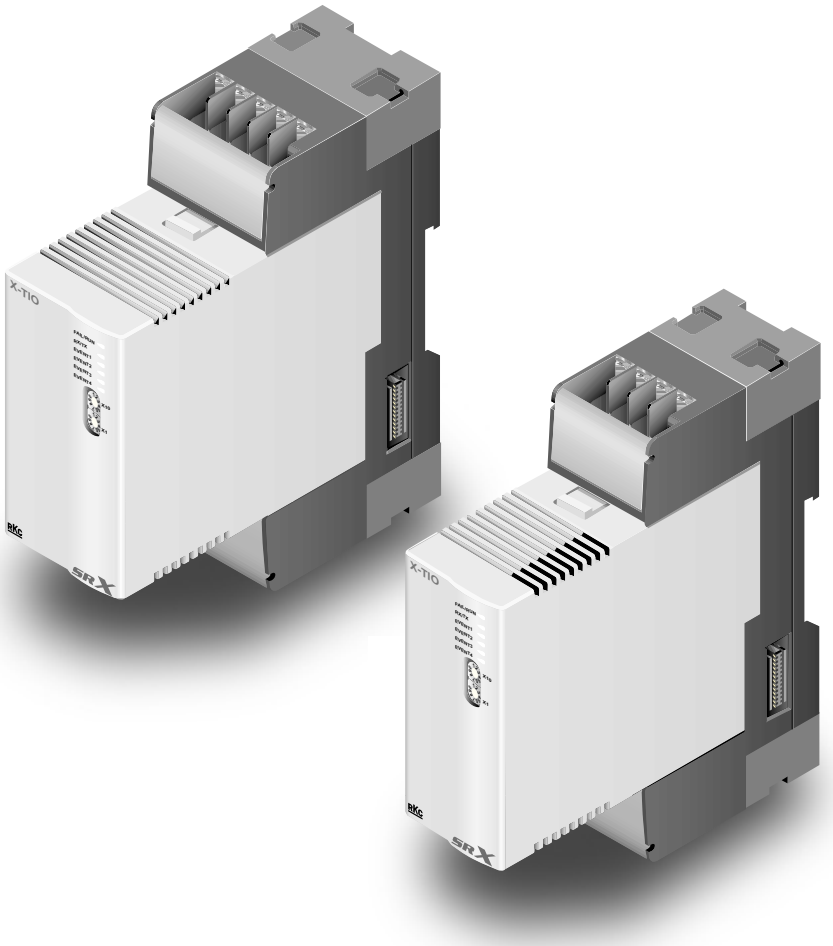
SRX SERIES

Module type

High-speed Digital Controller

SRX



CE,UL,CSA pending

RKC INSTRUMENT INC.

