

# 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  $\pm (0.1\% FS + 1 \text{ digit})$
- 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  $\pm 10\%$ )
- Sensor power supply

# COPING WITH ADVANCED PROCESS CONTROL

Temperature °C, Pressure MPa, Flowrate m<sup>3</sup>/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

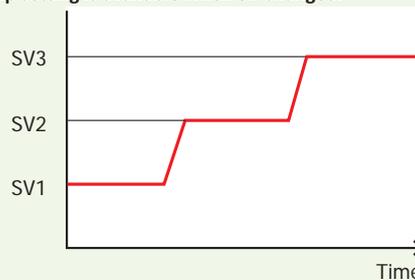
→  
All of them  
are  
acceptable.



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

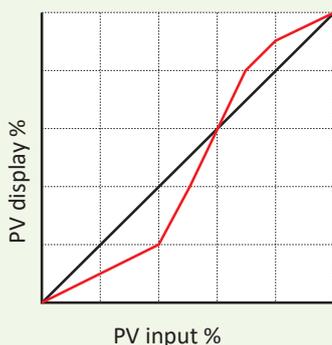
### Setting of SV is allowed up to 10 points.

- 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.



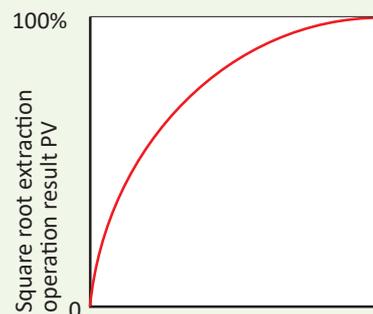
### Linearization approximation

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

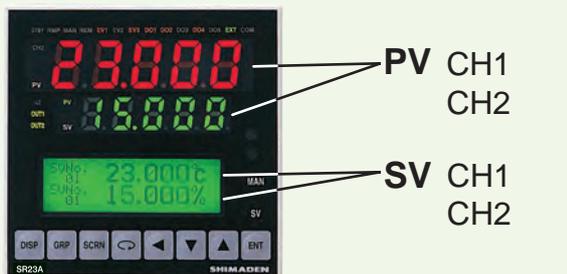
- DISP**: Return to the basic screen  
: Switching to display mode
- GRP**: Go to screen group
- SCRN**: Go to any screen within the group
- ↻**: Selection of editing and setting parameters
- ◀▶**: Increase/decrease of numeric value and scaling factor
- ENT**: Registration of numeric value and/or data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



