

SRX



General Description

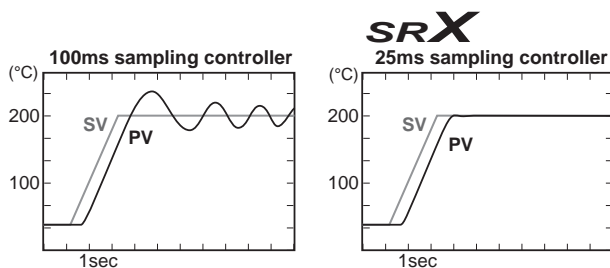
The SRX is a module type digital controller with a super high speed sampling of control updating cycle time of 25ms (0.025 sec). Dual loop control can be performed with a single compact module. A maximum of 31 modules can be connected for 62-loop control. Communication and power supply for extension modules are snapped together via mating connectors. Distributed installation via RS-485 is possible to allow formation of a multi-zone distributed control system in a compact size.

Features

- ☆ High-speed feedback control
- ☆ Multi-zone space-saving
- ☆ 256 Ramp/Soak program function

High-speed Feedback Control

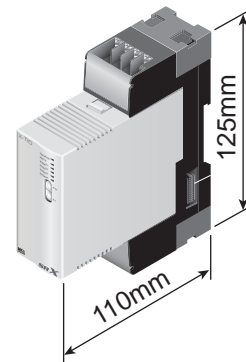
The SRX sampling of the control updating cycle time is a rapid 25ms (0.025sec.) Supplied with high resolution input and parameters settable in 1/100 sec. for process applications with fast response. Applications in RTP (Rapid Thermal Process), RTA (Rapid Thermal Anneal) and pulse heat temperature control of flip chip bonders in semiconductor manufacturing can be controlled by the SRX. The high speed sampling function also makes it suitable for additional application requirements such as pressure and flow rate.



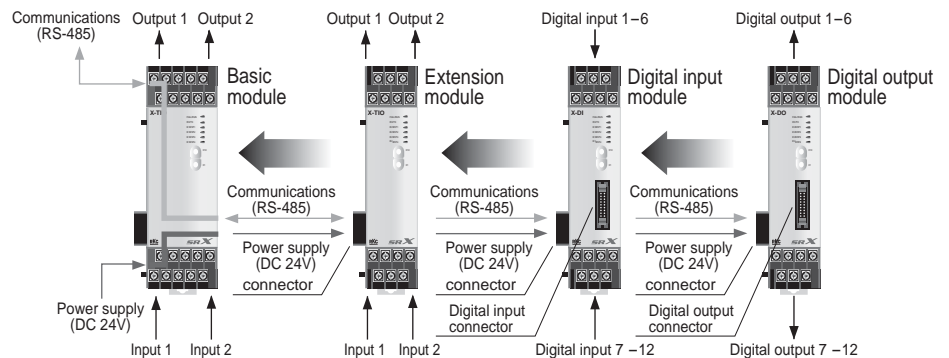
Multi-Zone Space-Saving

Dual loop control can be performed with a single compact module. Side connectivity for power supply and communications eliminates the need for wiring and offers close mounting. Distributed installation via RS-485 is possible to form a multi-zone distributed control system in a compact size.

The digital input module is used to accomplish operation mode changes. Digital output module outputs operating state or various event conditions.



Pulse heat temperature control of flip chip bonding.

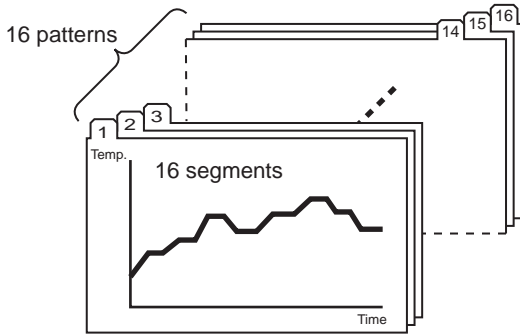


Extension modules can be added to a basic module.

Features

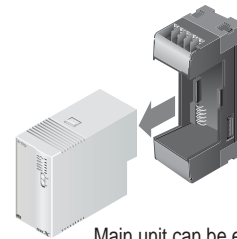
Ramp/Soak Program Function

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



Easy DIN Rail Mounting

The SRX controller utilizes DIN rail mounting for flexible installation. Control systems can be customized and expanded to meet specific application requirements simply by attaching additional modules on the rail.



