| °C |
| %RH |
| SHIMADEN |

Series **SR90**

SHIMADEN DIGITAL CONTROLLER

C E **approved**

BASIC FEATURES

☐ *Multi-input and multi-range performance*

☐ *Large 20mm bright display (SR93)*

☐ *Readable from a distance and in a low light area*

☐ *2-output heating and cooling control available*

☐ *RS-232C or RS-485 Interface (MODBUS/Shimaden) available*

☐ *Dust and splash proof front panel equivalent to IP66*

☐ *A wide selection of additional functions (optional) is available to suit various needs.*

■ **Display**

● Digital display
: Measured value (PV)/7 segments red LED 4 digits

  Target set value (SV)/7 segments green LED 4 digits

● Display accuracy
: ±(0.3%FS + 1 digit)

  Excluding reference contact temperature compensation accuracy of thermocouple input.

  Accuracy of readings lower than -100˚C of thermocouples K, T, U inputs is ±0.7%FS. Accuracy

  guarantee not applicable to 400˚C (752˚F) and below of B thermocouple.

● Display accuracy maintaining range
: 23˚C ± 5˚C (18 to 28˚C)

● Display resolution
: Depends on measuring range (0.001, 0.01, 0.1 and 1)

● Measured value display range
: -10% to 110% of measuring range

● Display updating cycle
: 0.25 seconds

● Action display/color
: 7 type, LED lamp display

  Control output (OUT1, OUT2)/Green Event (EV1, EV2)/Orange Auto tuning/Green

  Manual control output (MAN)/Green Set value bias, communication (SB/COM)/Green

■ **Setting**

● Setting method
: By operating 4 keys (⊙, ▼, ▲ and ㊜) on the front panel

● Target value setting range
: Same as measuring range (within setting limiter)

● Setting limiter
: Individual setting for higher and lower limits, any value is selectable within measuring range (Lower

  limit value<Higher limit value)

■ **Input**

● Type of input
: Selectable from multiple (TC, Pt, mV), voltage (V) and current (mA)

● Thermocouple
: B, R, S, K, E, J, T, N, PL II, C (Wre 5-26), {U, L (DIN 43710)}

  Input impedance
: 500kΩ minimum External resistance tolerance: 100Ω maximum

  Burnout function
: Standard feature (up scale) Reference junction compensation accuracy:

  ± 1˚C (within the accuracy maintaining range (23 ± 5˚C))

  ± 2˚C (between 5 and 45˚C of ambient temperature)

● R.T.D.
: Pt100/JPt100, 3-wire type

  Normal current
: 0.25 mA

  Lead wire tolerance
: 5Ω maximum/wire (3 lead wires should have the same resistance.)

● Voltage
: mV:　　-10 to 10, 0 to 10, 0 to 20, 0 to 50, 10 to 50, 0 to 100mv DC

  V:　　-1 to 1, 0 to 1, 0 to 2, 0 to 5, 1 to 5, 0 to 10V

  Input impedance
: 500kΩ minimum

● Current mA
: 0 to 20, 4 to 20mA DC Receiving impedance: 250Ω

● Input scaling function
: Scaling possible for voltage (mV, V) or current (mA) input

  Scaling range
: -1999 to 9999 digit

  Span
: 10 to 5000 digit

  Position of decimal point
: None, 1, 2 and 3 digits on the right of decimal point

● Sampling cycle
: 0.25 seconds

● PV bias
: -1999 to 2000 digit

● PV filter
: 0 to 100 seconds

● Isolation
: Control input not insulated from system, set value bias, and CT input but insulated from others

■ **Control**

● Control mode

With 1 output	: Expert PID control with auto tuning function
	RA (reverse action characteristic): Heating action
	DA (direct action characteristic): Cooling action
With 2 outputs	: Expert PID control with auto tuning function + PID control
	PID (output 1) + PID (output 2)
	RA (reverse action characteristic): Heating action
	(OUT1) and cooling action (OUT2)
	DA (direct characteristic): 2-stage heating action

● Type of control/rating : Contact/1a 240V AC 2A (resistive load)

                                            1.2A (inductive load)

   (Common to Output 1 and 2) : SSR drive voltage/12V±1.5V DC (Maximum load current 30mA)

                                            Current/4 to 20mA DC (Maximum load resistance 600Ω)

                                            Voltage/0 to 10V DC (Maximum load current 2mA)

● Control output resolution : Control output 1: approx. 0.0125% (1/8000)

                                            Control output 2: approx. 0.5% (1/200)

● Control output 1

Proportional band (P)	: OFF, 0.1 to 999.9% (ON-OFF action by OFF)
Integral time (I)	: OFF, 1 to 6000 seconds (P or PD action by OFF)
Derivative time (D)	: OFF, 1 to 3600 seconds (P or PI action by OFF)
Set value function	: OFF, 0.01 to 1.00
ON-OFF hysteresis	: 1 to 999 digit (Effective when P=OFF)
Manual reset	: −50.0 to 50.0% (Effective when I=OFF)
Higher/lower limit output limiter	: Lower limit 0.0 to 99.9%, higher limit 0.1 to 100.0% (Lower limit value < Higher limit value)
Proportional cycle	: 1 to 120 seconds (for contact and SSR drive voltage output)

● Control output 2 (option)

Proportional band (P)	: OFF, 0.1 to 999.9% (ON-OFF action by OFF)
Integral time (I)	: OFF, 1 to 6000 seconds (P or PD action by OFF)
Derivative time (D)	: OFF, 1 to 3600 seconds (P or PI action by OFF)
Set value function	: OFF, 0.01 to 1.00
ON-OFF hysteresis	: 1 to 999 digit (Effective when P=OFF)
Dead band	: -1999 to 5000 digit (Overlap with a negative value)
Higher/lower limit output limiter	: Lower limit 0.0 to 99.9%, higher limit 0.1 to 100.0% (Lower limit value < Higher limit value)
Proportional cycle	: 1 to 120 seconds (for contact and SSR drive voltage output)

● Manual control

Output setting range	: 0.0 to 100.0%
Setting resolution	: 0.1%
Manual ↔ auto switching	: Balanceless bumpless (within proportional range)

● Soft start : OFF, 1 to 100 seconds

● AT point : SV value in execution

● Control output characteristic : RA (reverse action characteristic)/DA (direct action characteristic) switching by front key or

                                            communication

                With 2 outputs : RA (heating/cooling)/DA (2 stage heating)

● Isolation : Contact output isolated from all.

