

## SERIES SR50

- High Accuracy  $\pm (0.25\% \text{ FS} + 1 \text{ digit})$
- After setting a value, you can delete (unnecessary) part of parameter display, leaving necessary data only. This simplifies operation.



### FEATURES

## SR52, SR53 and SR54

#### Standard Functions

Timer:	Off, Execution mode, Timer mode and Power on mode Start time: 0~9999 min. End time: 1~9999 min. When 0 is set, operation continues until a key is operated or power is turned off.
Set value bias (SB):	-1999~9999 units When selection is made via external control input, bias is put in action when input is closed.
External control input (DI):	Two points Selectable from 9 functions: NON, SB, AT, MAN, DA, REM, EXEC, ADV and HLD
Manual control:	Auto / manual changeable (balanceless bumpless)
Output limit:	Standard limit (-10.0~110.0%) / Special limit (synchronous type with PV value)
Power supply:	100~240V AC, 24V AC or 24V DC

#### Additional Functions (Options)

Programming function:	Ten steps maximum, 0~9999 min. / step Number of repeats: 0~9999 HLD and ADV functions included
Square root extraction operation:	Applicable only with DC voltage or current input
Remote setting:	Accuracy $\pm (0.25\% \text{ FS} + 1 \text{ digit})$ Bias, filter and scaling are possible.
Event output:	3 points maximum (individual setting, individual output) Selectable from 17 types of event including PV, SV and DEV (SR52 has only 2 points maximum)
Heater break alarm	
Heater loop alarm:	Selectable range of current: 0.1~30.0A CT to be installed externally Inhibit / non-inhibit selectable for alarm action
Analog output:	1 point Either PV or SV to be selected (Scaling possible within measuring range)
Communication function:	RS232C, RS422A or RS485

**SPECIFICATIONS**

**Display**

Digital display:	7 segment LED 4 digits (2 sets)
Display tolerance:	± (0.25% FS + 1 digit) at 23±5°C
Display resolution:	Depending on measuring range (0.001, 0.01, 0.1 and 1)
Sampling cycle:	0.25 sec.
Action display:	10 types Indication by LED lamps

**Setting**

Local setting:	By 7 front key switches
Setting range:	Same as measuring range
Setting limit:	Higher and lower limits individual setting, selectable in measuring range (lower limit value < higher limit value)
Remote SV setting:	By external analog signals (*option)
Setting through communication:	By communication function (*option)

**Input**

<u>Thermocouple</u>	B, R, S, K, E, J, T, N, PL II, WRe5-26 {(U, L (DIN 43710)) (multi-input / multi-range) *Refer to Table of Measuring Range Codes.
External resistance:	100Ω max.
Input impedance:	500kΩ min.
Burnout:	Standard feature (up scale)
Cold junction temperature compensation tolerance:	±2°C (5~45°C)
<u>R.T.D.</u>	JIS Pt100 / JPt100 changeable (multi-range) *Refer to Table of Measuring Range Codes.
Amperage:	Approx. 0.5mA
Lead wire tolerable resistance:	5Ω max. / wire
<u>Voltage</u>	-10~-10, 0~-10, 0~-20, 0~-50, 10~-50, 0~100mV DC or -1~-1, 0~-1, 0~-2, 0~-5, 1~-5, 0~10V DC (multi-input / programmable range)
Input impedance:	500kΩ min.
<u>Current</u>	4~20, 0~20mA DC (multi-input / programmable range)
Receiving impedance:	250Ω
Sampling time:	0.25 sec.
PV bias:	-1999~9999 units (sensor compensation)
PV filter:	0~100 sec.
Isolation:	Insulated between input, system and various output (not insulated between remote input, CT input and DI input)

**Control**

Control mode:	Auto-tuning PID
Proportional band (P):	On-Off, 0.1~999.9% FS
Integral time (I):	Off, 1~6000 sec.(Off: PD, P action)
Derivative time (D):	Off, 1~3600 sec.(OFF, 1: PI, P action)
Manual reset:	-50.0~50.0% (valid when I = Off). Also used as load factor constant
On-Off hysteresis:	0.1~10.0% FS
Proportional cycle:	1~120 sec.
Control output characteristics:	RA / DA changeable
Higher and lower output limit:	Standard limit: -10.0~110.0% (lower limit < higher limit) Special limit: PV value synchronous type limit