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

Digital Input Module

The DI-A module has 12 input points on the terminal block. The DI-B module has 16 additional inputs on the front face connector as well as 12 inputs on the terminal block.

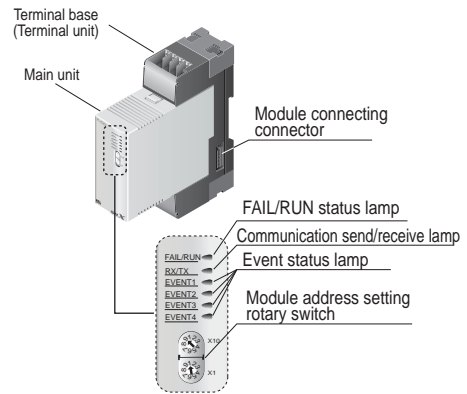
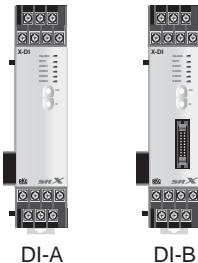
The DI module is used to facilitate operation mode changes (temperature control module, program pattern selection, start/stop of autotuning)

< Operation modes change >

- RESET
- RUN
- FIX
- MANUAL
- HOLD
- STEP

< Program pattern selection >

< Start / Stop of autotuning >

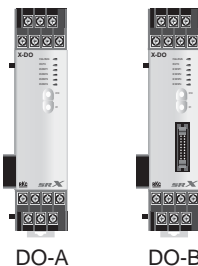


Digital Output Module

The DO-A module has 12 outputs from the terminal block. The DO-B module has 16 additional outputs from the front face connector as well as 12 outputs from the terminal block.

< Function of DO module >

- Burn-out state
- Event 1 output state
- Event 2 output state
- Heater break alarm state
- Loop break alarm state
- Program end state
- Pattern end state
- Program wait state
- Time signal 1 to 16 output state
- DI module CH1 to 28 input state