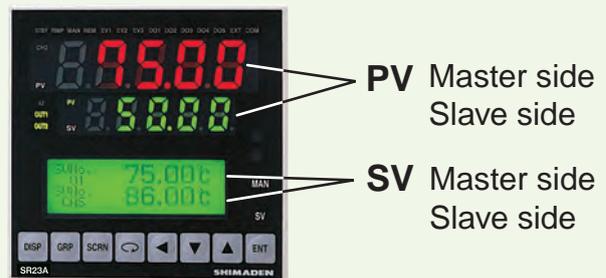
EASY PARAMETER SETTING THANKS TO THE DIALOG METHOD THROUGH 4 LINES LCD DISPLAY

## DISPLAY MODE CORRESPONDING TO EACH SPECIFICATION

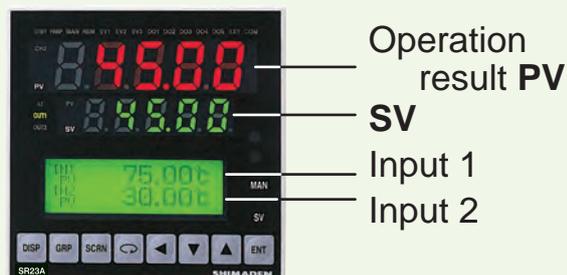
### ◆ Independent 2-loop control



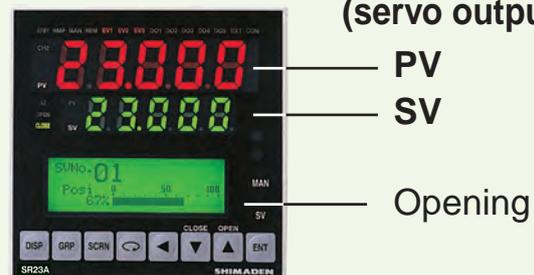
### ◆ Internal cascade control



### ◆ 2-input operation control



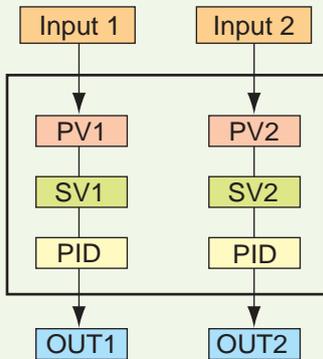
### ◆ Positioning proportional control (servo output)



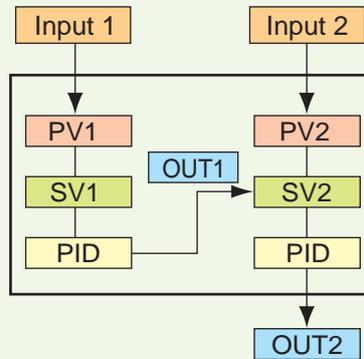
# COPING WITH MULTIFARIOUS APPLICATIONS

## 2-Input Control by One Unit

### Independent 2-loop control

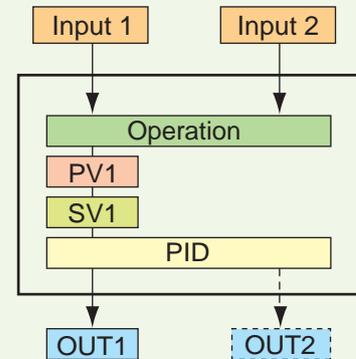


### Internal cascade control



### 2-input operation control

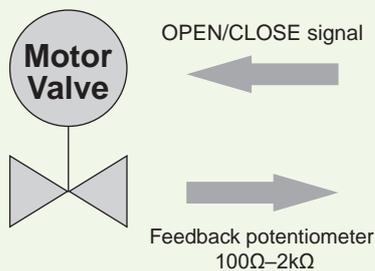
(max. value, min. value, deviation value, average value)



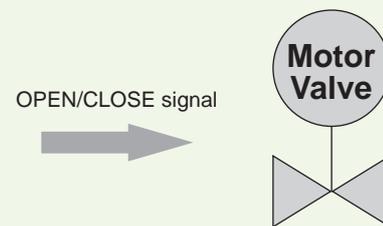
\* 2-outputs (for heat & cool/heat & heat/cool & cool) may also be provided.

## 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

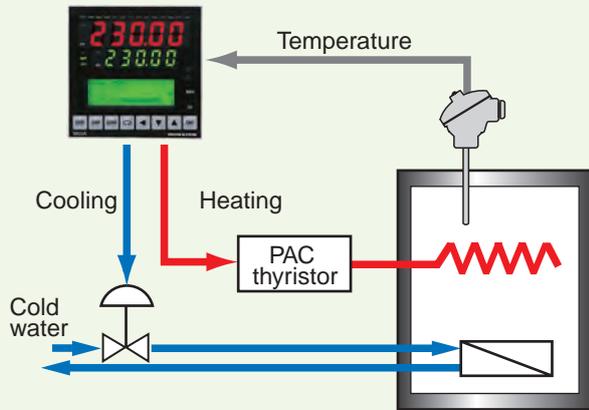
Externally output PV, SV, deviation value, output value and position value per channel in analog signal