**Control output type and ratings**

Contact output:	240V AC 2.5A / resistive load
Voltage output:	0~10V DC / load current 2mA max.
Current output:	4~20mA DC / load resistance 600Ω max.
SSR drive voltage output:	15V±3V DC (when resistive load is 1.5kΩ), 20mA max.
Isolation:	Between output and system, and between various inputs and outputs

# DIGITAL CONTROLLER

## Manual control

Output setting range:	-10.0~110.0% (setting resolution 0.1%) but within range of higher and lower output limits
Auto / Manual switching:	Balanceless bumpless but within proportional band range

## Set value bias (SB)

Setting range:	-1999~9999 units
Setting resolution:	Same as display resolution
Action input:	Bias in action when selected by external control input (DI) with input closed

## External control input (DI)

Number of input point:	2 points of DI 1 and DI 2 (1 point of DI 1 if HB is added)
Input rating:	Non-voltage contact, open collector input (approx. 5V / 2mA DC impression)
Types of action:	Selectable from 9 types: NON, SB, AT, MAN, DA, REM, EXEC, ADV and HLD
Isolation:	Insulated between DI input, system and various outputs (not insulated between PV input, remote input and CT input)

## Timer function

Types of action:	4 types: Off, Execution mode, Timer mode and Power on mode
Start time:	0~9999 min.
End time:	1~9999 min. Continues until key is operated or power is turned off when 0 is set.

## Others

Data storage:	By non-volatile memory (EEPROM)
Operating ambient temperature / Humidity ranges:	-10~50°C / 90% RH or lower (no dew condensation)
Supply voltage:	100~240V AC±10% 50 / 60Hz, 24V AC±10% 50 / 60Hz or 24V DC±10%
Power consumption:	SR52 and SR54: 13VA max., SR53: 15VA max.
Insulation resistance:	500V DC 20MΩ or higher between input / output terminals and power supply terminals 500V DC 20MΩ or higher between input / output terminals and ground terminal
Dielectric strength:	1 min. at 1000V AC between input / output terminals and power supply terminals 1 min. at 1500V AC between power supply terminals and ground terminal
Protective structure:	Only front panel has simple dust-proof and drip-proof structure.
Material:	Resin molding
External dimensions:	SR52: H72 × W72 × D110 (panel depth: 100) mm SR53: H96 × W96 × D110 (panel depth: 100) mm SR54: H96 × W48 × D110 (panel depth: 100) mm
Mounting:	Push-in panel (no mounting hardware necessary)
Panel thickness:	1~3.5mm
Panel cutout:	SR52: 68 × 68mm, SR53: 92 × 92mm, SR54: 92 × 45mm
Weight:	SR52: Approx. 350g, SR53: Approx. 450g, SR54: Approx. 350g

## Additional Functions (Options)

### Programming function

Number of steps registered:	10 max.
Program setting range	
Level:	Same as measuring range
Time:	0~9999 min. / step
Inclination:	Automatically set in accordance with level and time
Number of repeats:	0~9999 (maximum number of runs: 10000)
Other function:	Temporary suspension (HLD) and step forward (ADV)

### Square roof extraction

Applicable input types:	DC voltage or current input
Low cut range:	0~1% FS (input)

**Remote setting**

Setting range:	Same as measuring range
Setting accuracy:	± (0.25% FS + 1 digit)
Setting signal:	0~10V DC, 1~5V DC Input resistance: 500kΩ min. / 4~20mA DC Receiving resistance 250Ω
Scaling:	Variable within measuring range (lower limit value < higher limit value)
Remote bias:	-1999~9999 units
Remote filter:	0~100 sec.
Remote / Local switching:	By operating front keys, communication or external control input (DI input selection)
Sampling time:	0.5 sec.
Isolation:	Insulated among remote input, system and various outputs (not insulated among PV input, CT input and DI input)