Ultra High Speed

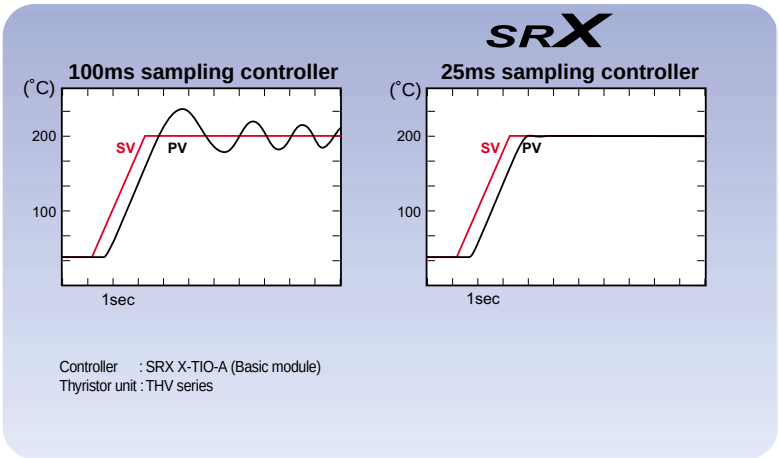
Temperature Control

Sampling 0.025 sec

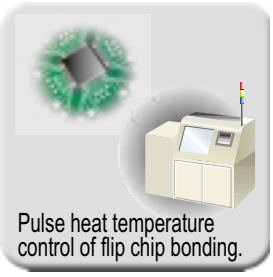
High Speed Responce

High speed feedback control of 40 samples per second

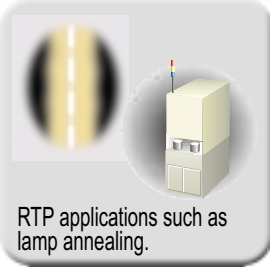
SRX is a digital controller with a super high speed sampling of control updating cycle time of 25ms (0.025 sec). Supplied with high resolution input and parameters settable in 1/100 sec. for process applications with fast response. Applications in RTP (Rapid Thermal Process) in semiconductor manufacturing process that were difficult to handle with conventional controllers such as pulse heat temperature control of flip chip bonders, lamp annealing with halogen lamps can be solved. Other applications include pressure, flow rate and other process control applications.



Controller : SRX X-TIO-A (Basic module)
Thyristor unit : THV series



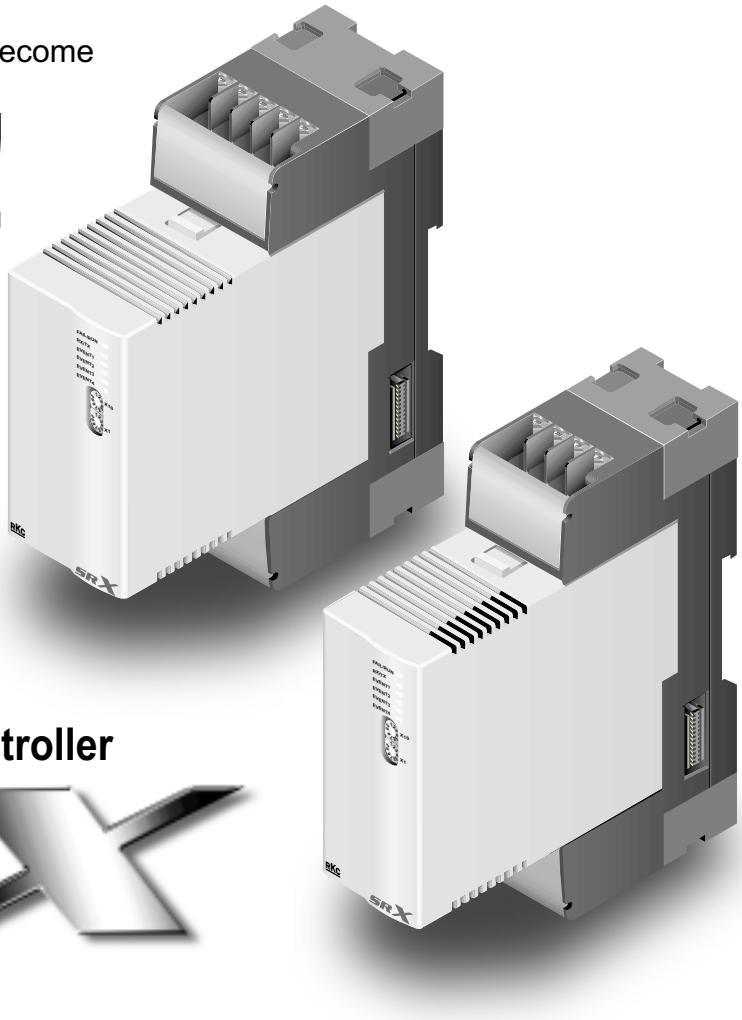
Pulse heat temperature control of flip chip bonding.



RTP applications such as lamp annealing.

Sampling speed of temperature control has become

Ultimate now!



