

SRV SERIES

Module type
Digital Temperature Controller

SRV



CE   
CE,UL,CSA pending

RKC® RKC INSTRUMENT INC.



Module type Digital Temperature Controller

SRV Series

Good for users

Cost-saving

Cost Performance

Combinations of dual loop control modules to realize a temperature control system at a reasonable cost.

From a single loop to 62 loops temperature control.



Good for environments

Energy saving

Low Power Consumption

Uses newly designed power supply and control circuits. Less heat generation to suppress temperature increase inside control panel.

21W/20ch

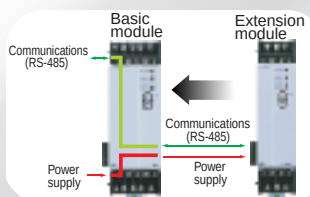


Good for environments

Resource saving

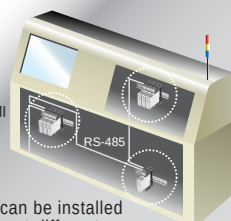
Less Wiring

Separated installations by control zones are possible. Wiring to sensors and output devices can be minimized. Modules can be installed separately inside a control panel or a machine to reduce the physical size of the housing.



Communication and power supply for extension modules are just connecting modules.

To computer/HMI



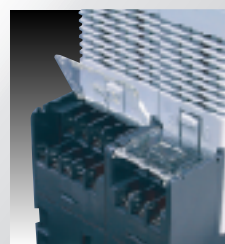
Modules can be installed separately at different positions.

Good for human

Safety

Safe, yet easy to use

Hinged terminal cover is supplied as standard.



Interleave terminal arrangement for easy wiring.



System Configuration

Module Configuration

- V-TIO-A and V-TIO-B (or V-TIO-C and V-TIO-D) have similar control functions and specifications.
- V-TIO-A and V-TIO-B can accept maximum of two inputs. (A single input only for V-TIO-C and V-TIO-D).
- Digital input/output functions are optional.

Basic type
Temperature control module

V-TIO-A



(With Digital input/output)

Extension type
Temperature control module

V-TIO-B



(With Digital input/output)

Basic type
Heat/Cool Temperature control module

V-TIO-C



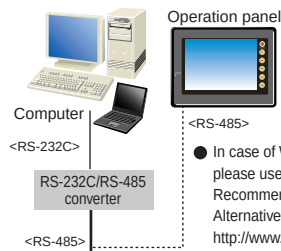
(With Digital input/output)

Extension type
Heat/Cool Temperature control module

V-TIO-D



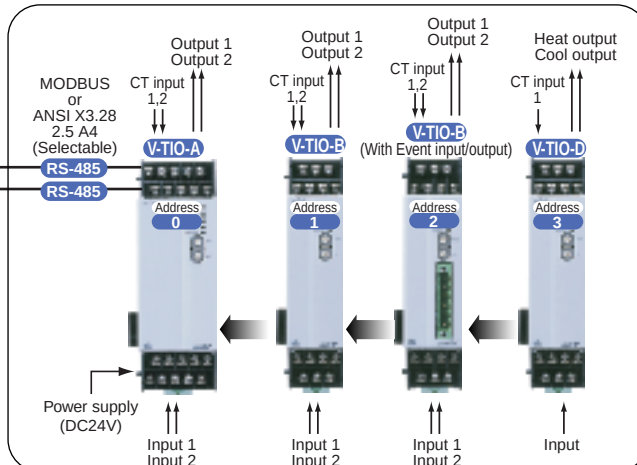
(With Digital input/output)



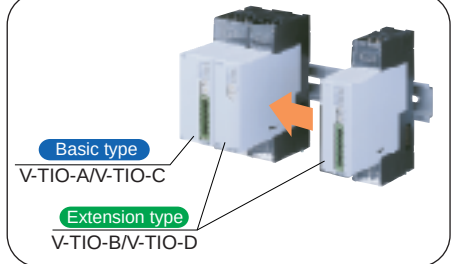
Example of system configuration

- In case of Windows 95/98/NT, please use an RS-232C/RS-485 converter with automatic send/receive switching function. Recommended products: CD485, CD485V (Data Link Co. Ltd). Alternative products (485 OI 9TB, etc) may be available from B and B-Electronics through <http://www.bb-elec.com>