**Event output**

Number of event outputs:	3 points: EV1, EV2 and EV3 (individually set and output) (2 points: EV1 and EV2 if HB is added) (In SR52, 2 points: EV1, EV2 and EV3 / HB Common)
Types of event:	Selectable from following 17 types: NON 1 point PV (higher limit, lower limit) 2 points SV (higher limit, lower limit) 2 points DEV (higher limit deviation, lower limit deviation, higher / lower limit deviation, within higher / lower limit range) 4 points TIME (START, END, START / END) 3 points PRG (RUN, END, STEP) 3 points AT, SO 2 points
Event action:	On-Off action (with PV, SV or DEV)
Event action hysteresis:	0.1~10.0% FS (with PV, SV or DEV)
Event output:	Contact output 240V AC 1.5A (resistive load), 1a (common)
Inhibit / non-inhibit:	Individual-switching (with PV, SV or DEV)

**Heater break alarm (HB)**

Alarm action:	Heater amperage detection by externally attached CT Alarm output on upon detection of heater break while output is ON (On). Alarm output on upon detection of heater loop alarm while output is OFF (Off).
Heater break alarm	
Current setting range:	0.1~30.0A (Alarm action stops when Off is set.)
Heater loop alarm	
Current setting range:	0.1~30.0A (Alarm action stops when Off is set.)
Setting resolution:	0.1A
Amperage display:	0.0~35.0A (±10%)
Display accuracy:	3% FS (when sine wave is 50Hz)
Minimum time for action confirmation:	On (Off) time 250 msec.or longer
Alarm output / Rating:	Contact output / 240V AC 1.5A (resistive load), 1a (common with EVENT outputs)
Alarm holding mode:	Inhibit / non-inhibit selectable
Sampling time:	1 sec.
Isolation:	Insulated among CT input, system and various outputs (not insulated among PV input, remote input and DI input)

**Analog output**

Number of analog outputs:	1 point
Type of analog output:	Selectable between process value (PV) and set value (SV)
Analog output:	0~10mV DC / FS, Output resistance: 10Ω 0~10V DC / FS, Load current: 2mA max. 4~20mA DC / FS, Load resistance: 300Ω min.
Output accuracy:	±0.25% FS (vs display value)
Output resolution:	Approx. 0.04% FS (1 / 2500)
Output scaling:	Within measuring range
Isolation:	Insulated between analog output, system and various inputs and outputs

**Communication function**

Communication type:	RS232C, RS422A or RS485
Communication system:	Half duplex start-stop synchronous system
Communication speed:	1200, 2400, 4800 or 9600 bps
Data bit length:	7 bits even number parity, 8 bits without parity, etc.
Communication address:	0~31
Communication code:	ASCII code
Communication protocol:	Protocol selectable based on standard (SR25, FP21)
Isolation:	Insulated between Communication signal, system and various inputs and outputs

## ORDERING INFORMATION

ITEMS	CODE		SPECIFICATIONS	
SERIES	SR52-		72 × 72 DIN size digital controller	
	SR53-		96 × 96 DIN size digital controller	
	SR54-		48 × 96 DIN size digital controller	
INPUT	1		Thermocouple B, R, S, K, E, J, T, N, PL II, WRe5-26, U, L	Multi-input Multi-range
	2		R. T. D. Pt100 / JPt100	Multi-range
	3		Voltage (mV) -10~10, 0~10, 0~20, 0~50, 10~50, 0~100mV DC	Multi-input
	4		Current (mA) 0~20, 4~20mA DC	Programmable
	6		Voltage (V) -1~1, 0~1, 0~2, 0~5, 1~5, 0~10V DC	range
CONTROL OUTPUT	Y-		Contact: Proportional cycle 1~120 sec. Contact capacity: 240V AC 2.5A / resistive load	
	I		Current: 4~20mA DC, Load resistance: 600Ω max. (RA when shipped)	
	P-		SSR drive voltage: Proportional cycle 1~120 sec Output rating: 15V±3V DC / 20mA max.	
	V-		Voltage: 0~10V DC Maximum load current: 2mA max.	
POWER SUPPLY	90-		100~240V AC±10%, 50 / 60HZ	
	10-		24V AC±10%, 50 / 60HZ	
	02-		24V DC±10%	
PROGRAMMING FUNCTION	N		None	
	P		Maximum 10 steps, Time: 0~9999 min. / step, Number of repeats: 0~9999	
EVENT OUTPUT	0		None	
	1		Contact (1a), SR52 (EV1, EV2 in common with EV3 / HB) 2 points; SR53, SR54 (EV1, EV2, EV3 / HB) 3 points	
REMOTE SETTING INPUT	00		None	
	14		4~20mA DC Receiving resistance: 250Ω	Insulated between system and various outputs, Not insulated between PV, CT and DI inputs.
	15		1~5V DC Input resistance: 500kΩ	
	16		0~10V DC Input resistance: 500kΩ	
HEATER BREAK / HEATER LOOP ALARM (selectable only when control output is Y or P)	0		None	
	1		Current setting range: 0.1~30.0A Contact output (1a): 240V AC 1.5A / resistive load	
SQUARE ROOT (√) EXTRACTION (selectable only with voltage or current input)	0-		None	
	1-		With	
ANALOG OUTPUT OR COMMUNICATION FUNCTION	00		None	
	03		Voltage 0~10mV DC Output resistance: 10Ω	Scaling possible
	04		Current 4~20mA DC Load resistance: 300Ω or lower	
	06		Voltage 0~10V DC Maximum load current: 2mA or lower	
	15		RS485	
	16		RS422A *Not applicable for SR52.	
	17		RS232C	
FRONT PANEL INFORMATION	J		Japanese	
	E		English	
REMARKS	0		Without	
	9		With (Please consult before ordering.)	