### Communication function

Shimaden standard protocol  
MODBUS (RTU/ASCII)  
communication protocol

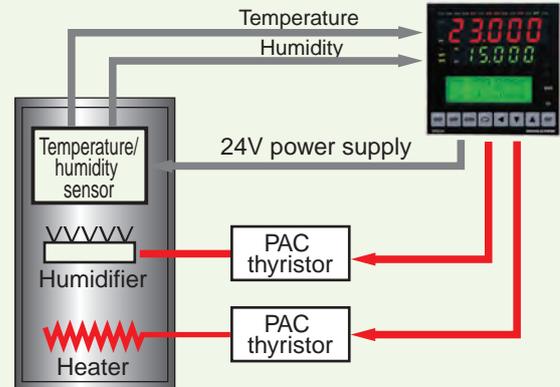
## Heating/Cooling Control

### 1-input Specification



## Constant-temperature/constant-humidity control

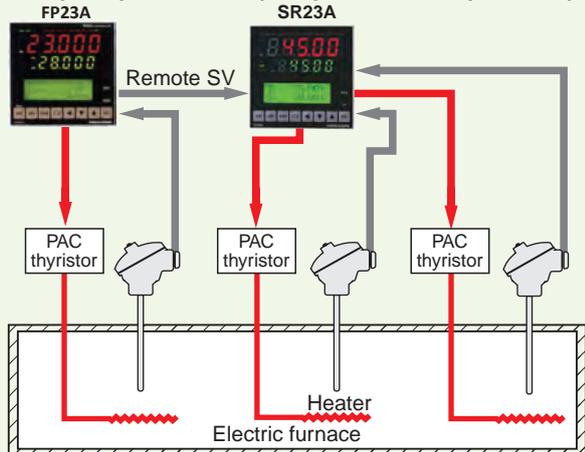
### 2-input Specification (Independent 2-loop control)



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

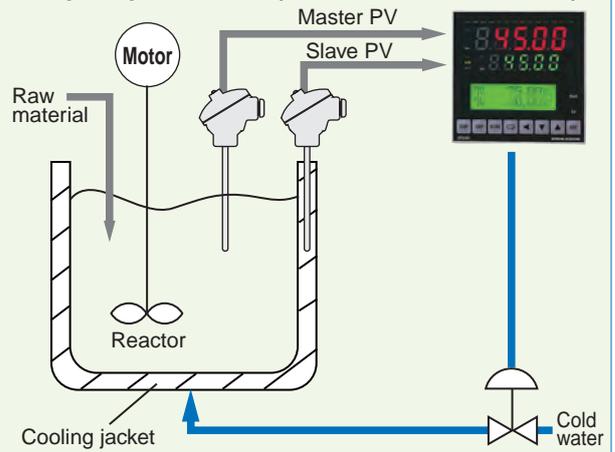
## 3-Zone Program Temperature Control of Electric Furnace

### 2-input Specification (Independent 2-loop control)



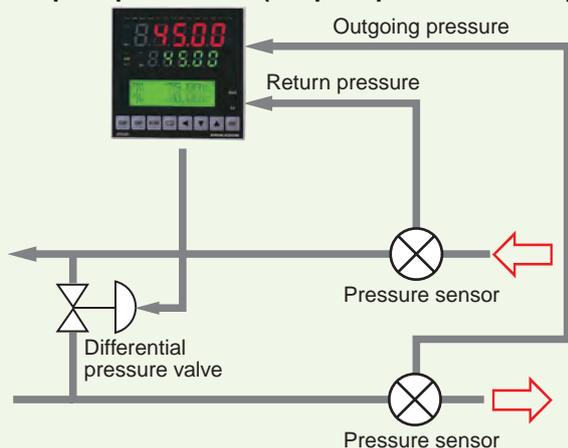
## Cascade Control of Temperature inside Reactor

### 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 mm

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**

Thermocouple input (TC)

:  $\pm(0.1\% + 1 \text{ digit})$  of measuring range (see range table for individual)

RTD input (pt)

:  $\pm(0.1\% \text{ FS} + 1^\circ\text{C})$  does not include reference contacts

Voltage input (mV, V)

:  $\pm(0.1\% \text{ FS} + 0.1^\circ\text{C} + 1 \text{ digit})$

Current input (mA)