                                            Analog output not insulated from SSR drive voltage, current and voltage but insulated from others.

                                            (In case another output is also SSR drive voltage, current or voltage, two outputs are not insulated

                                            from each other.)

■ **Event output (option)**

● Number of event points : 2 points of EV1 and EV2

● Types : Selectable from the following 9 types for EV1 and EV2:

oFF	No selection
Hd	Higher limit deviation
Ld	Lower limit deviation
od	Outside higher/lower limit deviations
Cd	Within higher/lower limit deviations
HA	Higher limit absolute value
LA	Lower limit absolute value
So	Scaleover
Hb	Heater break/loop alarm

● Event setting range : Absolute values (both higher limit and lower limit): Within measuring range

Deviations (both higher limit and lower limit): −1999 to 2000 digit

Higher/lower limit deviations (within/outside): 0 to 2000 digit

● Event action : ON-OFF action

● Hysteresis : 1 to 999 digit

● Standby action : Selectable from the following 4 types

EV1 and EV2 : 1. Without standby action.

2. Standby when power is applied.

3. Standby when power is applied and when SV value in execution is changed.

4. Control mode without standby action (No alarm is output at the time of abnormal input).

● Output type/rating : Contact (1a × 2 points common)/240V AC 1A (resistive load)

● Output updating cycle : 0.25 seconds

■ **Heater break/heater loop alarm (option)**

Heater break/loop detection only for OUT1 (Selectable when output type is contact or SSR drive voltage)

● Current capacity : 30A or 50A to be designated when CT is ordered.

● Alarm action : Heater current is detected by external CT provided as an accessory.

When heater break is detected while control output is ON=Alarm output ON

When heater loop alarm is detected while control output is OFF=Alarm output ON

● Current setting range : OFF, 0.1 to 50.0A (Alarm action is stopped by setting OFF)

● Setting resolution : 0.1A

● Current display range : 0.0 to 55.0A

● Display accuracy : ±2.0A (Sine wave at 50Hz)

● Minimum time to identify action : 0.25 seconds (every 0.5 seconds) common to ON and OFF

● Alarm retention mode : Selectable from lock (to retain) and real (not to retain).

● Standby action : Selectable from without (OFF) and with (ON).

● Sampling cycle : 0.5 seconds

● Isolation : CT input not insulated from system and other inputs but insulated from the others.

■ **Set value bias/DI (option)**

● Number of input points : 1 point

● Setting range : -1999 to 5000 digit

● Action input : Non-voltage contact or open collector (level action) about 5V DC, 1mA maximum

● Minimum level retention time : 0.15 seconds

● DI types : 1) None

2) SB; set value bias

3) STBY; standby

4) ACT; control action characteristics

● Isolation : Action input not insulated from system and other inputs but insulated from others

■ **Communication function (option)**

● Type of communication	: RS-232C, RS-485
● Communication system	: RS-232C : 3-line type half duplex system
	RS-485 : 2-line type half duplex system
	(RS-485 is of half-duplex multi-drop (bus) system)
● Communication distance	: RS-232C : The longest: 15 m
	RS-485 : The longest: 500 m (depending on conditions)
● Number of connectable instruments	: RS-232: 1, RS-485: up to 31
● Synchronization system	: Start-stop synchronization system
● Communication speed	: 1200, 2400, 4800, 9600, 19200 bps
● Communication address	: 1 to 255
● Communication delay time	: 1 to 100 (× 0.512 msec)
● Communication memory mode	: EEP/RAM/r_E
● Communication protocol(1)	: Shimaden standard protocol
Data format	: 7E1, 7E2, 7N1, 7N2, 8E1, 8E2, 8N1, 8N2
Control code	: STX_ETX_CR, @_:_CR
Communication BCC	: Add, Add two's cmp, XOR, None
Communication code	: ASCII code
● Communication protocol(2)	: MODBUS ASCII mode
Data format	: 7E1, 7E2, 7N1, 7N2
Control code	: CRLF
Error check	: LRC check
Function code	: 03H, 06H (Hex)
	1) 03H, read data
	2) 06H, write data
● Communication protocol(3)	: MODBUS RTU mode
Data format	: 8E1, 8E2, 8N1, 8N2
Control code	: None
Error check	: CRC-16
Function code	: 03H, 06H (Hex)
	1) 03H, read data
	2) 06H, write data
● Isolation	: Communication signals insulated from system, each input and each output.

■ **Analog output (option)**

● Number of output points	: 1 point
● Type of analog output	: Selectable from measured value, target value (SV in execution), control output 1 and control output 2.
● Output signal/rating	: 4 to 20mA DC/Maximum load resistance 300Ω
	0 to 10V DC/Maximum load current 2mA
	0 to 10mV DC/Output resistance 10Ω
● Output scaling	: Measured value, target value: Within measuring range (inversed scaling possible)
	Control output 1 and 2 0.0 to 100.0% (inversed scaling possible)
● Output accuracy	: ±0.3% FS (with respect to displayed value)
● Output resolution	: Approx. 0.01% (1/10000)
● Output updating cycle	: 0.25 seconds
● Isolation	: Analog output insulated from system and inputs but not insulated from control output except contact output.

