60Hz
5	20-32 VDC/VAC
9	Other

(2) Signal Input

1	Type J thermocouple	4	PT100 ohm JIS
2	Type K thermocouple	9	Other
3	PT100 ohm DIN		

(3) Range Code

Code	Range	Code	Range
2	-199 ~ 199 °C	K	-399 ~ 399 °F
3	-99.9 ~ 99.9 °C	L	-199 ~ 199 °F
4	-99 ~ 99 °C	M	-99.9 ~ 99.9 °F
5	-49.9 ~ 49.9 °C	N	-99 ~ 99 °F
6	0 ~ 49.9 °C	P	0 ~ 99 °F
7	0 ~ 99 °C	Q	0 ~ 99.9 °F
8	0 ~ 99.9 °C	R	0 ~ 199 °F
A	0 ~ 199 °C	S	0 ~ 399 °F
B	0 ~ 199.9 °C	T	0 ~ 599 °F
C	0 ~ 299 °C	U	0 ~ 799 °F
D	0 ~ 399 °C	V	0 ~ 999 °F
E	0 ~ 499 °C	W	0 ~ 1999 °F
F	0 ~ 599 °C	Y	0 ~ 499 °F
G	0 ~ 799 °C	Z	0 ~ 1200 °F
H	0 ~ 999 °C		
J	0 ~ 1200 °C		

(4) Control Mode (For BTC-905)

Code	Mode	J11
1	ON-OFF	Short
2	P (proportional)	Open

(4) Control Mode (For BTC-900)

0	None

(5) Output I (For BTC-905)

1	Relay, rated 5A/240VAC resistive
2	Pulsed voltage to drive SSR, rated 20mA/24V
3	4-20mA linear, max. load 500 ohms
4	0-20mA linear, max. load 500 ohms
5	0-10V linear, min. load 500K ohms
9	Other

(5) Output I (For BTC-900)

0	None

(6) Output II

0	None

(7) Alarm

0	None

(8) Communication

0	None

FUNCTION OF SOLDER GAP J1~J11

Location	Short	Open	Function
J1	o		T/C Type J or K
"		o	PT 100 ohms DIN or JIS
J2		o	Reverse control
"	o		Forward control
J3	o		100 °C span
J4	o		200 °C span
J5	o		300 °C span
J6	o		400 °C span
J7	o		460 °C span
J8	o		600 °C span
J9	o		800 °C span
J10	o		1200 °C span
J11	o		ON-OFF control
"		o	Time proportional control

FUNCTION OF SOLDER GAP J12~J13

J12	J13	Cycle time	Function
Short	Short	20 Secs.	Relay output
Open	Short	1 Sec.	SSR drive
Open	Open	0.02 Sec.	Linear current or voltage output

FUNCTION OF SOLDER GAP J14~J15

J14	J15	Function
Short	Open	Positive Setting
Open	Open	Positive and Negative setting
Open	Short	Negative setting

* Please refer detailed conversion from full technical information

NC30

Temperature Controller for Jacket Heaters

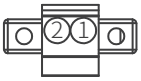
NC30 is a special designed temperature controller with fuzzy logic algorithm for cloth jacket heaters to control temperature. The temperature controller takes an input from a temperature sensor and has an output that is connected to a control element such as cloth jacket heaters. The controller equipped with 5A solid state relay as control output and a 2A, 240VAC Form A relay as alarm output as standard along with RS-485 communication. There are maximum of 247 units can be connected in RS-485.

Features

- Maximum Load Current 4.5A @ 50°C Ambient Temperature
- Instantaneous Power Consumption Display
- Load Current, Load Voltage and Load Power Display
- Heater Break Detection
- Connect with HMI for Alarm Monitoring
- Network up to 247 Controllers on RS-485 (Modbus Protocol)
- Automatic Addressing for RS-485
- Safe and Easy Wiring Leads to Reduced System Down Time
- Fastest Sampling Rate of 200msec
- Thermocouple & RTD Input
- Fuzzy Logic + PID Technology
- Auto-Tuning & Manual Tuning
- High Brightness LCD Display
- Output Power Limit Function
- Direct Connection of Heater
- Alarm Output

Wiring Diagram

CN1

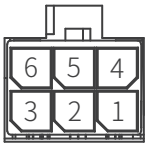


① + T/C RTD
② −

CN2

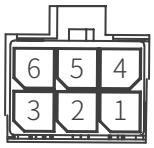
Micro USB
Programming Port

CN3



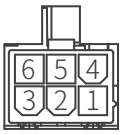
① TXB ┐
② TXA ┘ RS-485 AWG #16 Cable
③
④ EG
⑤ AC2 ┐ Max, Rating ┐ AWG #12 Cable
⑥ AC1 ┘ 90~250VAC ┘
23A

CN4



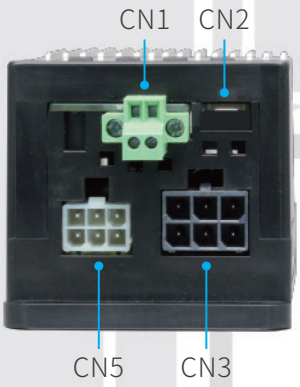
①
② TXA ┐ AWG #16 Cable
③ TXB ┘
④ AC1 ┐ Max, Rating ┐ AWG #12 Cable
⑤ AC2 ┘ 90~250VAC ┘
⑥ EG 23A

CN5

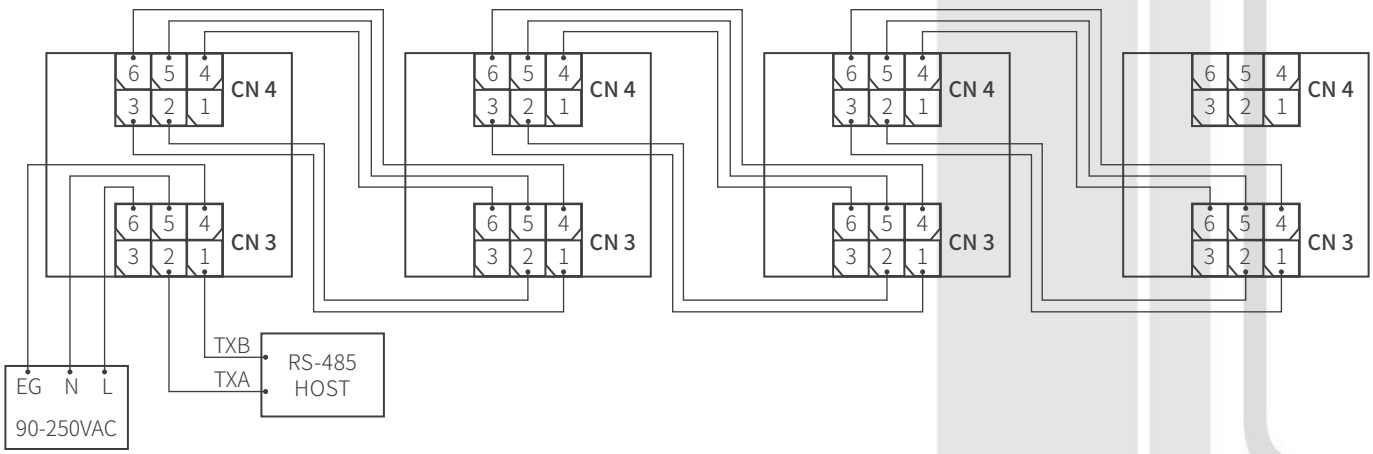


① HT2 ┐ Heater ┐ AWG #18 Cable
② HT1 ┘ Max, Rating ┘
5A/250VAC
③
④ NO ┐ Alarm Output ┐ AWG #18 Cable
⑤ NC ┘ Max, Rating ┘
⑥ C 4A/250VAC

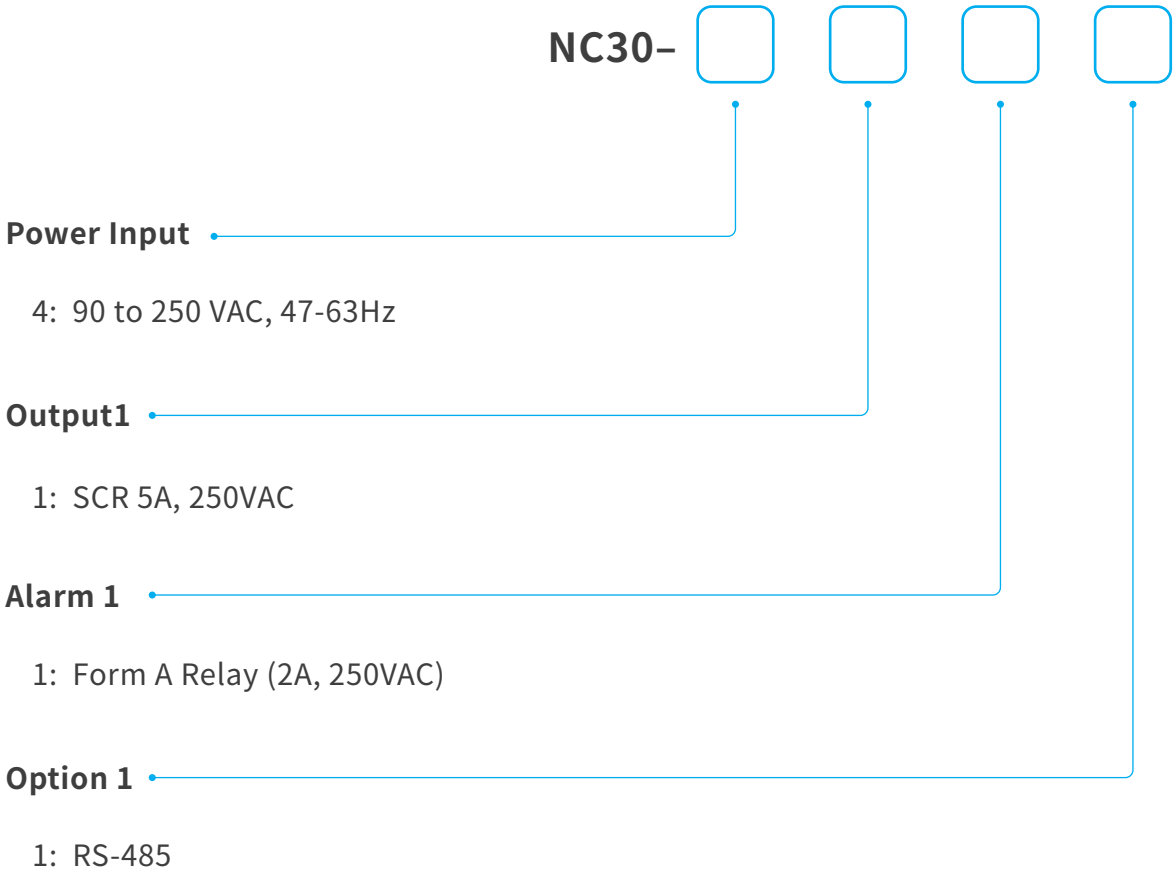
Dimension



Networking



Ordering Code



Accessories

- PA98-1 = USB Programming Adaptor
- CC98-1 = Programming Port Cable (1.5m)
- SNA-10A = Smart Network Adaptor for third party software, which converts up to 255 channels of RS-485 or RS-422 to be usable on an RS-232 Network

NC200

SPECIAL PURPOSE CONTROLLER FOR JACKET HEATERS

The NC200 is a specially designed controller with fuzzy logic algorithm for cloth jacket heaters to control temperature. The temperature controller takes an input from a temperature sensor and has an output that is connected to a control element such as cloth jacket heaters. The controller equipped with 3 Amp solid-state relay as control output and a 2A, 240VAC Form A relay as alarm output through DL200 communication module. Maximum of 247 units can be connected in the network by using DL200 communication module and the RJ11 4P4C cable.

Features

- Fastest Sampling Rate of 200msec
- Thermocouple & RTD Input
- Fuzzy Logic +PID Technology
- Auto-tuning & Manual tuning
- Maximum Load Current 7A @ 25° C, 3.5A @ 47.5° C ambient temperature
- Output power limit function
- Direct connection of heater
- Alarm output through DL200
- Connect with HMI for Alarm monitoring
- Network up to 247 controllers using DL200
- Auto addressing, manual configuration not required
- Safe and Easy wiring leads to reduced system down time

NC200

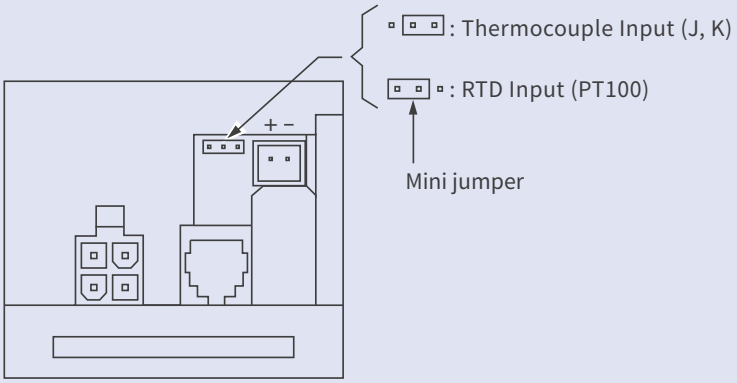
NC200 Specification

Specification	NC200			
Power Supply	90 to 250VAC, 47 to63Hz			
Power Consumption	800VA,5W Maximum			
Signal Input				
Type	Thermocouple: J, K; RTD: PT100(DIN)			
Resolution	18 Bits			
Sampling Rate	5 Times / Second (200msec)			
Input Characteristics	**Type**	**Range**	**Accuracy @ 25° C**	**Input Impedance**
	J	-17.8° C to 500° C (0° F to 932° F)	± 2° C	1 MΩ
	K	-17.8° C to 500° C (0° F to 932° F)	± 2° C	1 MΩ
	PT100(DIN)	-17.8° C to 500° C (0° F to 932° F)	± 1° C	1.3 KΩ
Control Output (Output 1)				
Type	SSR 3A, 250V AC			
Rating	7A @ 25° C, 3.5A @ 47.5° C Ambient Temperature			
Switch ON-OFF	Zero Crossing triggering			
Insulation Resistance	1000 MΩ minimum @ 500V DC			
Dielectric Strength	2500V AC for 1 minute			
Control Mode				
Control Action	Reverse (Heating)			
PID	Fuzzy logic modified Proportional band 0.1 ~ 500.0° C(0.1~900.0° F), Integral time 0 – 900 Secs, Derivative Time 0 - 300 Secs			
Cycle Time	2 Seconds			
Manual Control	0 ~ 100 %			
Auto-Tuning	Cold Start and Warm Start			
Output Power Limit	0~100%			
User Interface				
Keypad	3 Keys			
Display Type	3 Digit LED Display			
No of Display	1			
Environmental and Physical Specifications				
Operating Temperature	-10° C to 50° C			
Storage Temperature	-40° C to 60° C			
Humidity	0 to 90 % RH (Non-Condensing)			
Altitude	2000 Meters Maximum			
Insulation Resistance	20MΩ Minimum (@500V DC)			
Dielectric Strength	2000VAC,50/60 Hz for 1 Minute			
Vibration Resistance	10 to 55 Hz, 10m/s2 for 2 Hours			
Shock Resistance	200 m/s2(20g)			
Mounting	Wall Mounting			
Dimensions (W*H*D) (mm)	50.3 *52.4 * 45			
Weight (grams)	112			
Approval Standards				
Safety	EN61010-1 (IEC1010-1)			
Protective Class	IP20			
EMC	EN61326			

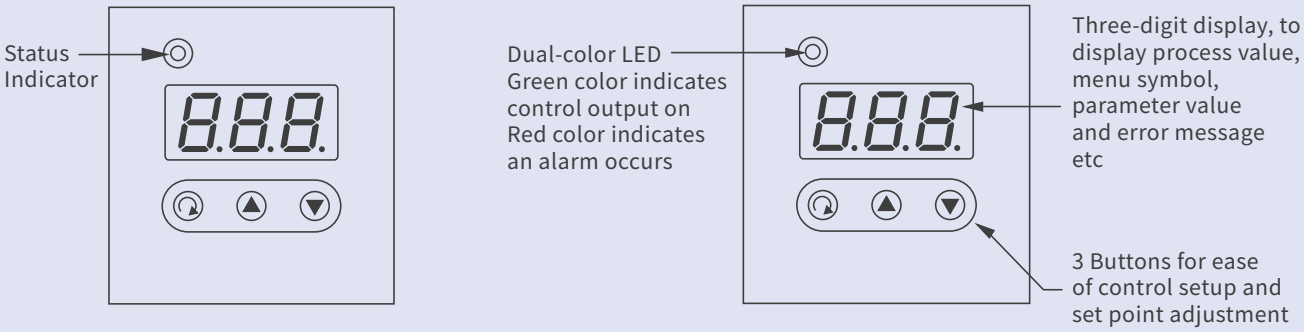
DL200 Specification

Specification	DL200
Power Supply	90 to 250VAC, 47 to63Hz
Power Consumption	3VA,1W Maximum
Alarm	
Relay Type	Form A
Maximum Rating	2A,240VAC,200000 Life Cycles for Resistive Load
Alarm Functions	Process High, Process Low, Sensor break, hardware failure on any units on the network
Alarm Indicator	Red Colour
Data Communication	
Interface	Master Side: RS232, Slave Side: RS422
Slave Side	
Protocol	Proprietary Protocol
Address	1 to 247
Baud Rate	92.16 Kbits/Second
Reading Speed	4msec /Unit (Reading 14 Words per unit)
Writing Speed	3.5 msec for writing 10 words; 1msec for writing 1 word
Master Side	
Address	20 (Fixed)
Parity Bit	Even
Data Length	8 Bits
Stop Bit	1 Bit
Reading Speed	60 msec for reading one word of data for 100 units, 480 msec for reading 4 words of data for 200 units
Environmental and Physical Specifications	
Operating Temperature	-10° C to 50° C
Storage Temperature	-40° C to 60° C
Humidity	0 to 90 % RH (Non-Condensing)
Altitude	2000 Meters Maximum
Insulation Resistance	20MΩ Minimum (@500V DC)
Dielectric Strength	2000VAC,50/60 Hz for 1 Minute
Vibration Resistance	10 to 55 Hz, 10m/s2 for 2 Hours
Shock Resistance	200 m/s2(20g)
Mounting	Wall Mounting
Dimensions (W*H*D) (mm)	102.5 *80 * 30
Weight (grams)	120
Approval Standards	
Safety	EN61010-1 (IEC1010-1)
Protective Class	IP20
EMC	EN61326

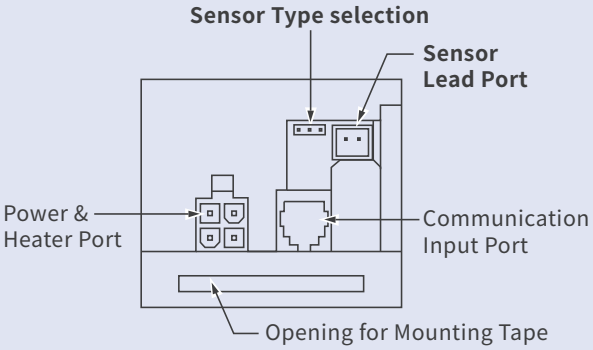
Mini-jumper Setting >>



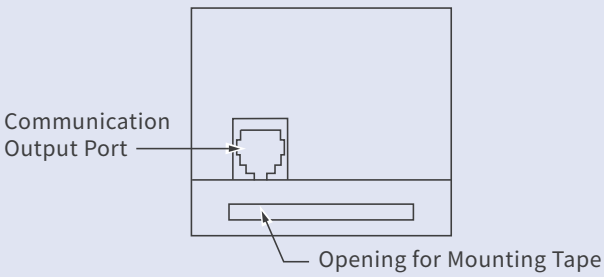
Front View >>



Left Side View >>

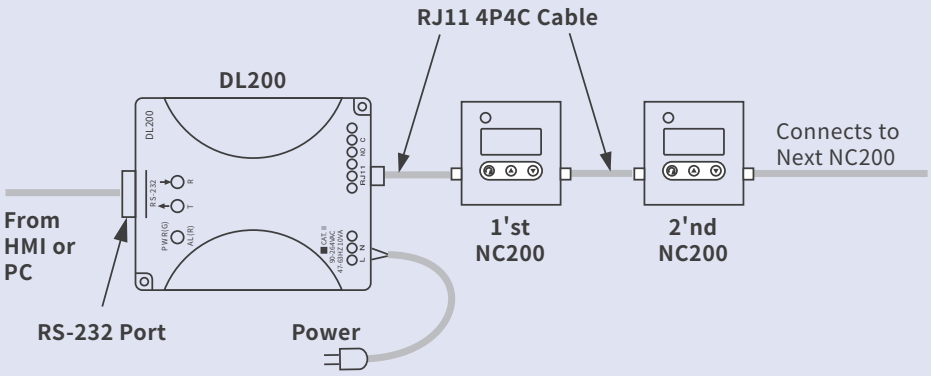


Right Side View >>



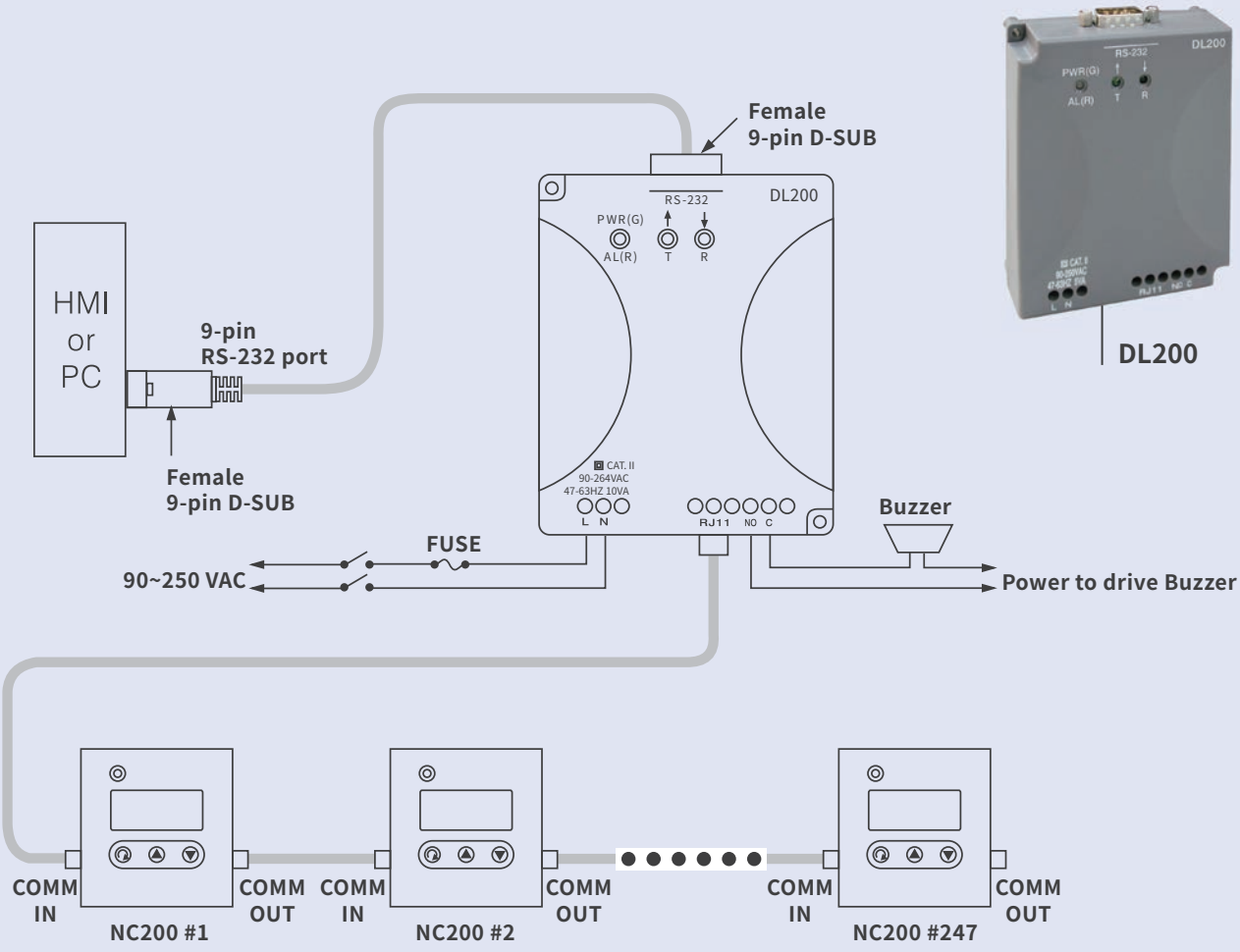
Networking of NC200

Networking of NC200 >>



System Wiring of NC200 and DL200

System Wiring of NC200 and DL200 >>



NC200 Ordering Code

NC200 – □ □ □ □

Power Input

4: 90 to 250 VAC, 47-63Hz

Standard Input

1: J, K Thermocouple, PT100 DIN RTD
9: Special Order

Control Output

1: SSR 3A, 250 VAC

Options

0: ° C
1: ° F

Related Products

DL200 = Smart Network Adaptor for third party software, which can connect up to 247 units on RS-422 and converts to be usable on an RS-232 Network.