:  $\pm(0.1\% \text{ FS} + 1 \text{ digit})$

● **Temperature range for maintaining display accuracy**

:  $\pm(0.1\% \text{ FS} + 1 \text{ digit}) + \text{external resistance accuracy}$

● **Display resolution**

:  $23^\circ\text{C} \pm 5^\circ\text{C}$

● **Sampling cycle**

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

■ **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

:  $\pm(0.1\% \text{ FS} + 1 \text{ digit})$

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

:  $\pm 10000 \text{ digit}$

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  $\Omega$

0 to 10 V: Approx. 570 k $\Omega$

1 to 5 V: Approx. 600 k $\Omega$

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  $\leq$  setting current, when control output is ON
  - Heater loop error detection : Heater current  $\geq$  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 : Measured value (measured value in execution)  
PV : Set value (set value in execution)  
SV : Deviation value (measured value in execution - set value in execution)  
DEV : Control Output 1  
OUT1 : Control Output 2 (in 2-output specification, 2-input specification)  
OUT2 : Individual selection (individual output)  
● Output rating : 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 : EEPROM, 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 : With/without feedback potentiometer
  - Setting : Any between 100 Ω and 2 kΩ/three-wire type
  - Potentiometer rating
- Control output : Contact 240 V AC 2A
  - Output type : 50 msec
  - Output update cycle
  - 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

Action delay time

Standby action

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

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

: 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

: 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

SV

DEV

OUT1

Posi

: Measured value (measured value in execution)

: Set value (set value in execution)

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

: Control Output 1

: 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°C
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°C
● 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		
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	
	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 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	
Additional external output control signal (DI/DO) *2	8	Sensor power supply 24V DC 25mA		
	0	None		
	1	DI 5 to 10 (6 points), DO 6 to 9 (4 points)		
COMMUNICATION FUNCTION	2	DI 5 to 10 (6 points), DO 6 to 13 (8 points)		
	0	None		
	5	RS-485	Shimaden standard protocol	
REMARKS	7	RS-232C	/ MODBUS (RTU/ASCII) communication protocol	
	0	Without		
	9	With		

