

For detailed usage and options, refer to the full Instruction Manual for the ACS-13A.
 Please download the full Instruction Manual from Shinko website.
<http://www.shinko-technos.co.jp/e/> → Support & Downloads → Downloads → Manuals

Thank you for purchasing our digital indicating controller ACS-13A. This manual contains instructions for the mounting, functions, operations and notes when operating the ACS-13A. To prevent accidents arising from the misuse of this controller, please ensure the operator receives this manual.

Safety Precautions (Be sure to read these precautions before using our products.)
 The safety precautions are classified into categories: "Warning" and "Caution".
⚠ Warning: Procedures which may lead to dangerous conditions and cause death or serious injury, if not carried out properly.
⚠ Caution: Procedures which may lead to dangerous conditions and cause superficial to medium injury or physical damage or may degrade or damage the product, if not carried out properly.

⚠ Warning

- To prevent an electrical shock or fire, only Shinko or other qualified service personnel may handle the inner assembly.
- To prevent an electrical shock, fire or damage to the instrument, parts replacement may only be undertaken by Shinko or other qualified service personnel.

⚠ Safety Precautions

- To ensure safe and correct use, thoroughly read and understand this manual before using this instrument.
- This instrument is intended to be used for industrial machinery, machine tools and measuring equipment. Verify correct usage after purpose-of-use consultation with our agency or main office. (Never use this instrument for medical purposes with which human lives are involved.)
- External protection devices such as protective equipment against excessive temperature rise, etc. must be installed, as malfunction of this product could result in serious damage to the system or injury to personnel. Proper periodic maintenance is also required.
- This instrument must be used under the conditions and environment described in this manual. Shinko Technos Co., Ltd. does not accept liability for any injury, loss of life or damage occurring due to the instrument being used under conditions not otherwise stated in this manual.

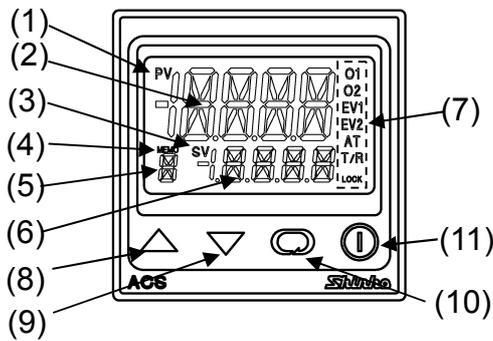
⚠ Caution with Respect to Export Trade Control Ordinance
 To avoid this instrument from being used as a component in, or as being utilized in the manufacture of weapons of mass destruction (i.e. military applications, military equipment, etc.), please investigate the end users and the final use of this instrument. In the case of resale, ensure that this instrument is not illegally exported.

1. Model

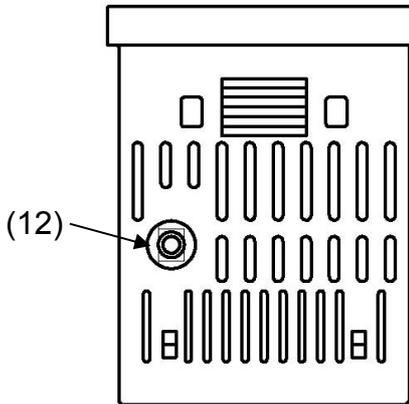
ACS - 1 3 □-□/□ □, □□□			Series name: ACS-13A (W48 x H48 x D62 mm)	
Control action	3		PID	
A1	A		Alarm type can be selected by keypad. *1	
Control output (OUT1)	R		Relay contact: 1a	
	S		Non-contact voltage (for SSR drive): 12 V DC ± 15%	
	A		Direct current: 4 to 20 mA DC	
Input	M		Multi-range *2	
Power supply voltage			100 to 240 V AC (standard)	
	1		24 V AC/DC *3	
Option (Multiple options are selectable.)	A2		Alarm 2 output (A2) *1	
	W(20A)	Heater burnout alarm	CT rated current: 20 A (Single-phase)	
	W(50A)		CT rated current: 50 A (Single-phase)	
	W3(20A)		CT rated current: 20 A (3-phase)	
	W3(50A)		CT rated current: 50 A (3-phase)	
	DR	Heating/Cooling control, Relay contact: 1a		
	DS	Control output (OUT2) Non-contact voltage: 12 V DC ± 15%		
C5	Serial communication (RS-485)			
SM	Set value memory external selection			