SPECIFICATIONS

■ **General specifications**

● Data storage : Non-volatile memory (EEPROM)

● Environmental conditions for instrument operation

  Temperature : -10 to 50 °C

  Humidity : 90% RH or less (no dew condensation)

  Height : 2000m from the sea level or lower

  Over voltage category : II

  Pollution class : 2 (IEC 60664)

● Storage temperature : -20 to 65 °C

● Supply voltage : Either 100 to 240V AC±10% 50/60Hz or 24V AC/DC±10% to be designated.

● Power consumption : SR91: 100 to 240VAC 11VA maximum for AC; 6W for DC 24V; 7VA for AC 24V

       SR92, SR93 and SR94: 100 to 240VAC 15VA maximum for AC; 8W for DC

● Input/noise removal ratio : 50 dB or higher in normal mode (50/60 Hz)

       130 dB or higher in common mode (50/60 Hz)

● Applicable standards : Safety: IEC61010-1 and EN61010-1

       EMC : EN61326-1

       RoHS Compliance

● 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.

● 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

● Protective structure : Front operating panel only is dust-proof and drip-proof. (equivalent to IP66, NEMA4X)

● Material of case : PPE resin molding (equivalent to UL94V-1)

● External dimensions : SR91: H48 × W48 × D111 (Panel depth: 100) mm

       SR92: H72 × W72 × D111 (Panel depth: 100) mm

       SR93: H96 × W96 × D111 (Panel depth: 100) mm

       SR94: H96 × W48 × D111 (Panel depth: 100) mm

● Mounting : Push-in panel (one-touch mount)

● Panel thickness : 1.0 to 4.0 mm

● Panel cutout : SR91: H45 × W45 mm

       SR92: H68 × W68 mm

       SR93: H92 × W92 mm

       SR94: H92 × W45 mm

● Weight : SR91: Approximately 170 g

       SR92: Approximately 280 g

       SR93: Approximately 330 g
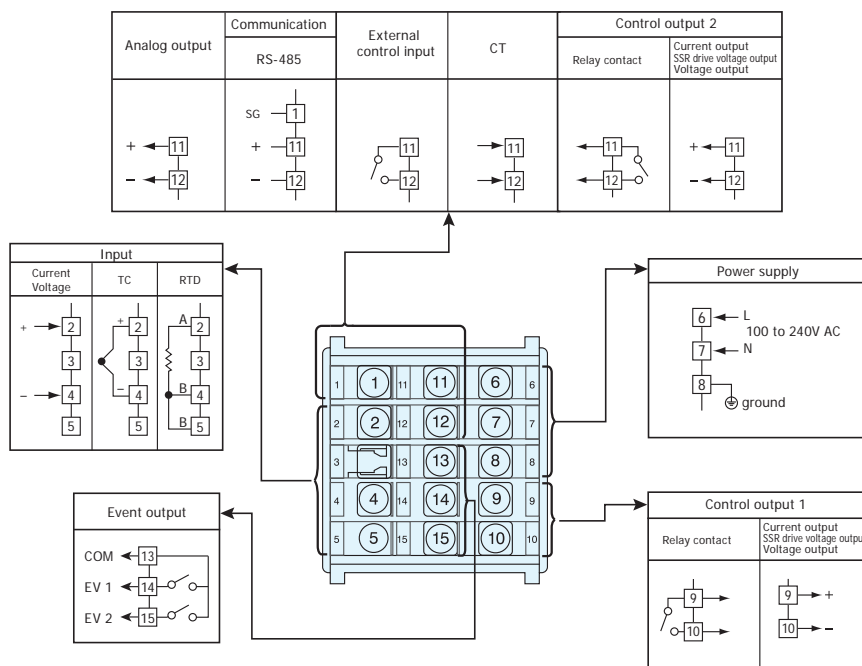
       SR94: Approximately 240 g

ORDERING INFORMATION

ITEMS	CODE			SPECIFICATIONS	
SERIES	SR91-			MPU-Based Auto-Tuning PID Digital Controller, DIN H48 × W48 × D110 mm	
INPUT	8	Multi input	Thermocouple	B, R, S, K, E, J, T, N, PLII, C (WRe 5-26), {U, L (DIN43710)}	
			R.T.D.	Pt100/JPt100	For voltage and current input: Scaling Possible Range: -1999 to 9999 Span : 10 to 5000 Note : Inverse scaling is not possible
			Voltage (mV)	-10 to 10, 0 to 10, 0 to 20, 0 to 50, 10 to 50 and 0 to 100mV DC Input resistance: 500 kΩ min.	
	4	Current (mA)		0 to 20, 4 to 20 mA DC Receiving impedance: 250 Ω	
	6	Voltage (V)		-1 to 1, 0 to 1, 0 to 2, 0 to 5, 1 to 5, 0 to 10V DC Input resistance: 500 kΩ min.	
CONTROL OUTPUT (1)	Y-	Contact		1a, Contact capacity: 240V AC 2.5A/resistive load Proportional cycle: 1 to 120 sec	
	I-	Current		4 to 20mA DC Load resistance: 600Ω max.	
	P-	SSR drive voltage		12V±1.5V DC/30mA max. Proportional cycle: 1 to 120 sec.	
	V-	Voltage		0 to 10V DC Load current: 2mA max	
POWER SUPPLY	90-			100 to 240V AC ±10% 50/60Hz	
	08-			24V AC/DC ±10% 50/60Hz	
EVENT OUTPUT (OPTION)	0			None	
	1			Contact output (2a) Ev1, Ev2: 240V AC 1A/resistive load	
OPTION		Control output (2)	N	None	
			Y	Contact	1a, Contact capacity: 240V AC 2.5A/resistive load Proportional cycle: 1 to 120 sec.
			I	Current	4 to 20mA DC Load resistance: 600Ω max.
			P	SSR drive voltage	12V±1.5V DC/30mA max. Proportional cycle: 1 to 120 sec.
			V	Voltage	Voltage: 0 to 10V DC Load current: 2mA max.
		Heater break alarm	1	Current setting range: 0.1 to 30.0A (with CT 30A)	Note: Avaialble only when control output (1) is Y or P and when event output is selected.
			2	Current setting range: 0.1 to 50.0A (with CT 50A)	
		Analog output	3	Voltage: 0 to 10mV DC, Output resistance: 10 Ω	
			4	Current: 4 to 20mA DC, Load resistance: 300 Ωmax.	
			6	Voltage: 0 to 10V DC, Load current: 2mA max.	
		Communication	5	RS-485 (Up to 31 connected units are possible)	
		DI (Set value bias)	8	1 point (setting range: -1999 to 5000), Non-voltage contact or Open collector input Open collector input rating: approx. 5V/1mA max.	
REMARKS			0	Without	
			9	With (Please consult before ordering.)	