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

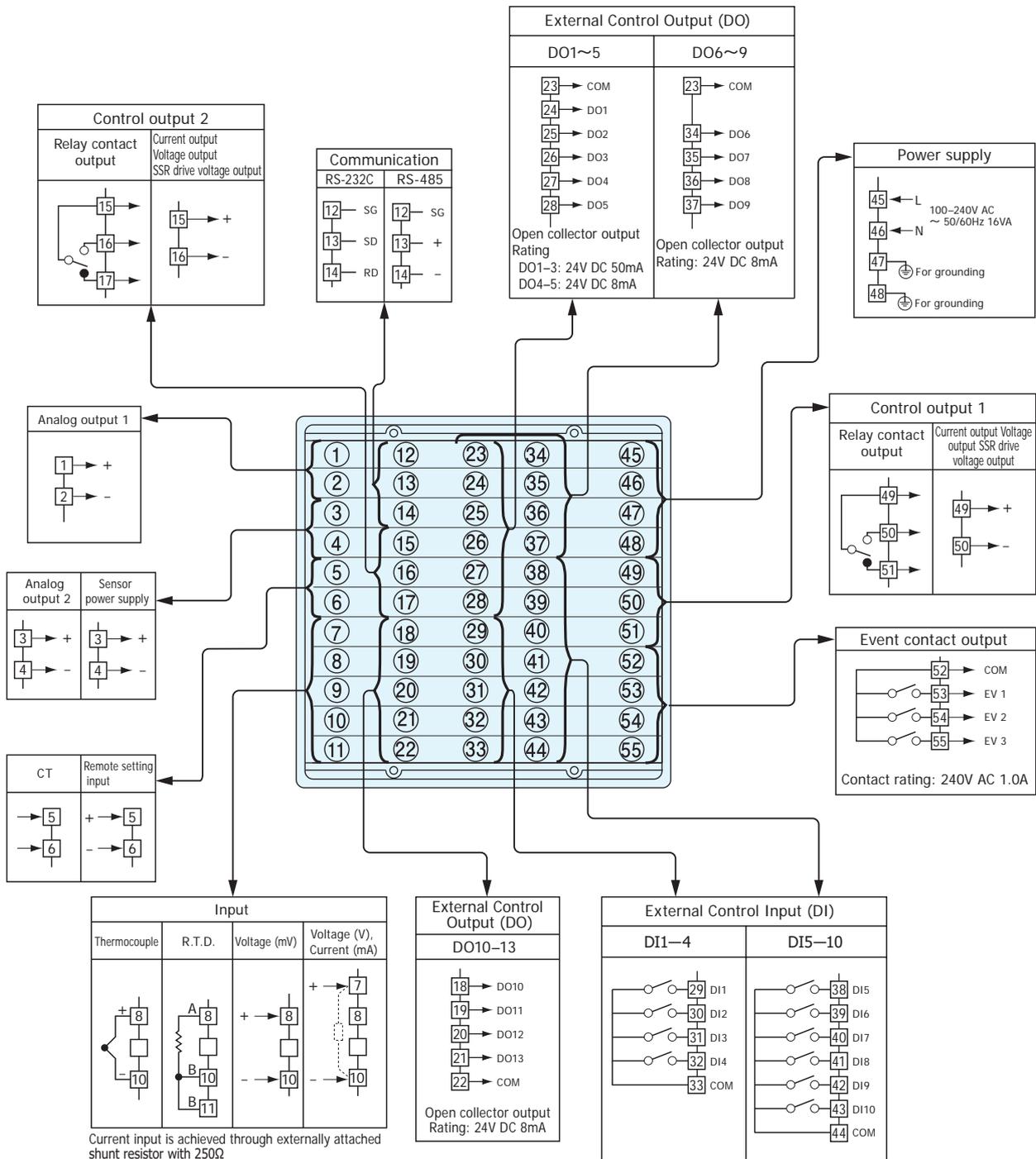
\*2 Ten DI points (code 1 or 2) are required for switching the SV No. by DI.

## 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/		
	7	RS-232C	MODBUS (RTU/ASCII) communication protocol		
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.