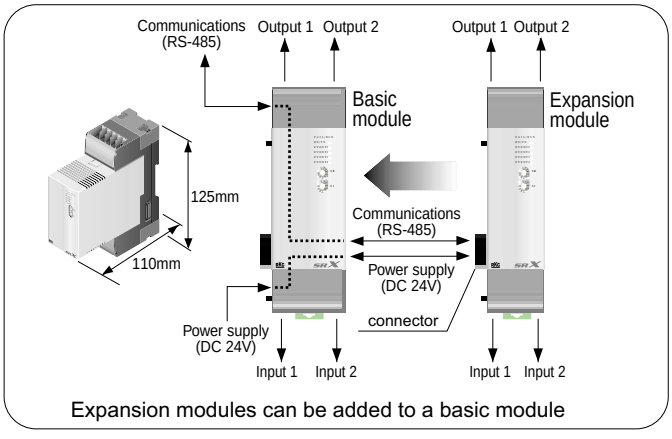
Module type
High-speed Digital Controller

SRX

Multi-zone space-saving

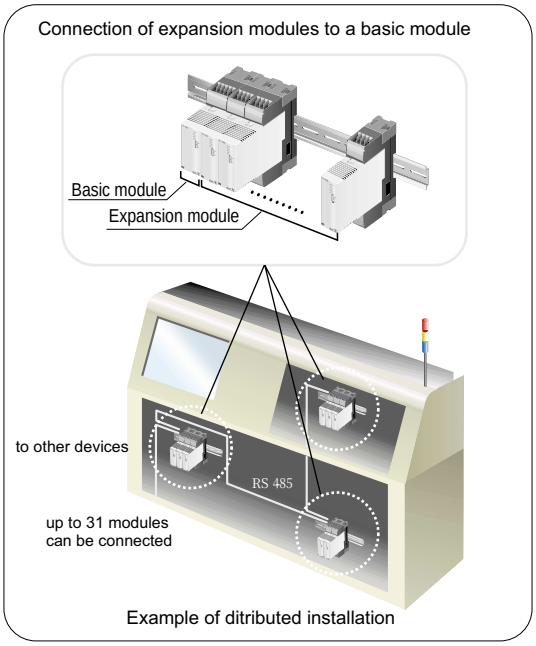
Dual loop control can be performed with a single compact module. A maximum of 31 modules can be connected for 62-loop control. Power supply and communication lines are via a connector on the side, and no need of wiring. Distributed installation via RS-485 is possible, enabling multi-zone distributed control system with less space requirements.

Dual loop control with a single module



Expansion modules can be added to a basic module

Up to 31 modules can be connected



Example of ditributed installation

Ramp/Soak program function

Ramp/Soak program control of 16 segments by 16 patterns is supplied as standard. Control can be selected from a standard fixed-setpoint control and ramp/soak program control.

Specifications

Input

Number of inputs	2 points (Isolated between each channel) ※ 2nd input can be used as a remote input
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 1V DC, 0 to 100mV DC, 0 to10mV DC b) RTD group Pt100 (JIS/IEC), JPt100 (JIS) * 3-wire system c) High voltage/Current group High voltage : 0 to 5V DC, 1～5V 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	0.025 sec.
Influence of external resitance	0.25μV/Ω (Thermocouple input)
Influence of lead resitance	Maximum 10Ω per wire (RTD input)
Input break action	Thernocouple input : Up-scale RTD input : Up-scale Low voltage input : Up-scale High voltage input : Value around 0V Current input : Value around 0mA
Input short action	Down-scale (RTD input)
Input digital filter	0.01 to 10.00 sec. (OFF when 0 is set.)
PV bias	-span to +span

Performance

Measuring accuracy	See input code table
Insulation resiatance	More than 500V DC 20MΩ betweeen 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 selectable
Setting range	a) Proportional band : Temperature input 0 to input span(°C) Voltage • Current input 0.0 to 1000.0% of input span b) Integral time : 0.01 to 360.00 sec or 0.1 to 3600.0 sec (selectable) c) Derivative time : 0.00 to 360.00 sec or 0.0～3600.0 sec (selectable) d) Control responce : Slow, Medium, Fast e) Output limitter : -5.0 to +105.0% (High/Low individual setting) f) Output change rate limitter : 0.0 to 100.0%/sec d) Proportional cycle : 0.2 to 50.0 sec e) Level PID : 8 sets of PID parameters can be assigned to set values at different points.
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, 1～5V DC, 0 to 10V DC (Load resistance : more than 1kΩ)