Control Unit

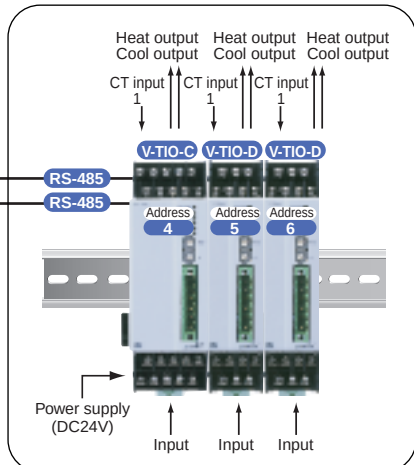


- Power supply and communication are available through connectors between V-TIO-A/V-TIO-C and combined modules.



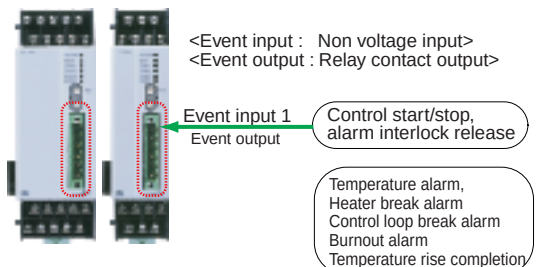
- When two or more modules are used combined, the first module must be a basic module (V-TIO-A or V-TIO-C). Extension modules (V-TIO-B or V-TIO-D) do not work alone without V-TIO-A or V-TIO-C. As long as the first module is a basic module, the added extension modules can be mixed (V-TIO-B and V-TIO-D).

Control Unit



Multidrop connection to other V-TIO-A or V-TIO-C (Max.31 modules with address setting range 0 to 99)

Digital input/output



Please use the following connectors for event input/output function.

Front screw type	Side screw type
Model SRVP-01 An equal product : FRONT-MSTB 2.5/6-STF-5,08, PHOENIX CONTACT	Model SRVP-02 An equal product : MSTB 2.5/6-STF-5,08, PHOENIX CONTACT

Specifications

Input

Number of inputs	2 points (V-TIO-A/B) 1 points (V-TIO-C/D, Heat/Cool type) * 2 points type : Isolated between each channel)
Input	a) Thermocouple, Low voltage group Thermocouple : K, J, E, T, R, S, B, N (JIS/IEC) PLII(NBS), W5Re/W26Re (ASTM) Low voltage : 0 to 100mV DC b) RTD group Pt100(JIS/IEC), JPt100(JIS) *3-wire system c) High voltage, Current group High voltage : 0 to 5V DC, 1 to 5V DC, 0 to 10V DC Current : 4 to 20mA DC, 0 to 20mA DC (Input impedance : 250Ω) * Inputs are freely selectable within each group.
Sampling time	0.5 sec
Measuring accuracy	a) Thermocouple (K, J, T, PLII, E) Less than -100°C : ±1.0°C -100 to 333°C : ±2.0°C More than 334°C : ±(0.3% of Reading + 1digit) b) Thermocouple (R, S, N, W5Re/W26Re) Less than 666°C : ±2.0°C More than 667°C : ±(0.3% of Reading + 1digit) c) Thermocouple (B) Less than 400°C : ±70.0°C 400 to 666°C : ±2.0°C More than 667°C : ±(0.3% of Reading + 1digit) d) RTD Less than 266°C : ±0.8°C More than 267°C : ±(0.3% of Reading + 1digit) e) Voltage : ±0.3% of span f) Current : ±0.3% of span
Cold junction temperature compensation error	±1.0°C (at 23°C±2°C) (Thermocouple) * Within ±1.5°C (Between 0 and 50°C)
Influence of external resistance	0.15μV/Ω (Thermocouple input)
Influence of lead resistance	Maximum 10Ω per wire (RTD input)
Input break action	Thermocouple input, RTD input, Low voltage input : Up-scale High voltage input : Value around 0V Current input : Value around 0mA
Input digital filter	0.01 to 10.00 sec. (OFF when 0 is set.)
PV bias	-span to +span