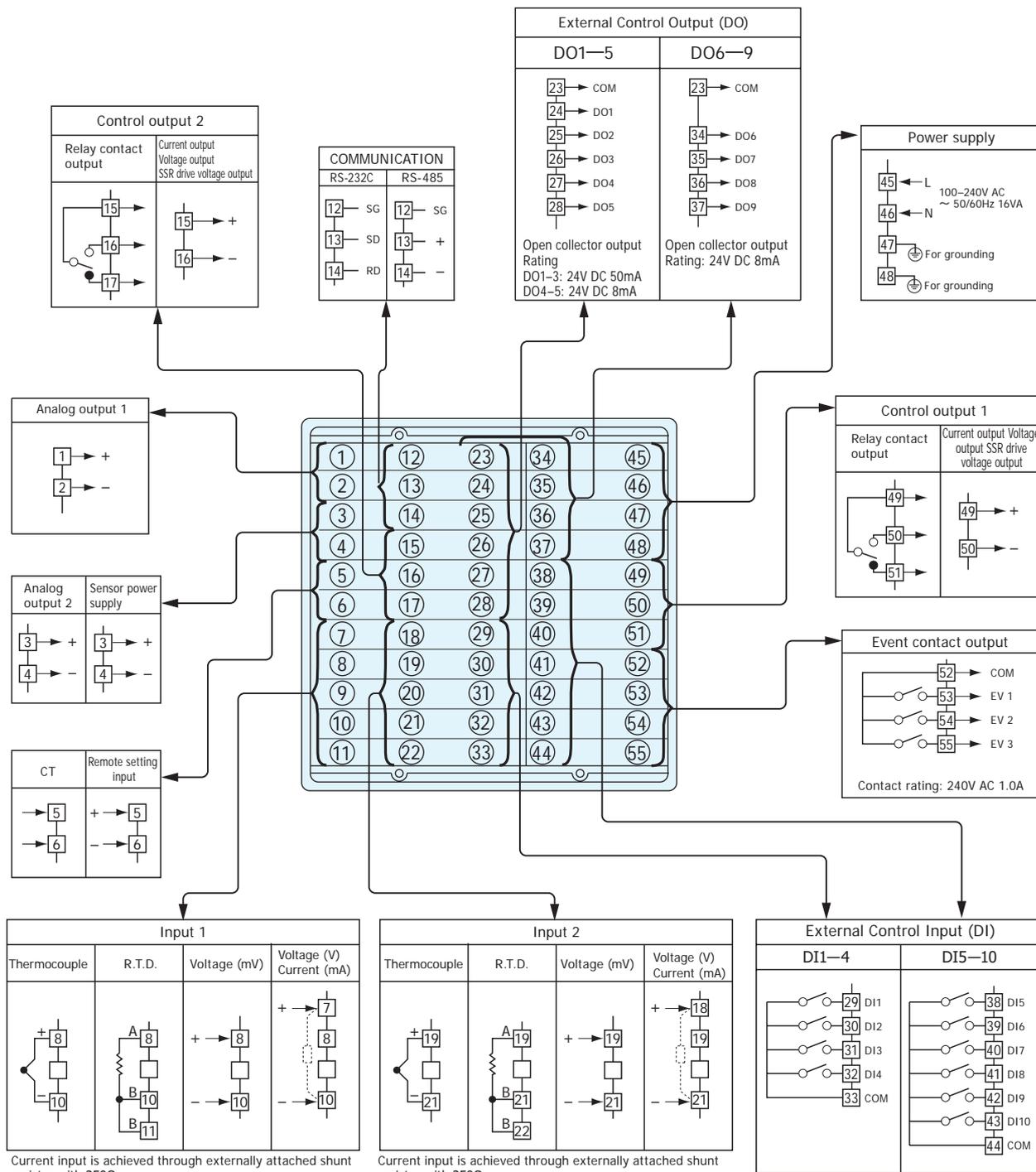
**Optional Accessories**

Name	Model	Description
Shunt Resistor	OCS002	 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



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
	05	1- 5V DC	Input resistance: approx. 600kΩ
	06	0- 10V DC	Input resistance: approx. 570kΩ
	14	4-20mA DC	Input resistance: 250Ω
	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 .
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/
	7	RS-232C	MODBUS (RTU/ASCII) communication protocol
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.

