Shimaden, Temperature and Humidity Control Specialists

°C
%RH
SHIMADEN

Series SR23A

SHIMADEN DIGITAL CONTROLLER

CE approved

PRODUCT FEATURE

- ☐ *2-channel controller (Basic type: 1-channel controller)*
- ☐ *Independent 2-loop / Internal Cascade / 2-input operation control*
- ☐ *High accuracy ± (0.1% FS + 1 digit)*
- ☐ *High Sampling Cycle 0.1 sec.*
- ☐ *High resolution 1/ 1000 °C display achieved*

  **Only for R.T.D. input (scale: 0.000–30.000 °C)*
- ☐ *Auto-Tuning PID / Expert PID / Self-Tuning PID Multi-Setting of 10 Set Values*
- ☐ *Independent Multi -Input*
- ☐ *User Friendly Operation (Menu Driven: 4 Lines LCD Display)*
- ☐ *Easy Setting & Maintenance via Infrared COM port on the front panel*
- ☐ *Interface RS-232C/RS-485 (MODBUS / Shimaden)*
- ☐ *The front dust/splash-proof IP66*
- ☐ *Universal Power Supply (100–240V AC ±10%)*
- ☐ *Sensor power supply*

COPING WITH ADVANCED PROCESS CONTROL

Temperature˚C, Pressure MPa, Flowrate m³/s, etc.

High-performance digital controller

SR23A Series

High accuracy:

± (0.1% FS+1 digit)

High sampling cycle:

100 msec.

(100 msec./loop even for 2-loop control)

High resolution:

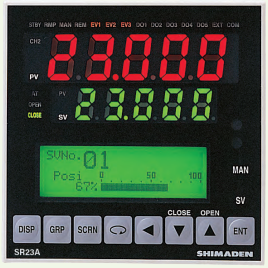
1/1000˚C display achieved

* This indication is available only for 0.000–30.000˚C at R.T.D.

Dual Universal-Input

Thermocouple
R.T.D.
DC voltage
DC current

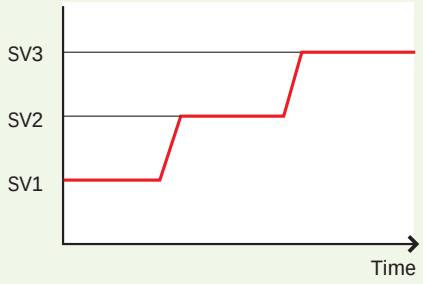
All of them are acceptable.



* Individual setting is allowed for each channel at 2-loop specification.
* Current input is executed through externally attached shunt resistor with 250 Ω

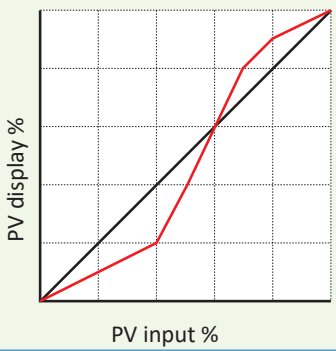
Setting of SV is allowed up to 10 points.

- **Controllability is improved thanks to individual PID setting allowed for each SV.**
- **Control by zone PID is also available (Max. 10 zones).**
- **Ramp setting is available when SV changed.**



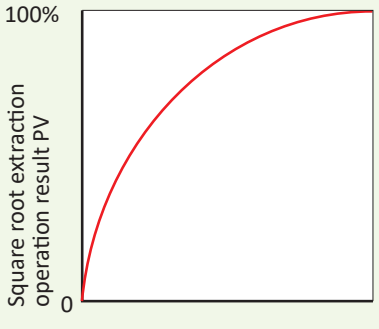
linearization approximation

Linearising nonlinear signal input Number of approximation point: Max. 11



Square root extraction operation functions

Linearisation of signals with square characteristic such as flow rate



EASY READABILITY AND USABILITY ARE RADICALLY PURSUED.

Excellent visibility thanks to the large LED with 5 digits x 2 lines and LCD with 128 x 32 dots

■PV Display Panel

- Measured value (PV) display
- CH2 PV is indicated when CH2 lamp is illuminated.
- Error message display

■SV Display Panel

- Target value (SV) display
- CH2 SV is indicated when CH2 lamp is illuminated. (only 2-input model)
- Error message display

■LCD Display Panel

- SV No. display
- Output display (numerical value and bar graph)
- Channel display
- Various setting parameters display

■Status Lamp Display Panel

STBY:	Control action not in execution: Flashing
RMP:	Ramp control in execution: Flashing
MAN:	Manual control in execution: Flashing
REM:	Remote SV in execution: Flashing
EV1~3:	Event output being on: ON
DO1~5:	External control output being on: ON
EXT:	External SV switch setting: ON
COM:	In communication mode: ON
AT:	Auto tuning in execution: Flashing
OUT 1, 2:	Control output monitor lamp

■Key Switch Display Panel

DISP	: Return to the basic screen : Switching to display mode
GRP	: Go to screen group
SCRN	: Go to any screen within the group
↻	: Selection of editing and setting parameters
◀▼▲	: Increase/decrease of numeric value and scaling factor
ENT	: Registration of numeric value and/or data
SV	: Switching of SV No.
MAN	: Used when switching to manual control mode

EASY PARAMETER SETTING THANKS TO THE DIALOG METHOD THROUGH 4 LINES LCD DISPLAY

DISPLAY MODE CORRESPONDING TO EACH SPECIFICATION

◆ Independent 2-loop control

PV CH1
CH2

SV CH1
CH2

◆ Internal cascade control

PV Master side
Slave side

SV Master side
Slave side

◆ 2-input operation control

Operation result **PV**

SV

Input 1

Input 2

◆ Positioning proportional control (servo output)

PV

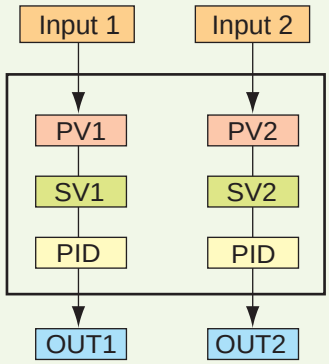
SV

Opening

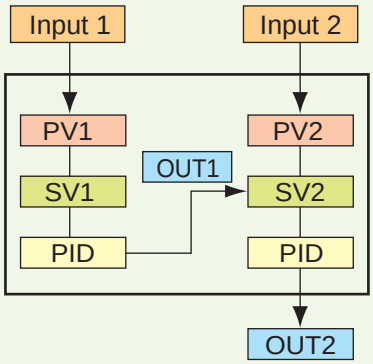
COPING WITH MULTIFARIOUS APPLICATIONS

2-Input Control by One Unit

Independent 2-loop control

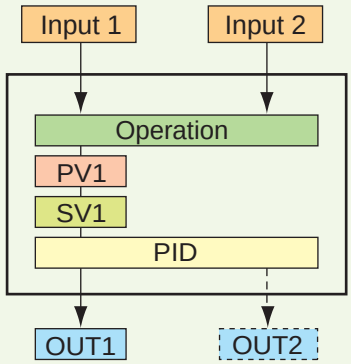


Internal cascade control



2-input operation control

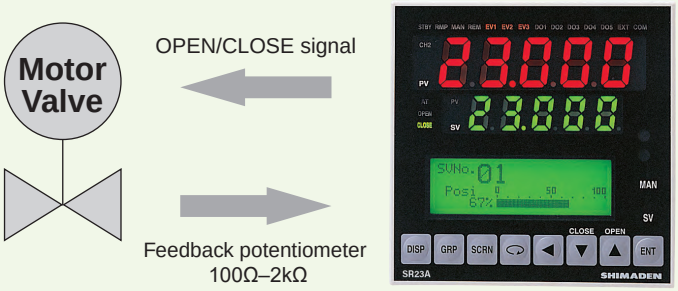
(max. value, min. value, deviation value, average value)



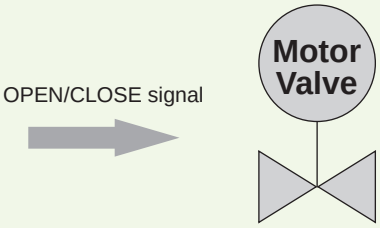
* 2-outputs (for heat & cool/heat & heat/cool & cool) may also be provided.

Servo Output Specification (Control motor/motor valve control)

With feedback potentiometer



Without feedback potentiometer



* Proportional control may be executed both **with** and **without** feedback potentiometer.

Easy Connection with PLC, etc. thanks to increased Input/Output Points

- **External Control Input (DI): Max. 10**

  Auto/Manual switching
  SV No. switching
  AT execution
  Execution/Standby of control
  Switching of output characteristics
  Execution of logical operation

- **Remote Setting Input**

  SV value may be set by external analog signal.