Note:

When you purchase a two-output type controller and use it in a one output capacity, larger overshooting or undershooting may happen as a result of integral operation. Therefore, we recommend you to choose a one-output type.

The cause of the above-mentioned problem is that the positional relationship between the proportional band (PB) and the set value (SV) of a one-output type controller differs from that of a two-output type.

TERMINAL ARRANGEMENT

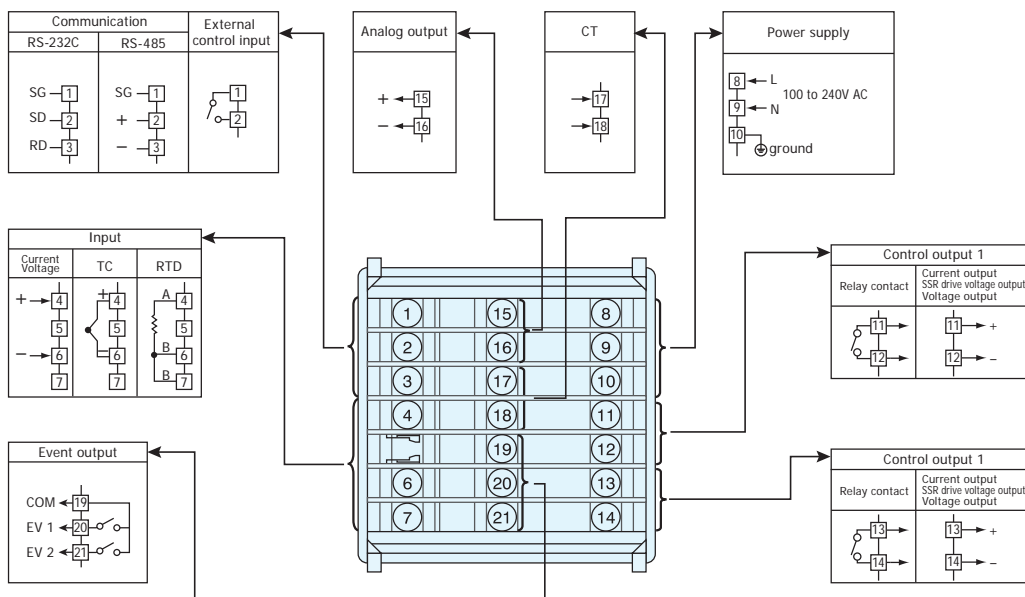Crimp-type terminals fit M3.5 screws.

ITEM	CODE			SPECIFICATIONS		
SERIES	SR92-			MPU-Based Auto-Tuning PID Digital Controller, DIN H72 × W72 × D110mm		
INPUT	8	Multi input	Thermocouple	B, R, S, K, E, J, T, N, PLII, C (WRe 5-26), {U, L (DIN43710)}		
			R.T.D.	Pt100/JPt100		
			Voltage (mV)	-10 to 10, 0 to 10, 0 to 20, 0 to 50, 10 to 50, 0 to 100mV DC Input resistance: 500 kΩ min.	For voltage and current input: Scaling Possible	
	4	Current (mA)		0 to 20, 4 to 20mA DC Receiving impedance: 250Ω	Range: -1999 to 9999 Span: 10 to 5000	
	6	Voltage (V)		-1 to 1, 0 to 1, 0 to 2, 0 to 5, 1 to 5,0 to 10V DC Input resistance: 500kΩ min.	Note: Inverse scaling is not possible.	
CONTROL OUTPUT (1)		Y-	Contact	1a, Contact capacity: 240V AC 2A/resistive load Proportional cycle: 1 to 120 sec.		
		I-	Current	4 to 20mA DC Load resistance: 600Ω max.		
		P-	SSR drive voltage	12V±1.5V DC/30mA max. Proportional cycle: 1 to 120 sec.		
		V-	Voltage	0 to 10V DC Load current: 2mA max.		
CONTROL OUTPUT (2)		N-	None			
		Y-	Contact	1a, Contact capacity: 240V AC 2A/resistive load Proportional cycle: 1 to 120 sec.		
		I-	Current	4 to 20mA DC Load resistance: 600Ω max.		
		P-	SSR drive voltage	12V±1.5V DC/30mA max. Proportional cycle: 1 to 120 sec.		
		V-	Voltage	0 to 10V DC Load current: 2mA max.		
POWER SUPPLY		90-		100V to 240V AC±10%, 50/60Hz		
EVENT OUTPUT/HEATER BREAK ALARM			0	None		
			1	Event output (2a) Ev1, Ev2 Contact capacity: 240V AC 1A/resistive load		
			2	Event output (Ev1) + Heater break alarm (with CT30A)	Note: Available only when control output (1) is Y or P is selected.	
			3	Event output (Ev1) + Heater break alarm (with CT50A)		
ANALOG OUTPUT				0	None	
				3	Voltage: 0 to 10mV DC, Output resistance: 10Ω	
				4	Current: 4 to 20mA DC, Load resistance: 300Ω max.	
				6	Voltage: 0 to 10V DC, Load current: 2mA max.	
COMMUNICATION or DI (Set value bias)					0	None
			Communication		5	RS-485 (Up to 31 connected units are possible)
					7	RS-232C
			DI (Set value bias)		8	1 point (setting range: -1999 to 5000), Non-voltage contact or Open collector input Open collector input rating: approx. 5V/1mA max.
REMARKS					0	Without
					9	With (Please consult before ordering.)