Performance

Insulation resistance	More than 500V DC 20MΩ between each isolation block
Dielectric voltage	More than 600V AC 1minute between each isolation block

Control

Control method	Brilliant PID control (with autotuning) • Direct action/Reverse action is selectable • ON/OFF action is selectable. Heat/Cool Brilliant PID control (with autotuning) • Air cooling/Water cooling are selectable
Setting range	a) Proportional band : Temperature input 0 to input span(°C) Voltage • Current input 0.0 to 1000.0% of input span * ON/OFF action when P=0 b) Cool side proportional band : Temperature input 0 to input span(°C) Voltage • Current input 0.0 to 1000.0% of input span c) Integral time : 1 to 3600 sec d) Derivative time : 0 to 3600 sec * Derivative action is OFF when I=0 e) Control response : Slow, Medium, Fast f) Output limiter : -5.0 to +105.0% (High/Low individual setting) g) Deadband/Overlap : -span to + span * Minus setting : Overlap h) Proportional cycle : 1 to 100 sec (Heat/Cool individual setting) i) Other setting : Auto/Manual selectable
Output	a) Relay contact output, Form a contact, 250V AC 3A (resistive load) • Electric life : 300,000 cycles or more (resistive load) b) Voltage pulse output DC 0/12V (Load resistance : more than 600Ω) c) Current output 4 to 20mA DC, 0 to 20mA DC (Load resistance : less than 600Ω) d) Continuous voltage output 0 to 5V DC, 1 to 5V DC, 0 to 10V DC (Load resistance : more than 1kΩ)

Event action

Number of alarm	Up to 2 points/ch
Alarm types	Deviation high, Deviation low, Deviation high/low, Deviation band, Process high, Process low * Hold action is available except for Deviation Band. * Alarm interlock and delay timer is available.
Setting range	a) Deviation alarm : -span to +span b) Process alarm : Same as input range c) Deviation high/low, Deviation band : 0 to input span
Differential gap	0 to input span
Output	Communication data output or event output (Option)

Heater break alarm (HBA)

Number of alarm	2 points (1point/ch)
CT type	CTL-6-P-N, CTL-12-S56-10L-N (Specify when ordering)
Input range	CTL-6-P-N : 0 to 30A CTL-12-S56-10L-N : 0 to 100A
Setting range	0.0 to 100.0A (Heater break alarm function is OFF when 0.0 setting)
Display accuracy	±5% of input value or ±2A (whichever is larger)
Output	Communication data output or event output (Option)

Control loop break alarm (LBA)

Number of alarm	2 points (1point/ch)
LBA time setting	0 to 7200 sec. (LBA is OFF when 0 is set)
LBD deadband setting	0 to input span
Output	Communication data output or event output (Option)

Communications

Communication method	Based on RS-485 (2-wire, half duplex connection)
Protocol	a) ANSI X3.28 (1976) 2.5 A4 b) MODBUS * Selectable
Communication speed	2400, 9600S, 19200, 38400BPS (selectable)
Bit configuration	Start bit : 1, Data bit : 7 or 8 (For MODBUS 8 bit only) Parity bit : Without, Odd or even Stop bit : 1
Maximum connection	31 modules

Event input (Optional)

Number of input	1 point
Input method	Non-voltage input (Open : 500KΩ or more, Close : 10Ω or less)
Rating voltage	24V DC
Rating current	Approx.6mA
Functions	Control run/stop select, Alarm interlock release

Event output (Optional)

Number of output	2 points
Output method	Relay contact output, Form a contact, 250V AC 3A (resistive load) • Electric life : 300,000 cycles or more (resistive load)
Functions	Temperature alarm output, Heater break alarm output, Control loop break alarm output, Burnout output, Temperature rise completion