- **Event Output: 3**
  External Control Output: Max. 13

  8 alarm actions, various status output and logical operation output

- **Sensor power supply**

  24V DC

- **Analog Output: Max. 2**

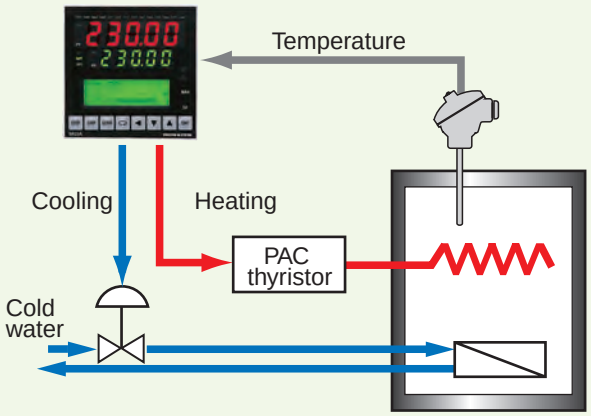
  Externally output PV, SV, deviation value, output value and position value per channel in analog signal

- **Communication function**

  Shimaden standard protocol
  MODBUS (RTU/ASCII) communication protocol

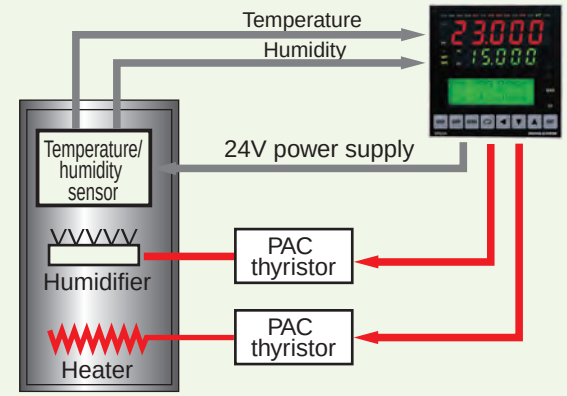
Heating/Cooling Control

1-input Specification



Constant-temperature/constant-humidity control

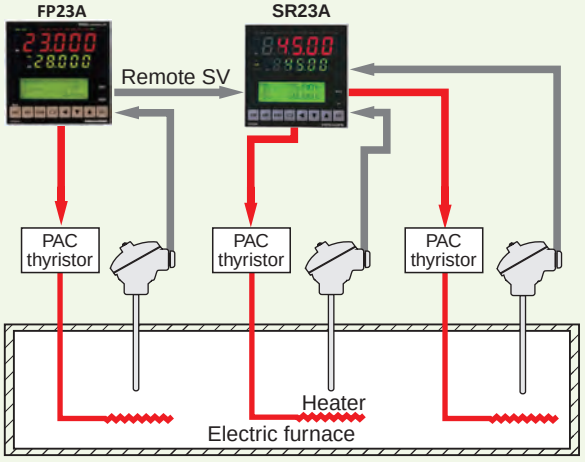
2-input Specification (Independent 2-loop control)



* Cooling (dehumidifying) may be achievable by using event output as well.

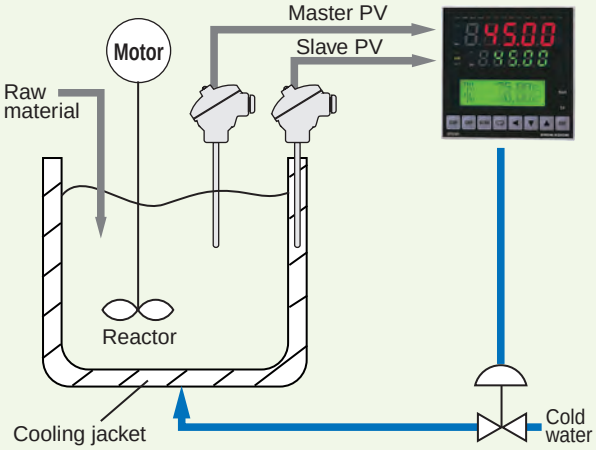
3-Zone Program Temperature Control of Electric Furnace

2-input Specification (Independent 2-loop control)



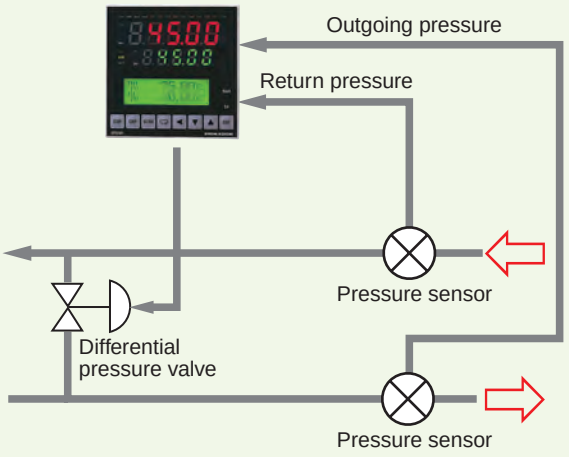
Cascade Control of Temperature inside Reactor

2-input Specification (Internal cascade control)



Differential Pressure Control

2-input Specification (2-input operation control)



Widely Coping with Various Usages

- Semiconductor manufacturing equipment
- Electrical/electronic parts/components manufacturing-related equipment
- Various industrial furnaces
- Vacuum heating furnaces
- Environmental test equipment
- Food processing machines
- Plastic processing/molding machines
- Sterilization/pasteurization equipment for pharmaceuticals

● 1-input Specifications, 2-input Specifications (Common Specification)

■ Display

● LED display

Measured value (PV) : 7-segment red LED 5 digits, height of characters 16 mmm

Set value (SV) : 7-segment green LED 5 digits, height of characters 11 mm

● LCD display : 128 x 32 dot matrix STN liquid crystal display with yellow- green LED backlight
SV No., OUT% graph, control output value, various parameter displays

● Action display lamps : 19 action statuses display
Light on or blinking when status is enabled

Symbol	Name	Color	Function
STBY	Standby	Green	Blinks when control output is set to standby (STBY = ON)
RMP	Ramp Control	Green	Blinks during execution of ramp control, and lights during ramp control is paused
MAN	Manual Operation	Green	Blinks when control output is set to manual operation
REM	Remote Input	Green	Lights when remote setting (REM) is set in SV No. selection
EV1 to EV3	Event Output	Orange	Lights when each EV acts
DO1 to DO5	External Control Output (DO)	Orange	Lights when each DO acts
EXT	External SV Switching	Green	Lights when SV No. can be selected by external switch
COM	Communication	Green	Lights when communication mode is ON
AT	Auto Tuning	Green	Blinks during execution of auto tuning or lights during holding of auto tuning
CH2	CH2 Display	Green	Lights when CH2 side display is selected
PV	CH2 PV Display	Green	Lights when CH2 side PV display is displayed
OUT1	Control Output	Green	Lights during control output (output 1 side)
OUT2		Green	Lights during control output (output 2/CH2 side)

● Display accuracy : ±(0.1% + 1 digit) of measuring range (see range table for individual)

Thermocouple input (TC) : ±(0.1% FS + 1°C) does not include reference contacts

RTD input (pt) : ±(0.1% FS +0.1 °C+1 digit)

Voltage input (mV, V) : ±(0.1% FS +1 digit)

Current input (mA) : ±(0.1% FS + 1 digit) + external resistance accuracy

● Temperature range for maintaining display accuracy : 23 °C±5 °C

● Display resolution : 0.0001, 0.001, 0.01, 0.1, 1 (differs depending on measuring range)

● Sampling cycle : 0.1 seconds (100 msec)

■ Setting

● Local setting : By 10 front panel key switches

Setting range : Same as the measuring range

Multi-SV value setting : Up to 10 points (SV1 to SV10) settable

Multi-SV value selection : Front panel key switches or external control input (binary code, when DI option is selected)

● Remote setting : By external analog signals.
Not insulated (standard)/insulated (option)
When heater break alarm is selected, remote setting is not available.

Setting accuracy : ± (0.1% FS +1 digit)

Setting signal : 0 to 10 V, 1 to 5 V, 4 to 20 mA DC (selectable from code selection table)

Sampling cycle : 0.2 seconds (200 msec)

Remote scaling : Possible within measuring range (reverse scaling possible)

Remote bias : ±10000 digit

Remote filter : OFF, 1 to 300 seconds

Remote square root : Low cut range 0.0 to 5.0% FS (at mV, V)

Remote ratio : 0.001 to 30.000

Local/remote switching : Front panel key switches or external control input

Direct tracking function : Remote set value switchable to local set value by bumpless transfers

Input resistance : 4 to 20 mA: 300 Ω
0 to 10 V: Approx. 570 kΩ
1 to 5 V: Approx. 600 kΩ

Isolation : Insulated/non-insulated selection available

Selection limit : Remote input and heater break alarm are exclusive selection

● Ramp control : Increment/decrement ramp control

Ramp value setting range : Ascending/descending individual setting
OFF, 1 to 10000 digits/minute or second (when multiplier = 1)
OFF, 0.1 to 1000.0 digits/minute or second (when multiplier = 0.1)

Ramp unit time : digits/second, digits/minute

Ramp unit multiplier : x 1, x 0.1

● Higher/lower limit setting limiter : Any value set within measuring range (lower limit < higher limit)

■ PV input (ch1)