Note:

When you purchase a two-output type controller and use it in a one output capacity, larger overshooting or undershooting may happen as a result of integral operation. Therefore, we recommend you to choose a one-output type.

The cause of the above-mentioned problem is that the positional relationship between the proportional band (PB) and the set value (SV) of a one-output type controller differs from that of a two-output type.

TERMINAL ARRANGEMENT
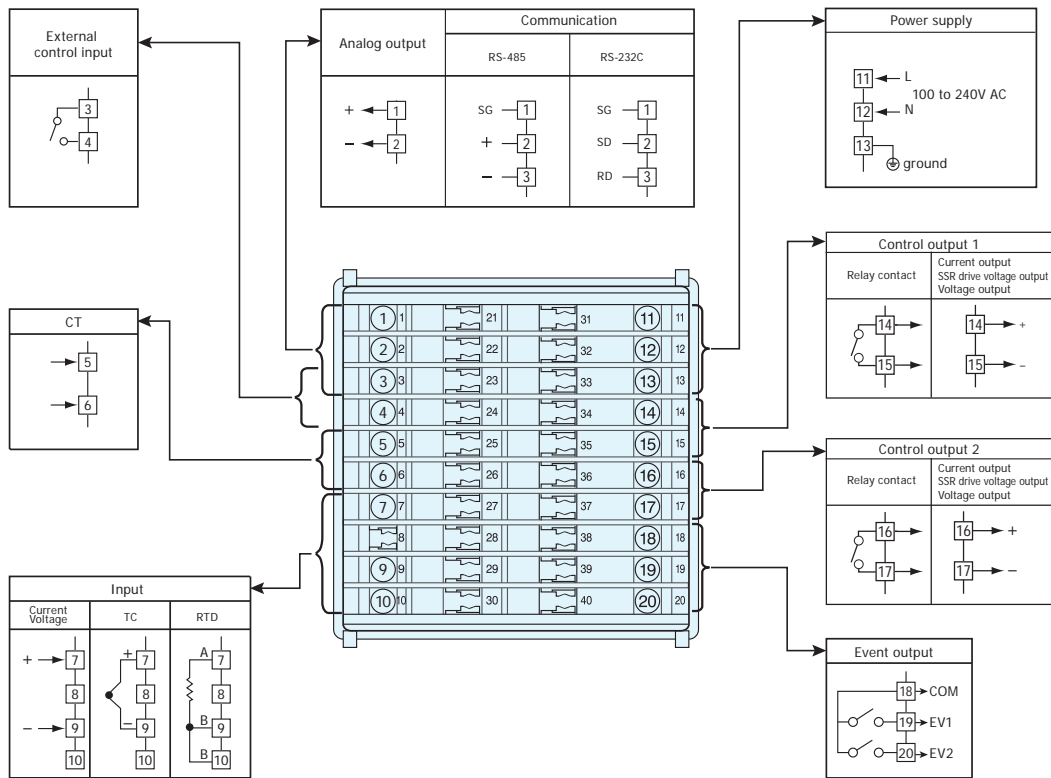

Crimp-type terminals fit M3.5 screws.

ITEM	CODE	SPECIFICATIONS

ITEM	CODE		SPECIFICATIONS	
SERIES	SR93-		MPU-Based Auto-Tuning PID Digital Controller, DIN H96 × W96 × D110mm	
	SR94-		MPU-Based Auto-Tuning PID Digital Controller, DIN H96 × W48 × D110mm	
INPUT	8	Multi input — Thermocouple	B, R, S, K, E, J, T, N, PLII, C (Wre 5-26), {U, L (DIN 43710)}	For voltage and current input: Scaling Possible Range: -1999 to 9999 Span: 10 to 5000 Note: Inverse scaling is not possible.
		R.T.D.	Pt100/JPt100	
		Voltage (mV)	-10 to 10, 0 to 10, 0 to 20, 0 to 50, 10 to 50, 0 to 100mV DC Input resistance: 500 kΩ min.	
	4	Current (mA)	0 to 20, 4 to 20mA DC Receiving impedance: 250Ω	
	6	Voltage (V)	-1 to 1, 0 to 1, 0 to 2, 0 to 5, 1 to 5,0 to 10V DC Input resistance: 500kΩ min.	

CONTROL OUTPUT (1)

Y-	Contact	1a, Contact capacity: 240V AC 2A/resistive load Proportional cycle: 1 to 120 sec.
I-	Current	4 to 20mA DC Load resistance: 600Ω max.
P-	SSR drive voltage	12V±1.5V DC/30mA max. Proportional cycle: 1 to 120 sec.
V-	Voltage	0 to 10V DC Load current: 2mA max.

CONTROL OUTPUT (2)

N-	None	
Y-	Contact	1a, Contact capacity: 240V AC 2A/resistive load Proportional cycle: 1 to 120 sec.
I-	Current	4 to 20mA DC Load resistance: 600Ω max.
P-	SSR drive voltage	12V±1.5V DC/30mA max. Proportional cycle: 1 to 120 sec.
V-	Voltage	0 to 10V DC Load current: 2mA max.