DL200 – □ □ □ □

Power Input

4: 90 to 250 VAC, 47-63 Hz

Alarm Input

1: Form A Relay, 2A/250 VAC

Communication

1: RS-232, Modbus protocol
9: Special order

Options

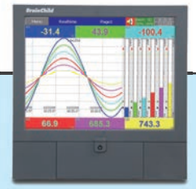
0: No speical option

Standard ordering code = DL200-4110

BrainChild

PR Series
Paperless Recorders

Outstanding Specifications & Features

			
	PR10	PR20	PR30
Product position	low-cost one, good for replacing 6-dotting chart recorders, and 1, 2, 3 pen recorders	medium size and powerful one, input numbers up to the highest 24 channels	big size and high-end one, good for sophisticated applications, for example power industry
Input numbers	3, 6 channels	3, 6, 12, 18, 24 channels	6, 12, 18, 24, 30, 36, 42, 48 channels
Input Signals	Thermocouples: J, K, T, E, B, R, S, N, L, U, P, W5 or C, W3, LR, A1, A2, A3, M RTD: Pt50, Pt100, Pt200, Pt500, Pt1000 (α=0.00385), Pt50, Pt100 (α=0.00391) JPt50, JPt100, JPt200, JPt500, JPt1000 (α=0.003916) Cu10 (α=0.00427), Cu50, Cu100(α=0.00426, 0.00428), Ni100, Ni200, Ni500, Ni1000 (α=0.00617) mA, V, mV		
The fastest sampling rate	to reach 100 msec / dot, default setting at 1 sec / dot		
Digital inputs / Relay outputs	Maximum 24 channels		
Analog outputs	Maximum 6 channels	Maximum 6 channels	Maximum 12 channels
Math channels (in standard firmware)	15	40	60
External channels (in plus 1/3 firmware)	24	48	96
Batch & FDA 21 CFR part 11	available in plus 1/3 firmware		
Custom display	available in plus 2/3 firmware		
Display	4.3" TFT wide touch screen	5.6" TFT touch screen	12.1" TFT touch screen
Resolution	480 x 272	640 x 480	1024 x 768
MTFB backlight at 25°C	30,000 hrs	30,000 hrs	60,000 hrs
Backlight	LED		
Screen saver, Email	Yes		
CPU	ARM Cortex-A8, 1Ghz with 256 MB RAM		
Internal Flash memory	256 MB		
Ethernet	Modbus TCP/IP		
RS-232/422/485	optional RS-232 or RS-422/485 Modbus RTU		
SD card Slot, USB host x 2	standard, one USB in the front, another USB in the back		
Pulse input	optional DI card supports pulse input up to 100 Hz		
PID Process control	Maximum 4 cards	Maximum 4 cards	Maximum 8 cards
START / STOP key	to start / stop record and to turn off the display only, not the power so that a quick restart possible later		
Calibration correction	on-site calibration possible, or using handy features of Offset and Gain for correction		
Multilingual	convenient for local users by offering languages in Brazil Portuguese, Chinese (simplified, traditional), Czech, Danish, Dutch, English, French, German, Greek, Italian, Japanese, Korean, Polish, Portuguese, Russian, Spanish, Swedish, Thai, Turkish, other languages negotiable		
PC software	standard: Historical Viewer+Configuration, optional Data Acquisition Studio for real-time monitoring & logging		
Power supply	90-250VAC or 11-36VDC		
Outer dimensions (W x H x L mm)	144 x 144 x189	144 x 144 x189	288 x 288 x 189
Shorter mounting depth (mm)	171	171	171
DIN Panel cutout (W x H mm)	137 x 137	137 x 137	281 x 281
Protection	IP65 front, IP20 rear		
Operating temperature	0°C to 50°C		
Storage temperature	-30°C to 70°C		
Safety standards	CE, UL, cUL, RoHS, WEEE (UL & cUL available only for 90-250VAC on PR10 & PR20)		

Features

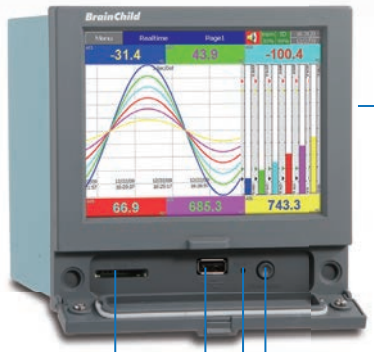
* 100 milliseconds data logging
* FDA 21 CFR part11 compliance
* Batch control, log data in batches
* Timer, Counter, Totalizer & Math channels
* Custom display pages
* PID control with profile function
* Alarms by email
* On field calibration
* Web server
* Clock synchronization via internet
* Handwriting function in historical data
* Multiple Languages
* Circular chart in PR30
* Direct printer connectivity or PDF printer
* USB barcode reader connectivity for data entry
* Dynamic data exchange (DDE) via PC software

IO modules easy for expansion

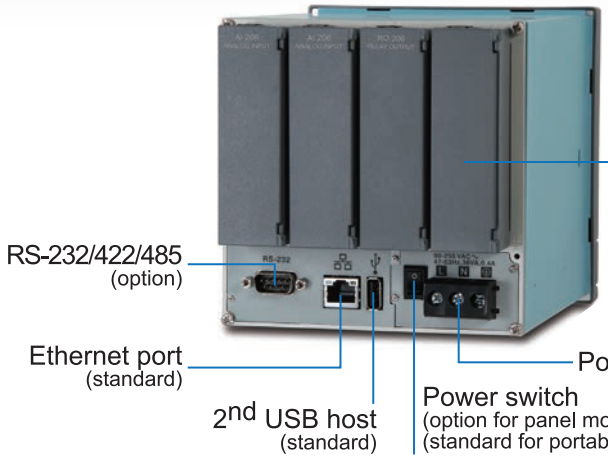
Smart Mechanism

Front view, Back view

PR20 Front view



PR20 Back view



Expandable modules of inputs & outputs

AI206
6 AI (6 analog inputs)

AI203
3 AI (3 analog inputs)

RO206
6 relay outputs

DI206
6 DI (6 digital inputs)

PC201
single loop process control

AO206
6 AO (6 analog outputs)

RD233
3 relays + 3DI

PR10
(4 Slots, up to 6 AI)

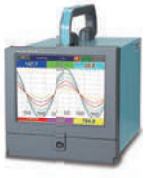
PR20
(4 Slots, up to 24 AI)

PR30
(16 Slots, up to 48 AI)

Portable recorders, Security key

Portable recorders

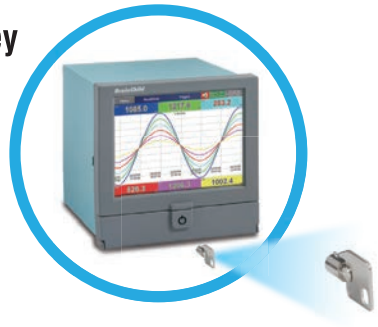
PR10



PR20

PR30

Security key



PC201: Single Loop PID Process Control Card

Input 1

Characteristics :

Type	Range	Accuracy @25°C	Input Impedance
J	-120°C -1000°C (-184°F -1832°F)	±2°C	2.2MΩ
K	-200°C -1370°C (-328°F -2498°F)	±2°C	2.2MΩ
T	-250°C -400°C (-418°F -752°F)	±2°C	2.2MΩ
E	-100°C -900°C (-148°F -1652°F)	±2°C	2.2MΩ
B	0°C -1820°C (32°F -3308°F)	±2°C (200°C - 1820°C)	2.2MΩ
R	0°C -1767.8°C (32°F -3214°F)	±2°C	2.2MΩ
S	0°C -1767.8°C (32°F -3214°F)	±2°C	2.2MΩ
N	-250°C -1300°C (-418°F -2372°F)	±2°C	2.2MΩ
L	-200°C -900°C (-328°F -1652°F)	±2°C	2.2MΩ
PT100 (DIN)	-210°C -700°C (-346°F -1292°F)	±0.4°C	1.3KΩ
PT100 (JIS)	-200°C -600°C (-328°F -1112°F)	±0.4°C	1.3KΩ
mV	-8mV -70mV	±0.05%	2.2MΩ
mA	-3mA -27mA	±0.05%	70.5Ω
V	-1.3V -11.5V	±0.05%	302KΩ

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/Ω of resistance difference of two leads
2-wire RTD: 2.6 ˚C/Ω 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 2

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
Characteristics :

Type	Range	Accuracy @25°C	Input Impedance
CT94-1	0-50.0 A	±2% of Reading ±0.2 A	302 KΩ
mA	-3mA-27mA	±0.05%	$70.5\Omega + \frac{0.8V}{\text{input current}}$
V	-1.3V-11.5V	±0.05%	302 KΩ

Input 3 (Event Input)

Logic Low : -10V minimum, 0.8V maximum.
Logic High : 2V minimum, 10V maximum
External pull-down Resistance : 400 KΩ maximum
External pull-up Resistance : 1.5 MΩ minimum

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	500 Ω max.
0-20 mA	0 mA	20-21 mA	500 Ω 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.

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 : 1000 VAC
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 : 1.5 V rms
Insulation Resistance : 1000 MΩ 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
20 V	±0.1 V	25 mA	0.2 Vp-p	500 VAC
12 V	±0.6 V	40 mA	0.1 Vp-p	500 VAC
5 V	±0.25 V	80 mA	0.05 Vp-p	500 VAC

Alarm 1/ Alarm 2 (Output 2)

Alarm 1 Relay :
Form C, life cycles 200,000 for resistive load
Alarm 2 Relay :
Form A, Max. rating 2A / 240VAC, life cycles 200,000 for resistive load
Dwell Timer : 0 - 6553.5 minutes

Control Mode

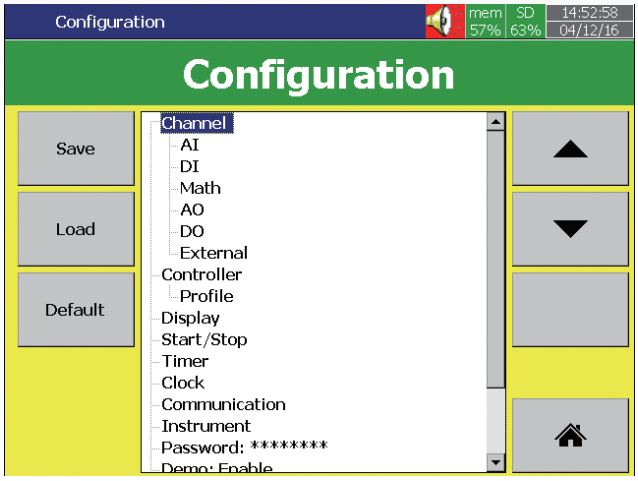
Output 1 : Reverse (heating) or direct (cooling) action
Output 2 : PID cooling control, cooling P band 1 ~ 255% of PB
ON-OFF : 0.1-100.0˚C (0.1-100.0˚F) hysteresis control (P band = 0)
P or PD : 0 - 100.0 % offset adjustment
PID : Fuzzy logic modified , Proportional band 0 ~ 500.0 ˚C , Integral time 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
Self-tuning : Select None and YES
Failure Mode : Auto-transfer to manual mode while sensor break or A-D converter damage
Ramping Control : 0-500.0˚C (0 - 900.0˚F) / minute or 0-500.0˚C (0 - 900.0˚F) / hour ramp rate
Sleep Mode : Enable or Disable
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

Profiler

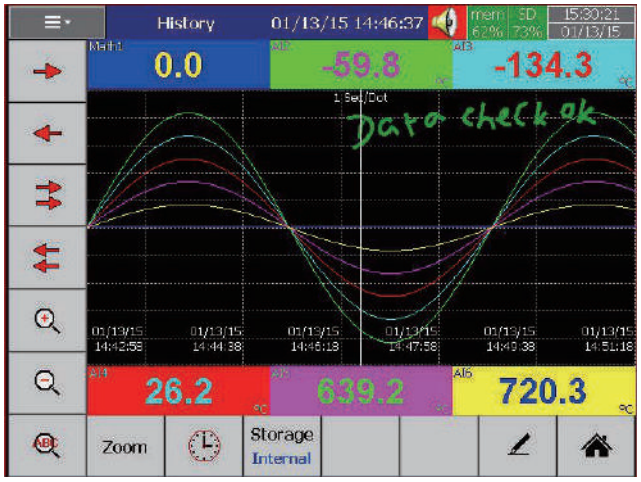
Number of Profiles : 50 per recorder
Number of Segments per Profile : 32
Note : Total Segments are limited to 1000 Segments

User friendly functions in recorders

Configuration in Tree Layout is easy for operation

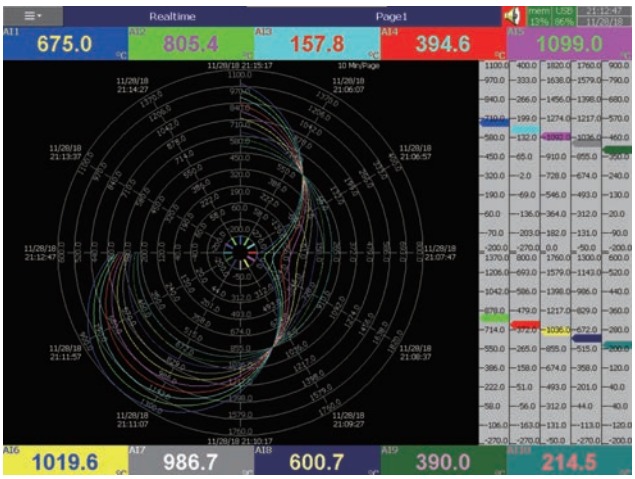


Handwriting messages are handy for users



Circular display (PR30 only)

For some industries preferred circular display, PR30 can offer this unique feature and set the display speed for each page/circle in 30 minutes, 1, 2, 4, 8, 12 hours,1, 2 days, or 1, 2, 4 weeks.



Standard version of Firmware

AI: Analog input is offered various log speed in 100ms, 1, 2, 5, 10, 20, 30 Sec, 1, 2 Min/Dot.

DI: Digital input is offered either normal Logic or high frequency Pulse.

AO: In analog output, mA or V and its Expression can be defined.

DO: Digital output/relay output can be enabled. Each DO card has 6 relays.

Display: Various display speeds are available in 100ms, 1, 2, 5, 10, 20, 30 Sec/Dot, or 1, 2, 10, 30 Min/Page, 1, 2, 4, 8, 12 Hour/Page, or 1 Day/Page.

Timer: Timer in Countdown, Repeat Countdown, Daily, Weekly or Monthly base, and various jobs can be defined.

Clock: Date Style of MM/dd/yy or dd/MM/yy, Time Synchronize via Internet, and Summer Saving Time can be defined.

Communication: Web Server and Email functions are available in Communication in Standard firmware.

Instrument: Brightness adjustment and Screen Saver are available in Instrument.

Password: If Normal Security is chosen, then only one password is offered. If high Security of CFR-21 is chosen, then 9 levels of password can be defined.

Demo: Enable or disable the demonstration.

Auto-output: Automatic output can be set to specify the printer, to print Historical data & Report data in specified period of time.

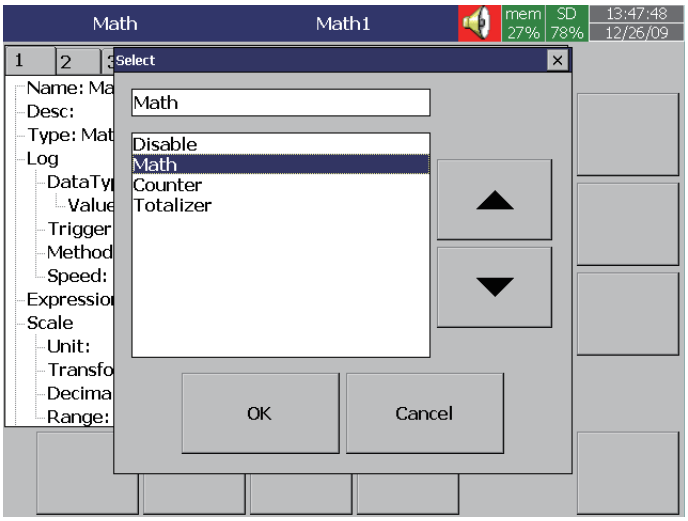
System information: It gives Firmware version number, Internal & External memory status, IP address, and IO card status of each Slot.

Calibrate: Sometimes the field calibration is required for high accuracy. In this case, a qualified engineer can do the necessary calibration.

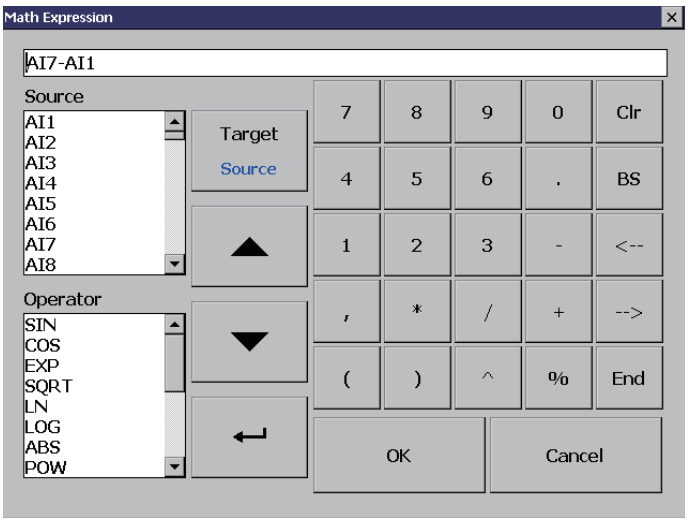
User friendly functions in recorders

Math: Standard version includes mathematics

Math: It includes Math, Counter & Totalizer.



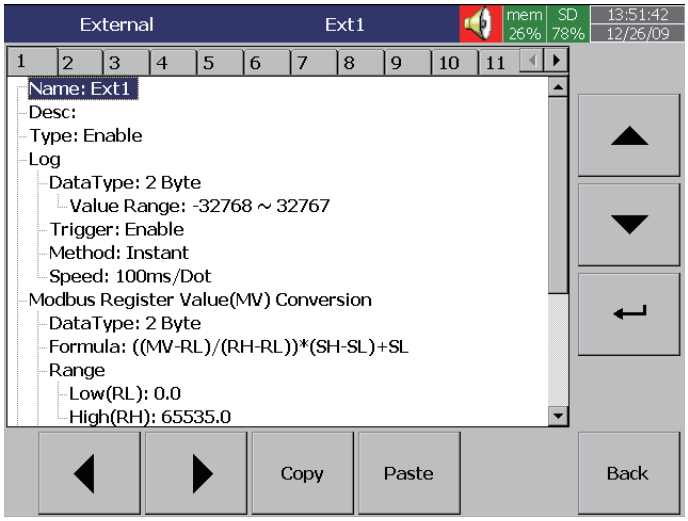
Math Expression is keyed in an easy way.



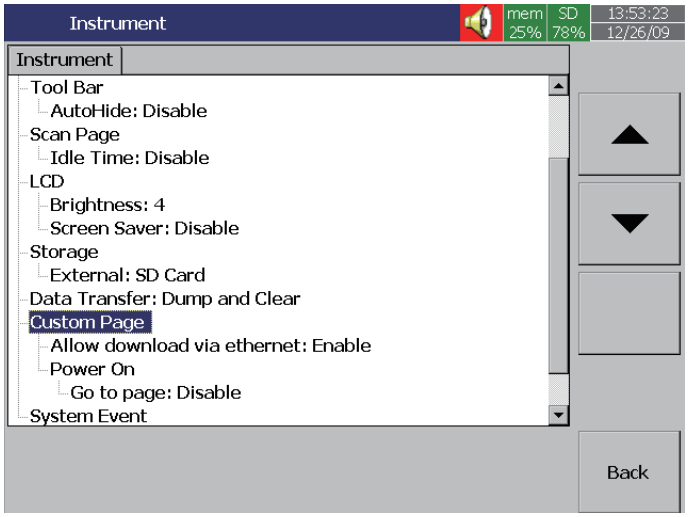
Plus version of Firmware

Plus versions offer more features of External Channels, Custom Display, Batch, FDA 21 CFR part 11.

External Channels: Besides AI & DI inputs, PR recorders accept inputs through communication called External Channels. PR10, PR20 & PR30 can work External Channels maximum up to 24, 48 & 96 respectively.



Custom Edited Display: In Plus versions, PC software Panel Studio allows users to edit the specific display instead of standard one, and then download it onto PR recorders.



Batch: Batch production record is constantly required for more strict production, for example food and drugs.

FDA 21 CFR part 11: This feature is complied with U.S. Food and Drug Administration with human health concern. All data should be avoided from manipulating after recording.

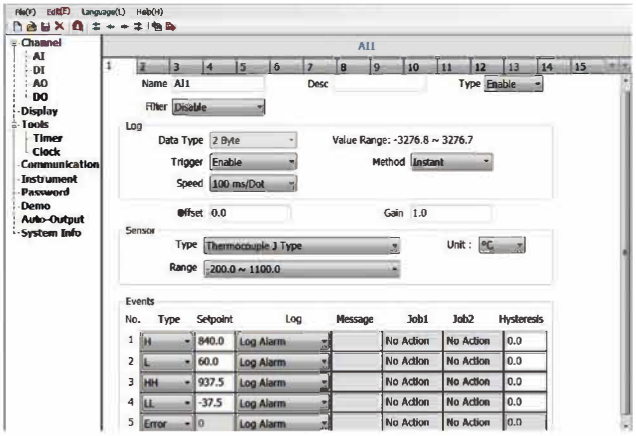
Powerful functions in PC Software

Free basic software

It consists of two parts, which are Configuration and Historical Viewer.

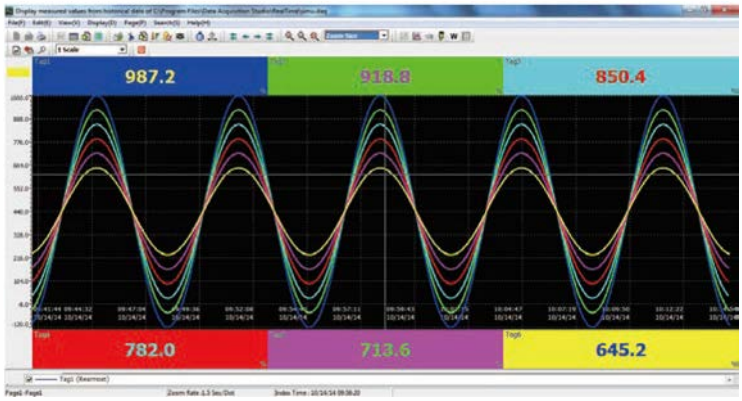
I. Configuration

It is easy to do recorder configuration on PC.
Then, send the configuration files from PC to recorder.



II. Historical Viewer

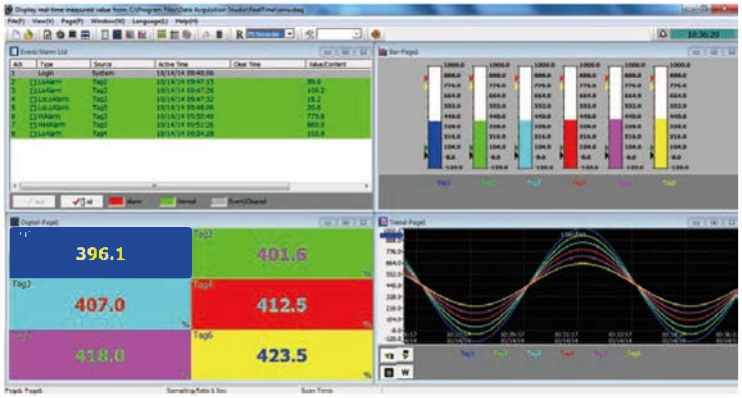
It can display historical trends, historical alarms, events, and then print it. It can search data by time, time period, tag, alarm, events and remarks. It also can export data in CSV format.



Extensive software Data Acquisition Studio

III. RealTime Viewer

Besides Configuration & Historical Viewer, it offers additional software RealTime Viewer for real-time monitoring.

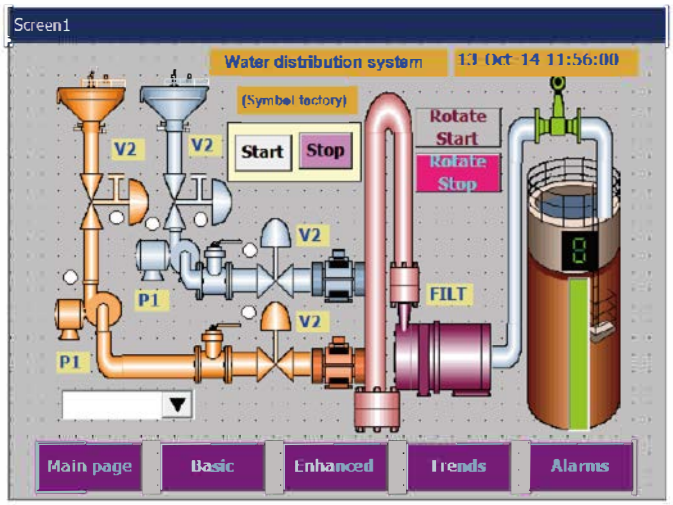


IV. Panel Studio

If Plus version 2 or 3 of Firmware is purchased, additional software Panel Studio is offered for editing custom display. The users can use it to edit specific displays on PC first, and then download it onto recorders. The custom edited displays will be additional pages to standard ones.

Edit it on PC

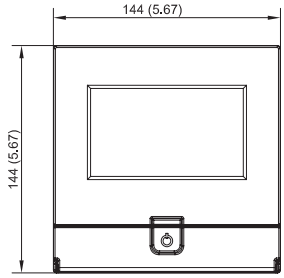
Download it onto recorders

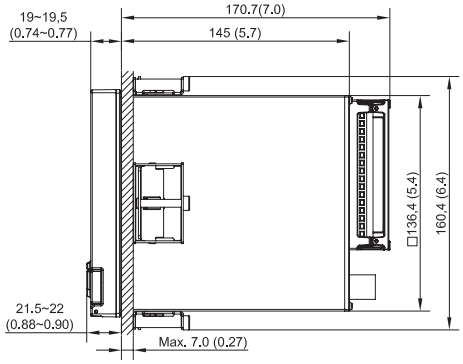


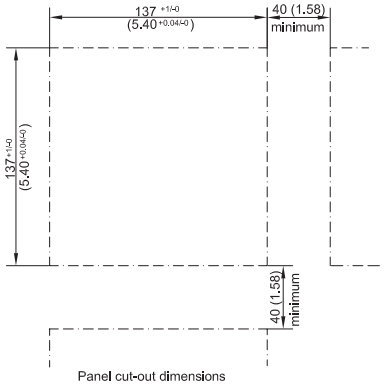
Installation

Dimensions in mm (in.)

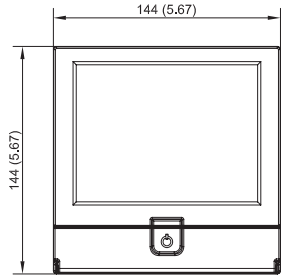
PR10

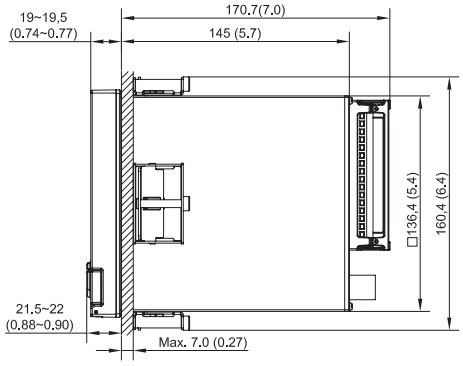


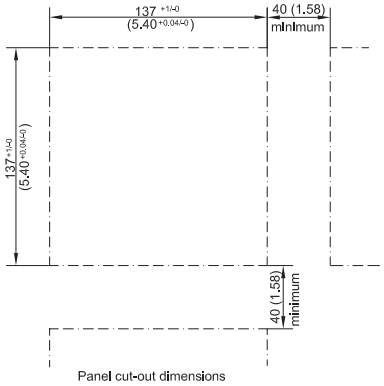




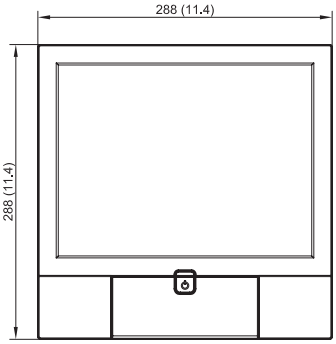
PR20

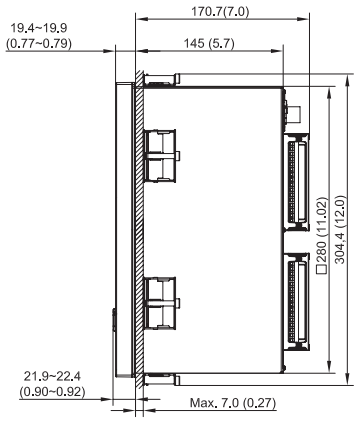


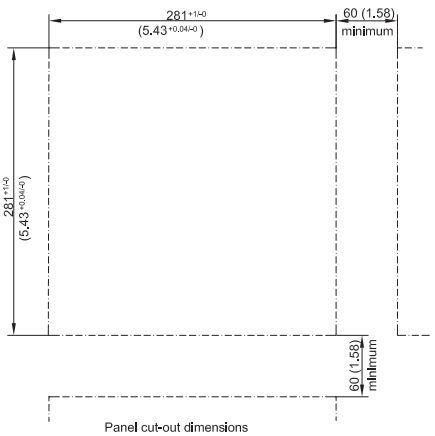




PR30







Ordering Code

PR10 Ordering Code

PR1003
(3 analog inputs)

Other inputs & outputs*
0: none
6: 3 relays + 3 DI

PR1006
(6 analog inputs)

Other inputs & outputs*
0: none
1: 6 relays
3: 6 DI
6: 3 relays + 3 DI
7: 6 relays + 6 DI

Power
A: 90-250 VAC, 50/60 Hz
D: 11-36 VDC

Communication
0: standard Ethernet
1: Ethernet + RS232
2: Ethernet + RS-422/485

Firmware
0: standard version with mathematics
1: Plus version 1 with external channels, batch & FDA 21 CFR part 11
2: Plus version 2 with custom edited display, an editing software Panel Studio to be supplied
3: Plus version 3 including Plus version 1+2 above

PC software
1: free basic software of Historical Viewer & Configuration
2: extensive software Data Acquisition Studio (RealTime Viewer + Historical Viewer + Configuration)

Mounting types, power cord & switch
0: panel mount, no power cord, no power switch
1: panel mount, no power cord, power switch
2: portable, UL & CSA power cord, power switch
3: portable, VDE power cord, power switch
4: portable, SAA power cord, power switch
5: portable, BS power cord, power switch
6: portable, no power cord, power switch
7: panel mount, UL & CSA power cord, power switch
8: panel mount, VDE power cord, power switch
9: panel mount, SAA power cord, power switch
A: panel mount, BS power cord, power switch

Special options
00: none
S1: 16G SD card
S2: 32G SD card

*Note: DI - digital inputs
PID Process control card can be purchased separately

Process Control card Ordering Code

PC201 –

Output 1
0: None
1: Relay 2A/240VAC
2: Pulse voltage to drive SSR, 5V/30mA
3: Isolated 4-20mA/0-20mA (OM95-3)
4: Isolated 1-5V/0-5V (OM95-4)
5: Isolated 0-10V (OM95-5)
6: Triac output 1A/240VAC,SSR
C: Pulse voltage to drive SSR, 14V/40mA (OM94-7)

Output 2
0: None
1: Relay 2A/240VAC
2: Pulse voltage to drive SSR, 5V/30mA
3: Isolated 4-20mA/0-20mA (OM95-3)
4: Isolated 1-5V/0-5V (OM95-4)
5: Isolated 0-10V (OM95-5)
6: Triac output 1A/240VAC,SSR
7: Isolated 20VDC/25mA power supply (DC94-1)
8: Isolated 12VDC/40mA power supply (DC94-2)
9: Isolated 5VDC/80mA power supply (DC94-3)
C: Pulse voltage to drive SSR, 14V/40mA (OM94-7)

Alarm 1
0: None
1: Form C relay 2A/240VAC

Alarm 2
0: None
1: Form A relay 2A/240VAC

PR20 Ordering Code

PR2003
(3 analog inputs)

Other inputs & outputs*
0: none
6: 3 relays + 3 DI
C: 3 relays + 3 DI + 6 AO

PR2006
(6 analog inputs)

Other inputs & outputs*
0: none
1: 6 relays
3: 6 DI
5: 6 AO
6: 3 relays + 3 DI
7: 6 relays + 6 DI
A: 6 relays + 6 AO
B: 6 DI + 6 AO
C: 3 relays + 3 DI + 6 AO
D: 6 relays + 6 DI + 6 AO

PR2009/12
(9/12 analog inputs)