Universal-input, multi-range	: Thermocouple input, RTD input, voltage input (mV, V), current input (mA) (by on external resistor)
● Thermocouple (TC) input	
Input type	: B, R, S, K, E, J, T, N, PLII, PR40-20, C(WRe 5-26), {L, U (DIN43710)}, AuFe-Cr
Display range	: ±10% of measuring range (not lower than -273.15°C)
Input resistance	: 500 kΩ min.
Cold junction compensation	: Selectable between internal and external cold junction compensation
Internal cold junction compensation accuracy	: ±1°C (in range of 18 to 28°C)
External resistance tolerance	: 100 Ω max.
Burnout functions	: Standard feature (upscale)
● RTD (RTD) input	
Input type	: JIS Pt100/JPt100 3-wire type. For details (see Measuring range codes)
Display range	: ±10% of measuring range (not lower than -240°C)
Lead wire tolerance	: 10 Ω max. per wire (value for all 3 wires must be equal)
Amperage	: Approx. 1mA
● Voltage (mV, V) input	
Input type	: -10 to 10, 0 to 10, 0 to 20, 0 to 50, 10 to 50, 0 to 100, -100 to 100 mV DC -1 to 1, 0 to 1, 0 to 2, 0 to 5, 1 to 5, 0 to 10, -10 to 10 V DC (see Measuring range codes)
Display range	: Programmable scaling ±10% of measuring range, lowest digit of display rounded to next digit
Input resistance	: V range: 520 kΩ or higher mV range: Min. 500 kΩ
External resistance tolerance	: 100 Ω max.
● Current input (mA) (1 to 5, 0 to 5 V DC input by external 250 Ω reception signal resistor (sold separately))	
Input type	: 0 to 20 mA, 4 to 20 mA (see range table)
Display range	: Programmable scaling ±10% of measuring range, lowest digit of display rounded to next digit
Receiving resistance	: 250 Ω by external shunt resistor (sold separately)
● Additional PV input (ch2) option	
Functions and performance are similar to ch1	
● PV input common specifications	
Range for maintaining accuracy	: 23°C±5°C
°C/°F supported	: Front panel key switch, switched by communication
Sampling cycle	: 0.1 seconds (100 msec)
PV bias	: ±10000 digit
PV slope	: Input value x 0.500 to 1.500
PV filter	: OFF, 1 to 100 seconds
PV input operation	: Square root extraction operation (possible with linear input). Low cut range 0.0 to 5.0% FS
(Possible with voltage or current input)	Linearizer approximation. Number of input points: 11
● Multi-bias	
Multi-bias type	: OFF, Linearizer, PV-MBIAS (PV), PV-MBIAS (SV), RSV-MBIAS (SV)
Bias zone	: 10 (A1 to A11)
Bias value	: Within ±10000 digits
Scale-over display	: SC_LL, SC_HH, burnout, etc.
Isolation	: Insulated between the system and other inputs/outputs (including between channels)

■ Control

● Control output : 1-output specification, 2-output specification (2-output can be added optionally (specified at time of order, standard equipment on 2-input specification))

SS	1-input/1-output control
SD	1-input/2-output control (heated and cooled control)
DL	Independent 2-channel, 2-output specification…Independent 2-loop control
DC	Internal cascade
DS	2-input, 1-output specifications…1-loop control with maximum, minimum, average, and deviation values
DD	2-input, 2-output specifications…1-loop heat/cooling control with maximum, minimum, average and deviation values

● Control output type/rating (common to Control Outputs 1 and 2)	
Contact output (Y)	: Contact (1c) 240 V AC/2.5 A (resistance load)
Current output (I)	: 4 to 20 mA DC/load resistance 600 Ω max.
SSR drive voltage output (P)	: 12 V±1.5 V DC/load current 30 mA max.
Voltage output (V)	: 0 to 10 V DC/load current 2 mA max.
Output accuracy	: ±0.5% FS (5 to 100% output/within precision maintenance temperature range)
Output resolution	: Approx. 1/4000 (for current, voltage output)
Isolation	: For Y: Insulated between the system and other inputs/outputs For P, I, V: Insulated between system and other inputs/outputs, except for analogue output Not insulated between the control outputs if other control output is other than Y

● Control system : Expert PID control with auto tuning function/expert PID + PID control for 2-output
Proportional band (P) : OFF, 0.1 to 999.9% (OFF: ON - OFF action)
Integral time (I) : OFF, 1 to 6000 seconds (OFF: P or PD control)
Derivative time (D) : OFF, 1 to 3600 seconds (OFF: P or PI control)
Manual reset (MR) : -50.0 to 50.0% (available when I = OFF)
Dead band (DB) : -19999 to 20000 digit (Control Output 2 in 1 loop 2-output specification)
ON - OFF hysteresis (DF) : 1 to 9999 digit (Effective when P = OFF)
Proportional cycle : 1 to 120 seconds (at contact or SSR drive voltage output)
Control output characteristics : Reverse (heat specifications)/Direct (cooling specifications)
Control outputs 1 and 2 individual setting (heat/cooling, 2-stage heat/2-stage cooling selection for 1 loop 2-output heating)
Output rate-of-change limiter : OFF, 0.1 to 100.0%/seconds (set individually for Control Outputs 1 and 2)
AT : Auto tuning, self tuning selection
Number of PID parameters : 10 sets
Zone PID : Max. 10 zones
● Manual control
Auto/manual switching : Balanceless/bumpless action (simultaneous for Control Outputs 1 and 2)
Output setting range : 0.0 to 100.0% (set individually for Control Outputs 1 and 2)
Setting resolution : 0.10%

■ Event Output (EV), External Control Output (DO)

● Number of outputs :

EV1 to EV3	Contact output	3 points
DO1 to DO5	Darlington open collector output	3 points
DO4 and DO5	Open collector output	2 points
DO6 to DO9	Open collector output	4 additional points optionally available
DO10 to DO13	Open collector output	4 additional points optionally available (1-input specification)

● Setting/selection : Individual setting (individual output), selectable from the following (to designate output)
Assigned to either CH1 or CH2 for independent 2-channel control or internal cascade control specifications

Symbol	Name/function	Setting range
None	No action	---
DEV Hi	Higher limit deviation action	±25000 digit
DEV Low	Lower limit deviation action	±25000 digit
DEV Out	Outside higher/lower limit deviation action	0 to 25000digit
DEV In	Inside higher/lower limit deviation action	0 to 25000digit
PV Hi	PV higher limit absolute value action	Within measuring range
PV Low	PV lower limit absolute value action	Within measuring range
SV Hi	SV higher limit absolute value action	Within measuring range
SV Low	SV lower limit absolute value action	Within measuring range
AT	ON during execution of auto tuning	---
MAN	ON during manual control operation	---
REM	ON during remote SV is in action	---
RMP	ON during ramp control is in action	---
STBY	ON during control operation standby	---
SO	ON when PV and REM scale over occurs	---
PV SO	ON when PV scale over occurs	---
REM SO	ON when REM scale over occurs	---
LOGIC	DI Logic operation EV1 to EV3, DO1 to DO5	---
Direct	Direct output by communication EV not possible DO6 to DO9 DO6 to DO13 (1-input specifications only)	---
HBA	ON during heater break alarm output	---
HLA	ON during heater loop alarm output	---

● Selection limits : LOGIC (logic operation) Only DO4 and DO5 can be assigned for the timers and counters.
● Output characteristics switching : Selectable between normally open and normally closed
Output operation : On-Off action
● Setting range
DEV Hi, Low : -25000 to 25000 digit
DEV Out, In : 0 to 25000 digit
PV/SV Hi, Low : Within measuring range
Hysteresis : 1 to 9999 digit (when DEV, PV or SV is selected)
Action delay time : OFF, 1 to 9999 seconds (when DEV, PV or SV is selected)
Standby action : Individual setting (individual output) Selectable from 4 types (when DEV, PV or SV is selected)
OFF No standby action
Standby 1 When power on, STBY ON → OFF
Standby 2 When power on, STBY ON → OFF, execution SV change
Standby 3 When the input is abnormal (SO), action OFF

● Output specifications/rating : 1) Contact (a contact) Shared 240 V AC/1.0 A: Resistance load
2) Open collector output 24 V DC/8 mA max.
3) Darlington collector output 24 V DC/50 mA max.
● Output update cycle : 0.1 seconds (100 msec)
● Action display : EV1 to EV3, DO1 to DO5 Orange lamp lights during operation
● Isolation : Insulated between system and other inputs/outputs (not insulated between EVs/DOs)

■ External Control Input (DI)

● Number of inputs : DI1 - DI4 4 points (standard)
DI5 - DI10 6 points (can be added as an option)
● Input operation : Non-voltage contact or open collector
● Input rating : Voltage 5 V DC, 2.5 mA max. application per 1 input
● Min. input holding time : At least 0.1 seconds (100 msec)
● Setting/selection : Individual setting (individual input), selectable from 10 types
In the case of independent 2-channel control or internal cascade control (CH1/CH2) specification, assignment will be done to either CH1 or CH2, or both.

Symbol	Name/function
None	No action
MAN	Switching of control output between auto/manual (when ON: manual)
REM	Switching of REM SV/LOCAL SV setting (when ON: REM SV setting)
AT	Switching of AT execution/stop (when ON "edge": AT execution)
STBY	Switching of control execution/standby (when ON: standby)
ACT	Switching of direct action/reverse action on Output 1 characteristics (when ON: direct action)
ACT2	Switching of direct/reverse action on Output 2 characteristics (when ON: direct action)
Pause	Switching of pause/resume of ramp control (when ON: ramp pause)
LOGIC	Logic operation (when ON: execution of logic operation and output to EV or DO)
EXT_SV	Only DI7 configurable (DI7 - DI10)

● Isolation : Insulated between system and other input (not insulated between DIs)

■ Logic Operation Functions

● Number of logic operation outputs : Assignable to 8 points in total: EV1 to EV3 3 points, DO1 to DO5 5 points
DO4 and DO5 are exclusively for timer and counter operation.
● Number of logic operation inputs : 10 external control input points, DI1 to DI10, can be assigned individually to source 1 and source 2
● Input logic conversion : Input logic conversion possible individually on source 1 and source2 (EV1 to EV3, DO1 to DO3 output)
BUF : By external control input logic
INV : Inversion of external control input logic
FF : Flip-flop logic operation of external control input
● Logic operation (1) : Logic operation output by source 1 and source 2 (EV1 to EV3, DO1 to DO3 output)
AND : Output by logical product
OR : Output by logical sum
XOR : Output by exclusive OR
● Logic operation (2) : Logic operation output by source 1 (DO4, DO5 output)
1) Timer operation OFF, 1 to 5000 seconds
2) Counter operation OFF, 1 to 5000 counts

■ Heater Break Alarm (option)