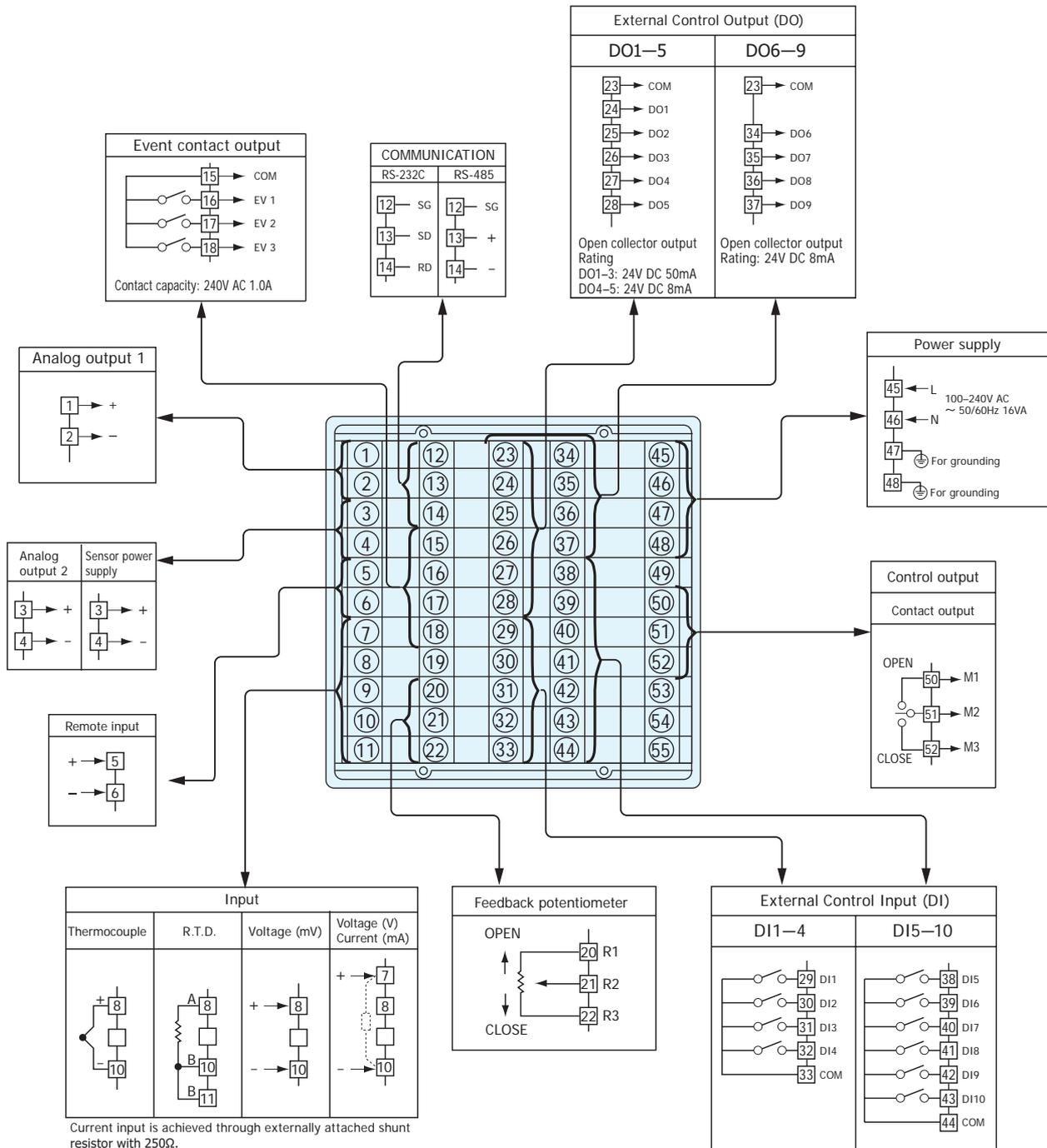
\*2 When switching the SV No. by DI, 10 points of DI (CODE 1) are required.

**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.

Input Type			Cord	Item	Measuring range (°C)		Measuring range (°F)		
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	*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	
Multi input	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
				45	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				
		0 to 10mV	72	0 to 10mV	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 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						

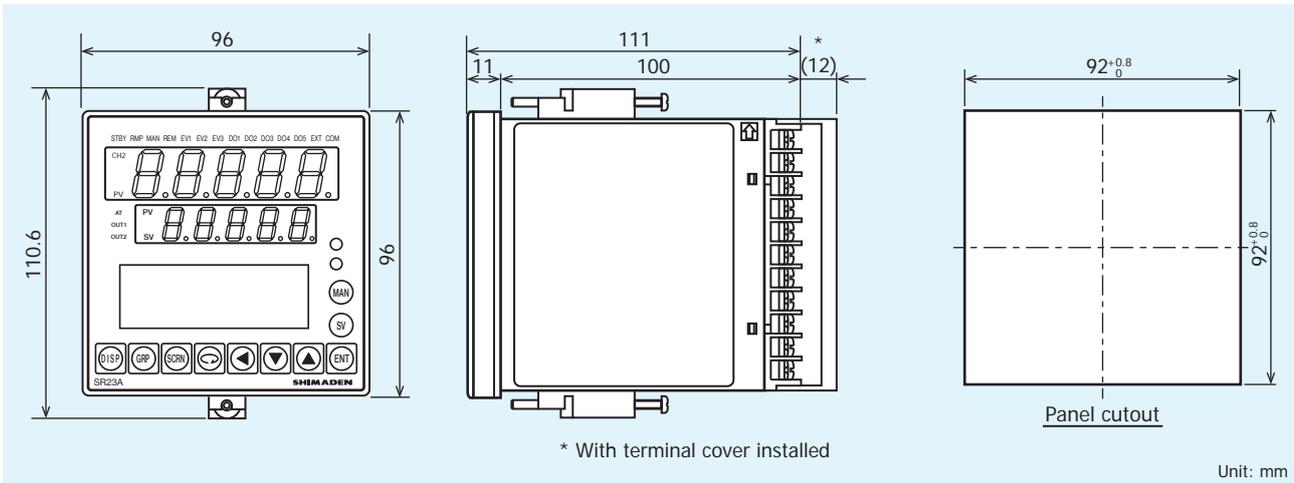
Note: Minimal decimal is selectable.