Event (Alarm) output

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.
Setting range	a) Deviation alarm : -span to +span b) Process alarm：Same as input range
Differential gap	Temperature input : 0 to 10°C or 0.0 to 10.0°C Voltage • current input：0 to 100digit
Output	Communication data output

Control loop break alarm : LBA

Number of alarm	2 points
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

Heater break alarm : HBA (Optional)

Number of alarm	2 points
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
Display range	0.0 to 100.0A
Display accuracy	±5% of input value or ±2A (whichever is larger)
Output	Communication data output

Program control

Storage Program pattern	Max.16 patterns (Max.16 segment per pattern) * With pattern link function
Storage segments	Max.256 segments (16 patterns x 16 segments)
Program setting	Level setting (Setting per channel) Segment time （Setting per channel)
Setting range	Level：Same as input range Segment time : 0.00 to 300.00 sec./0.0 to 3000.0 sec./ 0 to 30000 sec./0 to 30000 min（selectable）
Program repeat	1 to 1000 times (Continuous when 10000 times is set)
Time accuracy	± (0.01% of reading + 1digit)
Start mode	Zero start, Fixed time type PV start, Time shorting/ constant slope type PV start (selectable)
Functions	HOLD function/STEP function/WAIT function
Control mode	Reset mode/ Program control mode/ Fixed control mode/ Manual control mode
Time signal	16 points per 1 pattern * Contact outputs of time signals are provided from a DO module(available).

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 Parity bit : Without, Odd or even Stop bit : 1
Maximum connection	31 units

General Specifications

Supply voltage	21.6 to 26.4V DC [Including supply voltage variation] (Rating 24V DC)
Power consumption	Basic module : Maximum 120mA Expansion module： Maximum 120mA
Power failure	A power failure of 20msec or less will not affect the control action. If power failure of more than 20msec occurs, controller will restart. HOT or COLD start is selectable.
Memory backup	Backed up by non-volatile memory (FRAM). (Data retaining period : Approx.10 years, Number of writing : Approx.10,000,000,000 times, * Depending on storage and operating conditions.
Ambient temperature	-10 to 50°C
Ambient humidity	20 to 85%RH（No dew condensation)
Weight	Basic module : 220g Expansion module :190g
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.

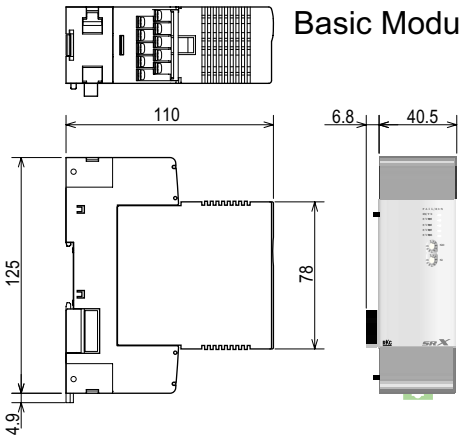
Compliance with Standards

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

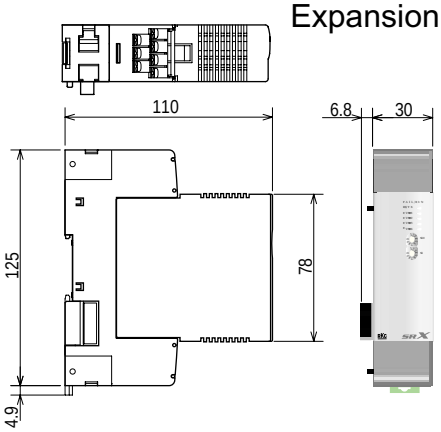
External Dimensions

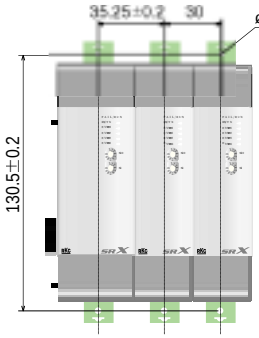
(Unit:mm)

Basic Module



Expansion Module





(when installed with screws)