When heater break alarm is selected, remote input is disabled.
● Alarm action
Heater break alarm : HBA alarm ON when control output is ON and heater break is detected
Heater loop alarm : HLA alarm ON when control output is OFF and heater loop error is detected
● Alarm detection
Heater break detection : Heater current ≦ setting current, when control output is ON
Heater loop error detection : Heater current ≧ setting current, when control output is OFF
Hysteresis for alarm detection : 0.2 A
● Current detection : Heater current detection by external CT (supplied CT for exclusive use/single phase)
Current detection selection : Selectable from Control Output 1 or Control Output 2 only when control output is Y or P
Sampling cycle : 0.2 seconds (200 msec)
Minimum action confirmation time : 0.2 seconds (200 msec) or longer (regardless of whether control output is ON or OFF)
● Current setting : Heater break, heater loop alarm set individually
Setting range : OFF, 0.1 to 50.0 A (OFF = suspension of alarm action)
Setting resolution : 0.1A
● Current display : 0.0 to 55.0 A
Display accuracy : 3% FS (sine wave 50 Hz)
Sampling cycle : 0.2 seconds (200 msec)
Minimum action confirmation time : 0.2 seconds (200 msec) or longer (regardless of whether control output is ON or OFF)
● Output : Assigned to EV/DO output
Output hold : Selectable between Lock mode and Real mode
● Isolation : Insulated between other inputs/outputs except the system

■ Analog Output (option)

● Number of outputs	:	Max. 2, Ao1, Ao2 individual setting, individual output Only Ao1 when sensor power supply (optional) is selected In the case of independent 2-channel control or internal cascade control (CH1/CH2) specification, assignment will be done to either CH1 or CH2.
● Output types		
PV	:	Measured value (measured value in execution)
SV	:	Set value (set value in execution)
DEV	:	Deviation value (measured value in execution - set value in execution)
OUT1	:	Control Output 1
OUT2	:	Control Output 2 (in 2-output specification, 2-input specification)
● Output rating	:	Individual selection (individual output) 0 to 10 mV DC/output resistance 10 Ω 0 to 10 V DC/load current 2 mA max. 4 to 20 mA DC/load resistance 300 Ω max.
● Output accuracy	:	±0.1% FS (of indicated value)
● Output resolution	:	Approx. 1/14000
● Output update cycle	:	0.1 seconds (100 msec)
● Output scaling	:	PV, SV within measuring range DEV within -100.0 to 100.0% OUT1 and OUT2 within 0.0 to 100.0%; reverse scaling possible
● Isolation	:	Insulated between the system and other inputs/outputs Not insulated between analogue outputs and between P, I, and V control outputs

■ Sensor Power Supply (option)

● Number of outputs	:	1 Output from Analog Output 2 (Ao2) terminal When the sensor power supply is selected, Analog Output 2 (Ao2) is unusable
● Output rating	:	24 V DC/25 mA max.
● Isolation	:	Insulated between the system and other inputs/outputs

■ Communication (option)

● Communication type	:	RS-232C, RS-485
● Communication system	:	RS-232C 3-line half-duplex system RS-485 2-line half-duplex multidrop (bus) system
● Communication distance	:	RS-232C 15 m max. RS-485 500 m max. (depending on connection conditions)
● Number of connectable devices	:	RS-232C × 1 RS-485 32 (differs depending on connection conditions including the host)
● Synchronization system	:	Start-stop synchronization
● Communication speed	:	2400, 4800, 9600, 19200 bps
● Communication (device) address	:	1 to 98
● Communication delay time	:	1 to 50 msec
● Communication memory mode	:	EEP, RAM, R_E
● Communication protocol (1)	:	Shimaden standard protocol
Data length	:	7-bit, 8-bit
Parity	:	EVEN, ODD, NONE
Stop bit	:	1-bit, 2-bit
Control code	:	STX_ETX_CR, STX_ETX_CRLF, @_: _CR
Checksum (BCC)	:	ADD, ADD_two's cmp, XOR, None
Communication code	:	ASCII code
● Communication protocol (2)	:	MODBUS communication protocol
ASCII Mode	:	ASCII Mode
Data length	:	7-bit (fixed)
Parity	:	EVEN, ODD, NONE
Stop bit	:	1-bit, 2-bit
Control code	:	_CRLF
Error check	:	LRC check
● RTU mode	:	Binary mode
Data length	:	8-bit (fixed)
Parity	:	EVEN, ODD, NONE
Stop bit	:	1-bit, 2-bit
Control code	:	None
Error check	:	CRC16
● Function code	:	Supports 03H and 06H (hexadecimal) for both ASCII and RTU modes 1) 03H Read data 2) 06H Write data

● 2-input Specifications

● Input and control specifications : Specifications to be decided by combinations of input and control output.
1CH specifications : 1-loop control specification
1) 2-input (1 CH specification)
Input operation specified by 2-input (PV1, PV2)
MAX Max. value input of PV1 and PV2, 1-output/2-output control specification
MIN Min. value input of PV1 and PV2, 1-output/2-output control specification
AVE Average value input of PV1 and PV2, 1-output/2-output control specification
DEV Deviation value input of PV1 - PV2, 1-output/2-output control specification
PV Taking PV value of Input 1
2CH specifications : 2-loop control specification
1) 2-input, internal cascade control specification : 2-loop control specification by internal cascade control
2) 2-input, 2-output specifications Independent 2-channel (2-loop) control specification
●Isolation : Insulated between the system and other inputs/outputs (including between channels)

● Servo output specifications

● Control output : Output for driving servo actuators
Feedback potentiometer with/without supported

■Display

● LED display (Measured value (PV)) : Position indicator data display
Display resolution : Position: 1%
Display range : Position: -10 to 110%
● LCD display : Position indicator, bar graph
● Action display lamps :

Symbol	Name	Color	Function
STBY	Standby	Green	Blinks when control output is set to standby (STBY = ON)
RMP	Ramp Control	Green	Blinks during execution of ramp control, and lights during ramp control is paused
MAN	Manual operation	Green	Blinks when control output is set to manual operation
REM	Remote input	Green	Lights when remote setting (REM) is set in SV No. selection
EV1 to EV3	Event output	Orange	Lights when each EV acts
DO1 to DO5	External control output	Orange	Lights when each DO acts
EXT	External SV switching	Green	Lights when SV No. can be selected by external switch
COM	Communication	Green	Lights when communication mode is ON
AT	Auto tuning	Green	Blinks during execution of auto tuning or lights during holding of auto tuning
OPEN	Control output	Green	Lights when open output is ON
CLOSE		Green	Lights when open output is ON

■Setting

Auto/manual switching : By front panel key switch (MAN)
Zero/span adjustment : Provided with Automatic adjustment function; manual adjustment is also possible (correction of potentiometer error)
Hysteresis : 1/4 of dead band. Fixed to 0.3% when dead band is less than 1.2% of input.
Dead band setting : 0.5 to 10.0% of input signal (Initial value: 2.0%)
● Feedback
Setting : With/without feedback potentiometer
Potentiometer rating : Any between 100 Ω and 2 kΩ/three-wire type
● Control output
Output type : Contact 240 V AC 2A
Output update cycle : 50 msec
Control output at error : Stop, Preset 1 to 7 (0 to 100%) with feedback potentiometer
Stop, Close, Open without feedback potentiometer
Control output at standby : Stop, Preset 1 to 7 (0 to 100%) with feedback potentiometer
Stop, Close, Open without feedback potentiometer
Control output at potentiometer error Stop, Close and Open with feedback potentiometer

■Event Output (EV), External Control Output (DO)

● Setting/selection : Individual setting (individual output), selectable from the following (to designate output)

Symbol	Name/function	Setting range
None	No action	---
DEV Hi	DEV Hi	±25000 digit
DEV Low	Lower limit deviation action	±25000 digit
DEV Out	Outside higher/lower limit deviation action	0 to 25000 digit
DEV In	Inside higher/lower limit deviation action	0 to 25000 digit
PV Hi	PV higher limit absolute value action	Within measuring range
PV Low	PV lower limit absolute value action	Within measuring range
SV Hi	SV higher limit absolute value action	Within measuring range
SV Low	SV lower limit absolute value action	Within measuring range
AT	ON during execution of auto tuning	---
MAN	ON during manual control operation	---
REM	ON while remote SV is in action	---
RMP	ON while ramp control is in action	---
STBY	ON while control is out of action	---
SO	ON when PV and REM Scale over error occurs	---
PV SO	ON when PV scale over error occurs	---
REM SO	ON when REM scale over error occurs	---
LOGIC	DI Logic operation EV1 to EV3, DO1 to DO5	---
Direct	Direct output in communication EV not possible DO6 to DO9	---
Posi.H	Position higher limit absolute value	0 to 100%
Posi.L	Position lower limit absolute value	0 to 100%
POT.ER	ON during feedback potentiometer error	---

Hysteresis : 1 to 9999 digits (when DEV, V, PV or Posi is selected)

Action delay time : OFF, 1 to 9999 seconds (when DEV, PV, SV or Posi is selected)

Standby action : Individual setting (individual output), selectable from 4 types (when DEV, PV, SV or Posi is selected)

OFF No standby operation

Standby 1 When power ON, or at STBY ON → OFF

Standby 2 When power ON, or at STBY ON → OFF, or at execution SV is changed

Standby 3 At input error (SO), when action is OFF

■ External Control Input (DI) : Individual setting (individual input), selectable from 10 types

Input types (assignable by setting)

Symbol	Name/function
None	No action (no assignment)
MAN	Switching of control output between auto/manual (when ON: manual)
REM	Switching of REM SV/LOCAL SV setting (when ON: REM SV setting)
AT	Switching of AT execution/stop (when ON “edge”: AT execution)
STBY	Switching of control execution/standby (when ON: standby)
ACT	Switching of direct/reverse action (when ON: direct action)
Pause	Switching of pause/resume of ramp control (when ON: ramp pause)
LOGIC	Logic operation (when ON: execution of logic operation and output to EV or DO)
EXT_SV	Only DI7 can be set. (DI7 to DI10)
Preset 1	Assignable to DI2 (DI2 Position set value 1 point)
Preset 2	Assignable to DI2 (DI2 to DI3 Position set value 3 points)
Preset 3	Assignable to DI2 (DI2 to DI4 Position set value 7 points)

■Analog Output

● Number of outputs : Max. 2, Ao1, Ao2 individual setting, individual output
Only Ao1 when sensor power supply (optional) is selected

● Output types

PV : Measured value (measured value in execution)

SV : Set value (set value in execution)

DEV : Deviation value (measured value in execution - set value in execution)

OUT1 : Control Output 1

Posi : Position value

● Output rating : Individual selection (individual output)
0 to 10 mV DC/output resistance 10 Ω
0 to 10 V DC/load current 2 mA max.
4 to 20 mA DC/load resistance 300 Ω max.