*1: Alarm types (9 types and No alarm action) and Energized/De-energized can be selected by keypad.
 *2: Thermocouple, RTD, Direct current and DC voltage can be selected by keypad.
 *3: Power supply voltage 100 to 240 V AC is standard. When ordering 24 V AC/DC, enter "1" after the input code.

2. Name and Functions



- (1) **PV indicator:** Lights when PV is indicated in the PV/SV display mode.
 (2) **PV display:** Indicates the PV (process variable) or setting characters during the setting mode.
 (3) **SV indicator:** Lights when SV is indicated in the PV/SV display mode.
 (4) **MEMO indicator:** Lights when Set value memory external selection (SM option) is added.
 (5) **MEMO display:** Indicates the set value memory number.
 (6) **SV display:** Indicates the SV (desired value), MV (manipulated variable) or each set value during the setting mode.
 (7) **Action indicators**
O1 (OUT1): Lights when control output (OUT1) is ON.
 For direct current output type, flashes corresponding to the MV in 250 ms cycles.
O2 (OUT2): Lights when control output (OUT2) (D□ option) is ON.
EV1: Lights when Alarm 1 output is ON.
EV2: Lights when Alarm 2 output (A2 option) is ON or when Heater burnout alarm (W, W3 option) is ON.
AT: Flashes while AT (auto-tuning) or auto-reset is performing.
T/R: Lights during Serial communication (C5 option) (TX output).
LOCK: Lights when Lock 1, Lock 2 or Lock 3 is selected.
 (8) **△ UP key:** Increases the numeric value.
 (9) **▽ DOWN key:** Decreases the numeric value.
 (10) **Mode key:** Selects the setting mode, or registers the set value.
 To register the set (selected) value, press this key.
 (11) **OUT/OFF key:** Switches control output ON/OFF or Auto/Manual control.



(Fig. 2-1)

(12) **Console connector:** By connecting to the USB communication cable (CMA, sold separately), the following operations can be conducted from the external computer using the Console software SWS-ACS01M.

- ① Reading and setting of SV, PID, various set values, ② Reading of PV and action status, ③ Function change

3. Mounting to the Control Panel

3.1 Site Selection

⚠ Caution

Use within the following temperature and humidity ranges.

Temperature: 0 to 50°C (32 to 122°F), Humidity: 35 to 85 %RH (No icing and non-condensing)

If the ACS-13A is installed through a control panel, the ambient temperature of the ACS-13A must be kept to under 50°C. Otherwise the life of electronic parts (especially electrolytic capacitors) of the ACS-13A will be shortened.

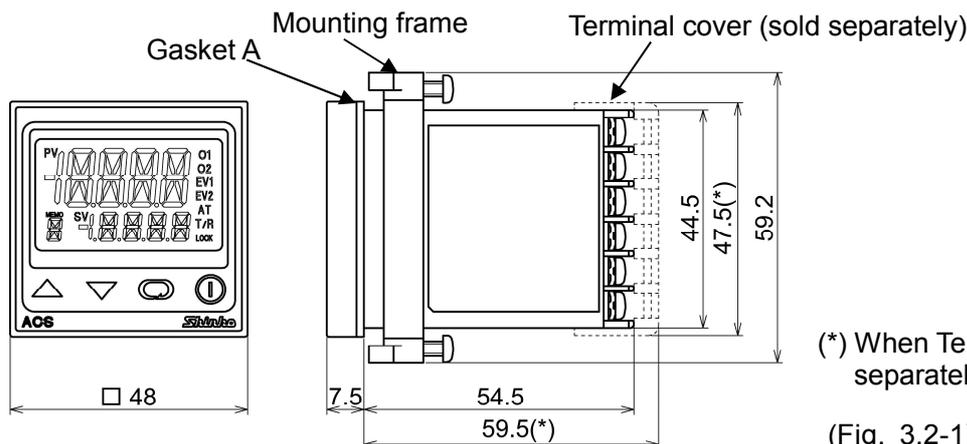
This instrument is intended to be used under the following environmental conditions (IEC61010-1):