General Specifications

Supply voltage	21.6 to 26.4V DC [Including supply voltage variation] (Rating 24V DC)
Power consumption	V-TIO-A/B/C/D, With event input/output : Maximum 120mA V-TIO-A/B/C/D, Without event input/output : Maximum 120mA
Power failure	A power failure of 20msec or less will not affect the control action.
Memory backup	Backed up by non-volatile memory (EEPROM). (Data retaining period : Approx.10 years, Number of writing : Approx.1,000,000 times, * Depending on storage and operating conditions.
Ambient temperature	-10 to 50°C
Ambient humidity	5 to 95%RH (No dew condensation) Absolute humidity : MAX.W.C 29g/m³ dry air at 101.3kPa
Weight	V-TIO-A/C, With event input/output : 210g V-TIO-A/C, With event input/output : 180g V-TIO-B/D, Without event input/output : 200g V-TIO-B/D, Without event input/output : 170g
External dimensions	See external dimensions
Operating environment	Free from corrosive and flammable gas and dust.
Other conditions	Free from external noise, vibration, shock and exposure to direct sunlight.

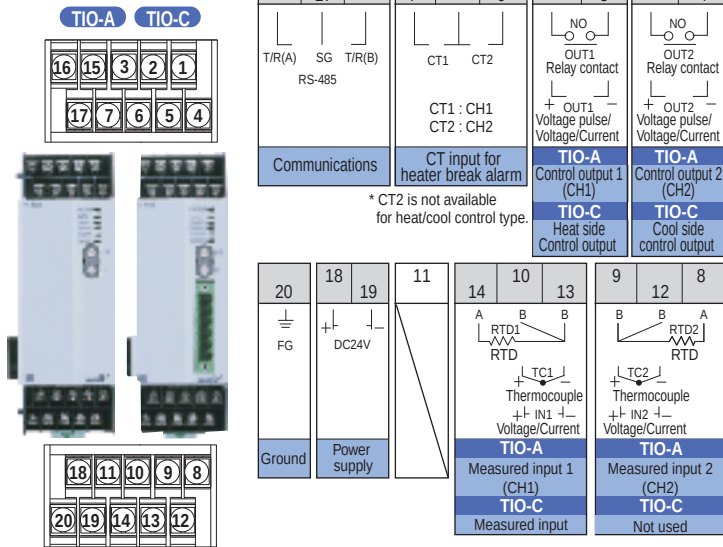
Compliance with Standards

CE Mark, UL Recognized, CSA Certified, C-Tick mark (Pending)

Terminals

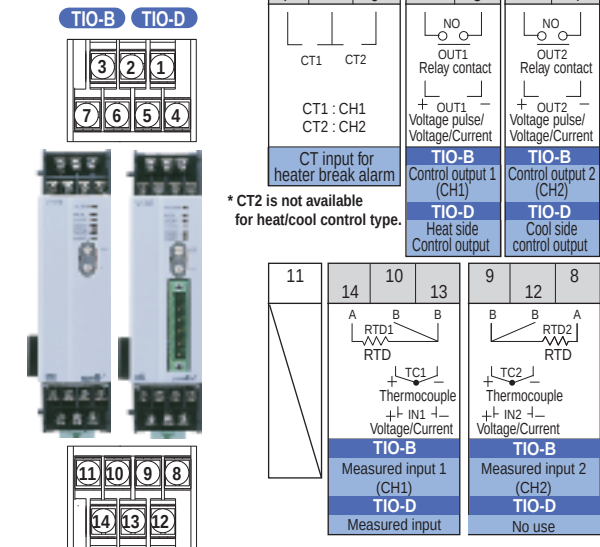
Terminal type

Temperature control module
(Basic type)



Terminal

Temperature control module
(Extension type)

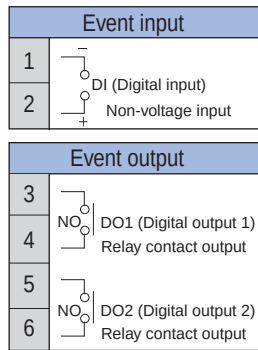
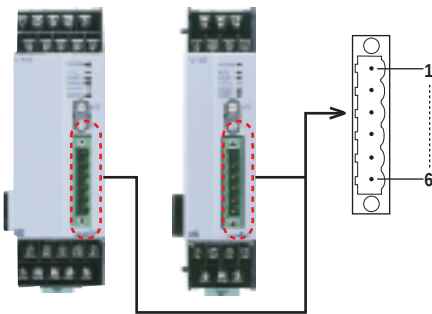