● Output accuracy : ±0.1% FS (of indicated value)

● Output resolution : Approx. 1/14000

● Output update cycle : 0.1 seconds (100 msec)

● Output scaling
PV, SV within measuring range
DEV within -100.0 to 100.0%
OUT1 within 0.0 to 100.0%
Posi within 0 to 100%
Reverse scaling possible

● Isolation : Insulated between the system and other inputs/outputs
Not insulated between analogue outputs and between P, I, and V control outputs

● General Specifications

● Data storage	: Non-volatile memory (EEPROM)	
● Operating environment conditions		
Temperature	: -10 to 50℃	
Humidity	: 90% RH max. (no dew condensation)	
Elevation	: 2000 m above sea level or lower	
Over voltage category	: II	
Pollution class	: 2 (IEC 60664)	
● Storage temperature	: -20 to 65℃	
● Power voltage	: 100 to 240 V AC ±10% 50/60 Hz	
● Power consumption	: Max. 16 VA	
● Input noise removal ratio	: Normal mode 40 dB min. (50/60 Hz)	
	Common mode 120 dB min. (50/60 Hz)	
● Applicable standards	: Safety IEC61010-1 and EN61010-1	
	EN IEC 61010-2-030	
	EMC EN61326-1	
	RoHS directive supported	
● Insulation resistance	: Input-output terminals and power terminal interval:	500 V DC 20MΩ min.
	Power terminals and ground terminal interval:	500 V DC 20MΩ min.
	PV input and channels interval:	500 V DC 20 MΩ min.
	PV input and remote input (insulated specifications only) terminal:	500 V DC 20 MΩ min.
● Dielectric strength	: Input-output terminals and power terminal interval:	2300 V AC 1 minute
	Power terminals and ground terminal interval:	1500 V AC 1 minute
	PV input and channels interval	500 V AC 1 minute
	PV input and remote input (insulated specifications only) interval:	500 V AC 1 minute
● Protective structure	: Front operating panel only is dust-proof and drip-proof. (equivalent to IP66, NEMA4X)	
● Case material	: PC resin molding (equivalent to UL94V-1)	
● External dimensions	: 96 (H) x 96 (W) x 111 (D) mm (panel depth:100 mm)	
	Panel depth is 112 mm when terminal cover is installed.	
● Mounting	: Imbedded in panel (using mounting fixtures)	
● Applicable panel thickness	: 1.0 to 8.0 mm	
● Panel cutout	: 92 (H) x 92 (W) mm	
● Weight	: Approx. 600 g	
● Terminal cover	: Standard feature	

*Places where the unit is denoted as digit should be regarded as the industrial unit used.

If the measurement range is 0.0 to 100.0°C, 1 digit equals 0.1°C.

- 1-output control
- 2-output control (Heat & Cool/Heat & Heat/Cool & Cool)

ORDERING INFORMATION

ITEM	CORD	SPECIFICATIONS
SERIES	SR23A-	96 x 96 DIN size, high-performance digital controller EV 1 to 3 (3 points), DI 1 to 4 (4 points), DO 1 to 5 (5points)
BASIC FUNCTIONS	SS	Multi input, 1-input/1-output control
	SD	Multi input, 1-input/2-output control
CONTROL OUTPUT 1	Y	Contact 1c, contact rating: 240V AC 2.5A/resistive load, 1A/inductive load
	I	Current 4–20mA DC, Load resistance: max. 600Ω
	P	SSR drive voltage output 12V±1.5V DC, Load current: max. 30mA
	V	Voltage 0–10V DC, Load current: max. 2mA
CONTROL OUTPUT 2 (Select N- for basic function SS.)	N-	None
	Y-	Contact 1c, contact rating: 240V AC 2.5A/resistive load, 1A/inductive load
	I-	Current 4–20mA DC, Load resistance: max. 600Ω
	P-	SSR drive voltage output 12V±1.5V DC, Load current: max. 30mA
	V-	Voltage 0–10V DC, Load current: max. 2mA
REMOTE SETTING INPUT/HEATER BREAK ALARM (FOR SINGLE-PHASE) *1	04	REMOTE SETTING INPUT 4–20mA DC Input resistance: 250Ω — Non-insulated input
	05	REMOTE SETTING INPUT 1–5V DC Input resistance: approx. 600kΩ — Non-insulated input
	06	REMOTE SETTING INPUT 0–10V DC Input resistance: approx. 570kΩ — Non-insulated input
	14	REMOTE SETTING INPUT 4–20mA DC Input resistance: 250Ω — Insulated input
	15	REMOTE SETTING INPUT 1–5V DC Input resistance: approx. 600kΩ — Insulated input
	16	REMOTE SETTING INPUT 0–10V DC Input resistance: approx. 570kΩ — Insulated input
	31	Heater break alarm* (heater current 30A with CT) — Selectable only when Control Output 1 or 2 is Y or P
	32	Heater break alarm* (heater current 50A with CT) — Selectable only when Control Output 1 or 2 is Y or P
ANALOG OUTPUT 1	0	None
	3	0–10mV DC, Output resistance: 10Ω
	4	4–20mA DC, Load resistance: max. 300Ω
	6	0–10V DC, Load current: max. 2mA
ANALOG OUTPUT 2 or SENSOR POWER SUPPLY	0	None
	3	ANALOG OUTPUT 2 0–10mV DC, Output resistance: 10Ω
	4	ANALOG OUTPUT 2 4–20mA DC, Load resistance: max. 300Ω
	6	ANALOG OUTPUT 2 0–10V DC, Load current: max. 2mA
	8	Sensor power supply 24V DC 25mA
Additional external output control signal (DI/DO) *2	0	None
	1	DI 5 to 10 (6 points), DO 6 to 9 (4 points)
	2	DI 5 to 10 (6 points), DO 6 to 13 (8 points)
COMMUNICATION FUNCTION	0	None
	5	RS-485 Shimaden standard protocol / MODBUS (RTU/ASCII) communication protocol
	7	RS-232C Shimaden standard protocol / MODBUS (RTU/ASCII) communication protocol
REMARKS	0	Without
	9	With

*1 When switching the SV No. by DI, 10 points of DI (CODE 1 or 2) are required.

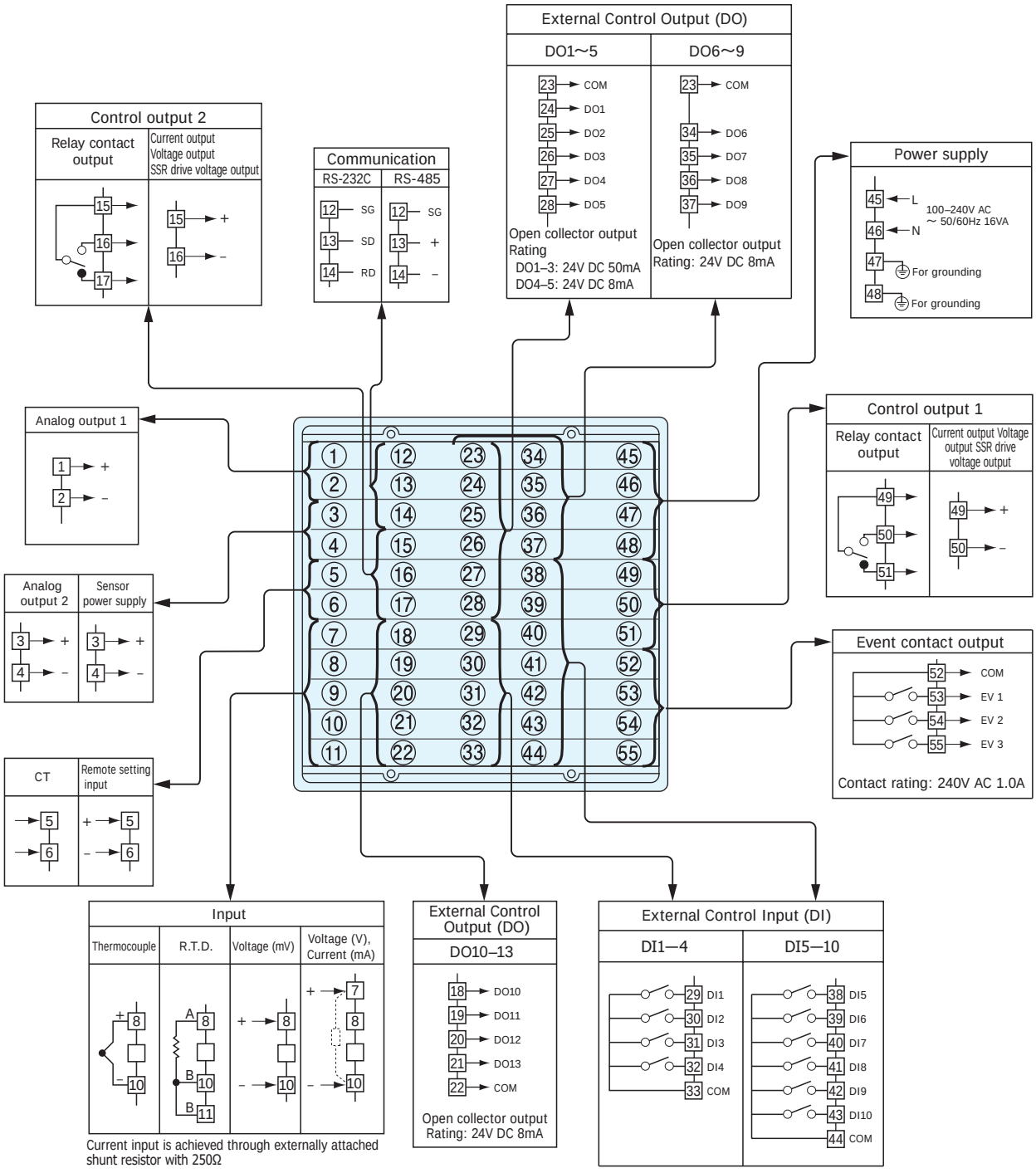
*2 Ten DI points (code 1 or 2) are required for switching the SV No. by DI.