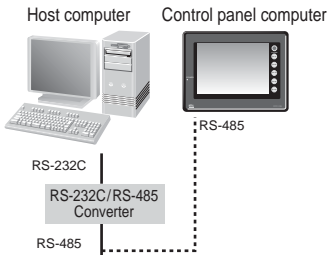


Compliance with Standards

- CE Mark
- UL/cUL Recognized
- RCM Mark

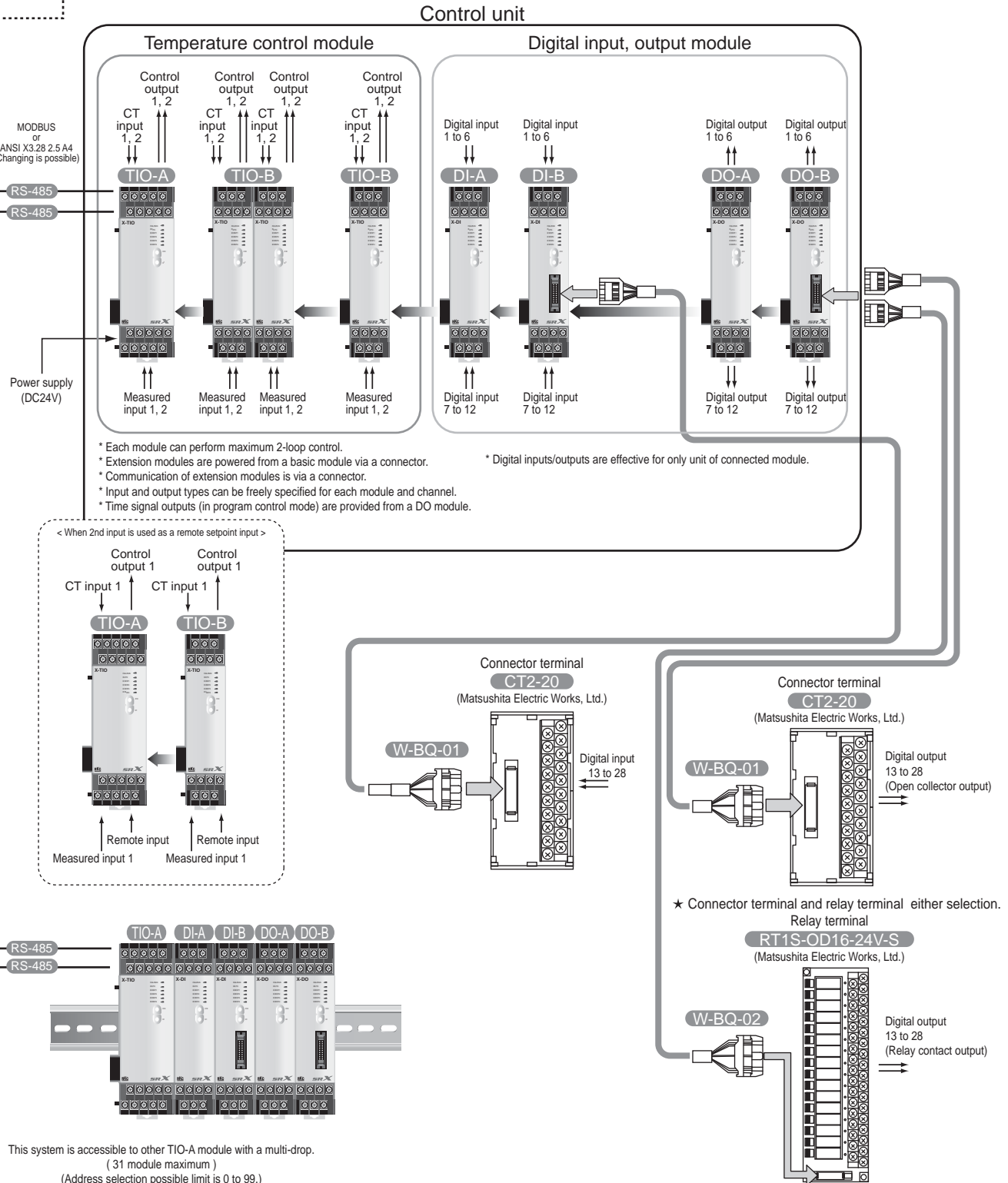


System Configuration



★ Serial port (RS-485 or RS-232C) is required.

★ When using with Windows 95/98/NT/2000/XP,
An RS232C/RS-485 converter with automatic send/receive switching function is required.
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>



Specifications

Temperature control module (TIO-A/B)

Input

Number of Inputs

2 points

- 2nd input can be used as a remote input.

Input

a) Thermocouple, DC low voltage group

Thermocouple : K, J, E, T, R, S, B, N (JIS/IEC)
PLII (NBS), W5Re/W26Re(ASTM)

- Input impedance : Approx. 1M Ω
- Influence of external resistance : Approx. 0.25 μ V/ Ω
- Input break action : Up-scale

DC low voltage : 0 to 1V DC, 0 to 100mV DC, 0 to 10mV DC

- Input break action : Up-scale (0 to 100mV, 0 to 10mV)
Value around 0V (0 to 1V)

b) RTD group

Pt100 (JIS/IEC), JPt100 (JIS)

- Influence of lead resistance : Approx. 0.01[%/ Ω] of reading
- Maximum 10 Ω per wire
- Input break action : Up-scale
- Input short action : Down-scale

c) DC high voltage, DC current group

DC high voltage : 0 to 5V DC, 1 to 5V DC, 0 to 10V DC

- Input break action : Value around 0V
- DC current : 0 to 20mA DC, 4 to 20mA DC
- Input break action : Value around 0V

Sampling Time

0.025 sec.

PV Bias

- span to +span (Within -1999 to 9999)

Digital Filter

0.01 to 10.00 sec. (OFF when 0 is set.)