Other inputs & outputs*
0: none
1: 6 relays
2: 12 relays
3: 6 DI
4: 12 DI
5: 6 AO
6: 3 relays + 3 DI
7: 6 relays + 6 DI
8: 9 relays + 3 DI
9: 3 relays + 9 DI
A: 6 relays + 6 AO
B: 6 DI + 6 AO
C: 3 relays + 3 DI + 6 AO

PR2015/18
(15/18 analog inputs)

Other inputs & outputs*
0: none
1: 6 relays
3: 6 DI
5: 6 AO
6: 3 relays + 3 DI

PR2021/24
(21/24 analog inputs)

Other inputs & outputs*
0: none

Power

A: 90-250 VAC, 50/60 Hz
D: 11-36 VDC

Communication

0: standard Ethernet
1: Ethernet + RS232
2: Ethernet + RS-422/485

Firmware

0: standard version with mathematics
1: Plus version 1 with external channels batch & FDA 21 CFR part 11
2: Plus version 2 with custom edited display, an editing software Panel Studio to be supplied
3: Plus version 3 including Plus version 1+2 above

PC software

1: free basic software of Historical Viewer & Configuration
2: extensive software Data Acquisition Studio (RealTime Viewer + Historical Viewer + Configuration)

Mounting types, power cord & switch

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4: portable, SAA power cord, power switch
5: portable, BS power cord, power switch
6: portable, no power cord, power switch
7: panel mount, UL & CSA power cord, power switch
8: panel mount, VDE power cord, power switch
9: panel mount, SAA power cord, power switch
A: panel mount, BS power cord, power switch

Special options

00: none
S1: 16G SD card
S2: 32G SD card

**Note: DI - digital inputs*
AO - analog retransmission output
PID Process control card can be purchased separately
Process control card cannot be chosen together with PR2003, PR2006, PR2012, PR2018 order codes 5, A, B, C, D nor with PR2024 (24 analog inputs)

PR30 Ordering Code

PR3006 (6 analog inputs)
PR3012 (12 analog inputs)
PR3018 (18 analog inputs)
PR3024 (24 analog inputs)
PR3030 (30 analog inputs)
PR3036 (36 analog inputs)
PR3042 (42 analog inputs)
PR3048 (48 analog inputs)

Relay outputs

0: none
1: 6 relays
2: 12 relays
3: 18 relays
4: 24 relays

Digital inputs

0: none
1: 6 channels
2: 12 channels
3: 18 channels

Analog outputs

0: none
1: 6 channels
2: 12 channels

Power

A: 90-250 VAC, 50/60 Hz
D: 11-36 VDC

Communication

0: standard Ethernet
1: Ethernet + RS232
2: Ethernet + RS-422/485

Firmware

0: standard version with mathematics
1: Plus version 1 with external channels, batch & FDA 21 CFR part 11
2: Plus version 2 with custom edited display, an editing software Panel Studio to be supplied
3: Plus version 3 including Plus version 1+2 above

PC software

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Mounting types, power cord & switch

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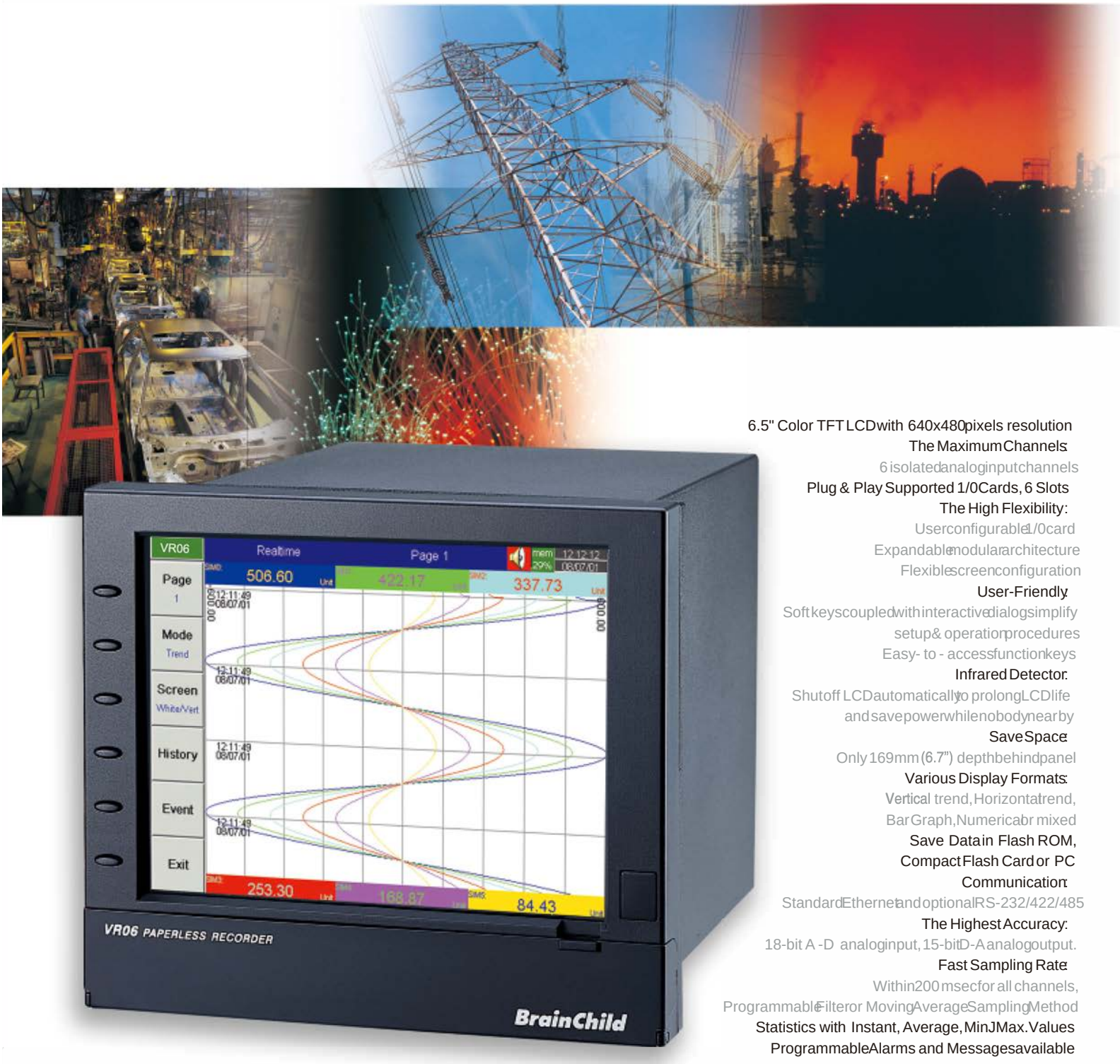
5: portable, BS power cord, power switch
6: portable, no power cord, power switch
7: panel mount, UL & CSA power cord, power switch
8: panel mount, VDE power cord, power switch
9: panel mount, SAA power cord, power switch
A: panel mount, BS power cord, power switch

Special options

00: none
S1: 16G SD card
S2: 32G SD card

**Note: PID Process control card can be purchased separately*

VR06 Paperless Recorder



6.5" Color TFT LCD with 640x480 pixels resolution

The Maximum Channels:
6 isolated analog input channels

Plug & Play Supported 1/0 Cards, 6 Slots

The High Flexibility:
User configurable 1/0 card
Expandable modular architecture
Flexible screen configuration

User-Friendly:
Soft keys coupled with interactive dialogs simplify setup & operation procedures
Easy- to - access function keys

Infrared Detector:
Shut off LCD automatically to prolong LCD life and save power while nobody near by

Save Space:
Only 169mm (6.7") depth behind panel

Various Display Formats:
Vertical trend, Horizontal trend, Bar Graph, Numerical or mixed

Save Data in Flash ROM, Compact Flash Card or PC

Communication:
Standard Ethernet and optional RS-232/422/485

The Highest Accuracy:
18-bit A -D analog input, 15-bit D-A analog output.

Fast Sampling Rate:
Within 200 msec for all channels, Programmable Filter or Moving Average Sampling Method

Statistics with Instant, Average, Min J Max. Values

Programmable Alarms and Messages available

BrainChild

VR06 is the Low-Cost paperless recorder in bigger size 6.5" with the highest resolution (true VGA , 640x480 pixels), infrared detector, 6 channels, plug & play I/O card, high flexibility, the most user - friendly and the shortest depth. In chemical plant, food & beverage plant, petrochemical plant, semiconductor plant, metal alloy, automotive plant, environmental monitoring or laboratory, VR06 can be used to monitor, record, evaluate the processes in the plants.

The user can access data on the screen as well as on site from a remote place via RS-232, RS-485, RS-422 serial interface or Ethernet networking. The historical data can be stored in flash ROM, Compact Flash Card, or collected in a remote host PC for data evaluation and print-out.

Panel Mounted Style

6.5" color TFT LCD 640x480 pixels resolution

Infrared detector protect LCD & save power

Power switch

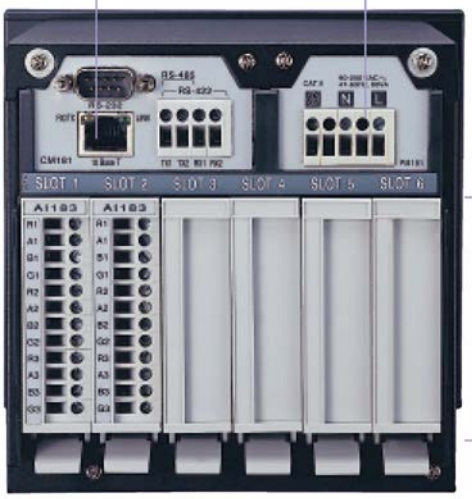
Compact Flash Card

12 SOFT KEYS FOR EASY OPERATION

Rear Terminals

standard Ethernet and optional RS-232/422/485

Power supply



6 SLOTs for Plug & play I/O cards, maximum 6 analog input or mixed with analog & digital I/O cards

Input & Output Cards

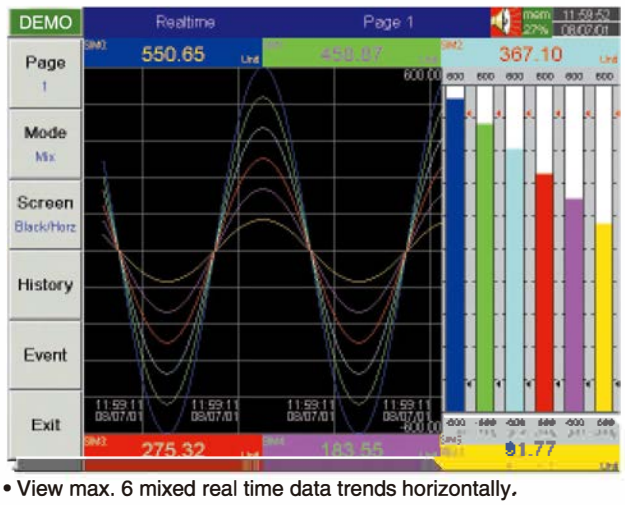
Digital input

Digital output (6 alarms)

Analog input

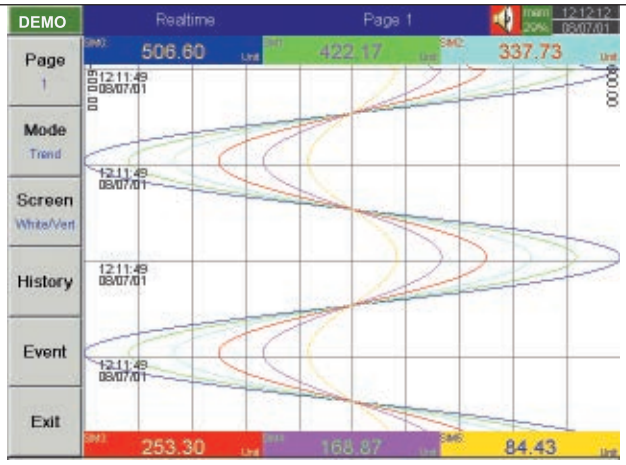
Configure input by DIP switches

Mixed Mode



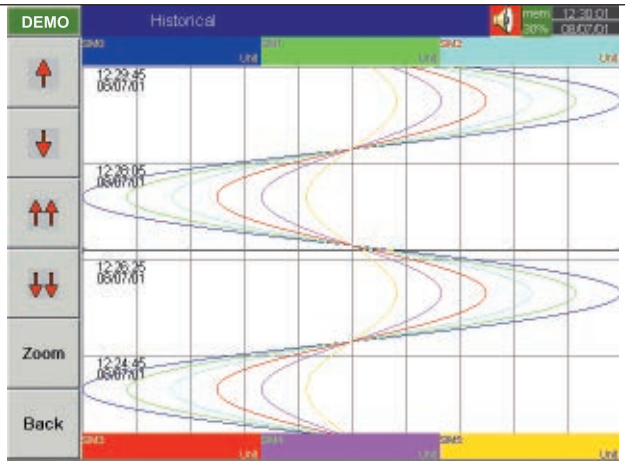
- View max. 6 mixed real time data trends horizontally.
- Display data in "Bars" and "Digits" together with mixed "Trends".
- Recognize data trends easily by different colors and tag names.
- Switch to other configured pages easily by "Page" function key.
- Display current "Time/Date" information.
- Remind the user of "Alarm" or "Memory Full".

Trend Mode



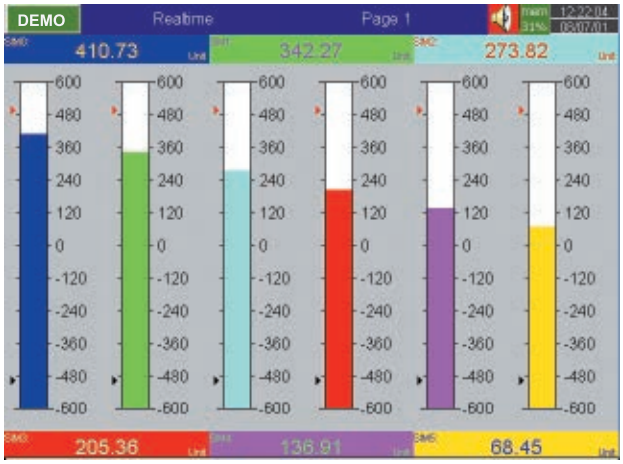
- View max. 6 real time data trends vertically.
- Recognize data trends easily by different colors and tag names.
- Switch to other configured pages easily by “Page” function key.
- Display current “Time/Date”information.
- Remind the user of “Alarm” or ”Memory Full”

Historical Mode



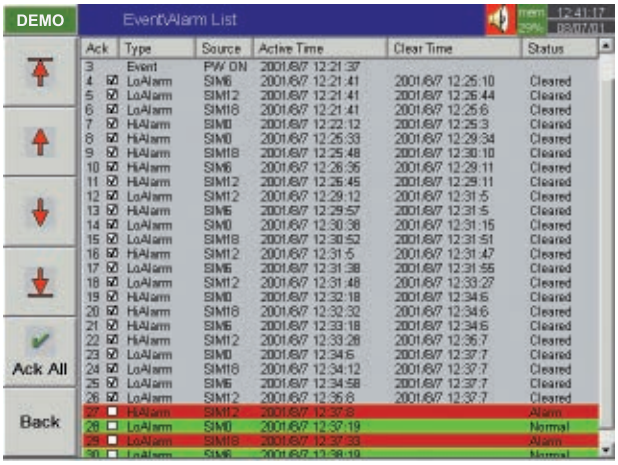
- Display max. 6 sets of historical data simultaneously.
- View desired data section by " ↑ "&" ↓ " function keys.
- Access precise data value at a point selected by moving the "ruler".
- "Zoom" to expand/contract the display time span.
- View historical data trends and their respective data values.
- Recognize trends easily by different colors and individual tag names.

Bar Graph Mode



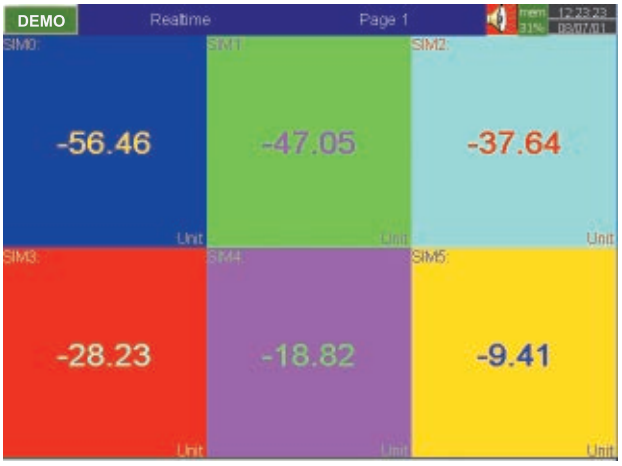
- View max. 6 real time data in bar graphs.
- Scale individually by user in “configuration”.
- Display data value and tag name in different colors together with each bar graph.
- Mark “Hi/Lo” alarm limits.
- Display current “Time/Date” information.
- Remind the user of the “Alarm” or “Memory Full”.

Alarm List



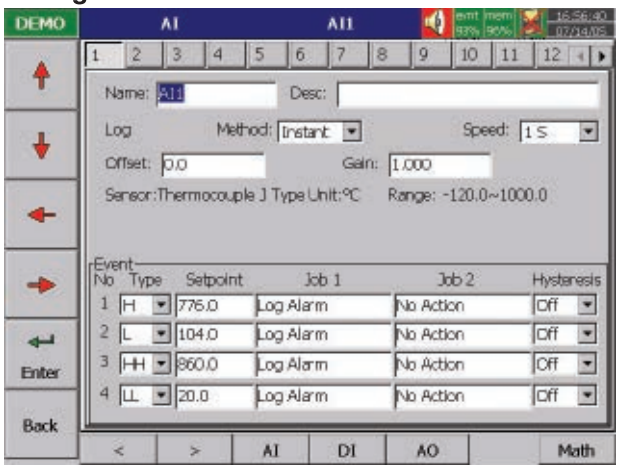
- List all the alarm records clearly with useful information.
- Browse through the alarm list or "acknowledge" alarm easily by function keys on the vertical bar.
- Remind the user of the alarm status in different colors.

Numerical Mode



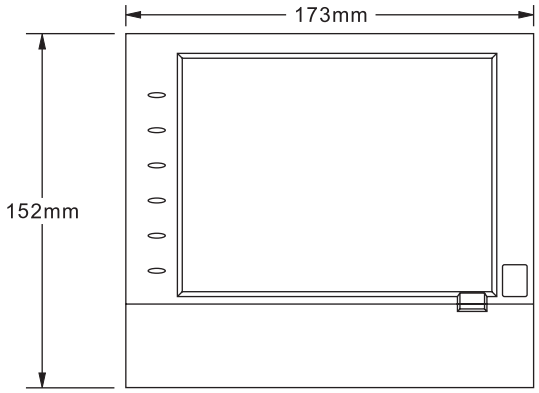
- View max. 6 real time data in numbers.
- Display data value and tag name in different color.
- Mark “Hi/Lo” alarm limits.
- Display current “Time/Date” information.
- Remind the user of the “Alarm” or “Memory Full”.

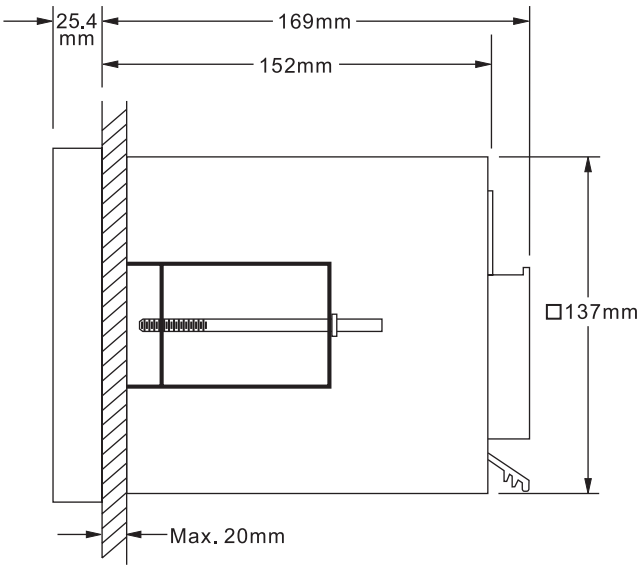
Configuration Mode



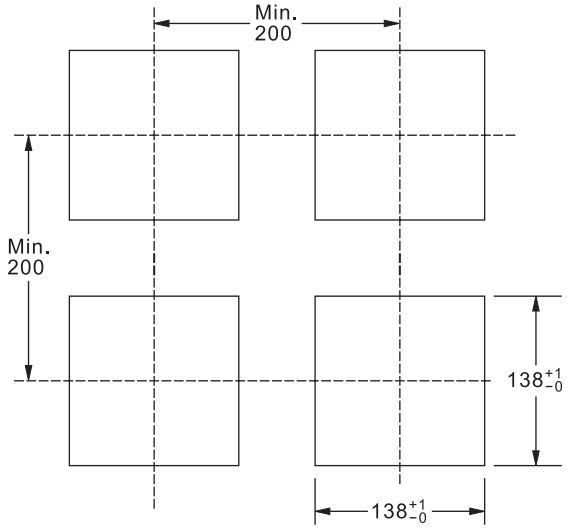
- Configure pen (input/output, pen name, event, job.....)
- Configure page (color, pen, decimal, pen width.....)
- Configure timer.
- Configure instrument (storage media, display, communication, time/date....)

Mechanical Data

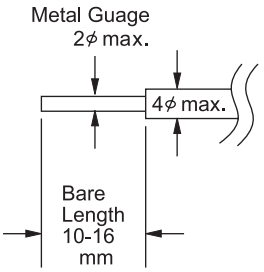




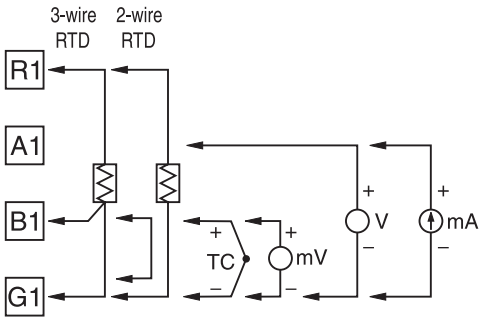
Panel Cutout



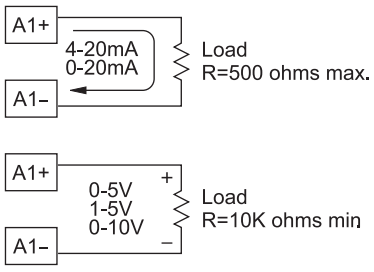
Wiring Cable



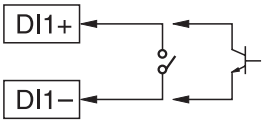
Analog Input Card (AI181, AI182, AI183)



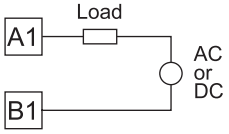
Analog Output Card (AO183I, AO183V)



Digital Input Card (DI181)



Digital Output Card (DO181)



SPECIFICATIONS

Power
90-250VAC or 20-28VAC，47-63Hz, 60VA, 30W maximum
11-18, 18-36 or 36-72 VDC 60VA, 30W maximum

Display
6.5"TFT LCD, 640X480 pixel resolution, 256 colors

Memory
Storage Memory on board:16MB
CF Card: 2GB standard

Analog Input Card (AI181, AI182, AI183)
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 μV/°C for all inputs except mA input
±3.0 μV/°C for mA input
Sensor Lead Resistance Effect:
T/C: 0.2 μV/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
Isolation Breakdown Voltage among channels: 430VAC min.
Sensor Break Detection:
Sensor open for TC,RTD and mV inputs,
below 1 mA for 4-20mA input,
below 0.25V for 1-5V inputs,
unavailable for other inputs.
Sensor Break Responding Time:
Within 10 seconds for TC, RTD and mV inputs,
0.1 second for 4-20 mA and 1-5V inputs.

Characteristics:

Type	Range	Accuracy @25°C	Input Impedance
J	-120°C - 1000°C (-184°F - 1832°F)	±1°C	2.2MΩ
K	-200°C - 1370°C (-328°F - 2498°F)	±1°C	2.2MΩ
T	-250°C - 400°C (-418°F - 752°F)	±1°C	2.2MΩ
E	-100°C - 900°C (-148°F - 1652°F)	±1°C	2.2MΩ
B	0°C - 1820°C (32°F - 3308°F)	±2°C (200°C - 1820°C)	2.2MΩ
R	0°C - 1767.8°C (32°F - 3214°F)	±2°C	2.2MΩ
S	0°C - 1767.8°C (32°F - 3214°F)	±2°C	2.2MΩ
N	-250°C - 1300°C (-418°F - 2372°F)	±1°C	2.2MΩ
L	-200°C - 900°C (-328°F - 1652°F)	±1°C	2.2MΩ
PT100 (DIN)	-210°C - 700°C (-346°F - 1292°F)	±0.4°C	1.3KΩ
PT100 (JIS)	-200°C - 600°C (-328°F - 1112°F)	±0.4°C	1.3KΩ
mV	-8mV - 70mV	±0.05%	2.2MΩ
mA	-3mA - 27mA	±0.05%	70.5Ω
0~1V	-0.12 - 1.15V	±0.05%	32KΩ
0~5V	-1.3V - 11.5V	±0.05%	332KΩ
1~5V	-1.3V - 11.5V	±0.05%	332KΩ
0~10V	-1.3V - 11.5V	±0.05%	332KΩ

Analog Input Card (AI183V)

Type	Range	Accuracy @25°C	Input Impedance
-60~60mV	-62~62mV	±0.1%	2.2MΩ
-2~2V	-2.2~2.2V	±0.3%	340KΩ
-20~20V	-22~22V	±0.1%	3.64MΩ
-20~20mA	-22~22mA	±0.1%	70.5Ω

Digital Input Card (DI181)
Channels: 6 per card
Logic Low: -5V minimum, 0.8V maximum
Logic High: 2V minimum, 5V maximum
External Pull-down Resistance: 1KΩ maximum
External pull-up Resistance: 1.5MΩ minimum

Digital Output Card (DO181)
Channels: 6 per card
Contact Form: N.O. (form A)
Relay Rating: 5A/240 VAC, life cycles 200,000 for resistive load

Analog Output Card (AO183I, AO183V)
Output Signal : 4-20mA, 0-20mA (AO183I)
0-5V, 1-5V, 0-10V (AO183V)
Resolution : 15 bits
Accuracy: ±0.05% of Span ±0.0025% / °C
Load Resistance: 0-500 ohms (for current output)
10K ohms minimun (for voltage output)
Output Regulation: 0.01% for full load change
Output Setting Time: 0.1 sec (stable to 99.9 %)
Isolation Breakdown Voltage: 1000VAC min.
Integral Linearity Error: ±0.005% of Span
Temperature Effect: ±0.0025% of Span / °C

COMM Module (CM181)
Interface: RS-232 (1 unit), RS-485 or RS-422 (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

Standard Ethernet Communication
Protocol: Mod Bus TCP / IP, 10 BaseT
Auto polarity correction for 10 BaseT
Ports: RJ-45

Infrared Detector
Distance: Detect moving human body within 2 meters

Environmental & Physical
Operating Temperature: 5°C to 50°C
Storage Temperature: -25°C to 60°C
Humidity: 20 to 80% RH (non-condensing)
Insulation Resistance: 20 Mohms min. (at 500 VDC)
Dielectric Strength: 1350VAC 50/60 Hz for 1 minute
Vibration Resistance: 10-55 Hz, 10m/S² for 2 hours
Shock Resistance: 30 m/S² (3g) for operation, 100g for transportation
Dimensions: 173mm(W) x 152mm(H) x 169mm(D)

Approval Standards
Safety: UL61010 C-1
CSA C22.2 No. 24-93
CE: EN61010-1 (IEC1010-1)
Overvoltage category II, Pollution degree 2
Protective Class:
IP 30 front panel, indoor use,
IP 20 housing and terminals
EMC
Emission: EN50081-1, EN61326
(EN55011 class A,
EN61000-3-2, EN61000-3-3)
Immunity: EN50082-2, EN61326
(EN61000-4-2, EN61000-4-3,
EN61000-4-4, EN61000-4-5,
EN61000-4-6, EN61000-4-8,
EN61000-4-11)

ACCESSORIES LIST

Part No.	Description
AI181	1-channel analog input card (Universal except -mA, -V)
AI182	2-channel analog input card
AI183	3-channel analog input card
AI183V	3-channel analog input card (±mA, ±V only)
DI181	6-channel digital input card
DO181	6-channel relay output card
AP181	24VDC auxiliary power supply
CM181	RS-232/422/485 & Ethernet Comm module
CM182	Ethernet Comm module
PM181	90~250 VAC power supply
PM182	11-18 VDC power supply
PM183	18-36 VDC power supply
PM184	90~250 VAC power supply with power plug
PM185	36-72 VDC power supply
PM186	20-28 VAC power supply
MK181	Panel mount assembly kit
CF204	2GB compact flash card
AS181	Basic PC software Observer I
AS182	Extensive PC software Observer II
SC181	Slot cover for empty slot
AO183I	3-channel analog output card with current output
AO183V	3-channel analog output card with voltage output
BT182	Boot ROM w/ Math, Counter, Totalizer & FDA 21 CFR part 11
SNA-10A	RS-485 to RS-232 converter
UMVR061	User Manual

Ordering Code:

VR06 – □ □ □ □ - □ □ □ - □ □ □

Power
- 4: 90-250 VAC, 47-63Hz
- 5: 20-28VAC, 47-63Hz
- 6: 11-18VDC
- 7: 18-36VDC
- 8: 36-72VDC

Analog input card
- 0: none
- 1: 1 channel with AI181
- 2: 2 channels with AI182
- 3: 3 channels with AI183
- 4: 4 channels with AI181 & AI183
- 5: 5 channels with AI182 & AI183
- 6: 6 channels with AI183
- 7: 6 channels with AI183 & AI183V
- G: 3 channels with AI183V
- H: 6 channels with AI183V

*See AI181/2/3 (V) to the left.