Overvoltage category II, Pollution degree 2

Ensure the mounting location corresponds to the following conditions:

- A minimum of dust, and an absence of corrosive gases
- No flammable, explosive gases
- Few mechanical vibrations or shocks
- No exposure to direct sunlight, an ambient temperature of 0 to 50°C (32 to 122°F) that does not change rapidly, and no icing
- An ambient non-condensing humidity of 35 to 85 %RH
- No large capacity electromagnetic switches or cables through which large current is flowing
- No water, oil, chemicals or the vapors of these substances can come into direct contact with the controller

3.2 External Dimensions (Scale: mm)



(*) When Terminal cover (sold separately) is used

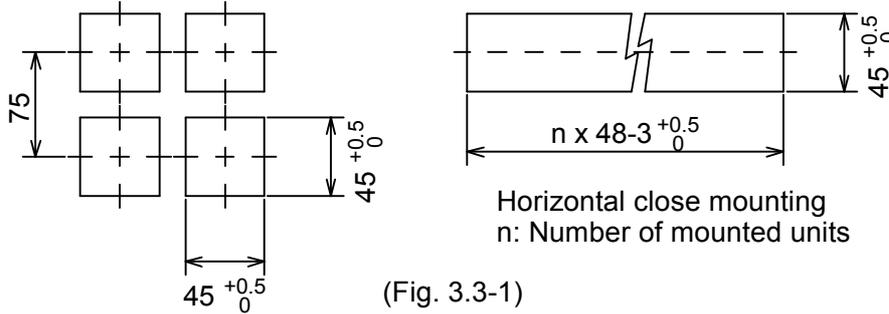
(Fig. 3.2-1)

3.3 Panel Cutout (Scale: mm)



Caution

If horizontal close mounting is used for the controller, IP66 specification (Drip-proof/Dust-proof) may be compromised, and all warranties will be invalidated.



(Fig. 3.3-1)

3.4 Mounting to and Removal from the Control Panel

3.4.1 How to Mount the ACS-13A

Mount the controller vertically to the flat, rigid panel to ensure it adheres to the Drip-proof/Dust-proof specification (IP66).

Mountable panel thickness: 1 to 5 mm

(1) Insert the controller from the front side of the panel. (Fig.3.4.1-1)

(2) Insert the mounting frame until it comes into contact with the panel, and fasten with the screw.

Tighten screws with one rotation upon the screw tips touching the panel. (Fig.3.4.1-2)

The torque is 0.05 to 0.06 N·m.