## STANDARD RANGE & USER-PROGRAMMABLE SCALING

Since the Series SR52, SR53 and SR54 have been designed for user-selectable inputs, user-selectable ranges and user-programmable scaling, the unit will be shipped with one factory-set standard range.

If a range selection other than the standard is required, user-selectable inputs ( T / C's) and user-selectable ranges (T / C's and R.T.D.) are available. Please refer to measuring range codes.

For DC voltage and DC current inputs, user-programmable scaling is available with a scaling range of -1999~9999 count.

### Standard Range (Factory-set When shipped)

INPUT	Standard / Rating	RANGE
1. Thermocouple	JIS K	0.0~800.0°C
2. R.T.D.	JIS Pt100	0.0~200.0°C
3. Voltage	0~10mV DC	0.0~100.0 No-legend
4. Current	4~20mV DC	0.0~100.0 No-legend
6. Voltage	1~5V DC	0.0~100.0 No-legend

## MEASURING RANGE CODES

①Type of input			②Measuring range							
Type	Code		°C	Code	°F	Code				
Thermocouple	* 1 B	IB	0 ~1800	A47	0 ~3300	A51				
	R	IR	0 ~1700	A46	0 ~3100	A50				
	S	IS	0 ~1700	A46	0 ~3100	A50				
	K	IK	-100.0 ~ 400.0	A25	-150 ~ 750	A73				
			0.0 ~ 800.0	A10	0 ~1500	A45				
			0 ~1200	A43	0 ~2200	A48				
	E	IE	0.0 ~ 700.0	A09	0 ~1300	A44				
	J	IJ	0.0 ~ 600.0	A08	0 ~1100	A42				
	T	IT	-199.9 ~ 200.0	A30	-300 ~ 400	A75				
	* 2 N	IN	0 ~1300	A44	0 ~2300	A49				
	* 3 PL II	IP	0 ~1300	A44	0 ~2300	A49				
	* 4 WRe5-26	IW	0 ~2300	A49	0 ~4200	A52				
	* 5 U	IU	-199.9 ~ 200.0	A30	-300 ~ 400	A75				
* 5 L	IL	0.0 ~ 600.0	A08	0 ~1100	A42					
R. T. D.	JPt100 (JIS)	2J	-199.9 ~ 600.0	A31	-300 ~1100	A76				
			-100.0 ~ 100.0	A23	-150.0~ 200.0	A28				
			-100.0 ~ 300.0	A24	-150.0~ 600.0	A29				
			-50.0 ~ 50.0	A21	-50.0~ 120.0	A22				
			*6 0.00 ~ 50.00	A01	0.0~ 120.0	A04				
			0.00 ~ 99.99	A02	0.0~ 200.0	A05				
			0.0 ~ 100.0	A03	0.0~ 200.0	A05				
			0.00 ~ 200.0	A05	0.0~ 400.0	A06				
			0.00 ~ 500.0	A07	0.0~ 1000	A41				
	Pt100 (JIS / IEC)	2F	-199.9 ~ 600.0	A31	-300 ~1100	A76				
			-100.0 ~ 100.0	A23	-150.0~ 200.0	A28				
			-100.0 ~ 300.0	A24	-150.0~ 600.0	A29				
			-50.0 ~ 50.0	A21	-50.0~ 120.0	A22				
			*6 0.00 ~ 50.00	A01	0.0~ 120.0	A04				
			0.00 ~ 99.99	A02	0.0~ 200.0	A05				
			0.0 ~ 100.0	A03	0.0~ 200.0	A05				
			0.00 ~ 200.0	A05	0.0~ 400.0	A06				
			0.00 ~ 500.0	A07	0.0~ 1000	A41				
mV	-10~ 10mV	31	As the instrument has the scaling function, you can set your measuring range freely within the following limits.							
	0~ 10mV	32								
	0~ 20mV	33								
	0~ 50mV	34								
	10~ 50mV	35								
	0~100mV	36								
mA	0~ 20mA	41								
	4~ 20mA	42								
V	-1~ 1V	61					Scaling range: -1999~9999 counts			
	0~ 1V	62					Span: 100~10000 counts			
	0~ 2V	63								
	0~ 5V	64								
	1~ 5V	65								
	0~ 10V	66								