Connector (Event input/output)

(Optional)

Temperature control module
(Basic type, Extension type)

TIO-A TIO-B TIO-C TIO-D



Connector (plug) for event input/output

Model : SRVP-01 (Front-screw type)

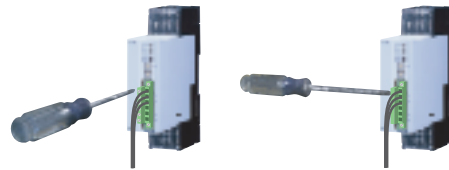
(Equivalent product : FRONT-MSTB 2,5/6-STF-5,08, PHOENIX CONTACT)

Model : SRVP-02 (Side-screw type)

(Equivalent product : MSTB 2,5/6-STF-5,08, PHOENIX CONTACT)

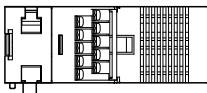
SRVP-01

SRVP-02

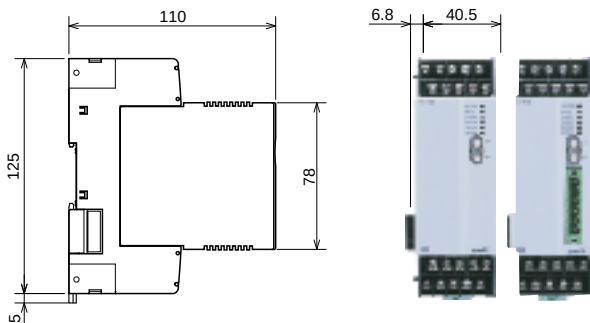


Temperature control module
(Basic type)

TIO-A TIO-C



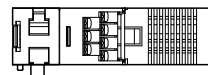
seen from top



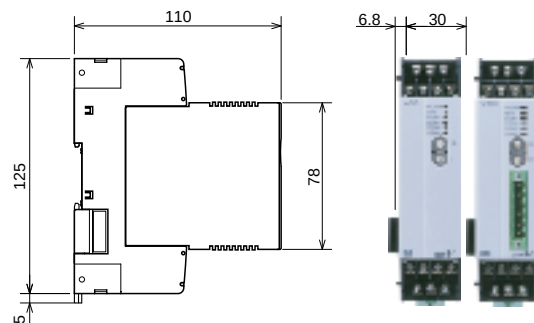
(Unit:mm)

Temperature control module
(Extension type)

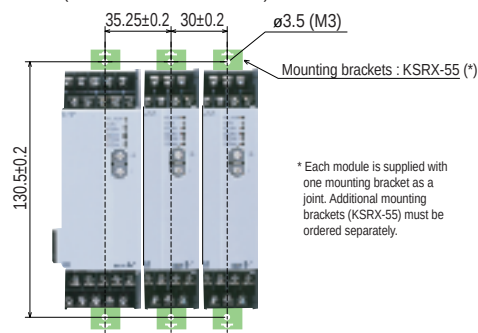
TIO-B TIO-D



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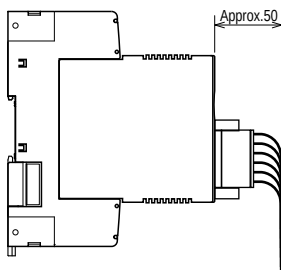


(when installed with screws)



* Each module is supplied with one mounting bracket as a joint. Additional mounting brackets (KSXR-55) must be ordered separately.

(Example: when a connector SRVP-01 is used with a module with digital input/digital output functions).