POWER SUPPLY — 90- — 100V to 240V AC±10%, 50/60Hz

EVENT OUTPUT/HEATER BREAK ALARM

0	None
1	Event output (2a) Ev1, Ev2 Contact capacity: 240V AC 1A/resistive load
2	Event output (Ev1) + Heater break alarm (with CT30A)
3	Event output (Ev1) + Heater break alarm (with CT50A)

Note: Available only when control output (1) is Y or P is selected.

OPTION

ANALOG OUTPUT	00	None
	30	Voltage: 0 to 10mV DC, Output resistance: 10Ω
	40	Current: 4 to 20mA DC, Load resistance: 300Ω max.
	60	Voltage: 0 to 10V DC, Load current: 2mA max.
DI (Set value bias)	08	1 point (setting range: -1999 to 5000), Non-voltage contact or Open collector input. Open collector input rating: approx. 5V/1mA max.
ANALOG OUTPUT + DI (Set value bias)	38	Voltage: 0 to 10mV DC, Output resistance: 10Ω SV bias 1 point
	48	Current: 4 to 20mA DC, Load resistance: 300Ω max. SV bias 1 point
	68	Voltage: 0 to 10V DC, Load current: 2mA max. SV bias 1 point
Communication	05	RS-485 (Up to 31 connected units are possible)
	07	RS-232C

REMARKS

0	Without
9	With (Please consult before ordering.)

Note:

When you purchase a two-output type controller and use it in a one output capacity, larger overshooting or undershooting may happen as a result of integral operation. Therefore, we recommend you to choose a one-output type.
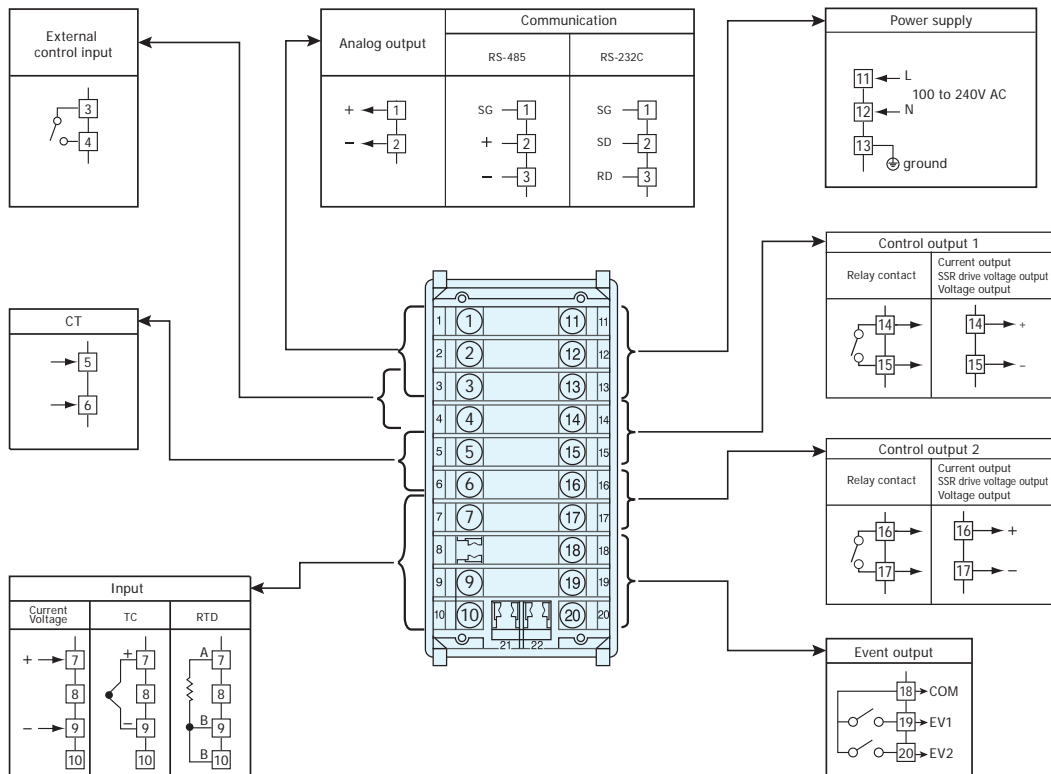
The cause of the above-mentioned problem is that the positional relationship between the proportional band (PB) and the set value (SV) of a one-output type controller differs from that of a two-output type.

●SR93

External control input

```
  3
  4
```

Analog output | Communication (RS-485 / RS-232C)

Analog output	RS-485	RS-232C
+ ← 1	SG — 1	SG — 1
− ← 2	+ — 2	SD — 2
	− — 3	RD — 3

Power supply

```
 11 — L
        100 to 240V AC
 12 — N
 13
    ⊕ ground
```

CT

```
  5
  6
```

Input

Current Voltage	TC	RTD
+ → 7	+ → 7	A 7
8	8	8
− → 9	− 9	B 9
10	10	B 10

Control output 1

Relay contact	Current output / SSR drive voltage output / Voltage output
14 / 15	14 + / 15 −

Control output 2

Relay contact	Current output / SSR drive voltage output / Voltage output
16 / 17	16 + / 17 −

Event output

```
 18 → COM
 19 → EV1
 20 → EV2
```

Terminal block numbers: 1–10, 21–30, 31–40, 11–20

Crimp-type terminals fit M3.5 screws.