## LEGEND CODES

③Legend	Code	③Legend	Code
No Legend	00	l / min	30
°C	01	l / h	31
°F	02	m³ / min	32
%RH	03	m³ / h	33
%	04	Nm³ / min	34
K	05	Nm³ / h	35
mV	06	mm / s	36
V	07	m / s	37
mA	08	m / min	38
A	09	m / h	39
W	10	m / s²	40
μS / cm	11	rpm	41
mbar	12	mm	42
bar	13	cm	43
psi	14	m	44
psig	15	mm³	45
Pa	16	cm³	46
kPa	17	m³	47
mmH₂O	18	in	48
mH₂O	19	lb	49
inH₂O	20	g	50
mmHg	21	kg	51
cmHg	22	t	52
inHg	23	l	53
l / s	24	ppm	54
kg / h	25	pH	55
kg / m²	26	cal	56
kg f / cm²	27	kcal	57
Torr	28	Plain	58
mmAq	29	Plain	59

\* Codes 58 and 59 are to be filled in by the user.

Note 1:

- \*1. Thermocouple B: 400°C (750°F) or below is out of the accuracy guarantee range.
- \*2. Thermocouple N: Nicrosil-Nisil IEC
- \*3. Thermocouple PL II: Platinel
- \*4. Thermocouple WRe5-26: (Hoskins Mfg.Co.)
- \*5. Thermocouple U.L.: DIN 43710
  - Thermocouple B, R, S, K, E, J, T: JIS / ANSI / IEC
- \*6. R.T.D.: Accuracy ±0.2°C
  - R.T.D.: JPt100: (Old) JIS
  - Pt100: (New) JIS / IEC

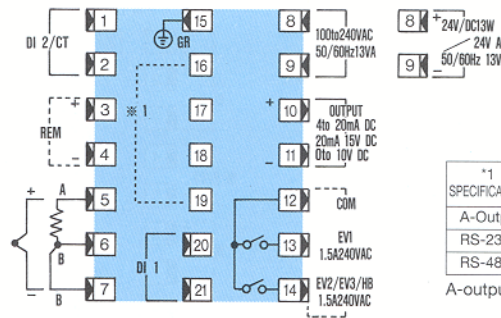
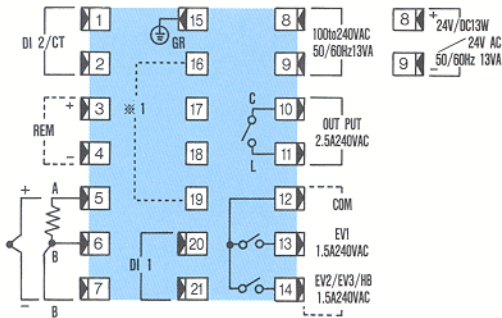
**SR52 TERMINAL ARRANGEMENT, EXTERNAL DIMENSIONS AND PANEL CUTOUT**

° Contact output type (Y)

° Current output type (I)