3.4.2 How to Remove the Mounting Frame and Unit (Fig. 3.4.2-1)

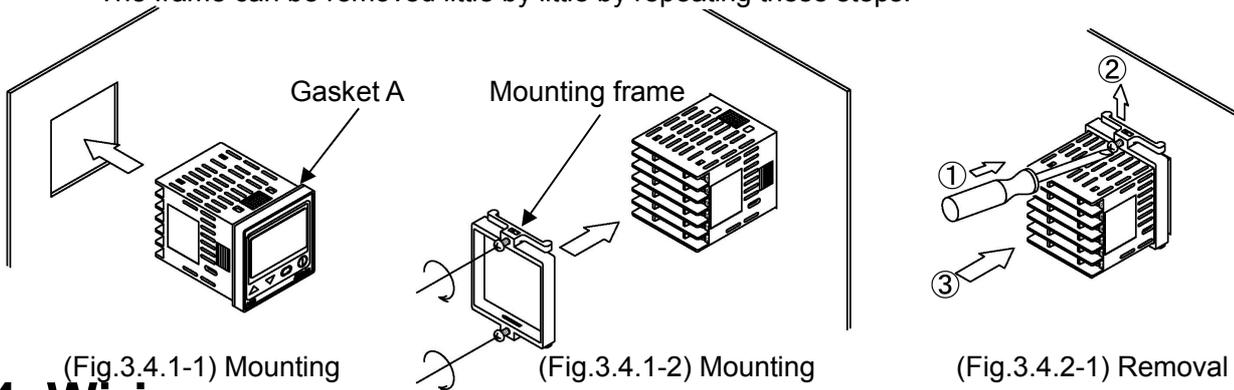
(1) Turn the power to the unit OFF, and disconnect all wires before removing the mounting frame.

(2) Insert a flat blade screwdriver between the screw frame and unit ①.

(3) Slowly push the frame upward using the screwdriver ②, while pushing the unit toward the panel ③.

(4) Repeat step (2) and slowly push the frame downward using the screwdriver for the other side.

The frame can be removed little by little by repeating these steps.



(Fig.3.4.1-1) Mounting

(Fig.3.4.1-2) Mounting

(Fig.3.4.2-1) Removal

4. Wiring



Warning

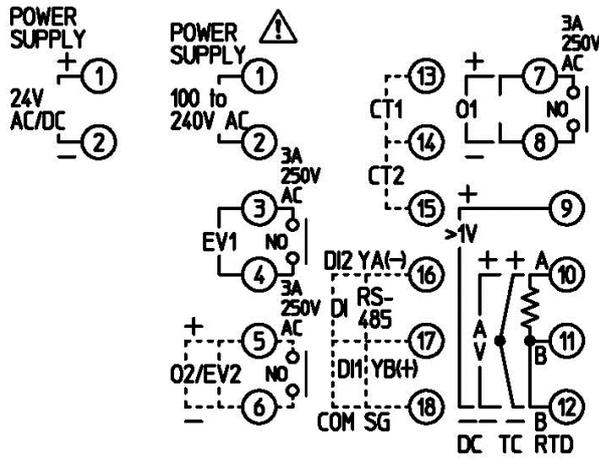
Turn the power supply to the instrument off before wiring or checking. Working on or touching the terminal with the power switched on may result in severe injury or death due to electrical shock.



Caution

- The terminal block of this instrument is designed to be wired from the left side. The lead wire must be inserted from the left side of the terminal, and fastened with the terminal screw. The torque should be 0.63 N·m.
- This instrument does not have a built-in power switch, circuit breaker or fuse. It is necessary to install them near the controller. (Recommended fuse: Time-lag fuse, rated voltage 250 V AC, rated current 2 A)
- For a 24 V AC/DC power source, do not confuse polarity when using direct current (DC).
- Use a thermocouple and compensating lead wire according to the sensor input specifications of this controller.
- Use the 3-wire RTD according to the sensor input specifications of this controller.
- (+) side input terminal number of 0 to 5 V DC, 1 to 5 V DC, 0 to 10 V DC differs from that of 0 to 1 V DC.
- (+) side input terminal number of 0 to 5 V DC, 1 to 5 V DC, 0 to 10 V DC: 9
- (+) side input terminal number of 0 to 1 V DC: 10
- When using a relay contact output type, externally use a relay according to the capacity of the load to protect the built-in relay contact.
- When wiring, keep input wires (thermocouple, RTD, etc.) away from AC sources or load wires.