Performance

Measuring Accuracy

a) Thermocouple

Type : K, J, T, E, PLII

Less than -100°C (-148°F) : $\pm 1.0^{\circ}\text{C}$ ($\pm 1.8^{\circ}\text{F}$)

-100 to 500°C (-148 to 932°F) : $\pm 0.5^{\circ}\text{C}$ ($\pm 0.9^{\circ}\text{F}$)

More than 500°C (932°F) : $\pm (0.1\% \text{ of Reading} + 1 \text{ digit})$

Type : N, S, R, W5Re/W26Re

-50 to 1000°C (-58 to 1832°F) : $\pm 1.0^{\circ}\text{C}$ ($\pm 1.8^{\circ}\text{F}$)

More than 1000°C (1832°F) : $\pm (0.1\% \text{ of Reading} + 1 \text{ digit})$

Type : B

Less than 400°C (752°F) : $\pm 70.0^{\circ}\text{C}$ ($\pm 126^{\circ}\text{F}$)

400 to 1000°C (752 to 1832°F) : 1.0°C (1.8°F)

More than 1000°C (1832°F) : $\pm (0.1\% \text{ of Reading} + 1 \text{ digit})$

Cold junction temperature compensation error

$\pm 1.0^{\circ}\text{C}$ (1.8°F) [at 23°C \pm 2°C (73.4°F \pm 3.6°F)]

Within $\pm 1.5^{\circ}\text{C}$ ($\pm 2.7^{\circ}\text{F}$) [Between 0 and 50°C (14 to 122°F)]

b) RTD

Less than 200°C (392°F) : $\pm 0.2^{\circ}\text{C}$ ($\pm 0.4^{\circ}\text{F}$)

More than 200°C (392°F) : $\pm (0.1\% \text{ of Reading} + 1 \text{ digit})$

c) DC voltage and DC current

$\pm (0.1\% \text{ of span} + 1 \text{ digit})$

Insulation Resistance

More than 20M Ω (500V DC) between each isolation block

Dielectric Strength

More than 600V AC for one minute between each isolation block

Control

Control Method

Brilliant PID control (with autotuning)

- Direct action/Reverse action (selectable)

Major Setting Range

Set value :

Same as input range.

Proportional band :

0 to span or 0.1 to span (Temperature)
0.0 to 1000.0% of input span (Voltage, Current)
(ON/OFF action when P=0)

Integral time :

0.01 to 360.00 sec. or 0.1 to 3600.0 sec.

Derivative time :

0.00 to 360.00 sec. or 0.0 to 3600.0 sec.

Control response :

Slow, Medium, Fast

Output limiter :

-5.0 to +105.0% (High/Low individual setting)

Output change rate limiter :

0.0 to 100.0% / sec.

Proportional cycle time :

0.2 to 50.0 sec.

Level PID :

8 sets of PID parameters can be assigned to set values at different points.

Control Output

Relay output :

Form A contact, 250V AC 3A (resistive load)

Voltage pulse output :

0/12V DC

(Load resistance : More than 600 Ω)

Current output :

0 to 20mA, 4 to 20mA DC

(Load resistance : Less than 600 Ω)

Continuous voltage output :

0 to 5V, 0 to 10V, 1 to 5V DC

(Load resistance : More than 1k Ω)

Alarms

Event (Alarm) Output

a) Number of alarm : Up to 2 points/channel

b) Type : Deviation High, Low, High/Low, Band, Process High, Low

- Hold action is available except for Band Alarm.

c) Setting range : Deviation alarm : -span to +span

Deviation High/Low, Band : 0 to span

Process alarm : Same as input range

d) Differential gap :

0 to 10°C (°F) or 0.0 to 10.0°C (°F)

(Temperature input)

0 to 100 digits (Voltage, Current input)

e) Output :

Communication data output

Loop break alarm (LBA)

a) Number of alarm : 2 points (1 point/channel)

b) LBA time setting : 0 to 7200 sec. (LBA is OFF when 0 is set)

c) LBA deadband : 0 to input span

d) Output : Communication data output

Heater Break Alarm (HBA) : (Optional)

a) Number of alarm : 2 points

b) CT type : CTL-6-P-N (30A), CTL-12-S56-10L-N (100A)
(Specify when ordering)

c) Display range : 0.0 to 100.0A

d) Accuracy : $\pm 5\%$ of input value or $\pm 2\text{A}$ (whichever is larger)

e) Output : Communication data output

Program

Storage Program Pattern : Max. 16 patterns (16 segments per pattern)

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 1000 times is set)

Time Accuracy : $\pm (0.01\% \text{ of reading} + 1 \text{ digit})$

Start Mode : Zero start, Fixed time type PV start, Time shorting/Constant slope type PV start (selectable)