●SR94

External control input

```
  3
  4
```

Analog output | Communication (RS-485 / RS-232C)

Analog output	RS-485	RS-232C
+ ← 1	SG — 1	SG — 1
− ← 2	+ — 2	SD — 2
	− — 3	RD — 3

Power supply

```
 11 — L
        100 to 240V AC
 12 — N
 13
    ⊕ ground
```

CT

```
  5
  6
```

Input

Current Voltage	TC	RTD
+ → 7	+ → 7	A 7
8	8	8
− → 9	− 9	B 9
10	10	B 10

Control output 1

Relay contact	Current output / SSR drive voltage output / Voltage output
14 / 15	14 + / 15 −

Control output 2

Relay contact	Current output / SSR drive voltage output / Voltage output
16 / 17	16 + / 17 −

Event output

```
 18 → COM
 19 → EV1
 20 → EV2
```

Terminal block numbers: 1–10, 11–20, 21, 22

Crimp-type terminals fit M3.5 screws.

Input Type			Code		Measuring range (°C)				Measuring range (°F)			
Multi-input	Thermocouple	B	*1	01		0	to	1800	°C	0	to	3300	°F
		R		02		0	to	1700	°C	0	to	3100	°F
		S		03		0	to	1700	°C	0	to	3100	°F
		K		04	*2	-199.9	to	400.0	°C	-300	to	750	°F
				05		0.0	to	800.0	°C	0	to	1500	°F
				06		0	to	1200	°C	0	to	2200	°F
		E		07		0	to	700	°C	0	to	1300	°F
		J		08		0	to	600	°C	0	to	1100	°F
		T		09	*2	-199.9	to	200.0	°C	-300	to	400	°F
		N		10		0	to	1300	°C	0	to	2300	°F
		PLII	*3	11		0	to	1300	°C	0	to	2300	°F
		C (WRe 5-26)		12		0	to	2300	°C	0	to	4200	°F
		U	*4	13	*2	-199.9	to	200.0	°C	-300	to	400	°F
		L	*4	14		0	to	600	°C	0	to	1100	°F
		Kelvin	K	15	*5	10.0	to	350.0	K	10.0	to	350.0	K
			AuFe-Cr	16	*6	0.0	to	350.0	K	0.0	to	350.0	K
			K	17	*5	10	to	350	K	10	to	350	K
			AuFe-Cr	18	*6	0	to	350	K	0	to	350	K
R.T.D.	Pt100			31		-200	to	600	°C	-300	to	1100	°F
				32		-100.0	to	100.0	°C	-150.0	to	200.0	°F
				33		-50.0	to	50.0	°C	-50.0	to	120.0	°F
				34		0.0	to	200.0	°C	0.0	to	400.0	°F
	JPt100			35		-200	to	500	°C	-300	to	1000	°F
				36		-100.0	to	100.0	°C	-150.0	to	200.0	°F
				37		-50.0	to	50.0	°C	-50.0	to	120.0	°F
				38		0.0	to	200.0	°C	0.0	to	400.0	°F
Voltage (mV)	-10 to 10mV			71									
	0 to 10mV			72									
	0 to 20mV			73									
	0 to 50mV			74		Owing to scaling function, any measuring range can be set within the following range.							
	10 to 50mV			75									
	0 to 100mV			76									
Voltage (V)	-1 to 1V			81		Scaling range: -1999 to 9999 digit							
	0 to 1V			82									
	0 to 2V			83		Span: 10 to 5000 counts on condition of lower side < higher side							
	0 to 5V			84									
	1 to 5V			85									
	0 to 10V			86									
Current (mA)	0 to 20mA			91									
	4 to 20mA			92									

Thermocouple   B, R, S, K, E, J, T, N : JIS/IEC

R.T.D. Pt100 : JIS/IEC JPt100

*1 Thermocouple: B: Accuracy guarantee not applicable to 400°C (752°F) and below.

*2 Thermocouple K, T, U: Accuracy of those whose readings are below -100°C is ±0.7% FS

*3 Thermocouple PLII: Platinel

*4 Thermocouple U, L: DIN 43710

*5. Thermocouple K (Kelvin) accuracy

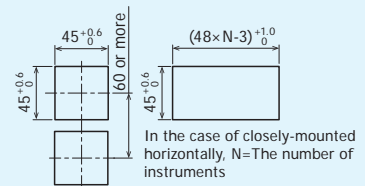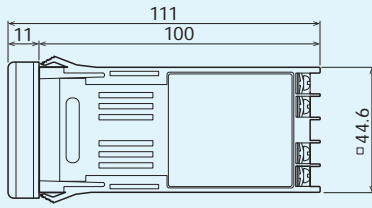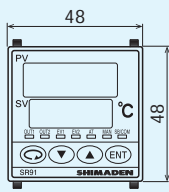| Temperature range	
10.0 to 30.0K	±{2.0%FS +40 °C+1 digit}
30.0 to 70.0K	±{1.0%FS +14 °C+1 digit}
70.0 to 170.0K	±{0.7%FS + 6 °C+1 digit}
170.0 to 270.0K	±{0.5%FS + 3 °C+1 digit}
270.0 to 350.0K	±{0.3%FS + 2 °C+1 digit}

*6. Thermocouple Metal-chromel (AuFe-Cr) (Kelvin) accuracy

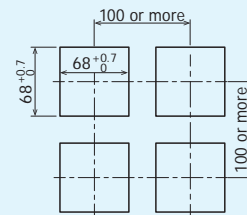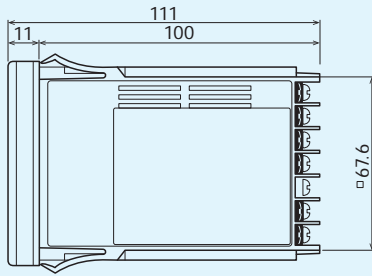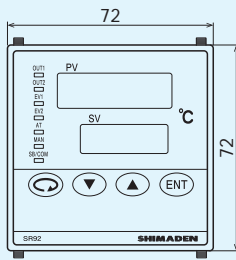| Temperature range	
0.0 to 30.0K	±{0.7%FS +6 °C +1 digit}
30.0 to 70.0K	±{0.5%FS +3 °C +1 digit}
70.0 to 170.0K	±{0.3%FS +2.4 °C +1 digit}
170.0 to 280.0K	±{0.3%FS +2 °C +1 digit}
280.0 to 350.0K	±{0.5%FS +2 °C +1 digit}