Digital input card
- 0: none
- 1: 6 channels

Digital output card
- 0: none
- 1: 6 relays
- 2: 12 relays

Communication
- 0: standard Ethernet interface
- 1: RS-232/422/485 (three in one)+Ethernet interface

PC software
- 1: free basic software Observer I for non-communication application
- 2: extensive software Observer II for RS-232/422/485 or Ethernet

Firmware
- 1: with Mathematics, Counter , Totalizer & FDA 21 CFR part 11 compliance

Storage media
- 6: 2GB compact flash card

Case / Mounting
- 4: standard panel mounting in black case

Special option
- 0: none
- 1: 24VDC auxiliary power supply (for transmitter, 6 channels)
- 2: 3-channel current output
- 3: 6-channel current output
- 4: 9-channel current output
- D: 3-channel voltage output
- E: 6-channel voltage output
- F: 9-channel voltage output
- G: panel mounting with rear power plug & Europe power cable
- 5: panel mounting with rear power plug & USA power cable
- 6: panel mounting with front power switch
- 7: 7=1+5, 24VDC auxiliary power supply with rear power plug
- 8: 8=1+6, 24VDC auxiliary power supply with front power switch
- 9: 9=1+5+6, 24VDC auxiliary power supply with rear power plug and front power switch
- X: other options

Note: * Standard model without option VR06-4X00-011-140
* The rear slots of the recorder will only accept up to 6 optional cards in any combination.

VR18 Paperless Recorder

6.5" Color TFT LCD with 640x480 pixels resolution

The Maximum Channels :
18 isolated analog input channels

Plug & Play Supported I/O Cards, 6 Slots

The High Flexibility :
User configurable I/O card
Expandable modular architecture
Flexible screen configuration

User-Friendly :
Soft keys coupled with interactive dialog simplify setup & operation procedures
Easy - to - access function keys

Infrared Detector :
Shut off LCD automatically to prolong LCD life and save power while nobody near by

Save Space :
Only 169 mm (6.7") depth behind panel

Various Display Formats :
Vertical trend, Horizontal trend,
Bar Graph, Numerical or mixed

Save Data in Flash ROM, Compact Flash Card or PC

Communication :
Standard Ethernet and optional RS-232/422/485

The Highest Accuracy :
18-bit A -D analog input, 15-bit D-A analog output.

Fast Sampling Rate :
Within 200 msec for all channels,
Programmable Filter or Moving Average Sampling Method

Statistics with Instant, Average, Min./Max. Values

Programmable Alarms and Messages available

BrainChild

VR18 is the World First paperless recorder of the same size with the highest resolution (true VGA , 640x480 pixels), infrared detector, 18 channels, plug & play I/O card, high flexibility, the most user - friendly and the shortest depth. In chemical plant, food & beverage plant, petrochemical plant, semiconductor plant, metal alloy, automotive plant, environmental monitoring or laboratory, VR18 can be used to monitor, record, evaluate the processes in the plants.

The user can access data on the screen as well as on site from a remote place via RS-232, RS-485, RS-422 serial interface or Ethernet networking. The historical data can be stored in flash ROM, Compact Flash Card, or collected in a remote host PC for data evaluation and print-out.

Panel Mounted Style

6.5"color TFT LCD 640x480 pixels resolution

Infrared detector protect LCD & save power

Power switch

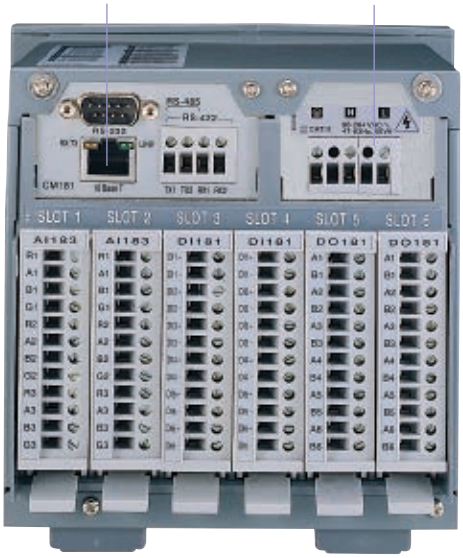
Compact Flash Card

12 SOFT KEYS FOR EASY OPERATION

Rear Terminals

standard Ethernet and optional RS-232/422/485

Power supply



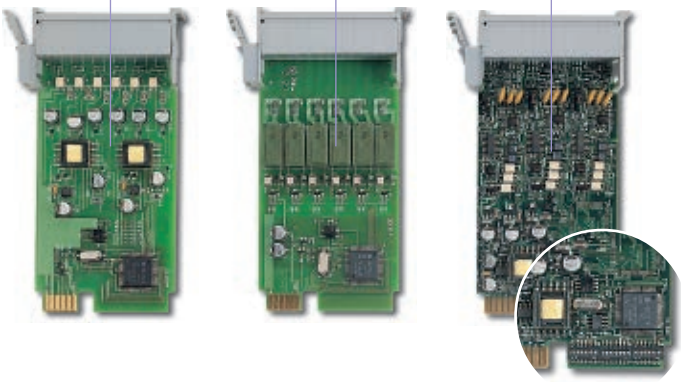
6 SLOTs for Plug & play I/O cards, maximum 18 analog input or mixed with analog & digital I/O cards

Input & Output Cards

Digital input

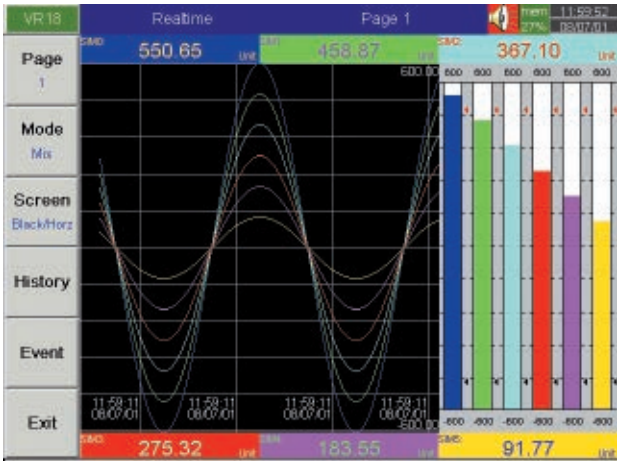
Digital output (6 alarms)

Analog input



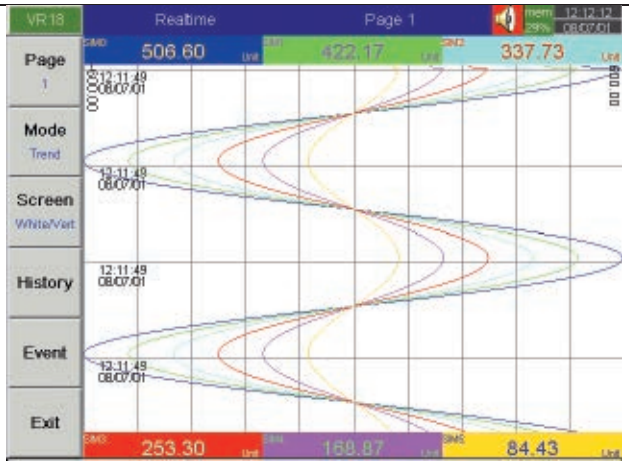
Configure input by DIP switches

Mixed Mode



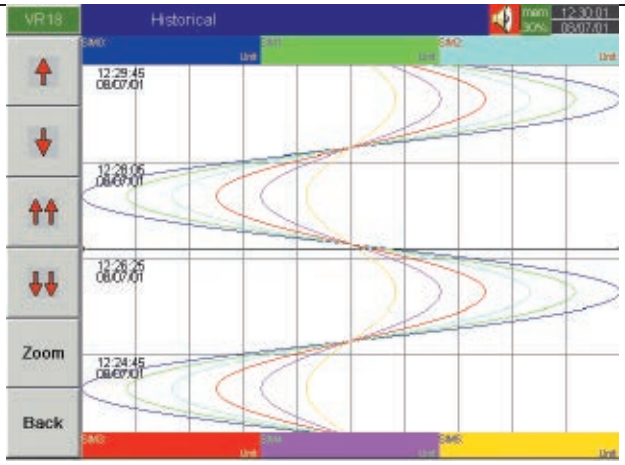
- View max. 6 mixed real time data trends horizontally.
- Display data in "Bars" and "Digits" together with mixed "Trends".
- Recognize data trends easily by different colors and tag names.
- Switch to other configured pages easily by "Page" function key.
- Display current "Time/Date" information.
- Remind the user of "Alarm" or "Memory Full".

Trend Mode



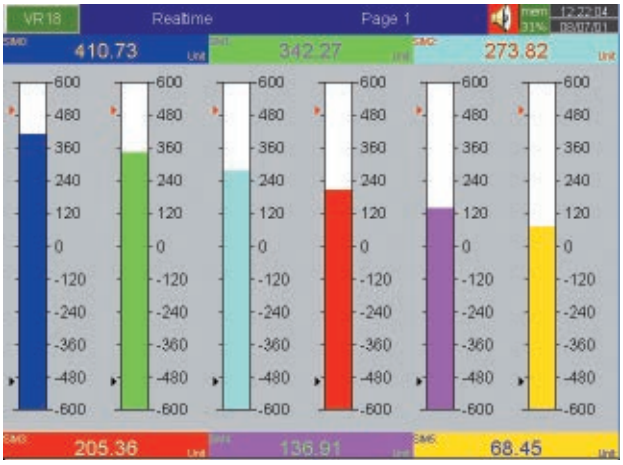
- View max. 6 real time data trends vertically.
- Recognize data trends easily by different colors and tag names.
- Switch to other configured pages easily by “Page” function key.
- Display current “Time/Date”information.
- Remind the user of “Alarm” or ”Memory Full”

Historical Mode



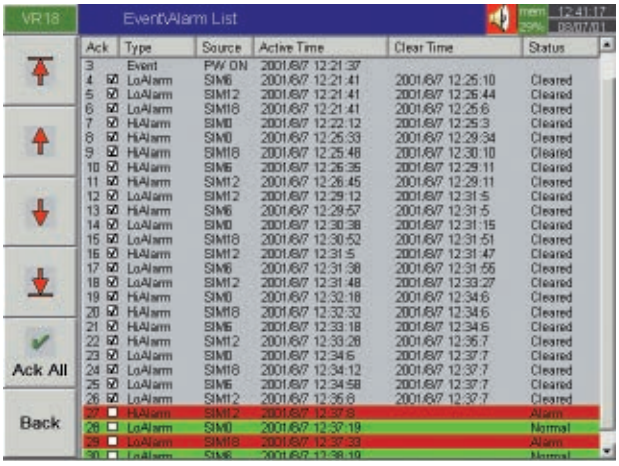
- Display max. 6 sets of historical data simultaneously.
- View desired data section by "↑"&"↓" function keys.
- Access precise data value at a point selected by moving the "ruler".
- "Zoom" to expand/contract the display time span.
- View historical data trends and their respective data values.
- Recognize trends easily by different colors and individual tag names.

Bar Graph Mode



- View max. 6 real time data in bar graphs.
- Scale individually by user in “configuration”.
- Display data value and tag name in different colors together with each bar graph.
- Mark “Hi/Lo” alarm limits.
- Display current “Time/Date” information.
- Remind the user of the “Alarm” or “Memory Full”.

Alarm List

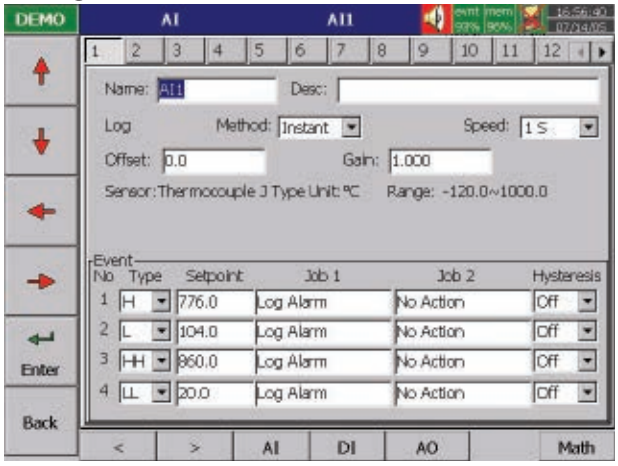


- List all the alarm records clearly with useful information.
- Browse through the alarm list or "acknowledge" alarm easily by function keys on the vertical bar.
- Remind the user of the alarm status in different colors.

Numerical Mode

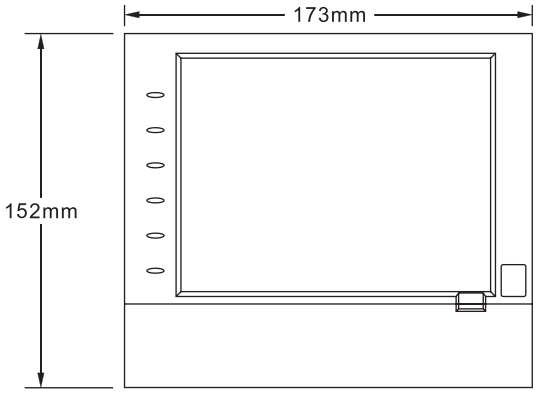
- View max. 6 real time data in numbers.
- Display data value and tag name in different color.
- Mark “Hi/Lo” alarm limits.
- Display current “Time/Date” information.
- Remind the user of the “Alarm” or “Memory Full”.

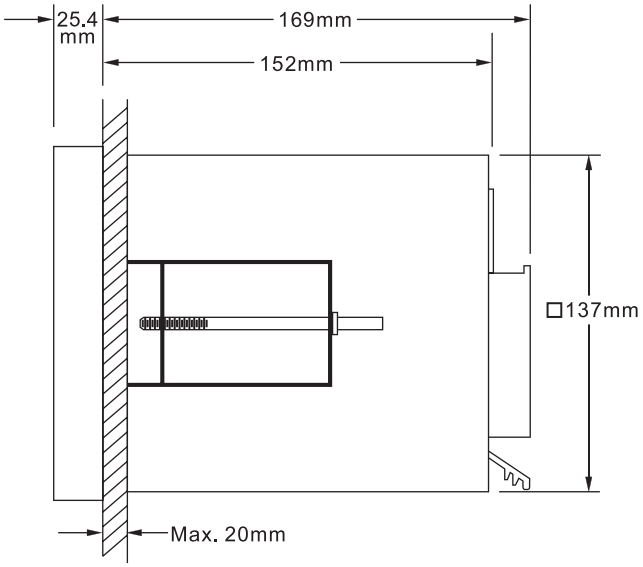
Configuration Mode



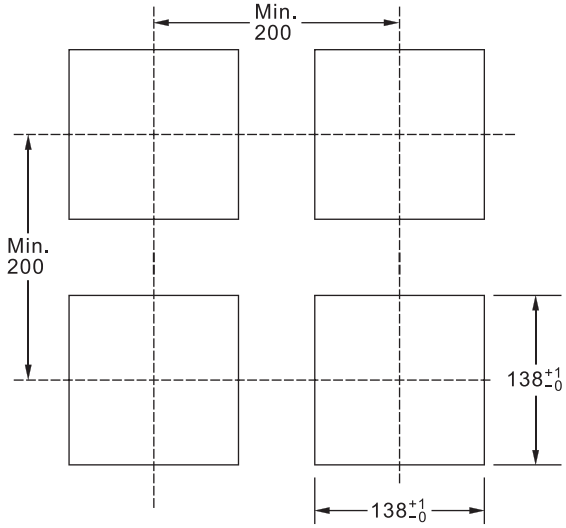
- Configure pen (input/output, pen name, event, job.....)
- Configure page (color, pen, decimal, pen width.....)
- Configure timer.
- Configure instrument (storage media, display, communication, time/date....)

Mechanical Data

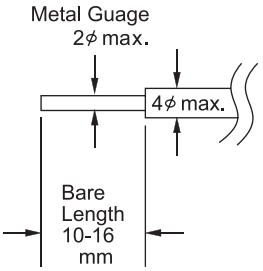




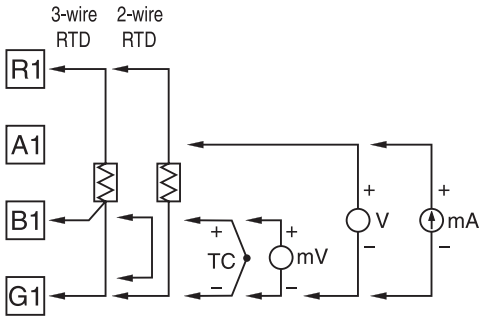
Panel Cutout



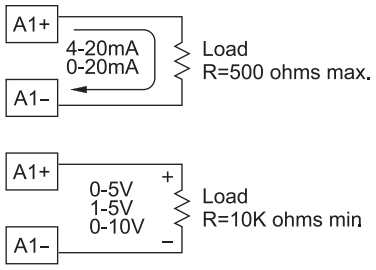
Wiring Cable



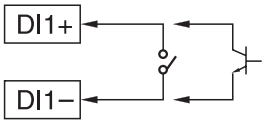
Analog Input Card (AI181, AI182, AI183)



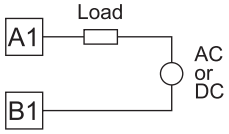
Analog Output Card (AO183I, AO183V)



Digital Input Card (DI181)



Digital Output Card (DO181)



SPECIFICATIONS

Power
90-250VAC or 20-28VAC，47-63Hz, 60VA, 30W maximum
11-18, 18-36 or 36-72 VDC 60VA, 30W maximum

Display
6.5" TFT LCD, 640X480 pixel resolution, 256 colors

Memory
Storage Memory on board: 16MB
CF Card: 2GB standard

Analog Input Card (AI181, AI182, AI183)
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 μV/°C for all inputs except mA input
±3.0 μV/°C for mA input
Sensor Lead Resistance Effect:
T/C: 0.2 μV/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
Isolation Breakdown Voltage among channels: 430VAC min.
Sensor Break Detection:
Sensor open for TC,RTD and mV inputs,
below 1 mA for 4-20mA input,
below 0.25V for 1-5V inputs,
unavailable for other inputs.
Sensor Break Responding Time:
Within 10 seconds for TC, RTD and mV inputs,
0.1 second for 4-20 mA and 1-5V inputs.

Characteristics:

Type	Range	Accuracy @25°C	Input Impedance
J	-120°C - 1000°C (-184°F - 1832°F)	±1°C	2.2MΩ
K	-200°C - 1370°C (-328°F - 2498°F)	±1°C	2.2MΩ
T	-250°C - 400°C (-418°F - 752°F)	±1°C	2.2MΩ
E	-100°C - 900°C (-148°F - 1652°F)	±1°C	2.2MΩ
B	0°C - 1820°C (32°F - 3308°F)	±2°C (200°C - 1820°C)	2.2MΩ
R	0°C - 1767.8°C (32°F - 3214°F)	±2°C	2.2MΩ
S	0°C - 1767.8°C (32°F - 3214°F)	±2°C	2.2MΩ
N	-250°C - 1300°C (-418°F - 2372°F)	±1°C	2.2MΩ
L	-200°C - 900°C (-328°F - 1652°F)	±1°C	2.2MΩ
PT100 (DIN)	-210°C - 700°C (-346°F - 1292°F)	±0.4°C	1.3KΩ
PT100 (JIS)	-200°C - 600°C (-328°F - 1112°F)	±0.4°C	1.3KΩ
mV	-8mV - 70mV	±0.05%	2.2MΩ
mA	-3mA - 27mA	±0.05%	70.5Ω
0~1V	-0.12 - 1.15V	±0.05%	32KΩ
0~5V	-1.3V - 11.5V	±0.05%	332KΩ
1~5V	-1.3V - 11.5V	±0.05%	332KΩ
0~10V	-1.3V - 11.5V	±0.05%	332KΩ

Analog Input Card (AI183V)

Type	Range	Accuracy @25°C	Input Impedance
-60~60mV	-62~62mV	±0.1%	2.2MΩ
-2~2V	-2.2~2.2V	±0.3%	332KΩ
-20~20V	-22~22V	±0.1%	332KΩ
-20~20mA	-22~22mA	±0.1%	70.5Ω

Digital Input Card (DI181)
Channels: 6 per card
Logic Low: -5V minimum, 0.8V maximum
Logic High: 2V minimum, 5V maximum
External Pull-down Resistance: 1KΩ maximum
External pull-up Resistance: 1.5MΩ minimum

Digital Output Card (DO181)
Channels: 6 per card
Contact Form: N.O. (form A)
Relay Rating: 5A/240 VAC, life cycles 200,000 for resistive load

Analog Output Card (AO183I, AO183V)
Output Signal : 4-20mA, 0-20mA (AO183I)
0-5V, 1-5V, 0-10V (AO183V)
Resolution : 15 bits
Accuracy: ±0.05% of Span ±0.0025% / °C
Load Resistance: 0-500 ohms (for current output)
10K ohms minimun (for voltage output)
Output Regulation: 0.01% for full load change
Output Setting Time: 0.1 sec (stable to 99.9 %)
Isolation Breakdown Voltage: 1000VAC min.
Integral Linearity Error: ±0.005% of Span
Temperature Effect: ±0.0025% of Span / °C

COMM Module (CM181)
Interface: RS-232 (1 unit), RS-485 or RS-422 (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

Standard Ethernet Communication
Protocol: Mod Bus TCP / IP, 10 BaseT
Auto polarity correction for 10 BaseT
Ports: RJ-45

Infrared Detector
Distance: Detect moving human body within 2 meters

Environmental & Physical
Operating Temperature: 5°C to 50°C
Storage Temperature: -25°C to 60°C
Humidity: 20 to 80% RH (non-condensing)
Insulation Resistance: 20 Mohms min. (at 500 VDC)
Dielectric Strength: 1350VAC 50/60 Hz for 1 minute
Vibration Resistance: 10-55 Hz, 10m/S² for 2 hours
Shock Resistance: 30 m/S² (3g) for operation, 100g for transportation
Dimensions: 173mm(W) x 152mm(H) x 169mm(D)

Approval Standards
Safety: UL61010 C-1
CSA C22.2 No. 24-93
CE: EN61010-1 (IEC1010-1)
Overvoltage category II, Pollution degree 2
Protective Class:
IP 30 front panel, indoor use,
IP 20 housing and terminals
EMC
Emission: EN50081-1, EN61326
(EN55011 class A,
EN61000-3-2, EN61000-3-3)
Immunity: EN50082-2, EN61326
(EN61000-4-2, EN61000-4-3,
EN61000-4-4, EN61000-4-5,
EN61000-4-6, EN61000-4-8,
EN61000-4-11)

ACCESSORIES LIST

Part No.	Description
AI181	1-channel analog input card (Universal except -mA, -V)
AI182	2-channel analog input card
AI183	3-channel analog input card
AI183V	3-channel analog input card (±mA, ±V only)
DI181	6-channel digital input card
DO181	6-channel relay output card
AP181	24VDC auxiliary power supply
CM181	RS-232/422/485 & Ethernet Comm module
CM182	Ethernet Comm module
PM181	90~250 VAC power supply
PM182	11-18 VDC power supply
PM183	18-36 VDC power supply
PM184	90~250 VAC power supply with power plug
PM185	36-72 VDC power supply
PM186	20-28 VAC power supply
MK181	Panel mount assembly kit
CF204	2GB compact flash card
AS181	Basic PC software Observer I
AS182	Extensive PC software Observer II
SC181	Slot cover for empty slot
AO183I	3-channel analog output card with current output
AO183V	3-channel analog output card with voltage output
BT182	Boot ROM w/ Math, Counter, Totalizer & FDA 21 CFR part 11
SNA-10A	RS-485 to RS-232 converter
UMVR181	User Manual

Ordering Code:

VR18 – □ □ □ □ - □ □ □ - □ □ □

Power
- 4: 90-250 VAC, 47-63Hz
- 5: 20-28VAC, 47-63Hz
- 6: 11-18VDC
- 7: 18-36VDC
- 8: 36-72VDC

Analog input card
- 0: none
- 1: 1 channel with AI181
- 2: 2 channels with AI182
- 3: 3 channels with AI183
- 4: 4 channels with AI181 & AI183
- 5: 5 channels with AI182 & AI183
- 6: 6 channels with AI183
- A: 9 channels with AI183
- B: 12 channels with AI183
- C: 15 channels with AI183
- D: 18 channels with AI183
- G: 3 channels with AI183V
- H: 6 channels with AI183V
- J: 9 channels with AI183V
- K: 12 channels with AI183V
- L: 15 channels with AI183V
- M: 18 channels with AI183V

*See AI181/2/3 (V) to the left.

Digital input card
- 0: none
- 1: 6 channels
- 2: 12 channels
- 3: 18 channels
- 4: 24 channels
- 5: 30 channels
- 6: 36 channels

Digital output card
- 0: none
- 1: 6 relays
- 2: 12 relays
- 3: 18 relays
- 4: 24 relays

Communication
- 0: standard Ethernet interface
- 1: RS-232/422/485 (three in one) + Ethernet interface

PC software
- 1: free basic software Observer I for non-communication application
- 2: extensive software Observer II for RS-232/422/485 or Ethernet

Firmware
- 1: with Mathematics, Counter , Totalizer & FDA 21 CFR part 11 compliance

Storage media
- 6: 2GB compact flash card

Case / Mounting
- 1: standard panel mounting in grey case

Special option
- 0: none
- 1: 24VDC auxiliary power supply (for transmitter, 6 channels)
- 2: 3-channel current output
- 3: 6-channel current output
- 4: 9-channel current output
- D: 3-channel voltage output
- E: 6-channel voltage output
- F: 9-channel voltage output
- G: panel mounting with rear power plug & Europe power cable
- 5: panel mounting with rear power plug & USA power cable
- 6: panel mounting with front power switch
- 7: 7=1+5, 24VDC auxiliary power supply with rear power plug
- 8: 8=1+6, 24VDC auxiliary power supply with front power switch
- 9: 9=1+5+6, 24VDC auxiliary power supply with rear power plug and front power switch
- X: other options

Note: * Standard model without option VR18-4X00-011-610
* The rear slots of the recorder will only accept up to 6 optional cards in any combination

CR06

HYBRID RECORDER

Low price, short case, light weight

NEW

Large LEDs
with 18mm-height display

Easy Operation Keys

Analog Recording
of 6 Point

Short Depth
150mm

Dust-proof,
IP65 Water-resistance

FEATURES

- 6-channel dotting
- Short depth in 150mm
- Weights 1.5kg only
- Dust-proof.IP-65 Water- resistance
- Standard RS-232 Communication interface
- Universal input and range
- UL, CSA, CE approved

BrainChild

CR06

HYBRID RECORDER

SPECIFICATIONS

Input

Nos. of input: 6
Input sampling: 10s/6ch, max
Type of input: Direct voltage: ±10mV, 0-20mV, 0-50mV, ±1V, 1-5V
Direct Current: 4-20mA
Thermocouple: K, T, J, E,B,S,R,G,C,N,PR40-20, PLII, L, Au-Fe
RTD: Pt100, Pt50, JPt100

Performance

Accuracy: ±0.2%±1 digit max. for Digital indicator/printing
Noise reduction : NMRR: 60dB min.
CMRR: 140dB min.
Isolation resistance: Each terminals/ground: 500VDC, 20MΩ min.
Dielectric strength: Power input terminal/ground: 1.5kVAC, 1 minute
Input terminal/ground: 0.5kVAC, 1 minute

Alarm

Nos. of relay outputs: 6 outs (Form a contacts; Built-in option)
Capacity: 30VDC 3A Max. Loaded

Communication

Interface: RS-232C (Standard), RS-485

Power Supply

Rated power voltage: 100-240VAC (50/60Hz)
Power consumption: 25VA max.

Structure

Mounting/housing: Panel mounting/Front panel: Dust-proof, Water-proof (IP-65)
Dimension: 144(W) x 144(H) x 150(D) mm
Weight: 1.5kg max.