Model and Suffix Code

● Temperature Control Module

Specifications	Digital Controller	Suffix Code	V-TIO-□-□ □□□-□ □* □□ □□-□-□
Type	Basic type	A	
	Extension type	B	
Control method	PID control with AT (reverse action)	F	
	PID control with AT (direct action)	D	
Measured input	See Input and Range code table (Common to CH1 and CH2)	□□□	
Control output 1 (CH1)	Relay contact output	M	
	Voltage pulse output 0/12V DC	V	
	Continuous voltage output 0 to 5V DC	4	
	Continuous voltage output 0 to 10V DC	5	
	Continuous voltage output 1 to 5V DC	6	
	Current output 0 to 20mA DC	7	
Control output 2 (CH2)	See control output 1 code	□	
	No event input	N	
Event input (DI)	RUN/STOP	1	
	Alarm interlock release	2	
Event output (DO1)	No event output	N N	
	See event output code table	□□	
Event output (DO2)	No event output	N N	
	See event output code table	□□	
CT type (*1)	CTL-6-P-N [0 to 30A]	P	
	CTL-12-S56-10L-N [0 to 100A]	S	
Communication	RS-485 (RKC standard/ANSI)	5	
	RS-485 (MODBUS)	6	

* Extension module alone cannot be used.

(*1) Please specify "P" for CT type for control output type is continuous voltage or current output, although Heater break alarm available with those types of output.

● Temperature Control Module (Heat/Cool control type)

Specifications	Digital Controller	Suffix Code	V-TIO-□-□ □□□-□ □* □□ □□-□-□
Type	Basic type	C	
	Extension type	D	
Control method	Heat/Cool PID control with AT (water cooling)	W	
	Heat/Cool PID control with AT (air cooling)	A	
Measured input	See Input and Range code table	□□□	
Heat output	Relay contact output	M	
	Voltage pulse output 0/12V DC	V	
	Continuous voltage output 0 to 5V DC	4	
	Continuous voltage output 0 to 10V DC	5	
	Continuous voltage output 1 to 5V DC	6	
	Current output 0 to 20mA DC	7	
Cool output	See control output 1 code	□	
	No event input	N	
Event input (DI)	RUN/STOP	1	
	Alarm interlock release	2	
Event output (DO1)	No event output	N N	
	See event output code table	□□	
Event output (DO2)	No event output	N N	
	See event output code table	□□	
CT type (*1)	CTL-6-P-N [0 to 30A]	P	
	CTL-12-S56-10L-N [0 to 100A]	S	
Communication	RS-485 (RKC standard/ANSI)	5	
	RS-485 (MODBUS)	6	

* Extension module alone cannot be used.

(*1) Please specify "P" for CT type for control output type is continuous voltage or current output, although Heater break alarm available with those types of output.

Connector (plug) for event input/output **Accessory**

Model
SRVP-01

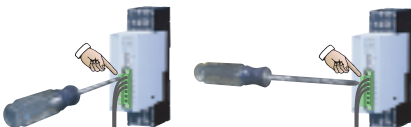
An equivalent product :
FRONT-MSTB 2,5/6-STF-5,08,
PHOENIX CONTACT

Model
SRVP-02

An equivalent product :
MSTB 2,5/6-STF-5,08,
PHOENIX CONTACT

Current transformer for heater break alarm **Accessory**

Model
CTL-6-P-N (0 to 30A)
CTL-12-S56-10L-N (0 to 100A)