Functions : HOLD, STEP, WAIT

Control Mode : Reset, Program, Fixed, Manual

Time Signal : 16 points per 1 pattern
• Contact outputs of time signals are provided from a DO module. (available soon)

Digital input module (DI-A/B)

Digital Input

Number of Inputs

DI-A module :	12 points (6 points/common) Terminal block
DI-B module :	12 points (6 points/common) Terminal block 16 points (4 points/common) Connector

Input Rating

Non-voltage contact input (OPEN : 500kΩ or more, CLOSE : 10Ω or less)	
Contact current :	Less than 10mA
Open voltage :	Approx. 24V DC

Input Type

- The function of each channel is programmable.
- Program control mode
RESET, RUN, FIX, MAN, HOLD, STEP
 - Program start pattern selection
 - Auto-tuning START / STOP

Isolation type

Photo-coupler isolation

Setting method

Setting by digital communication.

Digital output module (DO-A/B)

Digital Output

Number of Outputs

DO-A module :	12 points (6 points/common) Terminal block
DO-B module :	12 points (6 points/common) Terminal block 16 points (4 points/common) Connector

Output Rating

Transistor output (sink type)	
Rated load :	24V DC
Maximum load current :	50mA (1 point)
ON voltage :	Maximum 2V DC

Output Type

The function of each channel is programmable.

Burn-out state, Event 1 state, Event 2 state, Heater break out state, Loop break out (LBA) state, Pattern end state, Wait state, Time signal CH1 to 16 output state, DI module CH1 to 28 input state

Isolation type

Photo-coupler isolation

Setting method

Setting by digital communication.

Common specification

Communications

- Communication method : Based on RS-485 (2-wire)
- Communication speed : 2400, 9600, 19200, 38400 BPS
- Protocol : ANSI X3.28(1976) 2.5 A4
MODBUS
- Bit format

Start bit :	1
Data bit :	7 or 8 •For MODBUS 8 bit only
Parity bit :	Without, Odd or Even
Stop bit :	1
- Communication code : ASCII(JIS) 7-bit code
- Maximum connection : 31 (Address can be set from 0 to 99.)

External Dimensions

See external dimensions.

Operating Environment

Free from corrosive or flammable gas, and dust.

Other Conditions

Free from external noise, vibration, shock and exposure to direct sunlight.

General Specifications

Supply Voltage

21.6 to 26.4V DC (Ripple rate 10% p-p or less) [Rating : 24V DC]

Power Consumption

TIO-A module :	Less than 120mA
TIO-B module :	Less than 120mA
DI-A module :	Less than 115mA
DI-B module :	Less than 160mA
DO-A module :	Less than 70mA
DO-B module :	Less than 90mA

Power Failure Effect

A power failure of 20 msec or less will not affect the control action.
If power failure of more than 20 msec occurs, controller will restart.
HOT or COLD start is selectable. (Only TIO module)

Operating Environments :

-10 to 50°C [14 to 122°F]
5 to 95% RH (Non-condensing)
Absolute humidity : 29g/m³ dry air at 101.3kPa

Memory Backup :

Backed up by non-volatile memory (FRAM).
Data retaining period : Approx. 10 years.
Number of writing :
Approx. 10,000,000,000 times (TIO module)
Approx. 1,000,000 times (DI/DO module)

- Depending on storage and operating conditions.

Net Weight

TIO-A module :	Approx. 220g
TIO-B module :	Approx. 190g
DI-A module :	Approx. 152g
DI-B module :	Approx. 158g
DO-A module :	Approx. 152g
DO-B module :	Approx. 158g