Operation Condition

allowable conditions: Temperature: 0-50°C, Humidity: 20-80%RH

Recording / Printing Performance

Recording: Raster-scan printing
Printing: Dotting with 6 color ribbon
Dot print interval: 10.0s/6ch max.
Chart paper: Length: 16m, Dotting width: 100mm
Chart speed: User-selective from 28 speeds
In range: 10-1500mm/hr
Printing color: Purple, Red, Green, Blue, Brown, Black

ORDERING CODE

CR06 - □ □ □

Communication
0 = stardard RS - 232C
1 = RS -485

DI/DO (digital input / output)
0 = none
1 = 6 relay output
2 = 3 DI
3 = 3 DI + 6 relay output

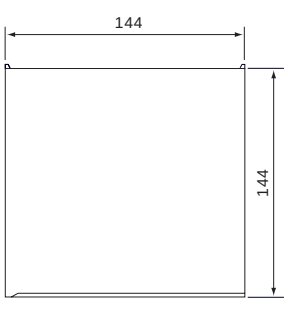
Out-of-paper sensor
0 = none
1 = yes

ACCESSORIES

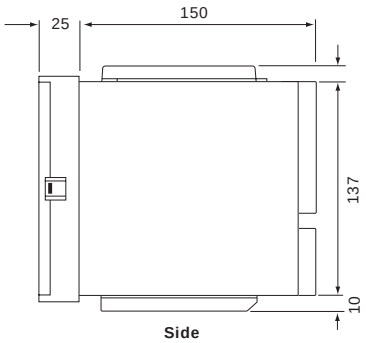
Item	Part number
Chart paper	HZCGA0105EL001
Ribbon cassette	WPSR188A000001A

DIMENSIONS & CUTOUT (mm)

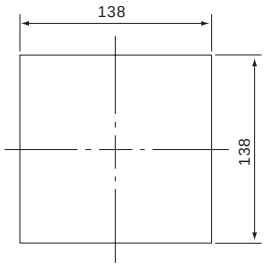
Unit: mm



Front



Side



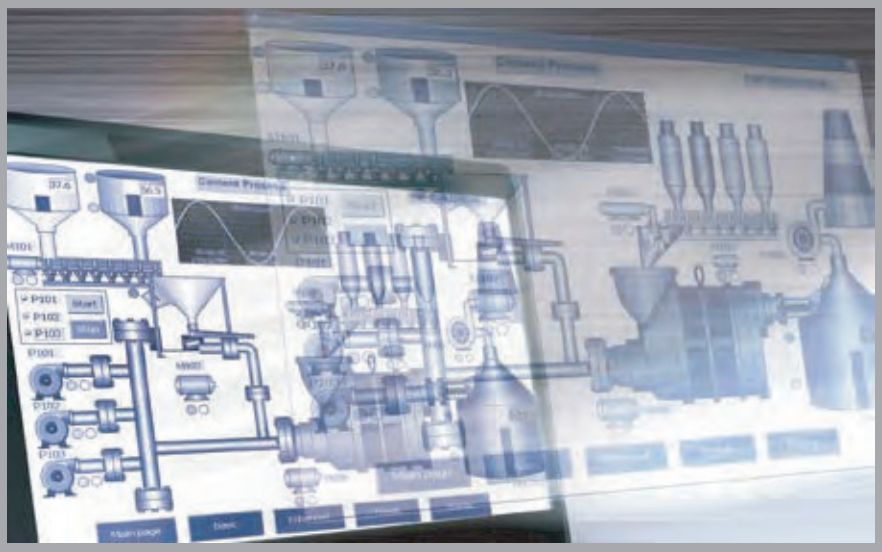
Panel Cutout

BrainChild

BRAINCHILD ELECTRONIC CO., LTD

Human Machine Interface
Operator Interface

Smart panels
operator interfaces



human machine interfaces for all industries

Brainchild Electronic Co., Ltd. was established in 1977. We have been the largest temperature controller maker in Taiwan since then, and the only maker of paperless recorder in Taiwan since 2003. In spring 2011 Brainchild started to introduce new product line of human machine interfaces with very high performance/price ratio to markets.

TÜV Rheinland certified our factory ISO9001. A CSA certified laboratory is used to do CSA tests, plus UL and CE tests. The strong and experienced R&D team helps us to offer customers innovative and state-of-art industrial instruments. We have won good reputation by supplying quality products with better features at competitive prices. The sales network has covered over 85 countries. It is our philosophy in pursuit of perfection through continuous improvement.

At the moment we have product lines of human machine interfaces, recorders, temperature controllers, data acquisition IO modules and networking products. To keep on supporting our customers, we will continue to invest and develop new instruments surround factory automation.

hardware features

- Five models in four sizes of 4.3", 7", 10" & 15"
- Two low-cost models HMI 450 & 730 with optional Ethernet and SD slot
- Three high-performance HMI 750, 1060 (wide screen) & 1550 with standard Ethernet and SD slot
- Touch panels, higher resolution and all in 65,536 colors
- USB host, 2 Serial ports
- Networks of MPI / Profibus-DP, ProfiNet, DeviceNet, EtherNet/IP, CANopen, EtherCAT, BACnet/IP, CC-Link
- Advanced and reliable WinCE 6.0® platform with more features for efficient and sophisticated control solutions
- HMI 750, 1550 standard aluminum front bezels, optional stainless steel fronts for food, beverage & pharmaceutical industries
- Rugged Stainless Steel front bezels with IP66K for high protection on dust & water, and polished surface for easy cleaning
- Large memory of 128 MB Flash, 256MB SDRAM, sound input + output, 3DI + 3DO
- USB Host port used for Keyboard, USB stick and Mouse
- Horizontal or vertical installation and display
- Wide range of power supply 11-36 VDC or 90-250 VAC
- LED backlight for even-color displays and long lifetime
- Open WinCE 6.0® Core & Professional panels for OEM business

Open Panel Option

- Open WinCE 6.0 panels with WinCE Core or WinCE Professional
- BSP & SDK for OEM applications
- Run 3rd party applications like SCADA & Visual Studio Applications
- Customized faceplate for private labelling
- Windows CE image update tools available for quick upgrade of the operating system
- OEM Tools (auto run maker) for configuring start-up image & application, creating desktop shortcut, registry editing, etc.

*Smart*panels specifications





Model	HMI 450	HMI 730	HMI 750	HMI 1060	HMI 1550
Display					
Size	4.3"	7"	7"	10"	15"
Resolution (W x H in pixels)	480 x 272 (wide screen)	800 x 480 (wide screen)	800 x 480 (wide screen)	1280 x 800 (wide screen)	1024 x 768
Display type	TFT wide touch screen	TFT wide touch screen	TFT wide touch screen	TFT touch screen	TFT touch screen
Colors	65,536	65,536	65,536	65,536	65,536
Touch screen Type	Resistive analog	Resistive analog	Resistive analog	Resistive analog	Resistive analog
Active Display Area (W x H mm)	95 x 54	152 x 91	152 x 91	217 x 135	304 x 228
Display position	Both horizontal & vertical	Both horizontal & vertical	Both horizontal & vertical	Both horizontal & vertical	Both horizontal & vertical
MTBF backlight at 25˚C	30,000 hrs	50,000 hrs	50,000 hrs	50,000 hrs	50,000 hrs
Backlight	LED	LED	LED	LED	CCFL
Brightness Adjustment	Yes	Yes	Yes	Yes	Yes
Screen Saver	Yes	Yes	Yes	Yes	Yes
Language Fonts	Unicode including Simplified and Traditional Chinese, Japanese & Korean				
Main Hardware					
Processor, CPU speed	ARM Cortex-A8 667Mhz	ARM Cortex-A8 667Mhz	ARM Cortex-A8 1Ghz	ARM Cortex-A8, 1Ghz	ARM Cortex-A8, 1Ghz
Flash Memory (ROM)	128 MB	128 MB	128 MB	128 MB	128 MB
SDRAM (RAM)	256 MB	256 MB	256 MB	256 MB	256 MB
Operation System	WinCE 6.0®	WinCE 6.0®	WinCE 6.0®	WinCE 6.0®	WinCE 6.0®
Real Time Clock	Yes	Yes	Yes	Yes	Yes
Buzzer	Yes	Yes	Yes	Yes	Yes
Sound input + output, 3DI + 3DO	N.A.	N.A.	Option	Option	Option
SD card slot	Option	Option	Yes	Yes	Yes
Interfaces					
RS232C, DB9 Male	1	1	1	1	1
RS232C/ RS422/ RS485, DB25 Female	1	1	1	1	1
Ethernet 10/100 Mbps, RJ45	Option	Option	1	2	2
USB Host	1	1	1	1	1
Other Networks (all slaves)					
Profibus-DP, ProfiNet	Option	N.A.	Option	Option	Option
DeviceNet, EtherNet/IP	Option	N.A.	Option	Option	Option
CANopen	Option	N.A.	Option	Option	Option
CC-Link	Option	N.A.	Option	Option	Option
General Specifications					
Power Supply	11-36VDC	11-36VDC, 90-250VAC	11-36VDC, 90-250VAC	11-36VDC, 90-250VAC	11-36VDC, 90-250VAC
Consumption (w/o sound output)	10 W	12 W	13 W	15 W	27 W
Power on LED indicator	Yes	Yes	Yes	Yes	Yes
Outer dimensions (W x H x D mm)	140 x 116 x 57	212 x 156 x 57	212 x 156 x 57	275 x 179 x 63	400 x 310 x 56
Mounting depth (mm)	51	51	51	51	50
Panel cutout (W x H mm)	123^{+1} x 99^{+1}	197^{+1} x 141^{+1}	197^{+1} x 141^{+1}	197^{+1} x 141^{+1}	367^{+1} x 289^{+1}
Protection	IP65 front, IP20 rear	IP65 front, IP20 rear	IP65 front, IP20 rear	IP65 front, IP20 rear	IP65 front, IP20 rear
Front bezel, housing	Plastic, plastic	Plastic, plastic	Aluminum, plastic	Plastic, plastic	Aluminum, metal
Stainless Steel front bezel (option)	N.A.	N.A.	Option, IP66K	N.A.	Option, IP66K
Installation	Panel Mount	Panel Mount	Panel Mount	Panel Mount	Panel Mount
Net Weight (Kgs)	0.5	1.2	1.4	1.4	5.1

Operating temperature
0˚C to 50˚C

Storage temperature
-20˚C to 60˚C

Humidity
10% to 90% RH

Vibration resistance
9 to 150 Hz, 9.8 m/s², X, Y & Z directions 10 times (100 min.)

Operating Shock resistance
15g at 11 msec

Altitude
2000 Meters

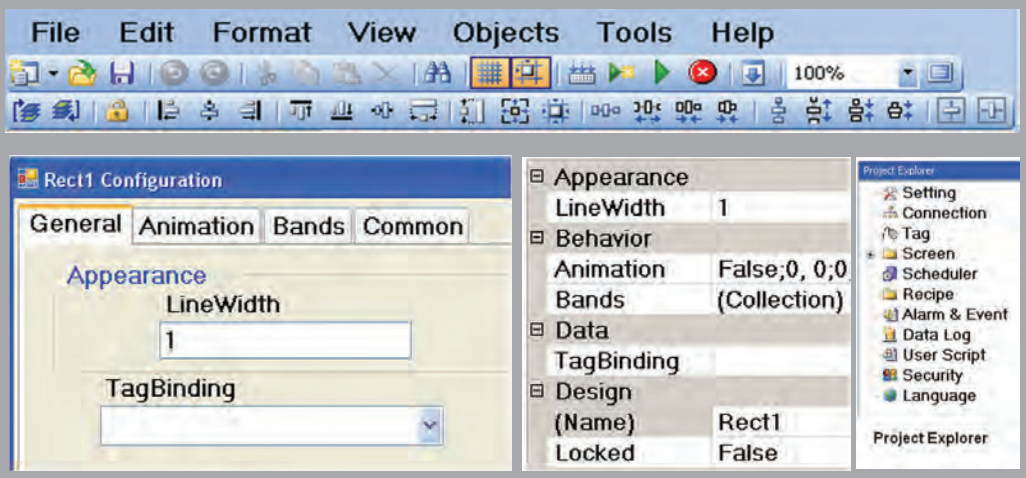
Safety standards
CE cULus RoHS

Panel Studio software features

- Free, powerful and friendly HMI editing software
- 2-editing styles in both GUI wizard and Property grid
- Lots of fine-made objects of Meters, Sliders, Digital LED, Check boxes, Combo boxes, Number Up/Down, etc.
- 112 basic symbols, high-resolution, vector format, some in 6 colors, flipped and rotatable in 4 directions in design time
- Basic symbols support moving and 32 band run-time animation on background color, visibility, flip, rotation
- Optional Symbol Factory with symbols over 4K, flipping, rotating in 4 directions, changing color in design time
- Symbol Factory control allows 50 band run-time animation, each band in different colors or blinking
- Picture box to import pictures in bmp, wmf, jpg, gif & png formats
- Dynamic objects like animated bar graph, button, bit lamp, 32-bit word lamp, drawing tools, etc.
- Drawing tools like rectangle, ellipse, etc., maximum 32 bands, each band with visible control, filling color & blinking
- Drawing tools like rectangle, ellipse, etc., with run-time animation like filling, moving & sizing
- Many PLC drivers supported on both Serial & Ethernet ports via OPC server
- Data exchange between two different PLCs as a gateway
- Diagnostic tools for drivers like OPC server & OPC client to test communications between PC and PLC directly
- IO poll groups, different scan rates for PLC tags, possible to scan tags always or only tags on active page
- Retentive and non-retentive internal variables available for mathematical calculation

- 3 types of screens in Page, Template and Pop-up
- The Scheduler to trigger actions at specific time or time intervals
- Recipe management to create data elements and data records in design time
- Recipe viewer to edit data records and transfer setpoints from HMI to PLC and vice versa in run-time
- Real-time alarms in 7 types, historical alarms and alarm management in maximum 9 groups
- Alarm banner to display the latest alarm in single line
- Real-time trends and historical trends, with maximum 24 pens for each component
- Bit-wise alarms for integer tag received from PLC
- Data stored in internal memory or optional SD card
- Data logging by 4 methods, 2 types and 10 rates
- Data acquisition software Historical Viewer to view historical data and alarms on PC
- Security management used for maximum 100 users divided by 9-authority levels
- Script/Macro programmed in C language for mathematical and logical calculation
- Run-time user administration done by user-view component
- Software in multilingual, easy for local application engineers
- Multilingual on the display, easy for users, 30 languages
- Online simulation to test application program quickly by simulating it on PC while connecting with PLC
- Offline simulation to test application program by simulating it on PC without connecting with PLC
- Copy screens between projects to save developing time
- Copy/paste animation for drawing tools like rectangle, ellipse etc., to save developing time
- Project compiler to verify the application under developing before downloading to HMI
- Message libraries via Word Lamp with animations to display various messages based on different values
- Advanced buttons with animation in 3 kinds of actions namely clicked, pressed and released with timing
- Bit-wise animation used with bit lamp for integer tag to show status of integer tag received from PLC
- Multiple sessions to open projects in design time on PC
- Handy components for tables to quickly draw rows and columns
- Project explorer and Tool box to quickly view hierarchy of all objects in software
- Flexible to call many system functions from buttons, events, schedulers, scripts, etc.
- To download application program efficiently from PC to HMI via Ethernet port, or via USB stick
- Printer drivers, Universal serial driver and HMI Remote Viewer

Editing tools & style



GUI Wizard

Property grid

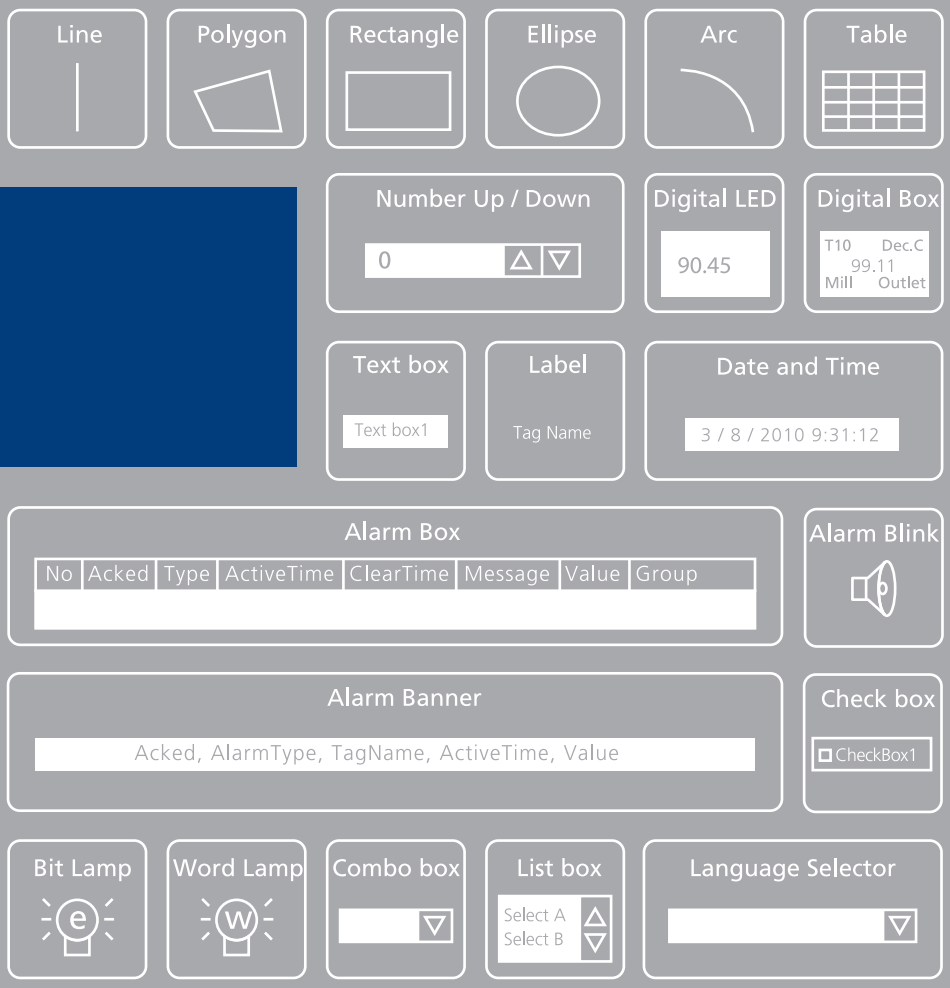
To edit properties of objects via user-friendly GUI Wizard or Property grid similar to Visual Studio® environment

Tabbed pane

To quickly retrieve tools in project explorer can be done by using tabbed pane. For example, once user has edited three pages, tag database, alarms, Scheduler, all these are available in tabbed pane for quick retrieval from Main window afterwards.

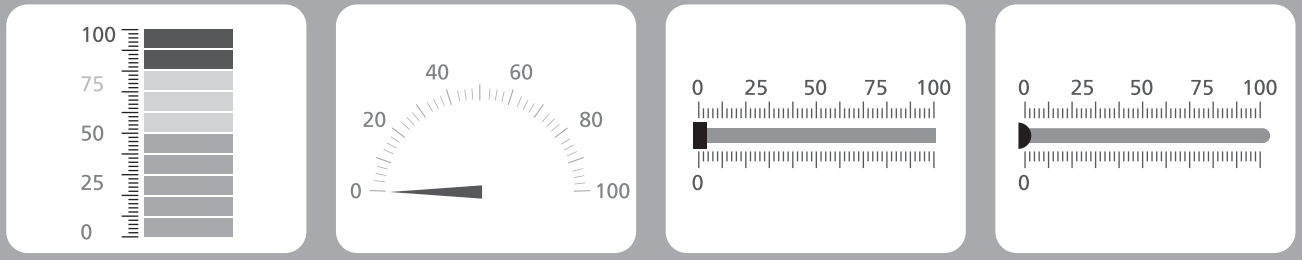
Basic objects

Line, Polygon, Rectangle, Ellipse, Arc, Table, Numerical Up/Down, Digital LED, Digital Box, Text box, Label, Date/Time Label, Alarm Box, Alarm banner, Alarm Blink, Button, Bit lamp, Word lamp, Check box, Combo box, List box, Recipe view, User view and Language selector



Enhanced objects

Level, Meter, Slider, Thermometer, Bar box, Scale, Historical Trends, Real Time Trends, Picture box

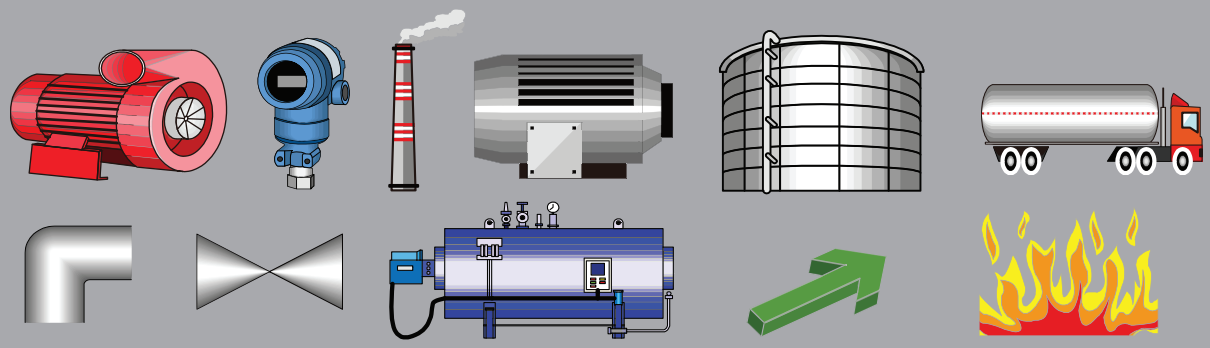


Level Meter Slider Thermometer

Basic symbols

in basic software ***Panel Studio***

Free basic symbols include 112 different ones divided by 18 popular categories.
All symbols are made in high resolution, vector wmf format in less memory.
Symbols of 10 categories are made in 6 colors of red, green, yellow, blue, brown and grey.
Transparent or color background can be selected for any symbols.
Run-time animation: moving, maximum 32 bands, animation on background color, visibility, flipped and rotated in 4 directions, linked to picture file



Symbol Factory

in extensive software ***Panel Studio Plus***

Symbol Factory offers over 4000 high-resolution symbols with run-time animation
Transparent or color background can be selected for any symbols.
All symbols are made in high resolution and .NET components in less memory.
Run-time animations: maximum 50 bands, each band covering foreground color or blinking in different styles of shade, solid or visibility
Within Panel Studio, only 1st symbol to be selectable in each category
Within Panel Studio Plus, all symbols to be selectable

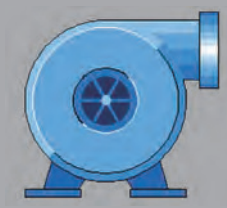
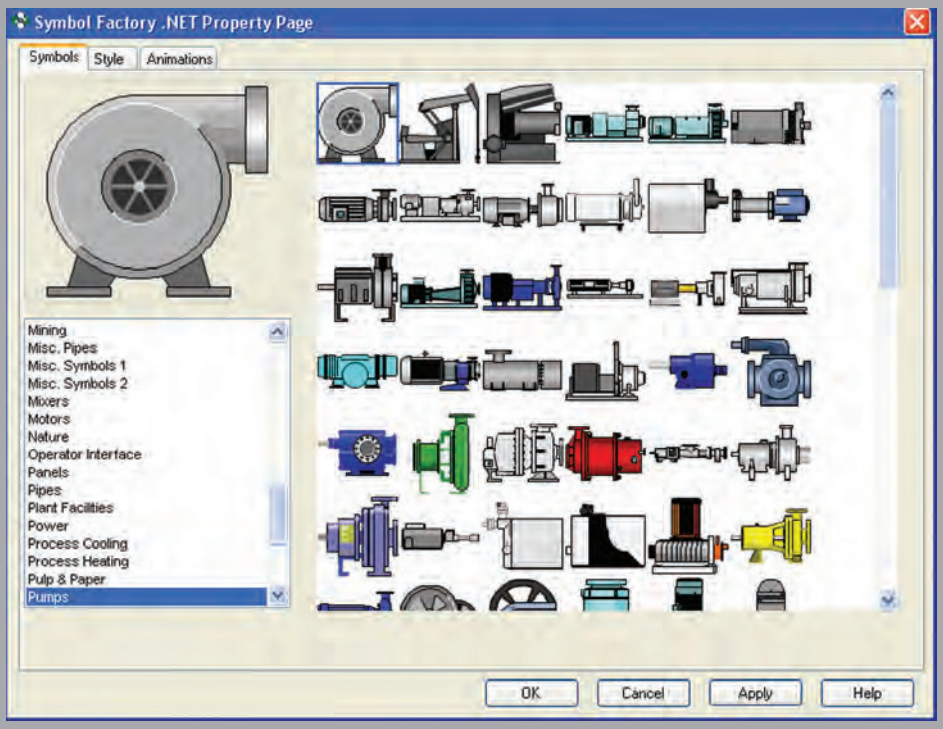
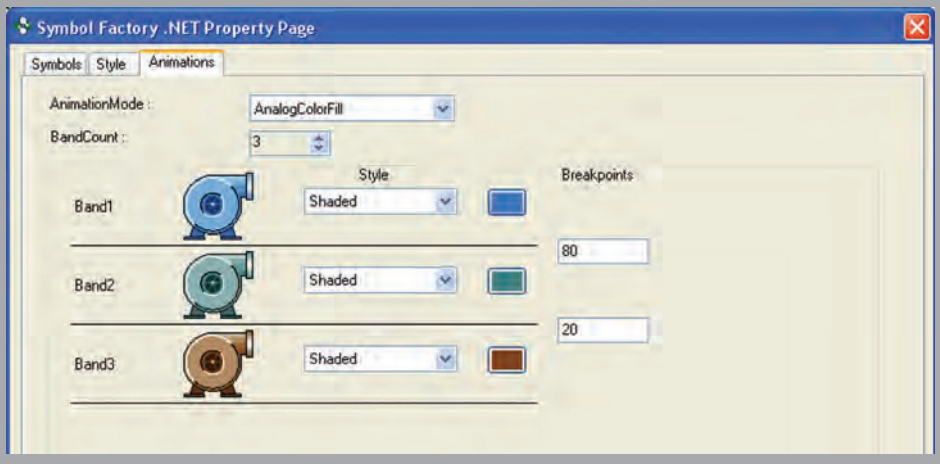


Fig: Pump


Symbol Factory .NET Property Page
Symbols
Style
Animations
Mining
Misc. Pipes
Misc. Symbols 1
Misc. Symbols 2
Mixers
Motors
Nature
Operator Interface
Panels
Pipes
Plant Facilities
Power
Process Cooling
Process Heating
Pulp & Paper
Pumps
OK
Cancel
Apply
Help


Symbol Factory .NET Property Page
Symbols
Style
Animations
AnimationMode :
AnalogColorFill
BandCount :
3
Style
Breakpoints
Band1
Shaded
80
Band2
Shaded
20
Band3
Shaded

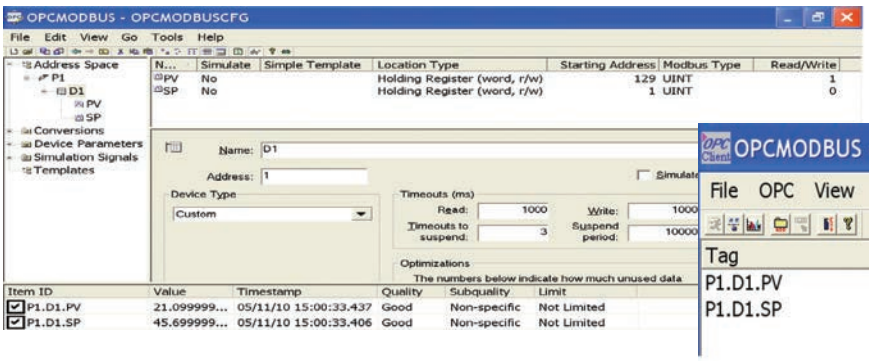
Data exchange as gateway

It is possible to exchange data from different PLCs via different ports of HMI simultaneously. Tools in HMI software are able to copy Tags from COM1 port to COM2, Ethernet, internal memory, or vice versa.

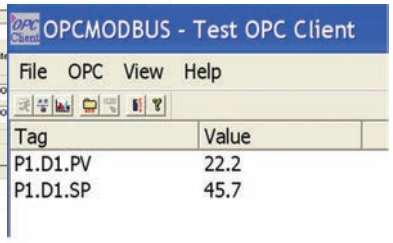
Diagnostic tools of OPC server, client

It is to test communication between PC and PLC, mainly on wirings & drivers, for quick trouble shooting and diagnostic purpose without using HMI and editing software.