4.1 Terminal Arrangement



(Fig. 4.1-1)

- EV1: Alarm 1 output
- EV2: Alarm 2 output (A2 option) or Heater burnout alarm output (W, W3 option)
- O2: Control output (OUT2) (D□ option)
- O1: Control output (OUT1)
- DC: DC voltage, current inputs
(For DC voltage input, + side terminal number differs depending on the voltage input.)
- TC: Thermocouple input
- RTD: Resistance temperature detector input
- CT1: CT input 1 (W, W3 option)
- CT2: CT input 2 (W3 option)
- DI: Contact input (SM option)
- RS-485: Serial communication (C5 option)

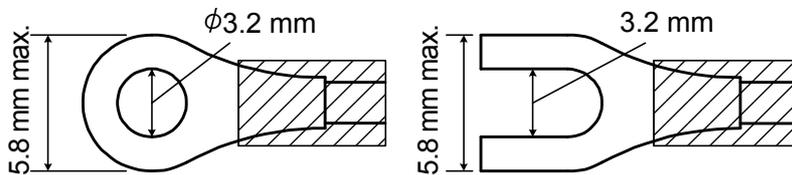
4.2 Lead Wire Solderless Terminal

Use a solderless terminal with an insulation sleeve in which an M3 screw fits as shown below. (Fig. 4.2-1) The torque should be 0.63 N•m.

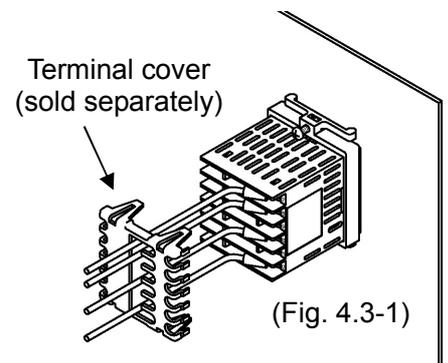
4.3 When Using a Terminal Cover

When using a terminal cover (sold separately), pass terminal wires numbered 7 to 12 into the holes of the terminal cover. (Fig. 4.3-1)

Solderless terminal	Manufacturer	Model	Tightening torque
Y-type	Nichifu Terminal Industries CO.,LTD.	TMEV1.25Y-3	0.63 N•m
	Japan Solderless Terminal MFG CO.,LTD.	VD1.25-B3A	
Ring-type	Nichifu Terminal Industries CO.,LTD.	TMEV1.25-3	
	Japan Solderless Terminal MFG CO.,LTD.	V1.25-3	



(Fig. 4.2-1)



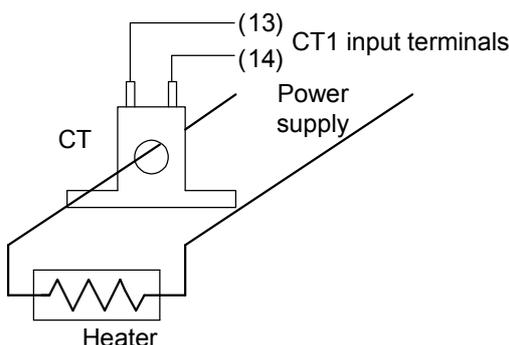
(Fig. 4.3-1)

4.4 Heater Burnout Alarm (W, W3 option) Wiring

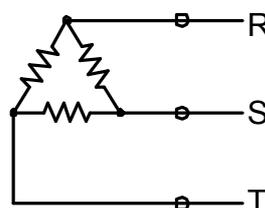
This alarm is not usable for detecting heater current under phase control.

Use the CT (current transformer) provided, and pass one lead wire of the heater circuit into the hole of the CT. (Fig. 4.4-1). When wiring, keep the CT wire away from AC sources or load wires to avoid the external interference.