Compliance with Standards

- CE Mark
- UL/cUL Recognized
- RCM Mark



Module type High-speed Digital Controller SRX

Model and Suffix Code

Temperature Control Module

Specifications	Model and Suffix Code										
Model	X-TIO <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>										
Type ¹	Basic module	A									
	Extension module	B									
Measured input 1 (CH1)	See Range and Input Code Table <input type="checkbox"/>										
Measured input 2 (CH2) ²	See Range and Input Code Table <input type="checkbox"/>										
Control output 1 (CH1)	Relay output								M		
	Voltage pulses								V		
	DC voltage : 0 to 5V								4		
	DC voltage : 0 to 10V								5		
	DC voltage : 1 to 5V								6		
	DC current : 0 to 20mA								7		
	DC current : 4 to 20mA								8		
Control output 2 (CH2)	Relay output								M		
	Voltage pulses								V		
	DC voltage : 0 to 5V								4		
	DC voltage : 0 to 10V								5		
	DC voltage : 1 to 5V								6		
	DC current : 0 to 20mA								7		
	DC current : 4 to 20mA								8		
Current Transformer Input 1 (CH1) ³	Not supplied									N	
	CTL-6-P-N									P	
	CTL-12-S56-10L-N									S	
Current Transformer Input 2 (CH2) ³	Not supplied										N
	CTL-6-P-N										P
	CTL-12-S56-10L-N										S

¹ Extension module cannot be used alone.

² The second PV input can be also used as a remote setpoint input (voltage / current input only).

³ When a heater break alarm (HBA) is used, please specify relay output or voltage pulse output for the relevant channel output.

Range and Input Table

Thermocouple and Low voltage group (Field-programmable)

Input	Code	Range	Resolution
K	K	-200 – 1372°C	1°C, 0.1°C, 1°F, 0.1°F (Selectable)
		-328 – 2501°F	
J	J	-200 – 1200°C	
		-328 – 2192°F	
T	T	-200 – 400°C	
		-328 – 752°F	
E	E	-200 – 1000°C	
		-328 – 1832°F	
PLII	A	0 – 1390°C	
		32 – 2534°F	
N	N	0 – 1300°C	
		32 – 2372°F	
S	S	-50 – 1768°C	
		-58 – 3000°F	
R	R	-50 – 1768°C	
		-58 – 3000°F	
W5Re/W26Re	W	0 – 2300°C	
		32 – 3000°F	
B	B	0 – 1800°C	
		32 – 3000°F	
0 – 10mV DC	1	-20000 – 20000 (Programmable within 20,000 span)	1, 0.1, 0.01, 0.001, 0.0001 (Programmable)
0 – 100mV DC	2		
0 – 1V DC	3		

RTD group (Field-programmable)

Input	Code	Range	Resolution
Pt100	D	-200 – 850°C	1°C, 0.1°C, 1°F, 0.1°F (Selectable)
		-328 – 1562°F	
JPt100	P	-200 – 600°C	
		-328 – 1112°F	

High voltage and Current group (Field-programmable)

Input	Code	Range	Resolution
0 – 5V DC	4	-20000 – 20000 (Programmable within 20,000 span)	1, 0.1, 0.01, 0.001, 0.0001 (Programmable)
0 – 10V DC	5		
1 – 5V DC	6		
0 – 20mA DC	7		
4 – 20mA DC	8		

Digital Input Module

Specifications	Model and Suffix Code	
Model	X-DI <input type="checkbox"/>	
Type	12 points input (Terminal)	A
	28 points input (Terminal and Connector)	B

X-DI-B ↔ Connector Terminal Cable

Type	Model and Suffix Code
Cable for connector terminal connection (Length:3m)	W-BQ-01-3000
Cable for connector terminal connection (Length:2m)	W-BQ-01-2000
Cable for connector terminal connection (Length:1m)	W-BQ-01-1000

Digital Output Module

Specifications	Model and Suffix Code	
Model	X-DO <input type="checkbox"/>	
Type	12 points input (Terminal)	A
	28 points input (Terminal and Connector)	B

X-DO-B ↔ Connector Terminal Cable (Length : 3m)

Type	Model and Suffix Code
Cable for connector terminal connection (Length:3m)	W-BQ-01-3000
Cable for connector terminal connection (Length:2m)	W-BQ-01-2000
Cable for connector terminal connection (Length:1m)	W-BQ-01-1000
Cable for relay terminal connection (Length:3m)	W-BQ-02-3000
Cable for relay terminal connection (Length:2m)	W-BQ-02-2000
Cable for relay terminal connection (Length:1m)	W-BQ-02-1000

Connector Terminal

Model and Suffix Code
RS7DS-20V2
(Yoshida Electric Industry CO.,LTD.)