NOTE: Unless otherwise specified, the measuring range will be set as follows
when shipped from the factory:

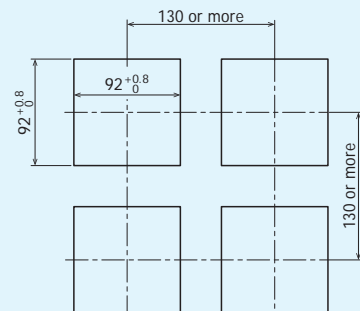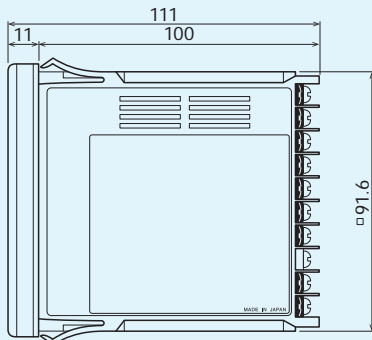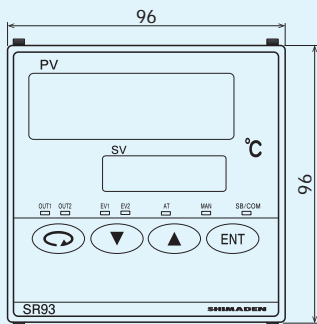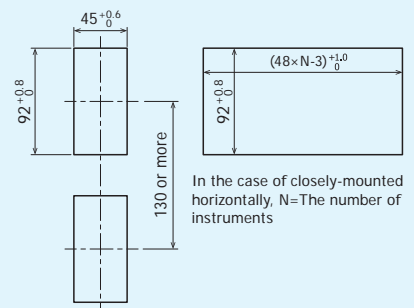| Input	Standard/rating	Measuring range
Multi-input	K thermocouple	0.0 to 800.0 °C
Voltage (V)	0 to 10V DC	0.0 to 100.0 no legend
Current (mA)	4 to 20mA DC	0.0 to 100.0 no legend

● **SR91**

In the case of closely-mounted horizontally, N=The number of instruments

● **SR92**

● **SR93**

● **SR94**

In the case of closely-mounted horizontally, N=The number of instruments
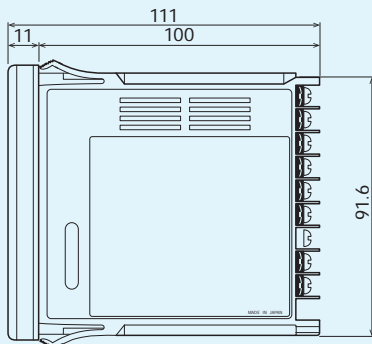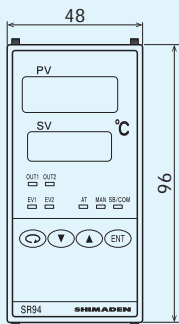
| Name	Code	Remarks
CT	QCC01	CT for 30A (CTL-6-S)
CT	QCC02	CT for 50A (CTL-12-S36-8)
Terminal cover	QCR001	For SR91
	QCR002	For SR92 (3 pcs./set)
	QCR007	For SR93 (2 pcs./set)
	QCR004	For SR94 (Single mounting, ⊕B Tight M2.3×6 2pcs.)
	QCR005	For SR94 (Close contact mounting, ⊕B Tight M2.3×6 4pcs.)

ACCESSORIES REQUIRED FOR CT INPUT

To CT input
terminal of controller
(no polarity)

Heater (load) wiring
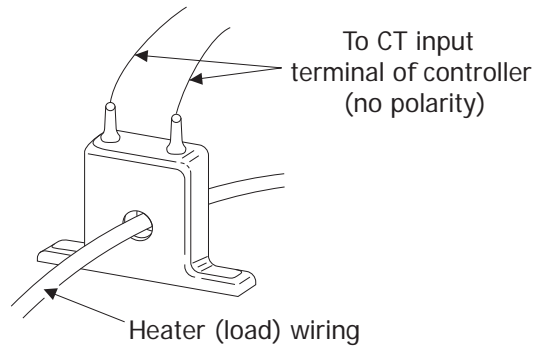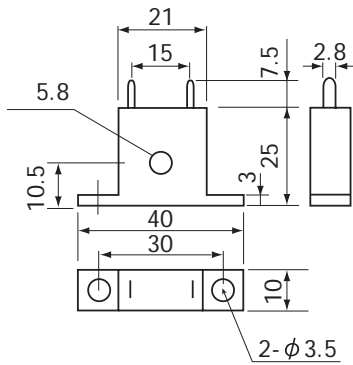
● CT FOR 30A (QCC01)   ● CT FOR 50A (QCC02)
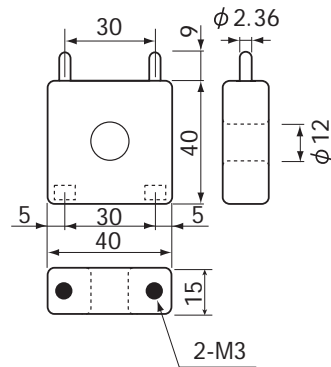
Unit: mm

⚠ **Warning**

• **The SR90 series are designed for the control of temperature, humidity and other physical values of general industrial equipment.**
  (They are not to be used for any purpose which regulates the prevention of serious effects on human life or safety.)

⚠ **Caution**

• **If the possibility of loss or damage to your system or property as a result of failure of any part of the process exists,**
  proper safety measures must be made before the instrument is put into use so as to prevent the occurrence of trouble.