OPC server



OPC client

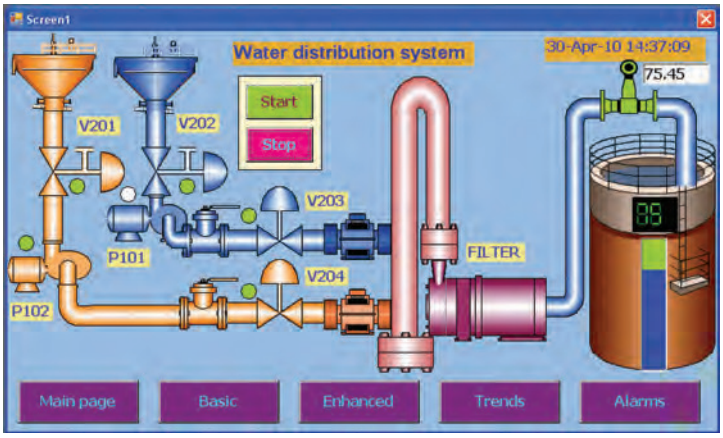


Tag database

Tag scan mode	active page or always
Tag scan rate (IO poll groups)	100 msec. to 10,000 msec.
Simulation of tag	possible
Retentive internal memory	available

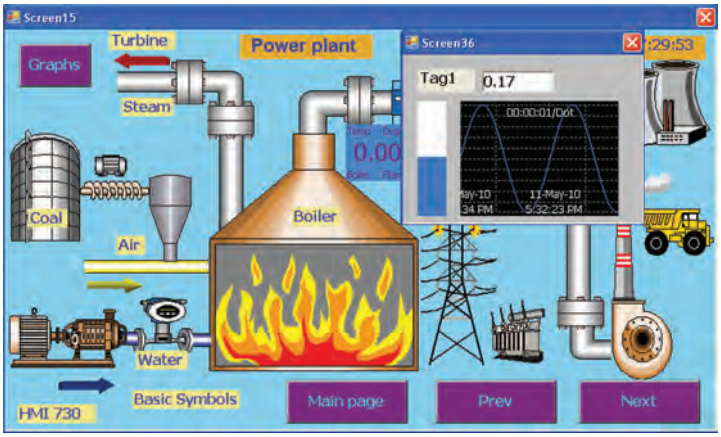
Templates

Screen can be defined as template and linked with another pages. For example, buttons, date/time etc. can be defined once and reused in other screens easily.



Pop-up screens

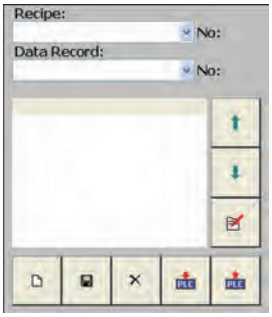
They are triggered by alarms with messages for the operator or display more information about process working area whenever the space of main screen is unavailable.



Scheduler types

Countdown	to trigger an action one time after elapse of time
Repeat countdown	to trigger an action repeatedly at certain time interval
Daily	to trigger an action at specific time daily
Weekly	to trigger an action at specific time weekly
Monthly	to trigger an action at specific time monthly

Recipe administration



Run-time
- User friendly recipe viewer
- Add data records
- Edit data records
- Save and Delete data records
- Write data records from HMI to PLC
- Read data records from PLC to HMI
- Select recipe

Design-time
- Create recipe elements
- Add data records

Alarms

real Time, historical alarms

Alarm setpoint reference	constant or tag
Hysteresis	available
Alarm types	Hi, Low, High High, Low Low, Dev+ & Dev-
Alarm control functions	acknowledge, dump, clear, navigation between pages
Job types	log alarm, log auto ack.alarm and log event
Customized alarm messages	possible

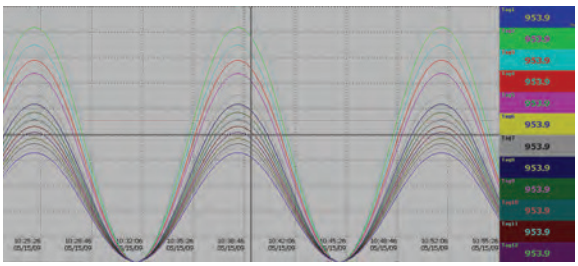
Data logging

Log trigger type	by timer, by change
Timer	100 msec., 1,2,5,10,20,30 sec., 1, 5 & 10 min.
Max. data points	as per predefined set point
Data log method	Instant, average, minimum and maximum

Data acquisition software

Historical Viewer

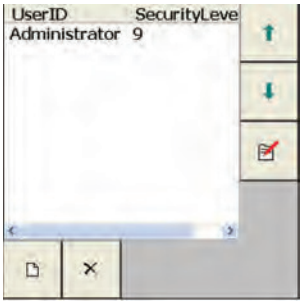
Historical data and events are stored in internal memory or SD card first, then downloaded to USB stick. The PC software ***Historical Viewer*** is used to view historical data & events on USB stick. Features of Historical Viewer are listed below,



* display historical trend
* display historical alarms/events
* display historical values on table
* search data at a specific time, time period, event/alarm and tag wise
* view trends both horizontally and vertically
* zoom out & zoom In
* display options as x sec., min./dot, x min., hrs.,days, weeks, months/page
* display white or black background
* print trend view, event/alarm list & Tag values
* export data and alarms/events to CSV files.

Security

Numbers of users	100
Numbers of levels	9
Password expiry period	define the number of days or unlimited
Prevent operators from unauthorized access to controls and data entry.	
Run-time user administration	available



Script / Macro supported functions

C program

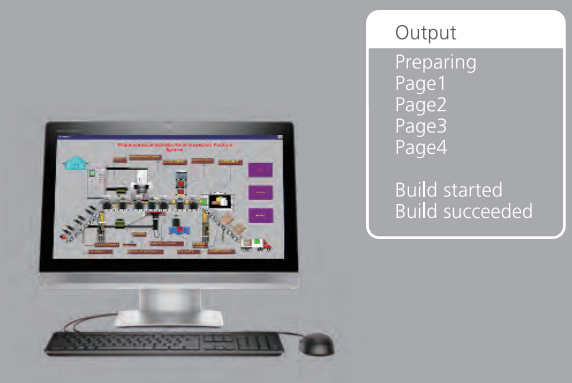
System functions	ack. alarms, start/stop scheduler, etc.
Math functions	Trigonometric, Log, Exp, Round, Power, etc.
Arithmetic functions	addition, subtraction, multiply, division, remainder
Logical functions	and, or, true, false, not, etc..
Shift functions	left, right
Relational functions	=, !=, >, <, <=, >=
Selection functions	If, else
Iteration functions	while, for
Jump functions	break, continue

Online simulator

It is to test HMI project on PC by connecting it with PLC directly. The online simulating software can last only for 2 hours.

Offline simulator

It is to test HMI project offline on PC without connecting with PLC. It is possible to enter tag values via Tabular column, simulate the tag values, and check the behavior of objects.



Project compile

It is to check problems in application development like syntax errors, missing tags for objects, etc. After successful compilation, it creates a build for downloading to HMI.

Button function editor

Advanced buttons with 3 kinds actions namely clicked, pressed and released with timing
Hold time to stay the command by predefined time after clicking button, and repeat time for pressed button

Page control functions	Navigate to various pages- 1st, next, last, previous, by number, pop-up
Alarm control functions	dump, clear, Ack, move to 1st page, last page, PageUp and PageDown
Historical trend control	zoom in, out, all, move to 1st page, previous page, next page, last page
Data log control	start/stop data logging, dump, clear
Scheduler control	start/stop at a specific time
On/Off	turn bit on, turn bit off, toggle bit
Math	set value to Tag, add value on Tag, subtract value from Tag, copy TagB to TagA, add TagB on TagA, subtract TagB from TagA, swap TagA for TagB
Others	log in/out, shut down, audio functions, recipe functions

Multiple sessions

Two projects can be opened simultaneously on PC and copy screen from project 1 to project 2. It saves time and the cost for the programmer.

Download the projects

via Ethernet port or USB stick

HMI Remote Viewer

The application

PC

Wireless device

PLC

Ethernet

* Ethernet 10/100 BaseT (Option:HMI450,730
  standard:HMI750,1060,1550)
* To connect with various PLC's, Inverters etc.
  (See driver list for supported protocols)
* To download application program from PC to HMI

SD Card

SD slot

* SD card
* To store historical data and alarms

Speaker

Sound input + output, 3DI + 3DO

* Sound input (record messages
  for other operators)
* Sound output (to speaker)

USB Disk

USB, Host

* To transfer historical data, historical alarms
* Upload firmware and application program
* Connect with Mouse / Keyboard

Networks (all slaves)

* Profibus-DP, ProfiNet, DeviceNet
  EtherNet/IP, CANopen, CC-Link

PLC

COM1

* COM1 (RS232C), DB9 male
* To connect with various PLC's, Inverter's, Controllers etc.
  (See driver list for supported protocols)

Inverter

Controller

IO module

PLC

COM2

* COM2 (RS232C/ RS422/ RS485), DB25 female
* To connect with various PLC's, Inverter's, Controllers
  etc. (See driver list for supported protocols)

Drivers of PLC & inverters

OPC server within Panel Studio includes many drivers for PLCs, inverters and 3rd party devices for both Serial (RS232, RS422, RS485) and Ethernet ports. HMI is able to communicate on both ports simultaneously.

Serial drivers

Manufacturers	Protocols	Models
Allen Bradley	DF1 protocol	SLC 500 series, MicroLogix, CompactLogix, ControlLogix, PLC5 series
Allen Bradley	DH485	SLC 500 series, MicroLogix
Beckhoff serial	KS8000 protocol	CX 90x0, & CX10x0 series , BC 90x0
Danfoss (inverter)	FC protocol	FC series for AutomationDrive / HVAC Drive
Delta	DVP serial	DVP-ES, DVP-EX, DVP-SS, DVP-SA, DVP-SX, DVP-SC, DVP-EH, DVP-EH2, DVP-SV, DVP-PM
Fatek	Fatek	FB series
Festo	CI Command	FEC series
Fuji	T-Link protocol	Micrex- F series
Fuji	Micrex Series protocol	SPH 200, SPH 300, SPH 300EX, SPH 2000
GE Fanuc	Series Ninety protocol (SNP)	Micro PLC, GE 90-30/ 90-70, Versa Max
GE Fanuc	SNP-X protocol	Micro PLC, GE 90-30/ 90-70, Versa Max
Hitachi	Hitachi Hi protocol	Micro EH, EH, EHV & H series PLC's
IDEC IZUMI	Data Link	MicroSmart,OpenNet Controller,Micro3
Keyence	ASCII	KV 700, KV1000, KV3000 & KV5000
Keyence	Modbus RTU	KV Nano
Koyo	Direct Net	DL05, 06, 105, 205, 305 & 405 series
Koyo	K Sequence	DL05, 06, 105, 205 & 405 series
Lenze (inverter)	LECOM	8200/ 9300 Vector, 9300 Servo controller, 9300 Servo PLC, Driver PLC, 8200 Motec
LG	LG Cnet	GM series, MK series-K80S, K120S, K200S, K300S, K1000S, XGB & XGK series
Matsushita (Panasonic)	Mewtocol	FP series-FP0, FP2, FP-X, FP-Sigma, FP2SH
Messung	Modbus RTU	Nextgen 2000, 5000 series
Mitsubishi	Melsec	FX, A, QnA & Q series, FX direct CPU port
Modicon	Modbus RTU Master & Slave	Any device
Moeller	CANopen	XC100, XC200 series (Via CANopen option converter)
Omron	HostLink	CV, CVMX, CX, CH, CS, CJ, CQM1H series
Omron	Fins	CP, CS, CJ series
Schneider	UniTeleway	TSX-Micro & TSX series
Siemens	PPI	S7-200
Siemens	MPI	S7-300/400
Teco	Modbus RTU	TP03
Teco (inverter)	Modbus RTU	MA, CV series
Toshiba	Computer link,T series serial	S2E/ST2 series
Toshiba	T1-micro series serial	T1-Micro
Vigor	Vigor Serial	M, VB, VH series
Vipa	MPI	100V,200V,300V,300S,500S
Yaskawa	Memobus- MP Serial	Memocon, MP-900 & MP-2000 series
Yaskawa (inverter)	Memobus-Inverter serial	F1000, V1000, T1000, A1000
Yokogawa	Factory Ace FA-M3 serial	FA-M3 model F3SPX series

Ethernet drivers

Manufacturers	Protocols	Models
Allen Bradley Ethernet	Ethernet/IP, CIP	SLC 500 series, MicroLogix, CompactLogix,ControlLogix,PLC5 series
Beckhoff Ethernet	Beckhoff Ethernet	CX90x0, CX10x0 series
Delta Ethernet	Delta Ethernet Protocol	DVP-SV series
Fatek Ethernet	Fatek Ethernet	FB series
Festo-Ethernet	Ethernet CI Command	FEC series
GE Ethernet	SRTP	GE 90-30/ 90-70, Versa Max
Hitachi Ethernet	H series Ethernet	EH, EHV and H series PLC
Keyence Ethernet	Keyence Ethernet	KV 700, KV1000, KV3000 & KV5000
Koyo Ethernet	Direct ECOM	DL05,06, 205, 405
LG Ethernet	LG Fast Ethernet	GM series, MK series 200S, 300S, 1000S, XGB & XGK series
Mitsubishi Ethernet	A, Q, QnA & FX Ethernet	A, Q, QnA & FX series PLC
Modicon	Modbus TCP Master & Slave	Any device
Omron Ethernet	FINS UDP	CH,CS & CJ Series
Siemens S7 Ethernet	Siemens TCP/IP	S7-200,300, 400 (Connection Via CP card at PLC),S7-1200
Toshiba Ethernet	Toshiba Ethernet	T series, V series
Vipa	TCP/IP	200V,300S,500S
Yaskawa MP Ethernet	Memobus Ethernet	MP-900 & MP- 2000 series
Yokogawa Ethernet	Yokogawa FA-M3 Ethernet	FA-M3 model F3SPX series

General drivers: ASCII protocol Serial & Ethernet, Modbus RTU Master & Slave, Modbus TCP Master & Slave

Networking Options

The networking cards with slave function are easily inserted in.

Available Networks: Profibus-DP, ProfiNet, DeviceNet, EtherNet/IP, CANopen, CC-Link

Ordering Code

HMI 450	1	0					0
HMI 730		0			0		0
HMI 750			1	1			
HMI 1060			1	1			0
HMI 1550			1	1			

Power supply
1: 11 to 36 VDC
2: 90 to 250 VAC

Sound input + output, 3DI+3DO
0: none
1: yes

SD card Slot
0: none
1: yes

Ethernet
0: none
1: yes

Other Networks (all slaves)
0: none
1: Profibus-DP
2: ProfiNet
3: DeviceNet
4: EtherNet/IP
5: CANopen
8: CC-Link

Software
1: free basic editing & data acquisition software ***Panel Studio***
2: extensive software ***Panel Studio Plus*** with Symbol Factory
3: No software, WinCE 6.0® Core platform only
4: No software, WinCE 6.0® Pro platform for SCADA

Enclosure
0: Standard — HMI 450, 730, 1060: all plastic, 750: aluminum front, plastic rear, HMI 1550: aluminum front, metal rear
1: Option — HMI 750, 1550 only, stainless steel front, high pressure water protection IP66K, good for food, beverage, tobacco & pharmaceutical industries

Optional Accessories

Part Number	Description
CA-PC3-80	program download cable from PC to HMI, RJ45, Ethernet cross over

Note: Please refer part numbers of PLC cables to a separated list.

Multifunctional Signal Conditioner RSC

The RSC is a specially designed signal conditioner which can accept an input from an universal input and output the conditioned signal. The universal input is fully programmable for linear voltage, linear current, PT100 and thermocouple types J, K, T, E, B, R, S, N, L, U, P, C and D input. The input signal is digitized by using an 18-bit A to D converter. Its fast sampling rate allows the signal conditioner to condition and retransmit the signal faster. The device can output maximum of 3 conditioned output from single input.

Features

- One Input to 3 Output Retransmission with 15 Bit Resolution
- 18 Bit High Accuracy Universal Input
- Individual Scaling for each Output
- One Digital Input
- Individual Square Root Function
- Dual LCD Display
- RS-485 Communication
- DIN Rail Mount
- Various Display Modes

Specifications

Specification	RSC			
Power Supply	90 to 250 VAC, 47 to 63 Hz, 20 to 28 VAC, 47-63 Hz / 11 to 40 VDC			
Power Consumption	10 VA, 5 W Maximum			
Signal Input				
Type	Thermocouple (J, K, T, E, B, R, S, N, L, U, P, C, D), RTD (PT100 (DIN), PT100 (JIS)), Current (mA), Voltage (Volts)			
Resolution	18 Bits			
Sampling Rate	5 Times / Second (200 msec)			
Maximum Rating	-2 VDC minimum, 12 VDC maximum			
Input Characteristics	**Type**	**Range**	**Accuracy @ 25°C**	**Input Impedance**
	J	-120℃ to 1000℃ (-184℉ to 1832℉)	±2℃	2.2 MΩ
	K	-200℃ to 1370℃ (-328℉ to 2498℉)	±2℃	2.2 MΩ
	T	-250℃ to 400℃ (-418℉ to 752℉)	±2℃	2.2 MΩ
	E	-100℃ to 900℃ (-148℉ to 1652℉)	±2℃	2.2 MΩ
	B	0℃ to 1820℃ (32℉ to 3308℉)	±2℃ (200℃ to 1800℃)	2.2 MΩ
	R	0℃ to 1767.8℃ (32℉ to 3214℉)	±2℃	2.2 MΩ
	S	0℃ to 1767.8℃ (32℉ to 3214℉)	±2℃	2.2 MΩ
	N	-250℃ to 1300℃ (-418℉ to 2372℉)	±2℃	2.2 MΩ
	L	-200℃ to 900℃ (-328℉ to 1652℉)	±2℃	2.2 MΩ
	U	-200℃ to 600℃ (-328℉ to 1112℉)	±2℃	2.2 MΩ
	P	0℃ to 1395℃ (32℉ to 2543℉)	±2℃	2.2 MΩ
	C	0℃ to 2300℃ (32℉ to 4172℉)	±2℃	2.2 MΩ
	D	0℃ to 2300℃ (32℉ to 4172℉)	±2℃	2.2 MΩ
	PT100 (DIN)	-200℃ to 850℃ (-328℉ to 1562℉)	±0.4℃	1.3 KΩ
	PT100 (JIS)	-200℃ to 600℃ (-328℉ to 1112℉)	±0.4℃	1.3 KΩ
	mA	-3 mA to 27 mA	±0.05%	2.5 Ω
	VDC	-1.3 VDC to 11.5 VDC	±0.05%	1.5 MΩ
Temperature Effect	1.5 µV / ℃ for all inputs except mA input, 3.0 µV / ℃ for mA			
Sensor Lead Resistance Effect	**Thermocouple:** 0.2 µV / Ω ; 3-wire RTD: 2.6℃ / Ω of difference of resistance of two leads **2-wire RTD:** 2.6℃ / Ω of sum of resistance of two leads			
Burn-out Current	200 nA			
Common Mode Rejection Ratio(CMRR)	120 dB			
Normal Mode Rejection Ratio (NMRR)	55 dB			
Sensor Break Detection	Sensor open for Thermocouple, RTD and mV inputs, sensor short for RTD input, below 1 mA for 4-20 mA input, below 0.25 VDC for 1-5 VDC input, not available for other inputs			
Sensor Break Response Time	Within 4 seconds for Thermocouple, RTD and mV inputs, 0.1 second for 4-20 mA and 1-5 VDC inputs			
Digital Input (DI1 or DI2)				
Number of DI	1			
Logic Low	-10 VDC minimum, 0.8 VDC maximum			
Logic High	2 VDC minimum, 10 VDC maximum			
Functions	See availability table			

Analog Retransmission Output 1 / Output 2 / Output 3	
Number of Outputs	3
Output Signal	4-20 mA, 0-20 mA, 0-10 VDC
Resolution	15 Bits
Accuracy	±0.05% of Span ±0.0025% / ℃
Load Resistance	0 to 500 Ω for current output, 10 KΩ minimum for voltage output
Output Regulation	0.01% for full load change
Output Setting Time	0.1 Second (stable to 99.9%)
Isolation Breakdown	1000 VAC minimum
Integral Linearity Error	±0.005% of span
Temperature Effect	±0.0025% of span / ℃
Saturation Low	0 mA or 0 VDC
Saturation High	22.2 mA or 5.55 VDC, 11.1 VDC minimum
Linear Output Ranges	0-22.2 mA (0-20 mA / 4-20 mA), 0-5.55 VDC (0-5 VDC, 1-5 VDC), 0-11.1 VDC (0-10 VDC)
Data Communication	
Interface	RS-485
Protocol	Modbus RTU (Slave Mode)
Address	1 to 247
Baud Rate	2.8 KBPS to 115.2 KBPS
Parity Bit	None, Even or Odd
Stop Bit	1 or 2 Bits
Data Length	7 or 8 Bits
Communication Buffer	160 Bytes
User Interface	
Keypad	4 Keys
Display Type	4 Digit LCD Display
No of Display	2
Upper Display Size	0.58” (15 mm)
Lower Display Size	0.3” (7.8 mm)
Programming Port	
Interface	Micro USB
PC Communication Function	Firmware upgrade
Digital Filter	
Function	First Order
Time Constant	0, 0.2, 0.5, 1, 2, 5, 10, 20, 30, 60 seconds, programmable
Environmental and Physical Specifications	
Operating Temperature	-10℃ to 50℃
Storage Temperature	-40℃ to 60℃
Humidity	0 to 90% RH (Non-Condensing)
Altitude	2000 meters maximum
Pollution	Degree II
Insulation Resistance	20 MΩ minimum (@500 VDC)
Dielectric Strength	2000 VAC, 50 / 60 Hz for 1 Minute
Vibration Resistance	10 to 55 Hz, 10 m / s2 for 2 Hours
Shock Resistance	200 m / s2 (20g)
Dimensions (W*H*D) (mm)	22.5*96*83
Weight (grams)	160
Approval Standards	
Safety	UL61010-1, CSA 22.2 No.61010-1-12, EN61010-1 (IEC1010-1)
Protective Class	IP65 for Panel (in process), IP20 for terminals and housing, all indoor use
EMC	EN61326

Ordering Code

RSC – □ □ □ □ □

Power Input

4: 90 to 250 VAC, 47-63 Hz
5: 20 to 28 VAC, 47-63 Hz / 11 to 40 VDC

Output 1

3: Retransmission 4-20 mA / 0-20 mA (OM98-3)
5: Retransmission 0-10 VDC (OM98-5)

Output 2

0: None
3: Retransmission 4-20 mA / 0-20 mA (OM98-3)
5: Retransmission 0-10 VDC (OM98-5)

Option 1

0: None
1: RS-485
2: 1 Digital Input (DI1)

Option 2 (Output 3 / Digital Input)

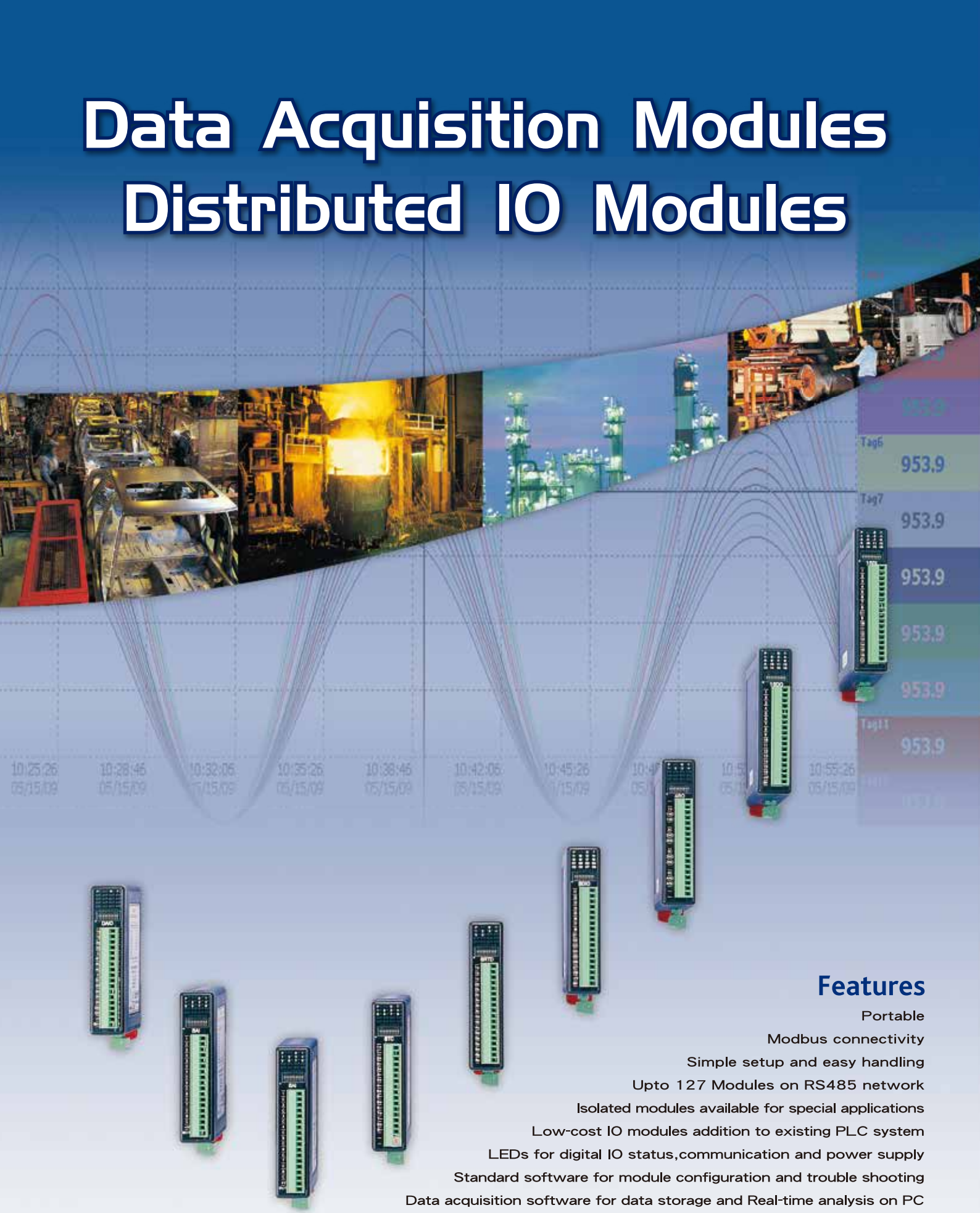
0: None
1: Retransmission 4-20 mA / 0-20 mA (OM98-3)
2: Retransmission 0-10 V (OM98-5)
4: 1 Digital Input (DI2)

◆ One Digital Input can be selected only

Accessories

OM98-3	= Isolated 4-20 mA / 0-20 mA Retransmission Module
OM98-5	= Isolated 0-10 VDC Retransmission Module
PA98-1	= USB Programming Adaptor
CC98-1	= Programming Port Cable (1.5 m)

Data Acquisition Modules
Distributed IO Modules



Features

Portable

Modbus connectivity

Simple setup and easy handling

Upto 127 Modules on RS485 network

Isolated modules available for special applications

Low-cost IO modules addition to existing PLC system

LEDs for digital IO status,communication and power supply

Standard software for module configuration and trouble shooting

Data acquisition software for data storage and Real-time analysis on PC

IO modules used with the third party softwares via Modbus RTU Protocol

Interface with field devices to provide real-time data for SCADA/PLC/HMI

Different types of IO Modules AI,AO,DI,DO,RTD,Thermocouples all available

Direct reading of temperature without scaling by using RTD and Thermocouple Modules

IO Modules

A new line of Modbus based IO modules for data acquisition and other applications are available now. These IO modules offer good reliability, low-cost solution for distributed IO applications. They are portable, easy integrated with existing Modbus network, and simple to use for end users. Various types of IO modules are available for different kinds of requirements. All IO modules have LED indications for visualization of IO status (Digital) and fault diagnostic analysis. Some models with high isolation among inputs are also available for special applications. IO Studio software is used to setup communication of IO modules and checks the IO status in PC for diagnosis purpose. With Modbus RTU protocol, these IO modules configured as slaves will be easy to communicate with Modbus master such as SCADA/PLC/HMI. All IO modules have 2 wire RS485 interface with Modbus RTU Protocol.