Optional Accessories

Name	Model	Description
Shunt Resistor	QCS002	 250Ω, external input resistance at current input
Relay Unit	AP2MC	Converts open collector output to contact output. 2 circuits built-in

Page 21 and after for details.

TERMINAL ARRANGEMENT



Crimp-type terminals fit M3 screws.

- **2-input/2-output control (independent 2-loop control)**
- **Internal cascade control *Output for control is output to Control Output 2.**
- **2-input operation/1-output control (1-loop control by max. value, min. value, average value, deviation value operation)**
- **2-input operation/2-output control (1-loop heat & cool/heat & heat/cool & cool control by max. value, min. value, average value, deviation value operation)**

ORDERING INFORMATION

ITEM	CORD	SPECIFICATIONS			
SERIES	SR23A-	96 x 96 DIN size, high-performance digital controller EV 1 to 3 (3 points), DI 1 to 4 (4 points), DO 1 to 5 (5points)			
BASIC FUNCTIONS *2, *3	DL	Multi input, independent 2-loop control			
	DC	Multi input, internal cascade control			
	DS	Multi input, 2-input operation/1-output control			
	DD	Multi input, 2-input operation/2-output control			
CONTROL OUTPUT 1 *1	Y	Contact 1c, contact rating: 240V AC 2.5A/resistive load, 1A/inductive load			
	I	Current 4–20mA DC, Load resistance: max. 600Ω			
	P	SSR drive voltage output 12V±1.5V DC, Load current: max. 30mA			
	V	Voltage 0–10V DC, Load current: max. 2mA			
CONTROL OUTPUT 2	Y-	Contact 1c, contact rating: 240V AC 2.5A/resistive load, 1A/inductive load			
	I-	Current 4–20mA DC, Load resistance: max. 600Ω			
	P-	SSR drive voltage output 12V±1.5V DC, Load current: max. 30mA			
	V-	Voltage 0–10V DC, Load current: max. 2mA			
REMOTE SETTING INPUT/ HEATER BREAK ALARM (FOR SINGLE-PHASE) *4	04	REMOTE SETTING INPUT 4–20mA DC	Input resistance: 250Ω	Non-insulated input	
	05	REMOTE SETTING INPUT 1–5V DC	Input resistance: approx. 600kΩ		
	06	REMOTE SETTING INPUT 0–10V DC	Input resistance: approx. 570kΩ		
	14	REMOTE SETTING INPUT 4–20mA DC	Input resistance: 250Ω	Insulated input	
	15	REMOTE SETTING INPUT 1–5V DC	Input resistance:approx. 600kΩ		
	16	REMOTE SETTING INPUT 0–10V DC	Input resistance:approx. 570kΩ		
	31	Heater break alarm (heater current 30A with CT)		Selectable only when Control Output 1 or 2 is Y or P	
	32	Heater break alarm (heater current 50A with CT)			
ANALOG OUTPUT 1	0	None			
	3	0–10mV DC, Output resistance: 10Ω			
	4	4–20mA DC, Load resistance: max. 300Ω			
	6	0–10V DC, Load current: max. 2mA			
ANALOG OUTPUT 2/ SENSOR POWER SUPPLY	0	None			
	3	ANALOG OUTPUT 2	0–10mV DC, Output resistance: 10Ω		
	4	ANALOG OUTPUT 2	4–20mA DC, Load resistance: max. 300Ω		
	6	ANALOG OUTPUT 2	0–10V DC, Load current: max. 2mA		
	8	Sensor power supply	24V DC 25mA		
Additional external output control signal (DI/DO) *5	0	None			
	1	DI 5 to 10 (6 points), DO 6 to 9 (4 points)			
COMMUNICATION FUNCTION	0	None			
	5	RS-485	Shimaden standard protocol/ MODBUS (RTU/ASCII) communication protocol		
	7	RS-232C			
REMARKS	0	Without			
	9	With			

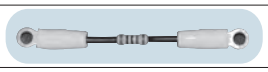
*1 Independent 2-loop control, internal cascade control, 2-input operation/1-output control and 2-input operation/2-output control are all supported in the 2-input specification. This controller is shipped with the function selected at BASIC FUNCTION set.

*2 In an internal cascade control specification, slave output for control is output to Control Output 2. Select the same specification as Control Output 2 for Control Output 1.

*3 In a 2-input operation/1-output control specification, the output for control is output to Control Output 1. Select the same specification as Control Output 1 for Control Output 2.

*4 In a 2-output specification, the heater break alarm is used by either of Control Output 1 or 2.

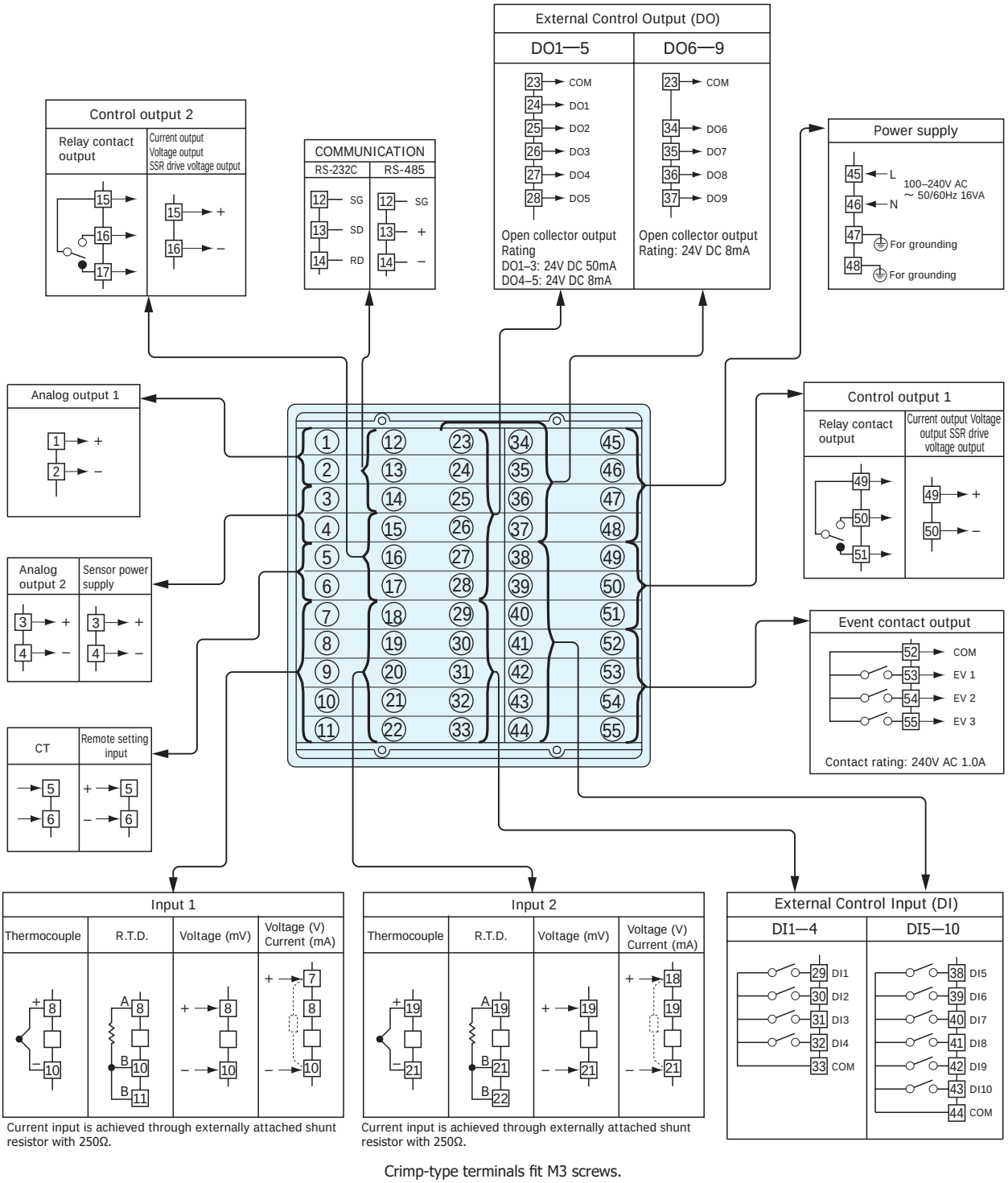
Optional Accessories

Name	Model	Description
Shunt Resistor	QCS002	 250Ω, external input resistance at current input
Relay Unit	AP2MC	Converts open collector output to contact output. 2 circuits built-in

Page 21 and after for details.

*5 When switching the SV No. by DI, 10 points of DI (CODE 1) are required.