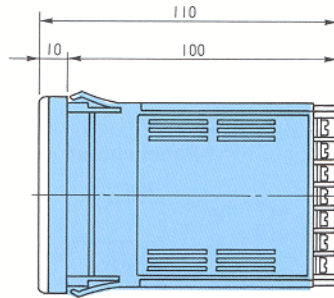
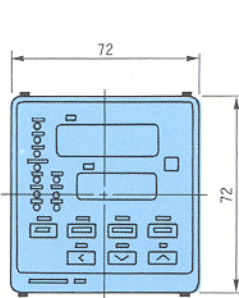
° Voltage output type (V)

° SSR drive voltage output type (P)

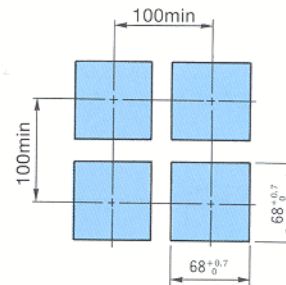


*1	TERMINAL			
SPECIFICATION	15	16	17	18
A-Output	GR	+	-	19
RS-232C	GR	SG	SD	RD
RS-485	GR	SG	+	-

A-output: Analog output



° Panel cutout



(Unit: mm)

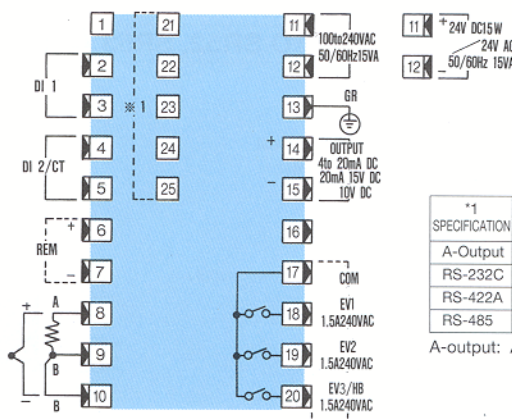
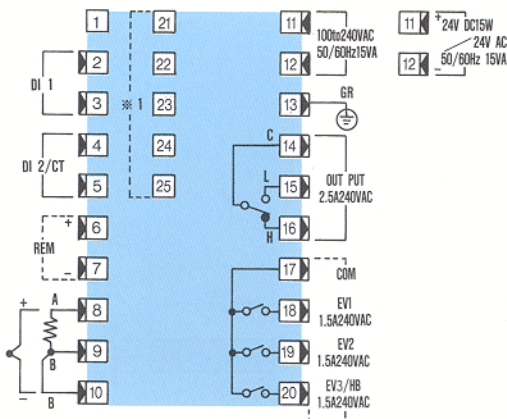
**SR53 TERMINAL ARRANGEMENT, EXTERNAL DIMENSIONS AND PANEL CUTOUT**

° Contact output type (Y)

° Current output type (I)

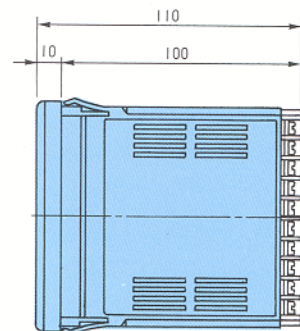
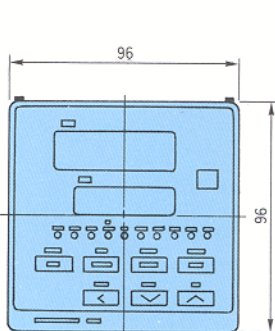
° Voltage output type (V)

° SSR drive voltage output type (P)

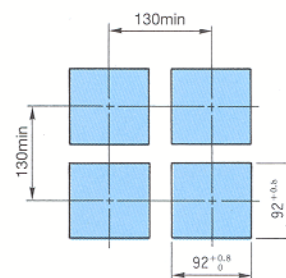


*1	TERMINAL			
SPECIFICATION	21	22	23	24
A-Output	+	-		
RS-232C	SG	SD	RD	
RS-422A	SG	SD+	SD-	RD+
RS-485	SG	+	-	

A-output: Analog output



° Panel cutout



(Unit: mm)