In the case of 3-phase (W3 option), pass any 2 lead wires of R, S, T into the CT, and connect them to CT1 (13, 14) and CT2 terminals (14, 15). (Fig. 4.4-2)



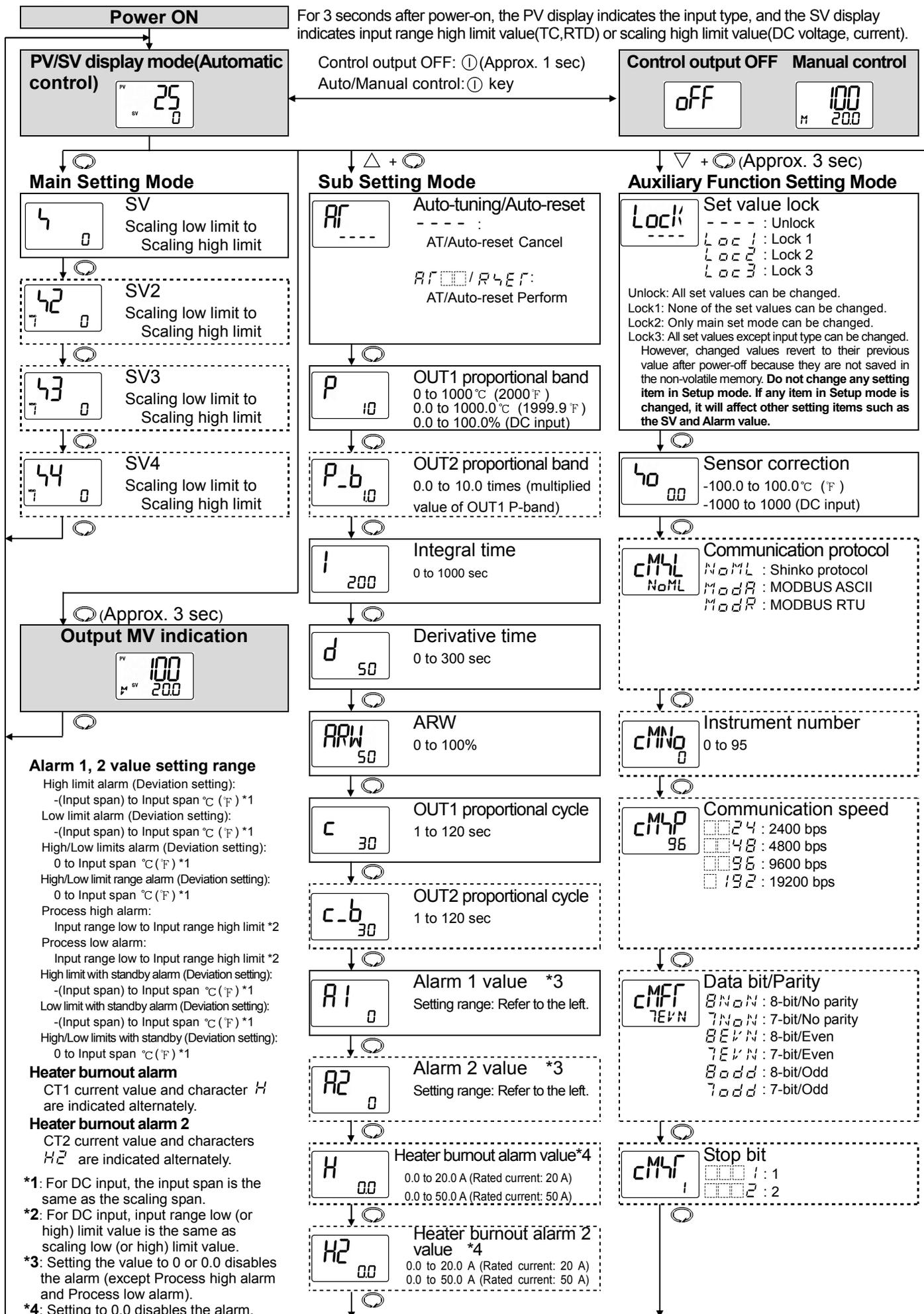
(Fig. 4.4-1)



Pass any 2 wires of R, S and T into CT.