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.

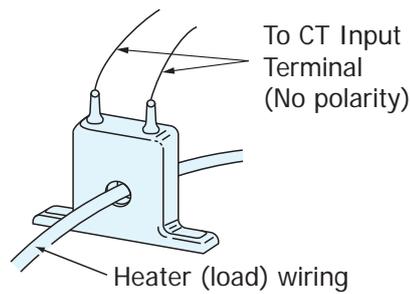
Note: Unless otherwise specified, the measuring range will be set as listed below during the shipment from the factory.

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

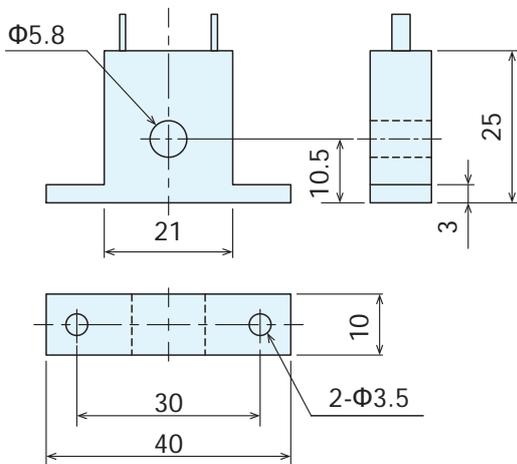


**CURRENT TRANSFORMER (CT) FOR HEATER BREAK ALARM**

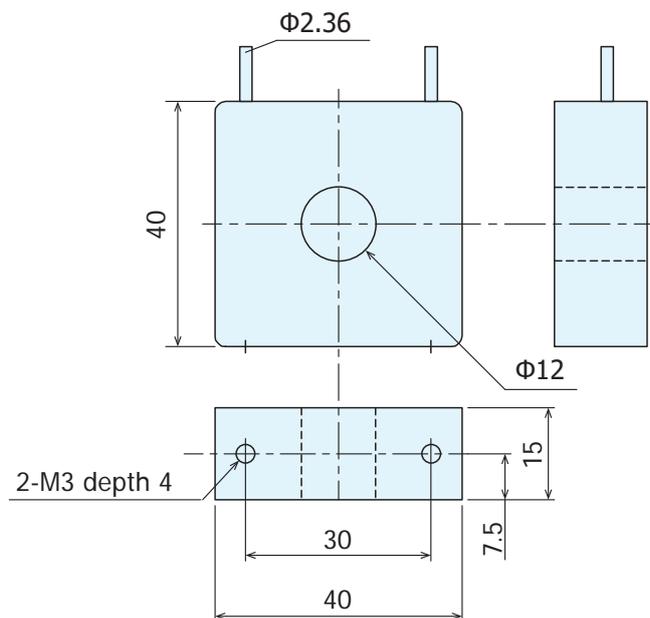
● CT-wiring example



■ QCC01 for 0–30 A



■ QCC02 for 0–50 A



■ **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.)

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