Environmental & Physical		Communication		Approval Standards	
Operating temperature	-10°C to +50°C	Interface	2 wire, RS485	Safety	IEC 950
Storage temperature	-40°C to +85°C	Modbus address setting	By Dip switch	EMC	IEC 61000-4-2-A1 Level 2
Dimension (WxHxD)	23 x 109 x 98mm	Modbus Max.address	127 only		IEC 61000-4-3-A1 Level 2
Weight	105 grams	Baud rate	2400, 4800, 9600, 19200,		IEC 61000-4-4 Level 3
Mounting	DIN Rail		38400, 57600, 115200		CISPR 11:1997-A1 /
		Parity	None, Even, Odd		EN 55011:1998
		Stop bits	1, 2		Group 1 Class A
		Data Bits	8		

Digital Modules

IO-16DI

IO-16DO

IO-4RO

IO-8DIO

Specifications

Digital Inputs	16	N.A	N.A	8
No.of Counters	16	N.A	N.A	8
Counter Resolution	32 Bit	N.A	N.A	32 Bit
Counter frequency	1 KHz	N.A	N.A	1 KHz
Counter Mode	UP/Down	N.A	N.A	UP/Down
Pulse width	Minimum 500 Micro sec	N.A	N.A	Minimum 500 Micro sec
Input Impedance	2200 ohms	N.A	N.A	2200 ohms
Isolation (Field&Logic)	1500 V RMS	N.A	N.A	1500 V RMS
Status Indication	LED for each channel	N.A	N.A	LED for each channel
Digital Outputs	0	16	4	8
Type of Digital output	N A .	Open collector	Relay, Form C	Open collector
Maximum load current	N A .	100 mA/channel	0.5A / 1 A each ch.	100 mA/channel
Maximum load Voltage	N.A	36 V DC	220 V AC/ 28 V DC	36 V DC
Isolation (Field&Logic)	N A .	1500 V RMS	1000 V RMS	1500 V RMS
Status Indication	N.A	LED for each channel	LED for each channel	LED for each channel
Power supply	12 to 24 V DC	12 to 24 V DC	24 V DC	12 to 24 V DC

Combination Module

Specifications

Analog Inputs	2	0-20 mA/0-10 V DC, Resolution: 12 bit, I/P Impedance: 250 Ohms for current I/P, 190 K Ohms for Voltage I/P
Analog Outputs	1	0(4)-20 mA/0(2)-10 V DC, Resolution: 12 bit, Drift: 100 PPM/Deg.C, Accuracy: 0.05 % of span, Load: 1000 ohms @ 24 V for Current, 2000 Ohms for voltage output.
Digital Inputs	4	Counter, 32 bit, Frequency: 50 Hz, Pulse width: 20 ms, Voltage:10-26 V DC
Digital Outputs	2	Open collector, 36 V DC (Max), 100 mA/Output
RTD Inputs	2	Connection:2/3 wire, Types: PT100/Ni120/PT1000, Resolution: 0.1 deg.C, Isolation: 1500 V RMS
Power supply		12 V to 24 V DC

IO-DAIO

***For IO-DAIO module, LED is available for power on and communication status only.**

Analog Modules RTD and Thermocouple Inputs

IO-6RTD

IO-8TC

IO-8TCS

Specifications

Input	6, RTD Inputs	8, Thermocouple Inputs	8, Isolated Thermocouple Inputs
Type	PT100, Ni 120, PT1000, Ni1000 -DIN, NI1000 Landys & Gyr 10-400 Ohs, 100-4000 Ohms	J,K,E,T,N,B,S,R,mV,C,D and G	J,K,E,T,N,B,S,R,mV,C,D andG
Connection	2/3 wire	2 wire	2 wire
Resolution	0.1 Deg.C	0.1 Deg.C	0.1 Deg.C
Sample rate	31 samples/ min	42 samples/ min	37 samples/ min
Drift	100 PPM/Deg.C	100 PPM/Deg.C	100 PPM/Deg.C
Isolation (Field&Logic)	1500 V RMS	1500 V RMS	1500 V RMS 350 V (P-P) between channels
Power supply	12 V to 24 V DC	12 V to 24 V DC	12 V to 24 V DC

Current & Voltage Inputs

IO-8AII

IO-8AIV

IO-8AIIS

IO-8AIVS

Specifications

Analog Inputs	8	8	8	8
Type	Single-Ended	Single-Ended	Differential	Differential
Voltage	N.A	0 - 10 V DC/ 0 - 5V DC	N.A	0(2) - 10 V / 0(1) - 5V DC
Current	0-20 mA	N.A	0-20 mA	N.A
Offset by switch	4 mA	2 V DC (0-10)/ 1 V DC(0-5)	4 mA	2 V DC (0-10)/ 1 V DC(0-5)
Resolution	12 bit (0-4095)	12 bit (0-4095)	12 bit (0-4095)	12 bit (0-4095)
Sample rate	12.5 samples/sec	12.5 samples/sec	12.5 samples/sec	12.5 samples/sec
I/P Impedance	250 Ohms	20 K Ohms	250 Ohms	110 Kohms
Isolation(Ch-Ch)	N.A	N.A	350 V (P-P)	350 V (P-P)
Drift	50 ppm/deg.C	50 ppm/deg.C	100 ppm/deg.C	100 ppm/deg.C
Accuracy	0.2 % of span	0.2 % of span	0.2 % of span	0.2 % of span
Isolation (Field&Logic)	1500 V RMS	1500 V RMS	1000 V RMS	1500 V RMS
Power supply	12 V to 24 V DC	12 V to 24 V DC	12 V to 24 V DC	12 V to 24 V DC

Analog Outputs

Specifications

	IO-8AOI	IO-8AOV
Analog Outputs	8	8
Voltage	N.A	0-10V DC
Current	0-20 mA	N.A
Offset	4 mA	2 V DC
Resolution	12 bits (0-4095)	12 bits (0-4095)
Drift	100 ppm/deg.C	100 ppm/deg.C
Accuracy	0.05 % of span	0.05 % of span
Load	1000 Ohms @ 24 V DC	2000 Ohms
Isolation (Field&Logic)	1500 V RMS	1500 V RMS
Power supply	12 V to 24 V DC	12 V to 24 V DC

IO-8AOI

IO-8AOV

Data Acquisition Studio

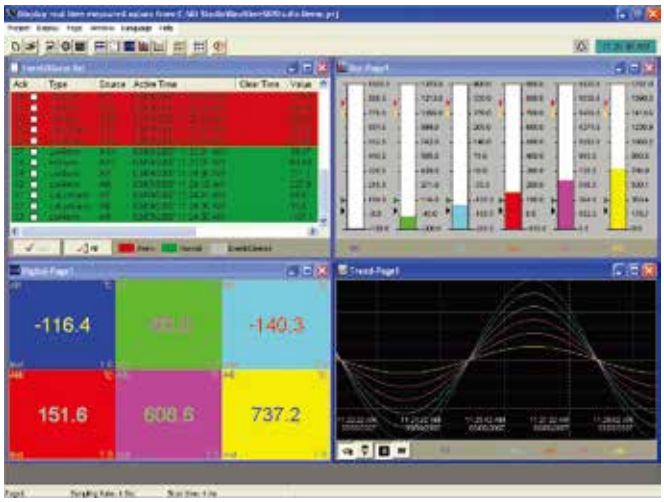
Single PC software for recorders, controllers, IO modules and third party devices by Modbus Protocol. User friendly PC based data logging and acquisition software.

Features

1. Maximum tags :2048
2. Real time trends, Bar graphs, Digital values
3. Real Time Alarms & Historical Alarms
4. Number of display pages: 200 maximum
5. Number of pens/page: 1 to 24 (Configurable)
6. Timers: 100, Counters: 50 & Totalizers: 50
7. Log Speed: 1, 2, 5 10, 30, 60 and 120 Sec
8. Log trigger type: By time, By value change
9. Log Methods: Instant, Average, Minimum & Maximum
0. Project Auto configuration with IO modules to create data base
1. Mathematic channels to write expressions or formula
2. Data Types: 2 byte, 4 byte and 8 byte, Decimal: 0 to 4
3. Alarms by email and 100 customized comments for Alarms
4. Event Types: H, HH, L, LL, Rate of increase, Rate of decrease and Error
5. Number of events per Analog Channel: 5, Number of Jobs/event: 2
6. Available Jobs: Log Alarm, Log Event, Log Alarm (Auto ack.), send email, Sound buzzer, DO Latch ON, DO Latch OFF, DO Process, Enable Timer, Disable Timer, Preset Totalizer, Reset Totalizer, Enable Totalizer, Disable Totalizer, Preset Counter, Reset Counter, Increase Counter, Decrease Counter, Log Report, Reset Min/Max/Avg and Log Message
7. Math functions: SIN, COS, EXP, SQRT, LN, LOG, ABS, POW, ROUND, HI, LO, INV, TG, CTG, ASIN, ACOS and ATG
8. Display languages: English, French, German, Italian, Japanese, Korean, Polish, Portuguese, Russian, Spanish, Thai and Czech, Chinese (Traditional) and Chinese (Simplified)
9. Four communication banks (Serial/Ethernet) Modbus RTU & TCP master protocols
20. Support dynamic data exchange (DDE)

Historical viewer features

1. Display Historical trend, Historical alarms/Event
2. Display Historical values in tabular column
3. Mark Remarks on data (Comments)
4. Search data by Time, Timer Period, Event/Alarm wise and Remark
5. View trends both Horizontally and Vertically
6. Zoom out & Zoon In
7. Display view options available at 1 sec/dot, 2 se 5 sec/dot, 10 sec/dot, 20 sec/dot, 30 sec/dot, 1 2 min/dot, 5 min/dot, 10 min/dot, 30 min/dot, 10 30 min/page, 1 hr/page, 2 hr/page, 4 hr/page, 8 day/page, week/page and Month/page
8. Display white back ground/black background
9. Print trend view, Event/Alarm list, Reports & Tag
10. Export data and alarms/events to CSV files. (Sp or time period or all)



IO Studio

t is standard PC software used to configure the communication settings for IO modules on the Modbus network. Once a module is detected, it is possible to view real-time data of the module directly on PC and it can be used for diagnostic purpose as well. All IO modules support RS485 communication. A RS232 to RS485 converter should be used between module and PC for configuration purpose. The address of each module is set up by using dip switches available on the module itself.

Networking Accessories

PC-E: Serials to Ethernet converter

Application	Connect IO modules (RS-485) to PC via Ethernet, 10/100 Base-T
	Modbus RTU to Modbus TCP, UDP, transparant modes
Sockets	Multisocket, share data to maximum 4 masters on Ethernet side
Power supply	12 to 24VDC
Interfaces	RS-232, RS-485 (2 wire)
Connection	Screw type terminal block (RS-232, RS-485)
Baud Rate	2400, 4800, 9600, 19.2K, 38.4K, 57.6K and 115.2K
Protection	Input fault protection to 70VDC, 16Kv HBM protection
Operating Temperature	-10℃ to 50℃
Installation	Din rail mount
Dimension	70 (L) X 59.5 (W) X 106 (H) mm
Weight	105 grams

SW5502 : Serials + Ethernet to Ethernet wireless converter

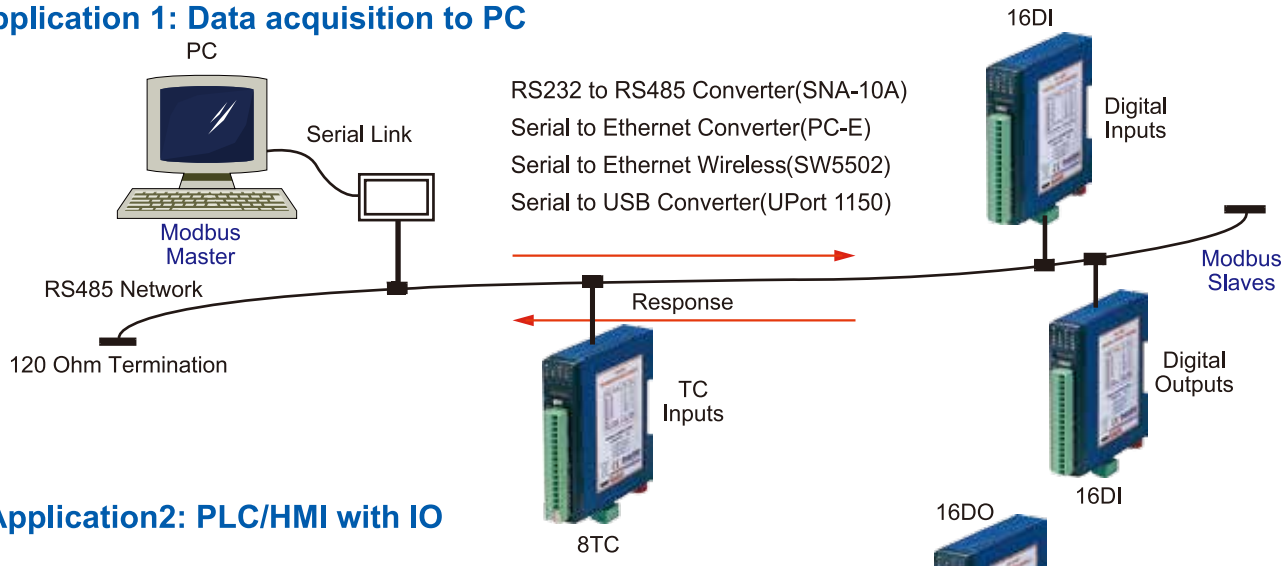
Application	Connect IO modules (RS-485) to PC via wireless
Protocols	IPv4, ICMP, TCP, UDP, DHCP Client, SNMP, SMTP, HTTP, DNS, NTP, RADIUS, RFC2217, WPS
Wireless	IEEE 802.11a/b/g/n, upto 54Mbps wireless network connectivity
Wireless security	WEP, WPA, WPA2, TKIP, AES, 802.1x
Link modes	TCP Server, TCP Client, UDP
Antenna	5GHz frequency supports to reduce interference on 2.4 GHz with other wireless devices, 3/5 dBi dual antenna design, SMA(R) female connector, optional 9dBi high-gain antenna
Transmission distance	250 meters for 3dBi antenna, 800 meters for 9dBi (optional)
Power supply	9 to 48VDC,0.65A, Approx. 5.85W (max)
Interfaces	Two serial ports (RS-232/422/485), one RJ45 Ethernet IEEE802.3ab 10/100/1000Mbps
Connection	D-Sub 9-pin connector (RS-232/422/485)
Baud Rate	110~921600Kbps
Operating temperature	-10°C ~ 60°C (14°F ~ 140°F)
Installation	Din rail mount
Dimension	47(H) x 110(W) x 90(D) mm
Weight	500 grams
Housing	Metal housing with IP50 protection

SNA-10A: RS-485/422 to RS-232 converter

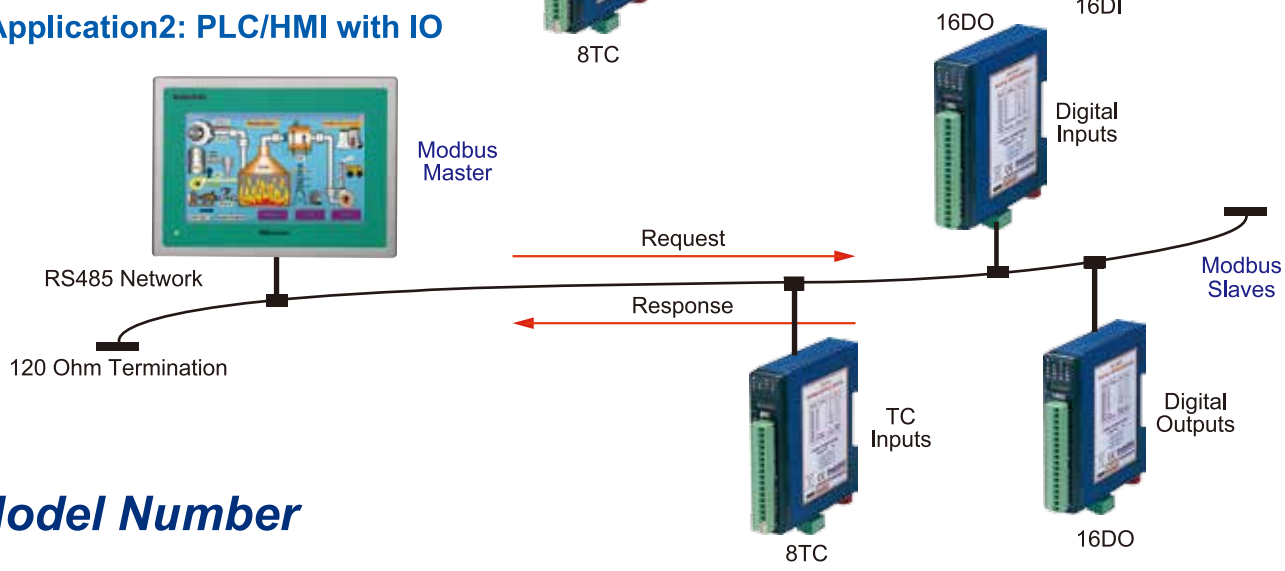
Application	Connect IO modules (RS-485) to PC(RS-232)
Power supply	90 to 264VAC, 47-63 Hz, 10VA
Interfaces	RS-232, RS-422 (4 wire) / RS-485 (2 wire)
Connectors	9-pin female D-SUB (RS-232) Screw type terminal block (RS-485/422)
Baud Rate	300, 600, 1200, 2400, 4800, 9600, 14400, 19200, 28800, 38400
Breakdown Voltage	2500VAC, 1 minute (power to RS-232, RS-485/422) 400 VAC, 1 minute (between RS-232 and RS-485/422)
Isolation resistance	>500 Mohm, 500 VDC
Operating Temperature	0 to 50℃
Installation	Din rail mount, wall mount
Dimension	102.5 (L) X 80 (W) X 30 (H) mm
Weight	120 grams

Applications

Application 1: Data acquisition to PC



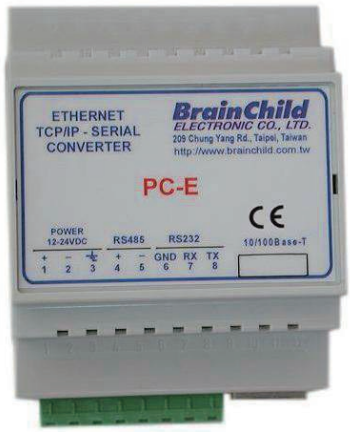
Application2: PLC/HMI with IO



Model Number

Model Number	Description
IO-16DI	16 DIGITAL INPUT MODULE INCLUDING COUNTERS
IO-16DO	16 DIGITAL OUTPUT MODULE
IO-4RO	4 RELAY OUTPUT MODULE
IO-8DIO	8 DIGITAL INPUT / 8 DIGITAL OUTPUT MODULE
IO-8TC	8 THERMOCOUPLE INPUT MODULE INCL. 0 - 50mV & ±100mV I/P
IO-8TCS	8 TC INPUT MODULE INCL. 0 - 50mV & ±100mV I/P FULLY ISOLATED
IO-6RTD	6 RTD INPUT MODULE - PT100, Ni120, PT1000, Ni1000, Ni1000LG & Ohms
IO-8AII	8 ANALOG INPUT 0 - 20mA / 4 - 20mA
IO-8AIV	8 ANALOG INPUT 0 - 5V / 1 - 5V / 0 - 10V / 2 - 10V
IO-8AIIS	8 ANALOG INPUT 0 - 20mA / 4 - 20mA / ±20mA FULLY ISOLATED
IO-8AIVS	8 ANALOG INPUT 0 - 1V / 0 - 10V / ±1V / ±10V FULLY ISOLATED
IO-8AOI	8 ANALOG OUTPUT MODULE 0(4) - 20mA
IO-8AOV	8 ANALOG OUTPUT MODULE 0(2) - 10V
IO-DAIO	2 RTD I/P, 2 ANALOG INPUT 0(4) - 20mA / 0(2) - 10V, 1 ANALOG OUTPUT 0(4) - 20mA / 0(2) - 10V, 4 DIGITAL INPUTS, 2 DIGITAL OUTPUTS
PC-E	RS-232/485 TO ETHERNET CONVERTER
SW5502	RS-232/422/485 TO ETHERNET WIRELESS CONVERTER
SNA-10A	RS-232 TO RS-485 CONVERTER
Data Acquisition Studio	PC BASED DATA LOGGING SOFTWARE FOR IO MODULES

Ethernet Converter PC-E



Description:

This type of Ethernet converter / Gateway is capable to link any serial (RS-232 or RS485) devices to your computer network via Ethernet for access control or remote control and monitoring purposes.

Features:

- Serial to Ethernet communication
- DIN Rail/Panel Mount
- COM1 : RS232/RS485, RJ45 for Ethernet connectivity
- Application : Connects IO modules, controllers, HMI with Ethernet Network
- Function : Transparent data link or Gateway to convert Modbus RTU to Modbus
- TCP messages
- Support Multiple sockets enables up to 4 Masters to communicate with slaves connected to PC-E converter
- Web server for Configuration

Technical Specification:

- Power Supply : 90mA @ 10VDC / 40mA @ 26VDC
- Ethernet : 10/100 Mbits, Connector RJ45
- Serial : RS232, 3 Wire, TX, RX & GND
  RS485, 2 Wire Multi drop twisted pair
  Baud Rate 2400, 4800, 9600, 19200, 38400, 57600, 115200
- Communication Settings :
  Data Bits: 5, 6, 7, 8
  Parity None, Even, Odd
  Stop Bits 1, 2.
- Operating Temperature : -10°C to + 50°C
- Storage Temperature : -40°C to + 85°C
- Connectors : Power and Communication: 8 way screw connector
- Protection class : IP20
- Humidity : Up to 95% non-condensing

UPort™ 1150/1150I

1-port RS-232/422/485 USB-to-serial converters with optional 2 KV isolation protection

UPort™ 1150

UPort™ 1150I

- Compatible with USB 2.0
- 12 Mbps USB data rate
- Software selectable RS-232, RS-422, 4-wire RS-485, and 2-wire RS-485
- Certified drivers provided for Windows (including Vista), WinCE 5.0, and Linux
- 15 KV ESD protection for all serial ports
- 2 KV optical isolation protection (UPort™ 1150I)
- Full modem status LEDs for UPort™ 1150I

The certification logos shown here apply to some or all of the products in this section. Please see the **Specifications** section or Moxa's website for details.

Instant Plug & Play

The UPort™ 1150/1150I USB-to-serial converters allow you to connect 1 RS-232/422/485 device to your laptop or workstation through the USB (Universal Serial Bus) port. These plug & play USB solutions are compatible with both new and legacy RS-232/422/485 devices, and are perfect for mobile, instrumentation, and point-of sale applications.

Simplified, Hassle-free Serial Port Expansion

USB plug & play makes serial port expansion easy, and does not require IRQ, DMA, or I/O address resources. Users no longer need to open the chassis or power down the system to add COM ports, saving on setup time and cost.

Specifications

USB Interface

Compliance: USB 1.0/1.1 compliant, USB 2.0 compatible
Connector:
UPort™ 1150: USB type A
UPort™ 1150I: USB type B
Speed: 12 Mbps (Full-Speed USB)

Serial Interface

Number of Ports: 1
Serial Standards: RS-232/422/485
Connector: DB9 male

Serial Line Protection

ESD Protection: 15 KV embedded
Optical Isolation Protection: 2 KV (UPort™ 1150I only)

Performance

Baudrate: 50 bps to 921.6 Kbps

Serial Communication Parameters

Data Bits: 5, 6, 7, 8
Stop Bits: 1, 1.5, 2
Parity: None, Even, Odd, Space, Mark
Flow Control: RTS/CTS, XON/XOFF
I/O Address: Assigned by BIOS
IRQ: Assigned by BIOS
FIFO: 64 bytes

Serial Signals

RS-232: TxD, RxD, RTS, CTS, DTR, DSR, DCD, GND
RS-422: TxD+(B), TxD-(A), RxD+(B), RxD-(A), GND
RS-485-4w: TxD+(B), TxD-(A), RxD+(B), RxD-(A), GND
RS-485-2w: Data+(B), Data-(A), GND
RS-485 Data Direction: ADDC™ (Automatic Data Direction Control)

Driver Support

Operating Systems: Windows (2000, XP x86/x64, 2003 x86/x64, Vista x86/x64), WinCE 5.0, Linux 2.4 x64, 2.6 x86/x64

Physical Characteristics

Housing:
UPort™ 1150: ABS + PC
UPort™ 1150I: SECC sheet metal (1 mm), IP30 protection

Weight:
Product only:
UPort™ 1150: 60 g (0.19 lb)
UPort™ 1150I: 80 g (0.16 lb)
Packaged:
UPort™ 1150: 181 g (0.43 lb)
UPort™ 1150I: 195 g (0.40 lb)

Dimensions:
UPort™ 1150: 37.5 x 60 x 20.5 mm (1.48 x 2.36 x 0.81 in)
UPort™ 1150I: 52 x 80 x 22 mm (2.05 x 3.15 x 0.87 in)

Environmental Limits

Operating Temperature: 0 to 55°C (32 to 131°F)

Operating Humidity: 5 to 95% RH

Storage Temperature: -20 to 70°C (-4 to 158°F)

Regulatory Approvals: EN55022 Class B, EN55024, EN61000-3-2, EN61000-3-3, IEC 61000-4-2, IEC 61000-4-3, IEC 61000-4-4, IEC 61000-4-5, IEC-61000-4-6, IEC 61000-4-8, IEC-61000-4-11, FCC Part 15 Class B

Power Requirements

Power Consumption:
UPort™ 1150: 77 mA @ 5 VDC
UPort™ 1150I: 260 mA @ 5 VDC

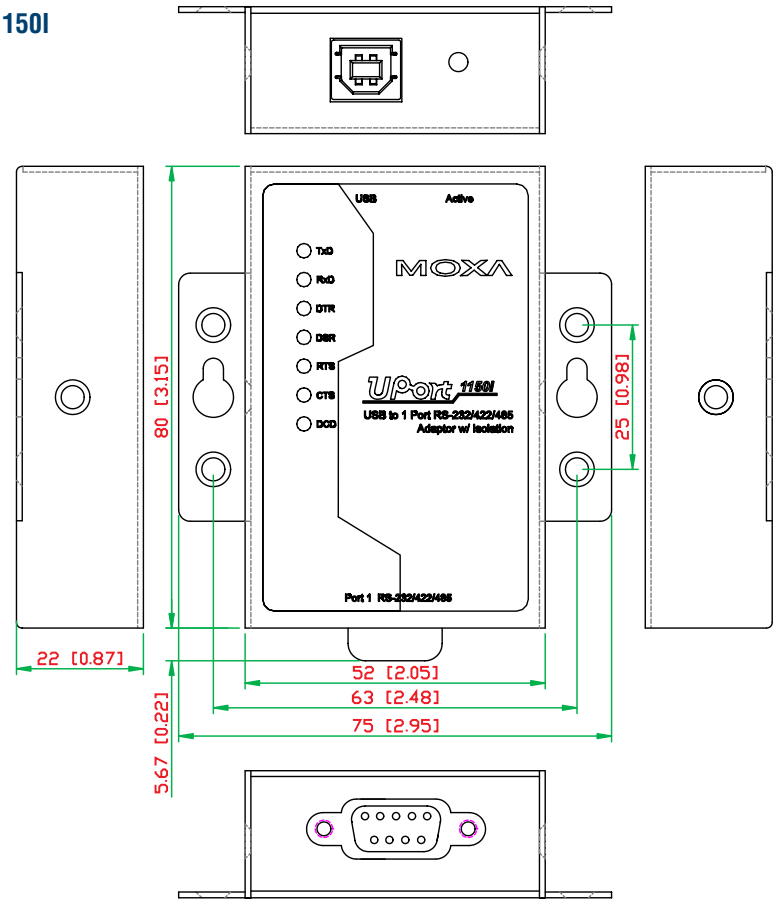
Warranty

Warranty Period: 5 years

Details: See www.moxa.com/warranty

Dimensions

UPort™ 1150I



unit: mm (in)

Ordering Information

Available Models

UPort™ 1150: 1-port RS-232/422/485 USB-to-serial converter

UPort™ 1150I: 1-port RS-232/422/485 USB-to-serial converter with 2 KV optical isolation protection

Optional Accessories (can be purchased separately)

Magnet Accessory: Magnets for attaching the UPort™ 1150I to the PC's housing

DK35A: For attaching the UPort 1150I to a DIN-Rail

Package Checklist

- UPort™ 1150 or 1150I USB-to-serial converter
- 1 mini DB9 female to terminal block adaptor
- Velcro lock-down strap for the USB cable
- Document and Software CD
- Quick Installation Guide (printed)
- Warranty Card

USB To RS-422 / 485 Converter

US-101 485

USB

- Chipset : Silicon Laboratories CP2102
- Compliant : USB 1.0 , 1.1 , 2.0
- Connector : USB type A
- Baud Rates : Full speed 12 Mbps

Driver Support

Win - 98SE / 2000 / XP / Server 2003 /
WIN 7 / Win 8 / Win 8.1 / Win 10 /
Mac osx / os9 / Linux 2.4 / 2.6

Serial Port

- Port : 1 port (Terminal Block)
- RS-422 : RxD+, RxD-, TxD+, TxD-
- RS-485 : Data+, Data-
- RS-422 , RS-485 Auto Detect
- RS-422 , RS-485 Surge Protect
- Receive buffer : 576 Byte
- Transmit buffer : 640 Byte
- Baud Rate : 300 ~ 230.4 K bps
- Flow Control : X-On / X-Off or Hardware

Dimension

- Size : 55 * 40 * 25 mm (W * D * H)
- Weight : 35 gm

Environment

- Operating Temp : -10 ~ 70°C
- Storage Temp : -20 to 85°C
- Humidity : 5~95 % RH

Power : USB Bus Power (5V)

RoHS

User's Manual

SNA10A Smart Network Adaptor

1.Features

* Supports both RS-485 and RS-422 Interface
* Baud Rate: 300 ~ 38400 bits/sec configurable
* Allows connection for 247 multi-drop units
* Automatic data direction control for RS-485 without the need to take care of RTS signal.
* Precision timing control for RS-485 allows fast switching between transmit and receive
* Universal (90 ~ 264 VAC) AC power input
* Isolated between RS-232 and RS-485 / 422 eliminate common mode noise problems
* Flexible installation: DIN rail mount or wall mount

2.Introduction

SNA10A is smart network adaptor which can be used to convert unbalanced RS-232 signals to balanced RS-485 or RS-422 signals.
The RS-485 is an enhanced version of the RS-422A balanced line standard. It allows multiple drivers and receivers on a 2-wire system and reduces wiring cost. This 2-wire system can perform half-duplex transmission only. Because RS-422 is a 4-wire system, it can perform full-duplex transmission. The driving capability is dependent on the input impedance of the connected receivers.
As many as 32 standard units can be put on RS-422 or RS-485 port.
Up to 247 high impedance units, such as Brainchild's interface products, can be put on RS-422 or RS-485 port.