(Fig. 4.4-2)

5. Operation Flowchart



Characters used in this manual:

Indication	-1	0	1	2	3	4	5	6	7	8	9	℃	℉
Number, °C/℉	-1	0	1	2	3	4	5	6	7	8	9	℃	℉
Indication	A	B	C	D	E	F	G	H	I	J	K	L	M
Alphabet	A	B	C	D	E	F	G	H	I	J	K	L	M
Indication	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
Alphabet	N	O	P	Q	R	S	T	U	V	W	X	Y	Z

(Table 5-1) Input type selection: [4EN4] (Default: K000 K, -200 to 1370°C)

K000	K	-200 to 1370 °C	K00F	K	-320 to 2500 ℉
K0.0	K	-200.0 to 400.0 °C	K0.F	K	-320.0 to 750.0 ℉
J000	J	-200 to 1000 °C	J00F	J	-320 to 1800 ℉
R000	R	0 to 1760 °C	R00F	R	0 to 3200 ℉
S000	S	0 to 1760 °C	S00F	S	0 to 3200 ℉
B000	B	0 to 1820 °C	B00F	B	0 to 3300 ℉
E000	E	-200 to 800 °C	E00F	E	-320 to 1500 ℉
T0.0	T	-200.0 to 400.0 °C	T0.F	T	-320.0 to 750.0 ℉
N000	N	-200 to 1300 °C	N00F	N	-320 to 2300 ℉
PL20	PL-II	0 to 1390 °C	PL2F	PL-II	0 to 2500 ℉
C000	C(W/Re5-26)	0 to 2315 °C	C00F	C(W/Re5-26)	0 to 4200 ℉
Pt100	Pt100	-200.0 to 850.0 °C	Pt100F	Pt100	-320.0 to 1500.0 ℉
JPt100	JPt100	-200.0 to 500.0 °C	JPt100F	JPt100	-320.0 to 900.0 ℉
Pt100	Pt100	-200 to 850 °C	Pt100F	Pt100	-320 to 1500 ℉
JPt100	JPt100	-200 to 500 °C	JPt100F	JPt100	-320 to 900 ℉
420A	4 to 20 mA	-2000 to 10000			
020A	0 to 20 mA				
01V	0 to 1 V	-2000 to 10000			
05V	0 to 5 V				
15V	1 to 5 V				
010V	0 to 10 V				

(Table 5-2) Alarm 1 type selection [AL1F] (Default - - - - : No alarm action)

	H000 High limit alarm	L000 Low limit alarm	HL00 High/Low limits alarm
Alarm action			
	HLR0 High/Low limit range alarm	RA00 Process high alarm	RLA0 Process low alarm
Alarm action			
	H00W High limit with standby alarm	L00W Low limit with standby alarm	HL00W High/Low limits with standby alarm
Alarm action			

Alarm 1 output is in standby.

“A1” means Alarm 1. For Alarm 2, read “A2” for “A1”.

- PV display indicates setting item characters, and SV display indicates default values.
- Setting items with dotted lines are optional, and they appear only when the options are ordered.
- **Key operation** (Use the Δ or ∇ key to set or select each setting item.)
 - If the \odot key is held down for 3 sec in any setting mode, the unit will revert to the PV/SV display mode.
 - $\downarrow \odot$: This means that if the \odot key is pressed, the unit proceeds to the next setting mode.
 - $\Delta + \odot$: Press and hold the Δ and \odot keys (in that order) together.
 - $\nabla + \odot$ (Approx. 3 sec): Press and hold the ∇ and \odot keys (in that order) together for approx. 3 sec.
 - $\Delta + \nabla$ (Approx. 3 sec): Press and hold the Δ and ∇ keys (in that order) together for approx. 3 sec.