Relay Terminal

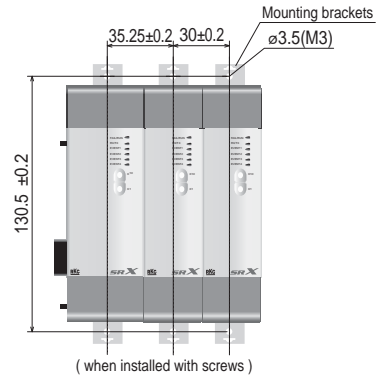
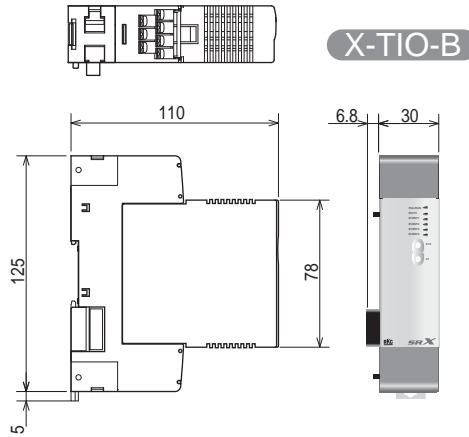
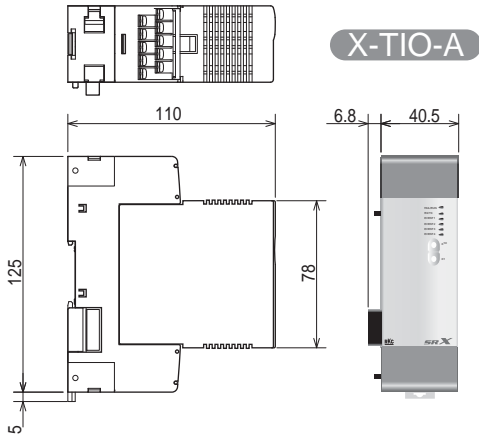
Type	Model and Suffix Code
Y-shaped solderless terminal type	PCRY-1H20-16-FD
Round shaped/Y-shaped solderless terminal type	PCRYR-1H20-16-FD
	(TOYOGIKEN CO.,LTD.)

External Dimensions and Terminals

Basic Control Module

Extension Control Module

Unit : mm

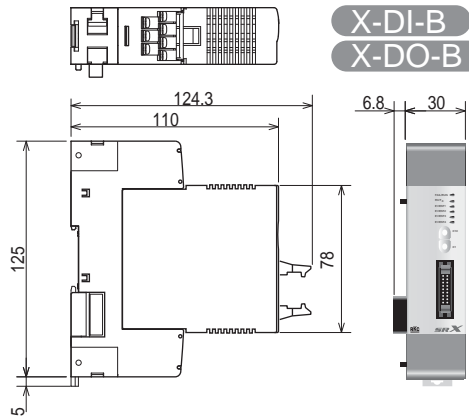
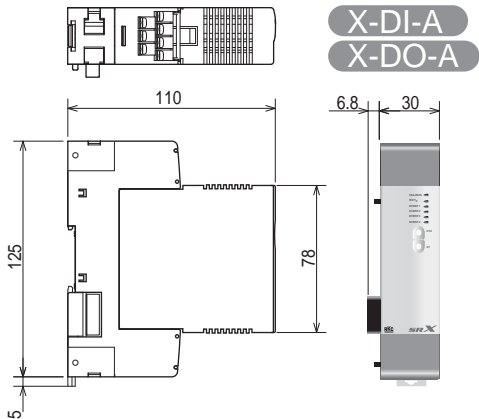