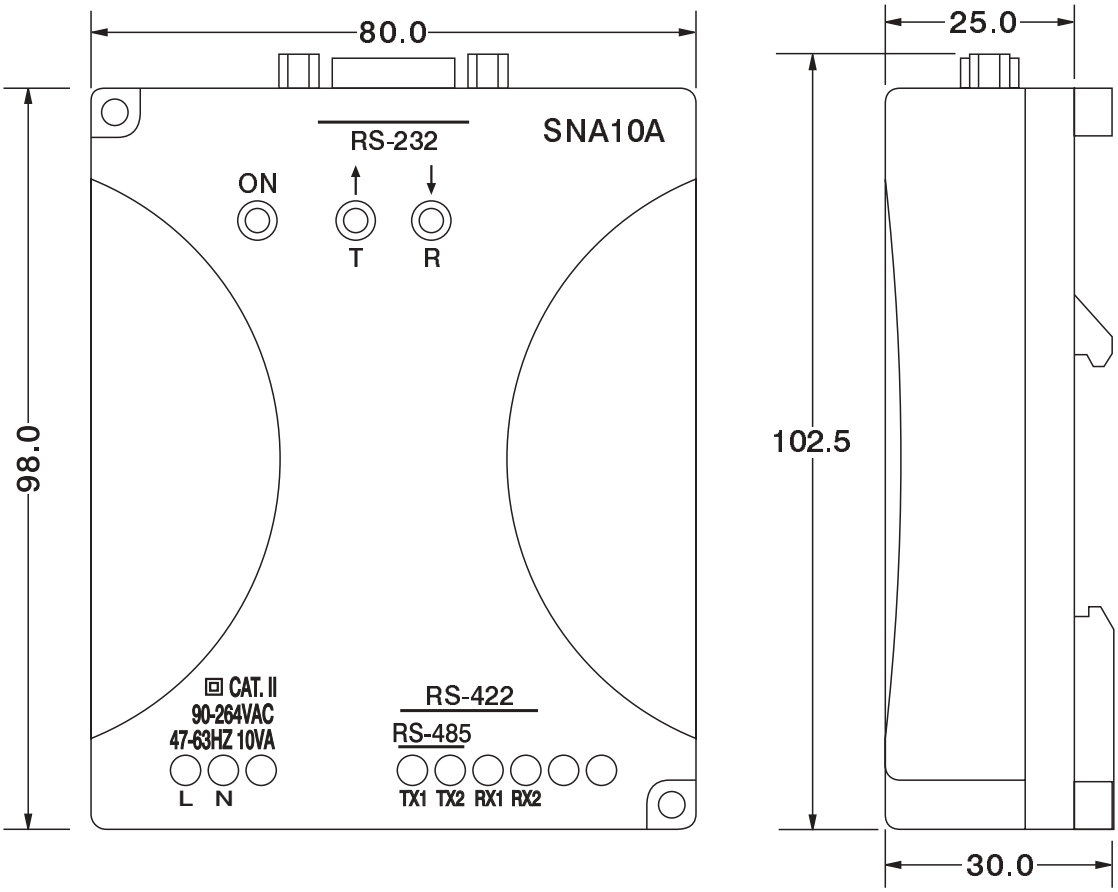
3.RS-232C Interface

Pin	EIA	Description	Source
1	CF	Carrier Detect (DCD)	DCE
2	BB	Received Data (RD)	DCE
3	BA	Transmitted Data (TD)	DTE
4	CD	Data Terminal Ready (DTR)	DTE
5	AB	Signal Ground (SG)	DTE/DCE
6	CC	Data Set Ready (DSR)	DCE
7	CA	Request to Send (RTS)	DTE
8	CB	Clear to Send (CTS)	DCE
9	CE	Calling Indication (RI)	DCE

4.Specifications

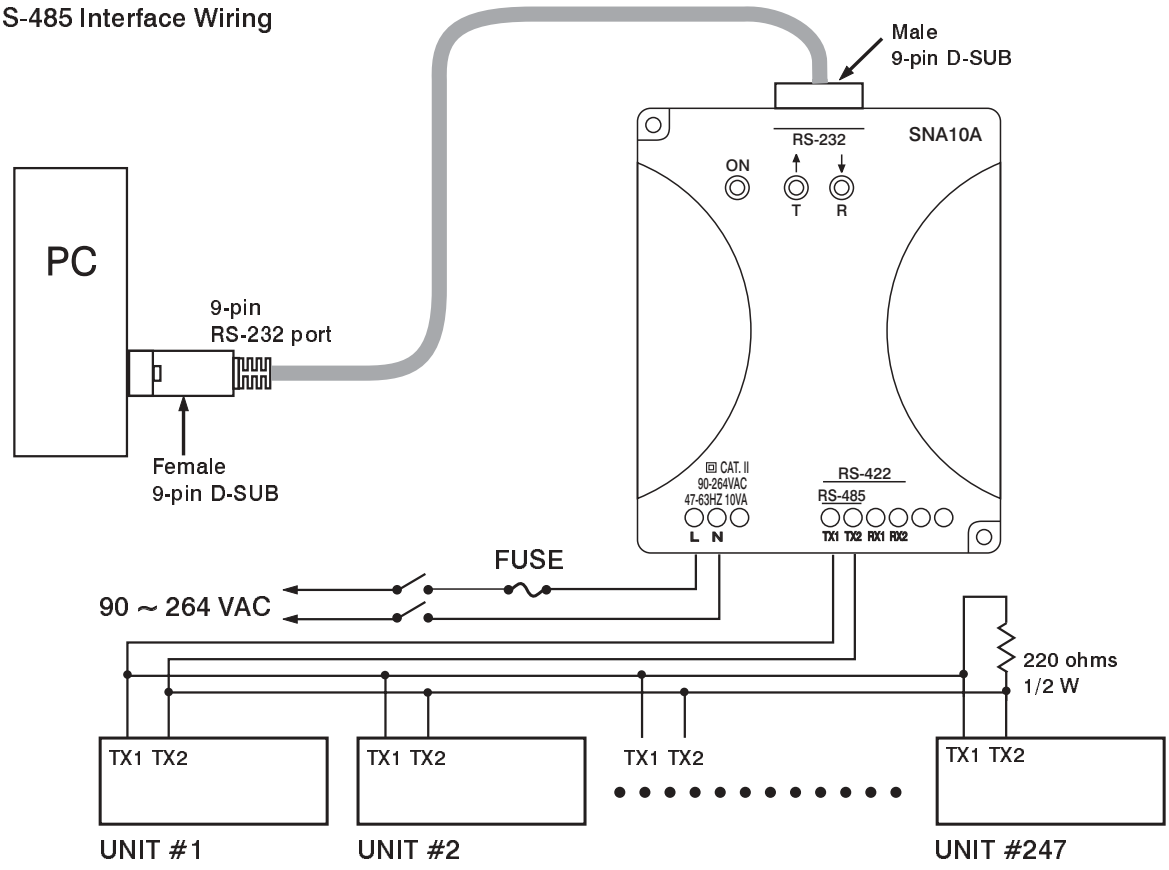
Baud rate:	300 ~ 38400 bits/sec
Parity bit:	None, odd or even
Data bit:	8 bits
Stop bit:	1 or 2 bits
Connectors:	9-pin Female D-SUB (RS-232)
	Screw type terminal block (RS-485/422)
Receiver threshold:	0.8 V min. 2.4 V max. (RS-232)
	±0.2 V (RS-485/422)
Receiver input impedance:	3K ~ 7 Kohm (RS-232)
	96 Kohm (RS-485/422)
Transmission mode:	Single ended (RS-232)
	Differential (RS-485/422)
Transmission distance:	50 ft (RS-232)
	5000 ft (RS-485/422)
Common-mode voltage:	±25 V (RS-232)
	+12 V, -7V (RS-485/422)
Driving capability:	32 receivers (12 Kohm input)
	247 receivers (96 Kohm input)
Power:	90~264 VAC, 47~63 Hz, 10VA, 4W max.
Breakdown Voltage:	2500VAC, 1minute (power to RS-232, RS-485/422)
	400 VAC, 1 minute (between RS-232 and RS-485/422)
Isolation resistance:	>500 Mohm VS. 500 VDC
Ambient temperature:	0~50 ℃
Storage temperature:	-20~80 ℃
Mounting method:	DIN rail mount or wall mount
Dimension:	102.5 (L) X 80 (W) X 30 (H) mm
Weight:	120 grams

5.Mechanical Data



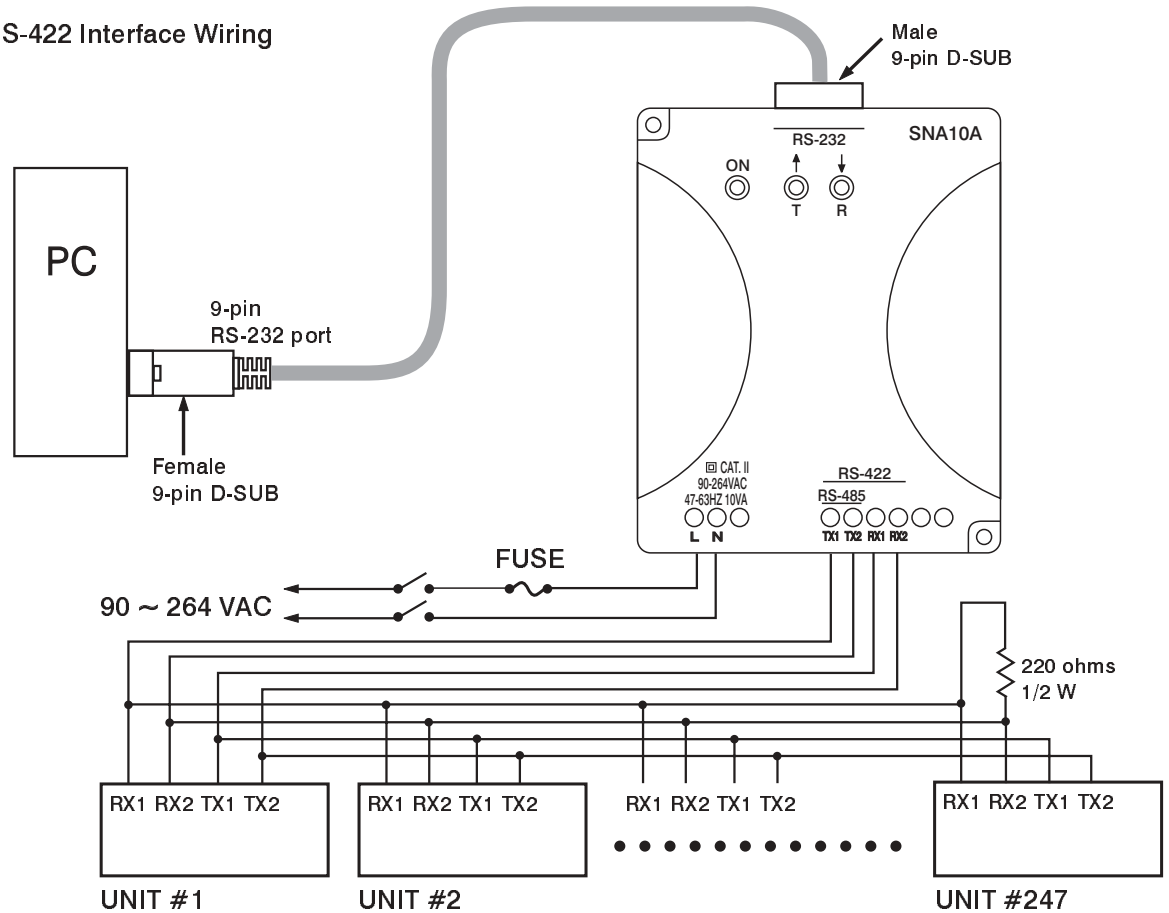
6.Application

(1) RS-485 Interface Wiring



A 220 ohms 1/2 W termination resistor across the TX1 and TX2 terminals of the last unit in the network is required.

(2) RS-422 Interface Wiring



A 220 ohms 1/2 W termination resistor across the receive terminals of the last unit in the network is required.

7.DIP Switch Setting

SNA10 DIP SWITCH SETTING
■ = ON POSITION
BLANK = OFF POSITION

		1	2	3	4	5	6	7	8
Interface	RS-422	■							
	RS-485								
Parity Bit	None		■	■					
	Even			■					
	Odd								
Stop Bit	1 bit				■				
	2 bit								
Baud Rate (bps)	300					■	■	■	■
	600						■	■	■
	1200					■		■	■
	2400							■	■
	4800					■	■		■
	9600						■		■
	14400					■			■
	19200								■
	28800					■	■	■	
	38400						■	■	

8.Ordering Data

SNA10A: Smart Network Adaptor for third party software or Communicator software application.

RoHS compliant

Industrial Wireless Serial Device Server

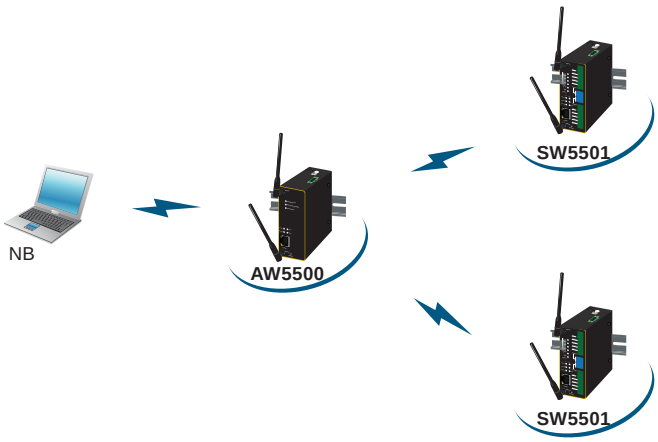
■ ■ **SW550X Series**

- Designed for 802.11a/b/g/n networks
- Embedded PCB coating protection
- Web server/Utility configuration (Serial Manager)
- Upgrade via Serial Manager or Web server
- 5 GHz frequency support to reduce interference on 2.4 GHz with other wireless devices
- FCC (United States), ETSI (Europe), and NCC (Taiwan) certified wireless equipment

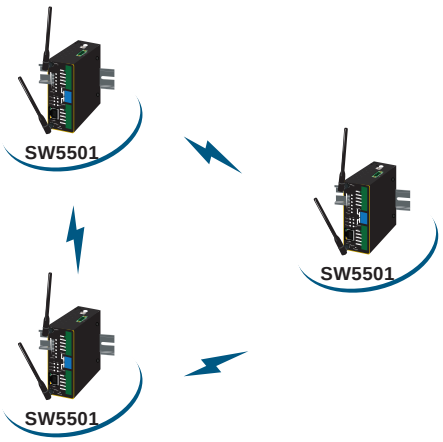
The SW550X Series is our latest addition to our Industrial Wireless products; its small size but powerful architecture makes it a perfect choice for industrial/manufacturing needs in which size is a decisive factor. It rewards our customers with superb connectivity withstanding all the harshness in your environment of choice. Among its many characteristics, we could mention:

- 5 GHz frequency support to reduce interference on 2.4 GHz with other wireless devices.
- Dual antenna design that offers better wireless coverage and reduces wireless blind spots.

Infrastructure Mode



Adhoc Mode



Specifications	
Network Interface	
Connector	RJ-45
Speed	IEEE802.3ab 10/100/1000Mbps
Serial Interface	
Connector	D-Sub9 RS-232/422/485 software selectable 5.08mm TB5 RS-232/422/485 software selectable (TB models) 5.08mm TB5 RS-422/485 software selectable (Sis models)
Ports	SW5501: 1 Port, SW5502: 2 Ports
Baud Rate	110~921600Kbps
Parity	None, Odd, Even, Space, Mark
Data Bits	5,6,7,8
Stop Bits	1,2
Flow Control	None, Xon/Xoff, RTS/CTS
Power Characteristics	
Input Voltage	9VDC-48VDC
Input Current(9VDC)	0.65A
Power Consumption	Approx. 5.85W (max)
Reverse Polarity Protection	Yes
Connection	5.08mm 3-pin Lockable Terminal Block
Mechanicals	
Dimensions(W X H x D)	47 mm x 110 mm x 90mm
Installation	DIN Rail, Wall Mount (optional)
Reset Button	Yes
Weight	500g
Environmental Limits	
Operating Temperature	-10°C ~ 60°C (14°F ~ 140°F)
Storage Temperature	-40°C ~ 85°C (-40°F ~ 185°F)
Ambient Relative Humidity	5 ~ 95% RH, (non-condensing)
Software	
Protocols	IPv4, ICMP, TCP, UDP, DHCP Client, SNMP, SMTP, HTTP, DNS, NTP, RADIUS, RFC2217, WPS
Wireless Security	WEP, WPA, WPA2, TKIP, AES, 802.1x
Configuration	Serial Manager, Web UI
Virtual COM	Windows / Linux redirection software
Link Modes	
TCP Server	4 connections, Virtual COM, or Reverse Telnet
TCP Client	Dual destinations or Virtual COM
UDP	Up to 4 ranges of IPs
Warranty	5 years

Regulatory Requirements	
EMC	EN 301489-1 V1.8.1, EN301489-17 V2.1.1 (Class A), FCC 15B (Class A), CNS 13438
Radio	FCC 15C 15.247, FCC 15E 15.407, EN 301893 V1.5.1, EN 300328 V1.7.1, NCC LP00002
EMF	EN 62311: 2008, EN 50385: 2002

Test	Item		Value	Level
IEC 61000-4-2	ESD	Contact Discharge	±8KV	4
		Air Discharge	±15KV	4
IEC 61000-4-3	RS	Radiated(Enclosure)	10(V/m)	3
IEC 61000-4-4	EFT	AC Power Port	±2.0 KV	3
		LAN Port	±2.0 KV	4
		COM Port	±2.0 KV	4
IEC 61000-4-5	Surge	AC Power Port	Line-to-Line±1.0 KV	3
		AC Power Port	Line-to-Earth±2.0 KV	3
		LAN Port	Line-to-Earth±2.0 KV	3
		COM Port	Line-to-Earth±2.0 KV	3
IEC 61000-4-6	CS	Conducted(Enclosure)	10 V rms	3
IEC 61000-4-8	PFMF	(Enclosure)	10(A/m)	3
IEC 61000-4-11	DIP	AC Power Port	-	-

***AC Ports are tested through an power adaptor avaiable in the accessory.**

Safety	UL60950-1/CB, EN60950-1, CNS 14336
Shock	IEC 60068-2-27
Freefall	IEC 60068-2-32
Vibration	IEC 60068-2-6
MTBF	22 years (MIL-HDBK-217F)
RoHS	Yes

Wireless Characteristics

Wireless PCI-e Module	Atheros AR9382
Tx / Rx	2T2R MIMO (2x2 with MCS 0-15)
Standard Conformance	802.11a, 802.11b, 802.11g, and 802.11n
Antenna	3/5 dBi Dual antenna design, SMA(R) Female connector

Operating Frequency

	2.4Ghz	5Ghz
United States (FCC)	2412-2462(20Mhz)/2422-2452(40Mhz)	5180-5240, 5745-5825(20Mhz)/5190-5230, 5755-5795(40Mhz)
Europe (ETSI)	2412-2472(20Mhz)/2422-2462(40Mhz)	5180-5240(20Mhz)/5190-5230(40Mhz)
Taiwan (NCC)	2412-2462(20Mhz)/2422-2452(40Mhz)	5280-5320, 5745-5825(20Mhz)/5310, 5755-5795(40Mhz)

Data Rate

802.11a	6, 9, 12, 18, 24, 36, 48,54Mbps
802.11b	1, 2, 5.5 and 11Mbps
802.11g	6, 9, 12, 18, 24, 36, 48, 54Mbps
802.11n	20MHz bandwidth: 1Nss: 65Mbps @ 800GI, 72.2Mbps @ 400GI (Max.) / 2Nss: 130Mbps @ 800GI, 144.4Mbps @ 400GI (Max.)
	40MHz bandwidth: 1Nss: 135Mbps @ 800GI, 150Mbps @ 400GI (Max.) / 2Nss: 270Mbps @ 800GI, 300Mbps @ 400GI (Max.)

Output Power

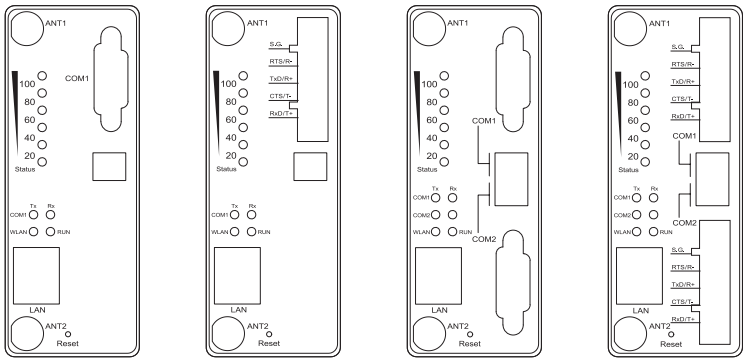
802.11a	+15dBm @ 6, 9, 12, 18, 24Mbps / +15dBm @ 36Mbps / +14dBm @ 48Mbps / +12dBm @ 54Mbps			
802.11b	+14dBm			
802.11g	+17dBm @ 6, 9, 12,18,24Mbps / +17dBm @ 36Mbps / +16dBm @ 48Mbps / +16dBm @ 54Mbps			
802.11n 2.4GHz/HT20	+16dBm @ MCS 0/8	+16dBm @ MCS 4/12	+16dBm @ MCS 1/9	+16dBm @ MCS 5/13
	+16dBm @ MCS 2/10	+16dBm @ MCS 6/14	+16dBm @ MCS 3/11	+15dBm @ MCS 7/15
802.11n 2.4GHz/HT40	+15dBm @ MCS 0/8	+15dBm @ MCS 4/12	+15dBm @ MCS 1/9	+15dBm @ MCS 5/13
	+15dBm @ MCS 2/10	+15dBm @ MCS 6/14	+15dBm @ MCS 3/11	+14dBm @ MCS 7/15
802.11n 5GHz/HT20	+15dBm @ MCS 0/8	+15dBm @ MCS 4/12	+15dBm @ MCS 1/9	+11 - 14dBm @ MCS 5/13
	+15dBm @ MCS 2/10	+9 - 12dBm @ MCS 6/14	+15dBm @ MCS 3/11	+7 - 10dBm @ MCS 7/15
802.11n 5GHz/HT40	+14dBm @ MCS 0/8	+14dBm @ MCS 1/9	+14dBm @ MCS 2/10	+14dBm @ MCS 3/11
	+14dBm @ MCS 4/12	+10– 13dBm @ MCS 5/13	+8 – 11dBm @ MCS 6/14	+6 – 9dBm @ MCS 7/15

Receiver Sensitivity

	Data Rate	IEEE Spec(1 Rx dBm)	Typical/Maximum(2Rx dBm)		Data Rate	IEEE Spec(1 Rx dBm)	Typical/Maximum(2Rx dBm)
802.11a	6M	-82	-95/-85	**802.11a/n HT40**	MCS0	-79	-92/-82
	9M	-81	-94/-84		MCS1	-76	-90/-79
	12M	-79	-93/+82		MCS2	-74	-87/-77
	18M	-77	-90/-80		MCS3	-71	-84/-74
	24M	-74	-88/-77		MCS4	-67	-80/-70
	36M	-70	-84/-73		MCS5	-63	-76/-66
	48M	-66	-82/-69		MCS6	-62	-74/-65
	54M	-65	-81/-68		MCS7	-61	-72/-64
802.11b	1M	not specified	-98/-85	**802.11b/g/n HT20**	MCS0	-82	-95/-85
	5.5M	not specified	-98/-85		MCS1	-79	-94/-82
	11M	not specified	-94/-85		MCS2	-77	-92/-80
802.11g	6M	-82	-96/-85		MCS3	-74	-89/-77
	9M	-81	-96/-84		MCS4	-70	-86/-73
	12M	-79	-95/-82		MCS5	-66	-82/-69
	18M	-77	-93/-80		MCS6	-65	-80/-68
	24M	-74	-90/-77		MCS7	-64	-78/-67
	36M	-70	-87/-73	**802.11b/g/n HT40**	MCS0	-79	-92/-82
	48M	-66	-83/-69		MCS1	-76	-92/-79
	54M	-65	-82/-68		MCS2	-74	-89/-77
802.11a/n HT20	MCS0	-82	-94/-85		MCS3	-71	-86/-74
	MCS1	-79	-92/-82		MCS4	-67	-83/-70
	MCS2	-77	-90/-80		MCS5	-63	-77/-66
	MCS3	-74	-87/-77		MCS6	-62	-76/-65
	MCS4	-70	-84/-73		MCS7	-61	-75/-64
	MCS5	-66	-79/-69				
	MCS6	-65	-78/-68				
	MCS7	-64	-76/-67				

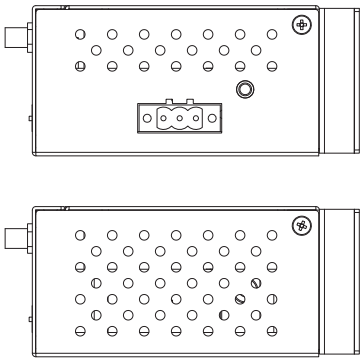
Ordering Information	
SW5501	P/N:1P1SW550100001G
	1-port Industrial Wireless Serial Device Server, DB9
SW5501-Sis	P/N:1P1SW5501SIS01G
	1-port Industrial Wireless Serial Device Server, TB5 with serial isolation
SW5501-TB	P/N:1P1SW5501TB001G
	1-port Industrial Wireless Serial Device Server, TB5
SW5502	P/N:1P1SW550200001G
	2-port Industrial Wireless Serial Device Server, DB9
SW5502-Sis	P/N:1P1SW5502SIS01G
	2-port Industrial Wireless Serial Device Server, TB5 with serial isolation
SW5502-TB	P/N:1P1SW5502TB001G
	2-port Industrial Wireless Serial Device Server, TB5
Optional Accessories	
AD17-24C (US-Y)	P/N: 50500151240002G
Power Adapter	Y-Type power adaptor,100-240VAC input, 0.6A @ 24VDC output, US plug
AD17-24D (EU-Y)	P/N: 50500151240012G
Power Adapter	Y-Type power adaptor,100-240VAC input, 0.6A @ 24VDC output, EU plug
ADP-DB9(F)-TB5	P/N: 59906231G
	Female DB9 to Female 3.81 TB5 Converter
WMK-454-Black	P/N: 70100000000043G
	Black Aluminum Wall Mount Kit

Front View

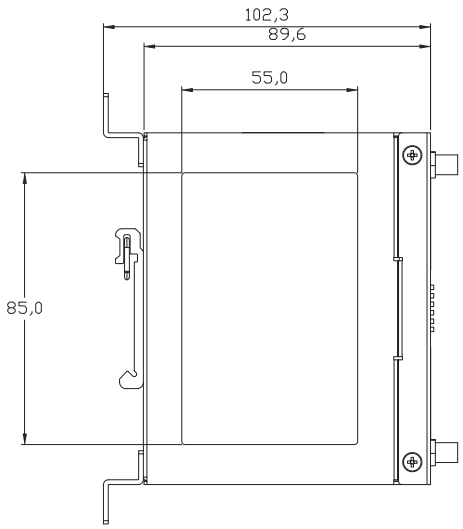


SW5501 SW5501-TB SW5502 SW5502-TB

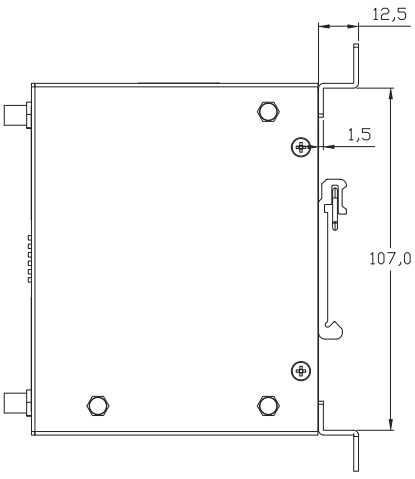
Top and Bottom View



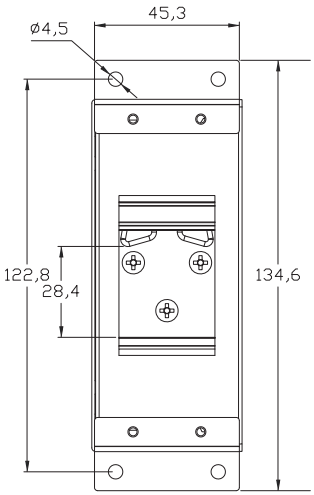
Left Side View



Right Side View



Rear View



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