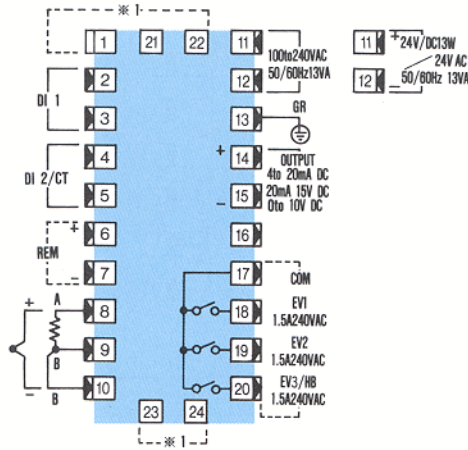
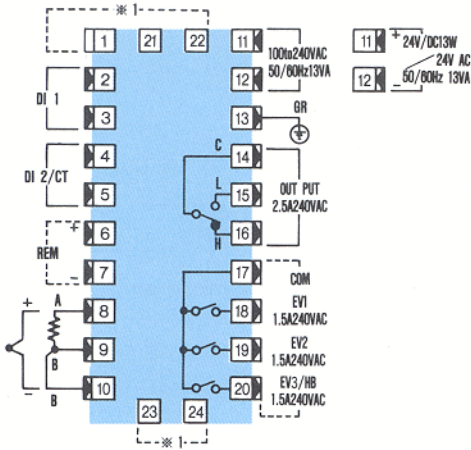
## SR54 TERMINAL ARRANGEMENT, EXTERNAL DIMENSIONS AND PANEL CUTOUT

° Contact output type (Y)

° Current output type (I)

° Voltage output type (V)

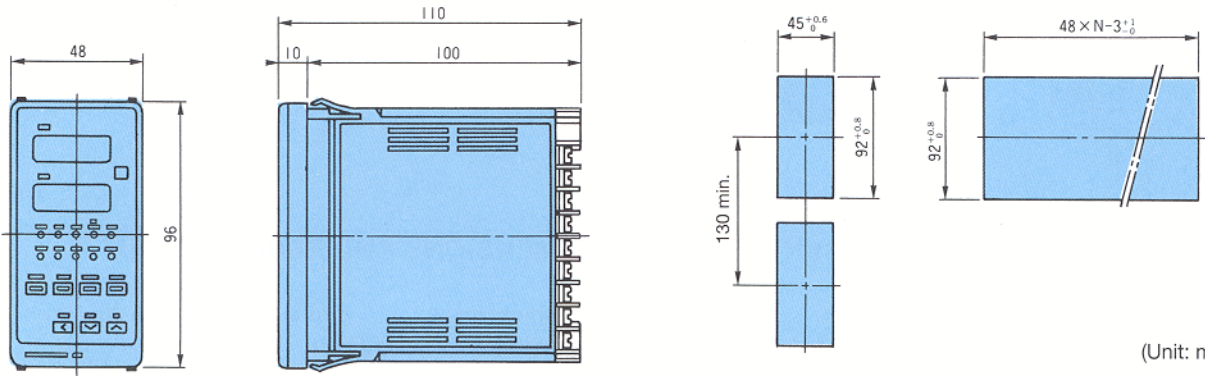
° SSR drive voltage output type (P)



*1 SPECIFICATION	TERMINAL				
	1	21	22	23	24
A-Output	/	+	-	/	/
RS-232C	SG	SD	RD	/	/
RS-422A	SG	SD+	SD-	RD+	RD-
RS-485	SG	+	-	/	/

A-output: Analog output

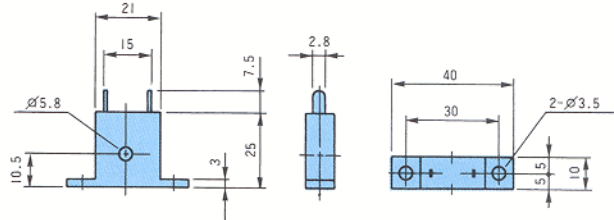
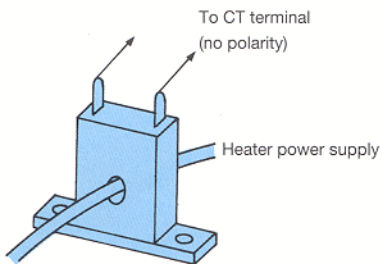
° Panel cutout



(Unit: mm)

## WIRING EXAMPLE (COMMON TO SR52, SR53 AND SR54)

CT wiring



(Unit: mm)