* Mounting brackets

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

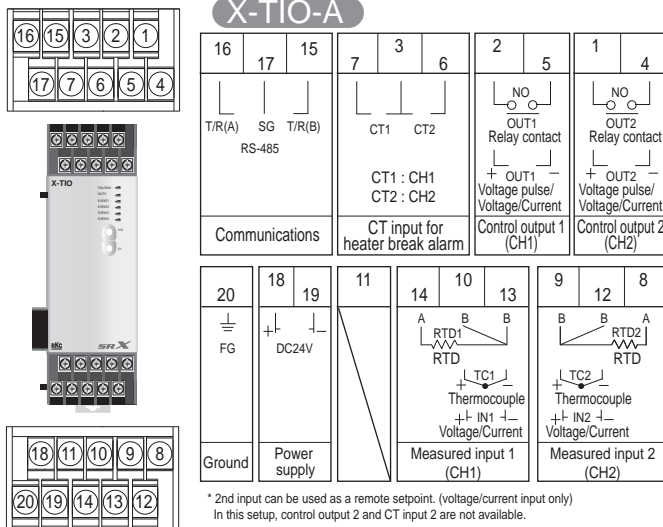
Digital Input/Output Module

Digital Input/Output Module



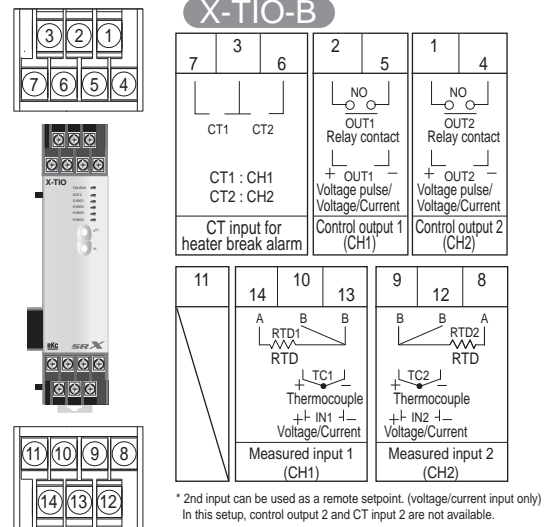
Basic Control Module

X-TIO-A

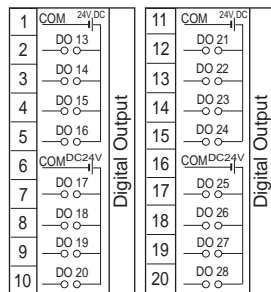
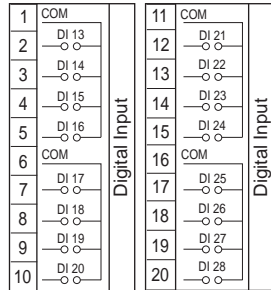
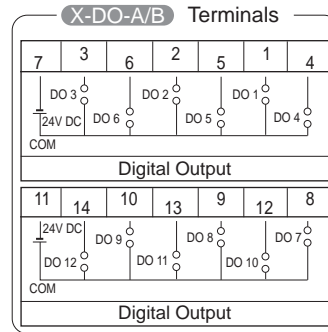
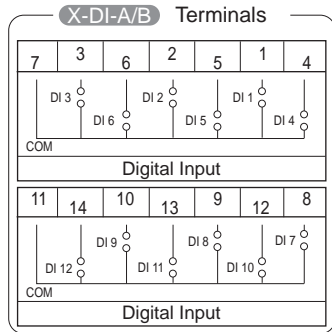
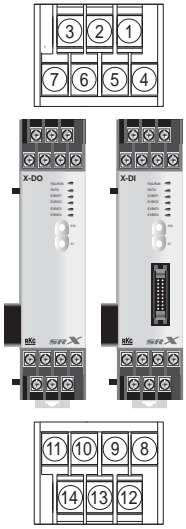


Extension Control Module

X-TIO-B

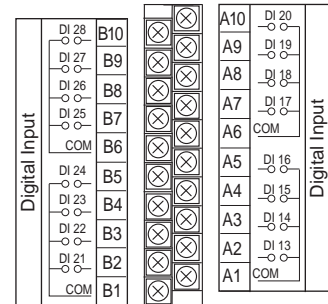
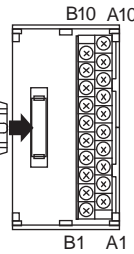


Module type High-speed Digital Controller SRX



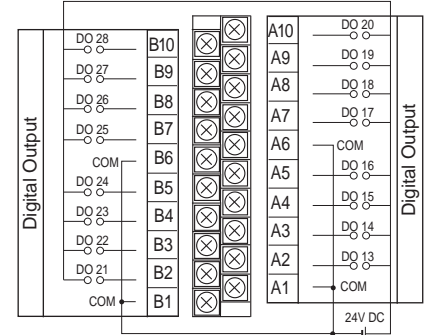
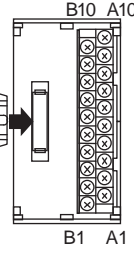
Connector terminal

CT2-20



Connector terminal

CT2-20



Connector terminal

RT1S-OD16-24V-S