Input Code Table

Input Type (Input group)	Range	Code	Range	Code
Thermocouples and Low voltage group	0 to 400°C	K02	32 to 752°F	KB9
	0 to 800°C	K04	32 to 1472°F	KB8
	-200 to +1372°C	K16	-328 to +2501°F	KB7
	0.0 to 400.0°C	K09	32.0 to 752.0°F	KB2
	-200.0 to +400.0°C	K35	-328.0 to +752.0°F	KB1
	0 to 400°C	J02	32 to 752°F	JC2
	0 to 800°C	J04	32 to 1472°F	JC1
	-200 to +1200°C	J15	-328 to +2192°F	JB9
	0.0 to 400.0°C	J09	32.0 to 752.0°F	JC4
	-200.0 to +400.0°C	J27	-328.0 to +752.0°F	JC3
	0 to 400°C	T08	32 to 752°F	TB9
	0 to 200°C	T09	32 to 392°F	TC1
	-200 to +400°C	T16	-328 to +752°F	TB8
	0.0 to 400.0°C	T06	32.0 to 752.0°F	TC3
	-200.0 to +400.0°C	T19	-328.0 to +752.0°F	TC2
	0 to 1768°C	S05	32 to 3214°F	SA6
RTD group	0 to 1768°C	R06	32 to 3214°F	RA6
	0 to 1390°C	A02	32 to 2534°F	AA2
	0 to 1300°C	N02	32 to 2372°F	NA6
	0 to 2300°C	W03	32 to 4172°F	WA9
	0 to 800°C	E01	32 to 1472°F	EA8
	0 to 1000°C	E02	32 to 1832°F	EA7
	0 to 1800°C	B03	32 to 2372°F	BB1
	0 to 100mV DC	P01	Programmable	
	0 to 400°C	D17	32 to 752°F	DC5
	0 to 850°C	D33	32 to 1562°F	DC4
	0.0 to 400.0°C	D16	32.0 to 752.0°F	DC7
	-200.0 to +400.0°C	D28	-328.0 to +752.0°F	DC6
	0 to 400°C	P17	32 to 752°F	PC5
	0 to 600°C	P23	32 to 1112°F	PC4
	0.0 to 400.0°C	P16	32.0 to 752.0°F	PC7
	-200.0 to +400.0°C	P28	-328.0 to +752.0°F	PC6
High voltage and Current group	0 to 5V DC	401		
	0 to 10V DC	501		
	1 to 5V DC	601	Programmable	
	0 to 20mA DC	701		
	4 to 20mA DC	801		

* Inputs are freely selectable within each input group.

Event output code table

CH1 Event type	Code	CH2 Event type	Code
CH1 Deviation High	1A	CH2 Deviation High	2A
CH1 Deviation Low	1B	CH2 Deviation Low	2B
CH1 Deviation High-Low	1C	CH2 Deviation High-Low	2C
CH1 Band	1D	CH2 Band	2D
CH1 Deviation High with Hold	1E	CH2 Deviation High with Hold	2E
CH1 Deviation Low with Hold	1F	CH2 Deviation Low with Hold	2F
CH1 Deviation High-Low with Hold	1G	CH2 Deviation High-Low with Hold	2G
CH1 Process High	1H	CH2 Process High	2H
CH1 Process Low	1J	CH2 Process Low	2J
CH1 Process High with Hold	1K	CH2 Process High with Hold	2K
CH1 Process Low with Hold	1L	CH2 Process Low with Hold	2L
CH1 Deviation High with Re-hold	1Q	CH2 Deviation High with Re-hold	2Q
CH1 Deviation Low with Re-hold	1R	CH2 Deviation Low with Re-hold	2R
CH1 Deviation High-Low with Re-hold	1T	CH2 Deviation High-Low with Re-hold	2T
CH1 Heater Break Alarm *3	1P	CH2 Heater Break Alarm *3	2P
CH1 Control Loop Break Alarm *4	11	CH2 Control Loop Break Alarm *4	21
CH1 Burnout Alarm	12	CH2 Burnout Alarm	22
CH1 Temperature rise completion	13	CH2 Temperature rise completion	23

(*2) In case of a heat/cool control type, event type code cannot be specified from a table for channel 2. Please select the code from a table for channel 1.

(*3) An exclusive CT (sold separately) is required if heater break alarm (HBA) is used. Please specify relay or voltage pulse output for the channel where HBA is used.

(*4) Control Loop Break Alarm is not available when heat/cool PID control type.



Before operating this product, read the instruction manual carefully to avoid incorrect operation.
• This product is intended for use with industrial machines, test and measuring equipment. It is not designed for use with medical equipment.
• If it is possible that an accident may occur as a result of the failure of the product or some other abnormality, an appropriate independent protection device must be installed.
• When installing this product, avoid the following:
• Direct exposure to sunlight.

• An ambient temperature lower than -10°C or higher than 50°C
• Areas subject to high humidity. Ambient humidity should not be lower than 5% or higher than 95%RH
• Direct contact with water.
• Corrosive environments.
• Hazardous areas containing explosive or flammable gases.
• Vibration or shock.
• Areas subject to electrical noise caused by inductive interference, static electricity or magnetic fields.

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