TERMINAL ARRANGEMENT



Current input is achieved through externally attached shunt resistor with 250Ω.

Current input is achieved through externally attached shunt resistor with 250Ω.

Crimp-type terminals fit M3 screws.

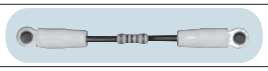
● Control motor position proportional control

ORDERING INFORMATION

ITEM	CORD	SPECIFICATIONS			
SERIES	SR23A-	96 x 96 DIN size, high-performance digital controller EV 1 to 3 (3 points), DI 1 to 4 (4 points), DO 1 to 5 (5points)			
BASIC FUNCTIONS	MS	Multi input, 1-input Servo output			
CONTROL OUTPUT 1 *1	Y	Contact, rating: 240V AC 2A, CR absorber built-in			
	R	Contact, rating: 240V AC 2A			
CONTROL OUTPUT 2	N-	None			
REMOTE SETTING INPUT	04	4–20mA DC Input resistance: 250Ω	Non-insulated input		
	05	1– 5V DC Input resistance: approx. 600kΩ			
	06	0– 10V DC Input resistance: approx. 570kΩ			
	14	4–20mA DC Input resistance: 250Ω	Insulated input		
	15	1– 5V DC Input resistance: approx. 600kΩ			
	16	0– 10V DC Input resistance: approx. 570kΩ			
ANALOG OUTPUT 1	0	None			
	3	0–10mV DC Output resistance: 10Ω			
	4	4–20mA DC Load resistance : max.300Ω			
	6	0– 10V DC Load current : max. 2mA			
ANALOG OUTPUT 2/SENSOR POWER SUPPLY	0	None			
	3	ANALOG OUTPUT 2 0–10mV DC Output resistance: 10Ω			
	4	ANALOG OUTPUT 2 4–20mA DC Load resistance : max.300Ω			
	6	ANALOG OUTPUT 2 0– 10V DC Load current : max.2 mA .			
	8	Sensor power supply 24 V DC 25mA			
Additional external output control signal (DI/DO) *2	0	None			
	1	DI 5 to 10 (6 points), DO 6 to 9 (4 points)			
COMMUNICATION FUNCTION	0	None			
	5	RS-485	Shimaden standard protocol/ MODBUS (RTU/ASCII) communication protocol		
	7	RS-232C			
REMARKS	0	Without			
	9	With			

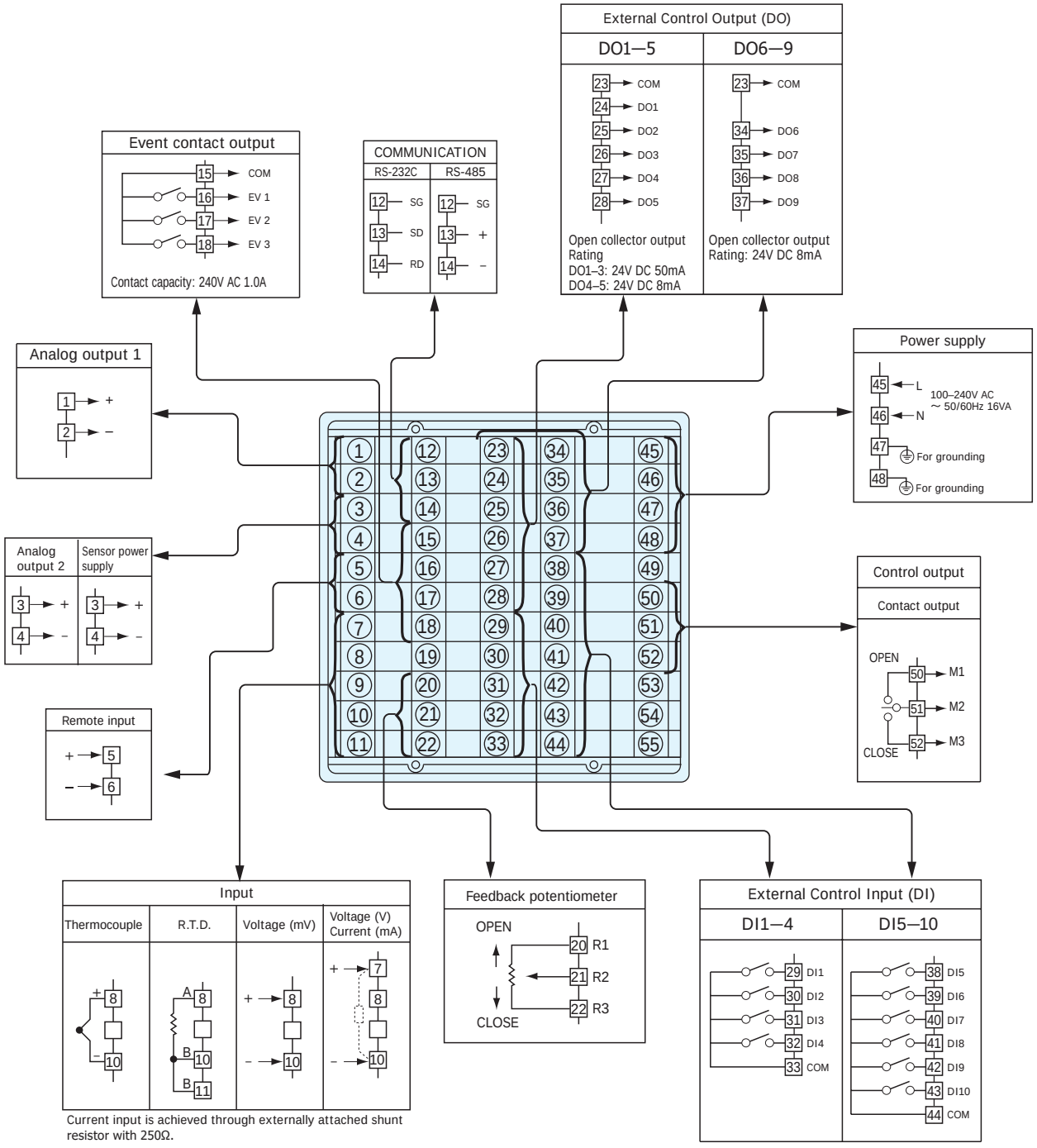
*1 Y: This must be selected when directly controlling the motor.
R: This must be selected when controlling the motor through auxiliary relay, PLC or the like.
*2 When switching the SV No. by DI, 10 points of DI (CODE 1) are required.

Optional Accessories

Name	Model	Description
Shunt Resistor	QCS002	 250Ω, external input resistance at current input
Relay Unit	AP2MC	Converts open collector output to contact output. 2 circuits built-in

Page 21 and after for details.

TERMINAL ARRANGEMENT



Crimp-type terminals fit M3 screws.

MEASURING RANGE CODES

Input Type					Cord	Item	Measuring range (°C)	Measuring range (°F)
Multi input	Thermocouple		B	*1	01	B	0.0 to 1800.0 °C	0 to 3300 °F
			R	*2	02	R	0.0 to 1700.0 °C	0 to 3100 °F
			S	*2	03	S	0.0 to 1700.0 °C	0 to 3100 °F
			K	*3	04	K	-100.0 to 400.0 °C	-150.0 to 750.0 °F
			K		05	K	0.0 to 400.0 °C	0.0 to 750.0 °F
			K		06	K	0.0 to 800.0 °C	0.0 to 1500.0 °F
			K		07	K	0.0 to 1370.0 °C	0.0 to 2500.0 °F
			K	*3	08	K	-200.0 to 200.0 °C	-300.0 to 400.0 °F
			E		09	E	0.0 to 700.0 °C	0.0 to 1300.0 °F
			J		10	J	0.0 to 600.0 °C	0.0 to 1100.0 °F
			T	*3	11	T	-200.0 to 200.0 °C	-300.0 to 400.0 °F
			N	*2	12	N	0.0 to 1300.0 °C	0.0 to 2300.0 °F
			PLII	*4	13	PLII	0.0 to 1300.0 °C	0.0 to 2300.0 °F
			PR40-20	*5	14	PR40-20	0.0 to 1800.0 °C	0 to 3300 °F
			C (WRe 5-26)		15	WRe 5-26	0.0 to 2300.0 °C	0 to 4200 °F
			U	*3	16	U	-200.0 to 200.0 °C	-300.0 to 400.0 °F
			L		17	L	0.0 to 600.0 °C	0.0 to 1100.0 °F
		Kelvin	K	*6	18	K	10.0 to 350.0 K	10.0 to 350.0 K
			AuFe-Cr	*7	19	AuFe-Cr	0.0 to 350.0 K	0.0 to 350.0 K
	RTD *9		Pt100		31	Pt 1	-200.00 to 600.00 °C	-300.0 to 1100.0 °F
					32	Pt 2	-100.00 to 100.00 °C	-150.0 to 200.0 °F
					33	Pt 3	-100.0 to 300.0 °C	-150.0 to 600.0 °F
					34	Pt 4	-60.00 to 40.00 °C	-80.00 to 100.00 °F
					35	Pt 5	-50.00 to 50.00 °C	-60.00 to 120.00 °F
					36	Pt 6	-40.00 to 60.00 °C	-40.00 to 140.00 °F
					37	Pt 7	-20.00 to 80.00 °C	0.00 to 180.00 °F
					38	Pt 8	0.000 to 30.000 °C	0.00 to 80.00 °F
					39	Pt 9	0.00 to 50.00 °C	0.00 to 120.00 °F
					40	Pt 10	0.00 to 100.00 °C	0.00 to 200.00 °F
					41	Pt 11	0.00 to 200.00 °C	0.0 to 400.0 °F
					42	Pt 12	0.00 to 300.00 °C	0.0 to 600.0 °F
					43	Pt 13	0.0 to 300.0 °C	0.0 to 600.0 °F
					44	Pt 14	0.0 to 500.0 °C	0.0 to 1000.0 °F
					59	Pt 15	0.000 to 50.000 °C	0.00 to 120.00 °F
			JPt100		45	JPt 1	-200.00 to 500.00 °C	-300.0 to 900.0 °F
					46	JPt 2	-100.00 to 100.00 °C	-150.0 to 200.0 °F
					47	JPt 3	-100.0 to 300.0 °C	-150.0 to 600.0 °F
					48	JPt 4	-60.00 to 40.00 °C	-80.00 to 100.00 °F
					49	JPt 5	-50.00 to 50.00 °C	-60.00 to 120.00 °F
					50	JPt 6	-40.00 to 60.00 °C	-40.00 to 140.00 °F
					51	JPt 7	-20.00 to 80.00 °C	0.00 to 180.00 °F
					52	JPt 8	0.000 to 30.000 °C	0.00 to 80.00 °F
					53	JPt 9	0.00 to 50.00 °C	0.00 to 120.00 °F
					54	JPt 10	0.00 to 100.00 °C	0.00 to 200.00 °F
					55	JPt 11	0.00 to 200.00 °C	0.0 to 400.0 °F
					56	JPt 12	0.00 to 300.00 °C	0.0 to 600.0 °F
					57	JPt 13	0.0 to 300.0 °C	0.0 to 600.0 °F
					58	JPt 14	0.0 to 500.0 °C	0.0 to 900.0 °F
					60	JPt 15	0.000 to 50.000 °C	0.00 to 120.00 °F
	Voltage	mV	-10 to 10mV		71	-10 to 10mV	Initial value : 0.0 to 100.0 Measuring range may be arbitrarily set within following range by scaling function. Scaling range: -19999 to 30000 digit Span: 10 to 30000 digit Lower limit value < Higher limit value Decimal alignment: None, decimal positions: 1, 2, 3 or 4 If using at 0 to 20 mA, select code 84 (0 to 5 V); if using 4 to 20 mA, select code 85 (1 to 5 V) and attach a separate sold shunting resistor QCS002 (250 Ω) between the input terminals.	
			0 to 10mV		72	0 to 10mV		
			0 to 20mV		73	0 to 20mV		
			0 to 50mV		74	0 to 50mV		
			10 to 50mV		75	10 to 50mV		
			0 to 100mV		76	0 to 100mV		
			-100 to 100mV		77	-100 to 100mV		
		V	-1 to 1V		81	-1 to 1V		
			0 to 1V		82	0 to 1V		
			0 to 2V		83	0 to 2V		
			0 to 5V		84	0 to 5V		
			1 to 5V		85	1 to 5V		
			0 to 10V		86	0 to 10V		
			-10 to 10V		87	-10 to 10V		