Mounting kit

Each module is supplied with one mounting kit as a joint. Additional mounting kit must be ordered separately

Rear Terminals

Basic Module

16	17	15	7	3	6	2	5	1	4
T/R(A) SG T/R(B) RS-485			CT1 CT2 CT1 : CH1 CT2 : CH2			NO OUT1 Relay contact + OUT1 − Voltage pulse/ Voltage/Current		NO OUT2 Relay contact + OUT2 − Voltage pulse/ Voltage/Current	
Communications			CT input for heater break alarm			Control output 1 (CH1)		Control output 2 (CH2)	

20	18	19	11	14	10	13	9	12	8
FG	DC24V			A B B RTD1 RTD TC1 Thermocouple + IN1 − Voltage/Current			B B A RTD2 RTD TC2 Thermocouple + IN2 − Voltage/Current		
Ground	Power supply			Measured input 1 (CH1)			Measured input 2 (CH2)		

* 2nd input can be used as a remote setpoint. (voltage/current input only)
In this setup, control output 2 and CT input 2 are not available.

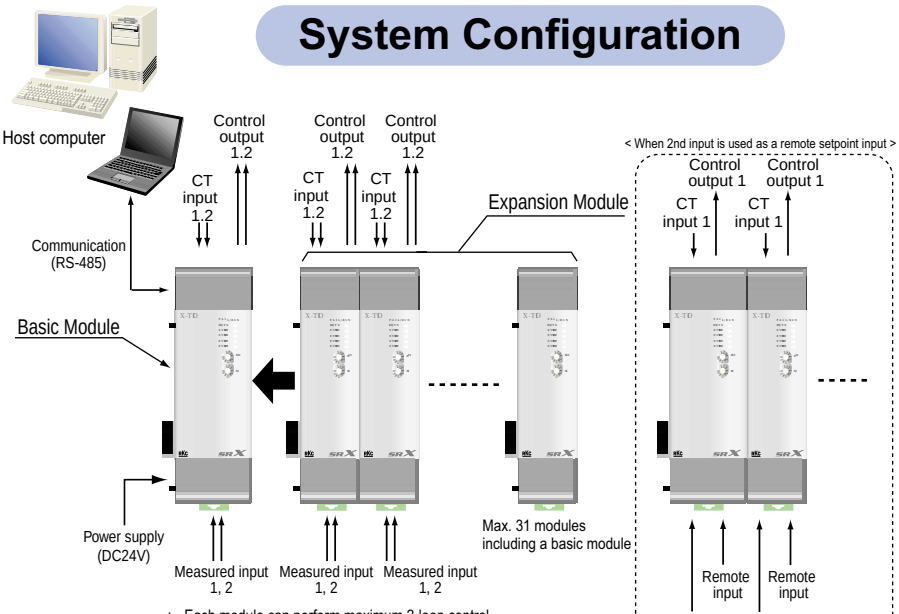
Expansion Module

7	3	6	2	5	1	4
CT1 CT2 CT1 : CH1 CT2 : CH2			NO OUT1 Relay contact + OUT1 − Voltage pulse/ Voltage/Current		NO OUT2 Relay contact + OUT2 − Voltage pulse/ Voltage/Current	
CT input for heater break alarm			Control output 1 (CH1)		Control output 2 (CH2)	

11	14	10	13	9	12	8
	A B B RTD1 RTD TC1 Thermocouple + IN1 − Voltage/Current			B B A RTD2 RTD TC2 Thermocouple + IN2 − Voltage/Current		
	Measured input 1 (CH1)			Measured input 2 (CH2)		

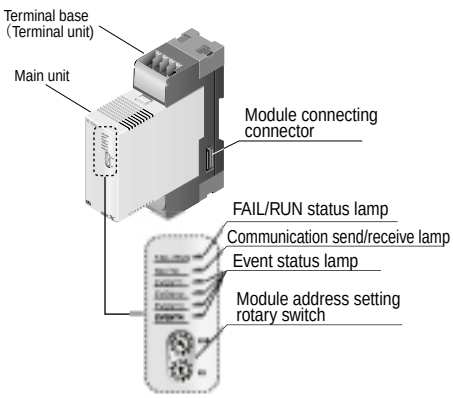
* 2nd input can be used as a remote setpoint. (voltage/current input only)
In this setup, control output 2 and CT input 2 are not available.