Note: Minimal decimal is selectable.

Note:

*1. Thermocouple B: accuracy is not guaranteed at 400°C/750° F or below.
Accuracy at 400 to 800°C (750 to 1472°F) is ±(0.2% FS + 1 digit).

*2. Thermocouple R, S, N: accuracy of indicated values below 200°C and 392°F is ±(0.2% FS+ 1 digits).

*3. Thermocouple K, T, U: accuracy at -100°C and -148°F or below is ±(0.5% FS + 1 digit).
Accuracy at -100 to 0°C (-148 to 32°F) is ±(0.2% FS + 1 digit).

*4 Thermocouple PLII: accuracy is ±(0.2% FS + 1 digit).

*5. Thermocouple PR40-20: accuracy at 400°C and 752°F or below is ±(0.5% FS + 1 digit).
Accuracy at 400 to 800°C (752 to 1472°F) is ±(0.3% FS + 1 digit).

*6. Thermocouple K (Kelvin) : accuracy temperature range:
10.0 to 30.0 K: ±(0.75% FS + 1 digit)
30.0 to 70.0 K: ±(0.30% FS + 1 digit)
70.0 to 350.0 K: ±(1.0% FS + 1 digit)

*7. Thermocouple AuFe-CR: accuracy is ±(0.25% FS + 1 digit).

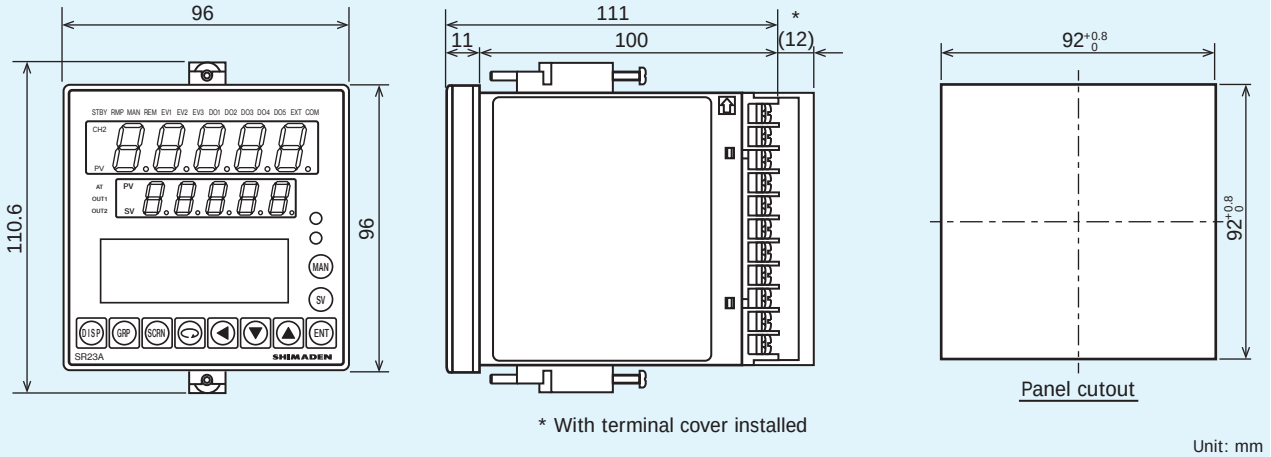
*8. If higher limit exceeds 32000 digit, scaleover is displayed.

*9. If lower than -240 °C in all ranges of the resistance temperature detector, underscale is displayed.

Note: Unless otherwise specified, the measuring range will be set as listed below during the shipment from the factory.

Input	Standard/Rating	Measuring range
Thermocouple	JIS K	0.0 to 800.0 °C

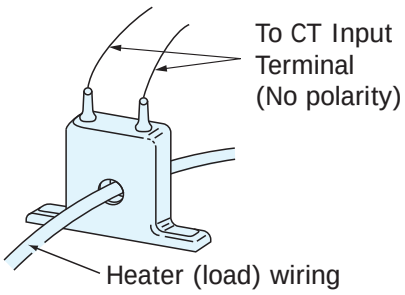
EXTERNAL DIMENSIONS/PANEL CUTOUT



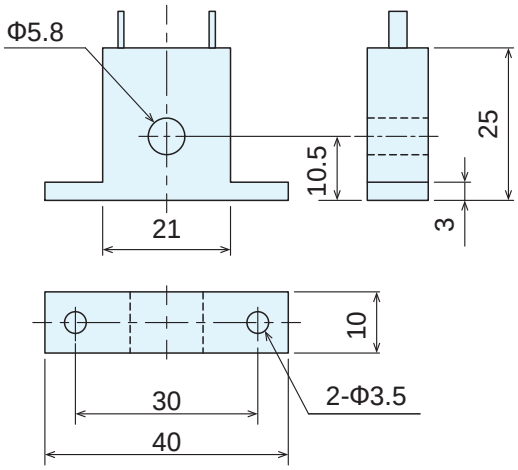
Unit: mm

CURRENT TRANSFORMER (CT) FOR HEATER BREAK ALARM

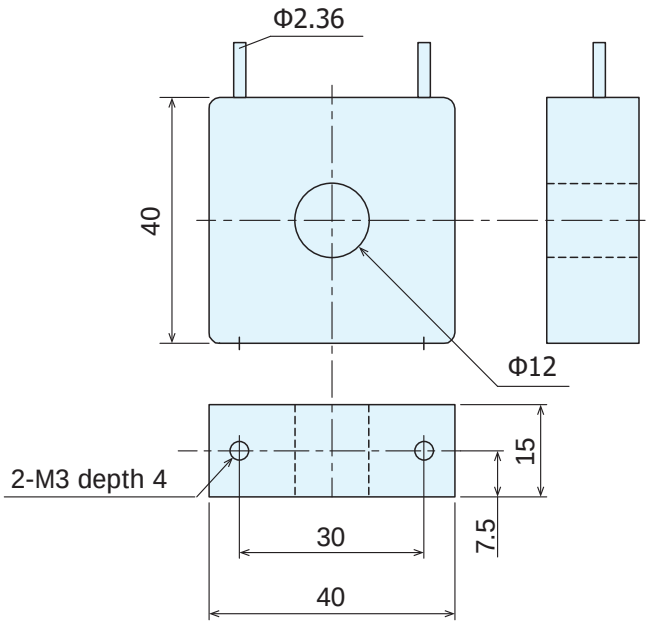
● CT-wiring example



■ QCC01 for 0–30 A



■ QCC02 for 0–50 A



Unit: mm

■ Relay Unit Model AP2MC

(Converts open collector output to contact output. 2 circuits built-in)

Head Office & Saitama Factory
ISO 9001/ISO 14001 Certification Obtained

(The contents of this brochure are subject to change without notice.)

Temperature and Humidity Control Specialists
SHIMADEN CO., LTD.
Head Office: 2-30-10 Kitamachi, Nerima-Ku, Tokyo 179-0081 Japan
Phone: +81-3-3931-7891 Fax: +81-3-3931-3089
E-MAIL: exp-dept@shimaden.co.jp URL: https://www.shimaden.co.jp