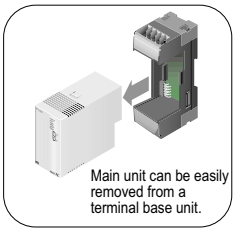
System Configuration



* Each module can perform maximum 2-loop control.
* Expansion modules are powered from a basic module via a connector.
* Communication of expansion modules is via a connector.
* Input and output types can be freely specified for each module and channel.
* Time signal outputs (in program control mode) are provided from a DO module (available soon)

Name of Parts





Main unit can be easily removed from a terminal base unit.

Model and Suffix Code

● X-TIO

Specifications	Suffix Code High-speed digital controller (Module type) X-TIO -□ -□ □ -□ □ * □ □
Type	Basic module: A
	Expansion module: B
Measured input 1 (CH1)	See input code: □
Measured input 2 (CH2)	See input code: □
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: 7
	Current output 4 to 20mA: 8
Control output 2 (CH2)	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: 7
	Current output 4 to 20mA: 8
CT input 1 (CH1)	No CT input: N
	CTL-6-P-N: P
	CTL-12-S56-10L-N: S
CT input 2 (CH2)	No CT input: N
	CTL-6-P-N: P
	CTL-12-S56-10L-N: S

* Expansion module alone cannot be used.

* The second PV input can be also used as a remote setpoint input (voltage/current input only).

* When a heater break alarm (HBA) is used, please specify relay output or voltage pulse output for the relevant channel output.

● Accessory

Name	Model code
Current transformer for heater break alarm	CTL-6-P-N (0 to 30A)
	CTL-12-S56-10L-N (0 to 100A)

Input Code Table

Input type		Range	Code	Measuring accuracy	Resolution
Thermocouple Low voltage group	**K**	-200 to 1372˚C	K	*1 Less than -100˚C : ±1.0˚C -100 to 500˚C : ±0.5˚C 500˚C : ±(0.1% of Reading+1digit)	1˚C, 0.1˚C (Selectable)
	J	-200 to 1200˚C	J		
	T	-200 to 400˚C	T		
	E	-200 to 1000˚C	E		
	PLII	0 to 1390˚C	A		
	N	0 to 1300˚C	N	*1 -50~1000˚C : ±1.0˚C More than 1000˚C : ±(0.1% of Reading+1digit)	
	S	-50 to 1768˚C	S		
	R	-50 to 1768˚C	R		
	W5Re/W26Re	0 to 2300˚C	W		
	B	0 to 1800˚C	B	Less than 400˚C : ±70.0˚C *1 400 to 1000˚C : ±1.0˚C More than 1000˚C : ±(0.1% of Reading+1digit)	
	0 to 10mV DC	-20000 to 20000 (Programmable within 20,000 span)	1	±(0.1% of Reading+1digit)	1, 0.1, 0.01, 0.001, 0.0001 (Programmable)
	0 to 100mV DC		2		
	0 to 1V DC		3		
RTD group	Pt100	-200 to 850˚C	D	Less than 200˚C : ±0.2˚C More than 200˚C : ±(0.1% of Reading+1digit)	1˚C, 0.1˚C (Selectable)
	JPt100	-200 to 600˚C	P		
High voltage Current group	0 to 5V DC	-20000 to 20000 (Programmable within 20,000 span)	4	±(0.1% of Reading+1digit)	1, 0.1, 0.01, 0.001, 0.0001 (Programmable)
	1 to 5V DC		5		
	0 to 10V DC		6		
	0 to 20mA DC		7		
	4 to 20mA DC		8		

*1 Cold junction temperature compensation error : ±1.0˚C (at 23˚C±2˚C), Within ±1.5˚C (Between 0 and 50˚C)

Safety Warning

- 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 0˚C or higher than 50˚C
  - Areas subject to high humidity. Ambient humidity should not be lower than 45% or higher than 85%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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