$\Delta + \nabla$ (Approx. 3 sec)
Setup Mode

4EN4 Input type
Selection item: See Table 5-1.
K C

4FLH Scaling high limit
Scaling low limit to Input range high limit
-2000 to 10000 (DC input)

4FL Scaling low limit
Input range low limit to Scaling high limit
-2000 to 10000 (DC input)

dP Decimal point place
0
No decimal point
1 digit after the point
2-digit after the point
3-digit after the point

FILF PV filter time constant
0.0 to 10.0 sec
0.0

oLH OUT1 high limit
OUT1 low limit to 100%
OUT1 low limit to 105% (A/M)
100

oLL OUT1 low limit
0% to OUT1 high limit
-5% to OUT1 high limit (A/M)
0

H44 OUT1 ON/OFF hysteresis
0.1 to 100.0 °C (°F)
1 to 1000 (DC input)
1.0

cAcF OUT2 action mode
Air cooling
Oil cooling
Water cooling
Air R

oLHb OUT2 high limit
OUT2 low limit to 100%

oLLb OUT2 low limit
0% to OUT2 high limit

db Overlap/Dead band
-100.0 to 100.0 °C (°F)
-1000 to 1000 (DC input)
0.0

H44b OUT2 ON/OFF hysteresis
0.1 to 100.0 °C (°F)
1 to 1000 (DC input)
1.0

ALIF Alarm 1 type
Selection item: See Table 5-2.

AL2F Alarm 2 type
Selection item: See Table 5-2.

A1LM Alarm1 Energized/De-energized
NoML : Energized
REv4 : De-energized
NoML

A2LM Alarm2 Energized/De-energized
NoML : Energized
REv4 : De-energized
NoML

A1HY Alarm 1 hysteresis
0.1 to 100.0 °C (°F)
1 to 1000 (DC input)
1.0

A2HY Alarm 2 hysteresis
0.1 to 100.0 °C (°F)
1 to 1000 (DC input)
1.0

A1d4 Alarm 1 delay time
0 to 10000 sec
0

A2d4 Alarm 2 delay time
0 to 10000 sec
0

RRFU SV rise rate
0 to 10000 °C /min.(°F /min.)
0.0 to 1000.0 °C /min.(°F /min.)
0 to 10000/min.
0

RRFd SV fall rate
0 to 10000 °C /min.(°F /min.)
0.0 to 1000.0 °C /min.(°F /min.)
0 to 10000/min.
0

CONF Direct/Reverse control
HEAT : Reverse (Heating)
cool : Direct (Cooling)
HEAT

AT_b AT bias
0 to 50 °C (0 to 100 °F)
0.0 to 50.0 °C (0.0 to 100.0 °F)
20

4V_b SVTC bias
Converted value of $\pm 20\%$ of input span
DC input: $\pm 20\%$ of scaling span
0

d1IN Contact input function
4M: Set value memory external selection
oUF: OUT/OFF external selection 1 (SV, SV2 switchable)
oUF2: OUT/OFF external selection 2

EOUF Output status when input errors occur
oFF: Outputs OFF(4mA) or OUT1(OUT2) low limit.
oN: Outputs a value between OFF(4mA) and ON(20mA) or between OUT1(OUT2) low limit and OUT1(OUT2) high limit value depending on the deviation.
oFF

MANU OUT/OFF key function
oFF: Control output OFF
MANU: Auto/Manual control
oFF

bKLF Backlight selection
ALL: All are backlit
PV: PV display is backlit
4V: SV display is backlit
Ac: Indicators are backlit
PV4V: PV+SV display are backlit
PVAc: PV+ Indicators are backlit
4VAc: SV+ Indicators are backlit
ALL

colR PV color
GRN: Green
REd: Red
oRD: Orange
ALGR: Alarm 1 or Alarm 2: ON
Green \rightarrow Red
ALoR: Alarm 1 or Alarm 2: ON
Orange \rightarrow Red
PvGR: PV continuous change
APGR: PV continuous change + Alarm 1 or Alarm 2 ON (Red)
REd

cLRc PV color range
0.1 to 100.0 °C (°F)
1 to 1000 (DC input)
5.0

dPFM Backlight time
0 to 99 minutes
(0 minutes: Continuous)
0

P4V Indication when output OFF
oFF: OFF indication
RoFF: No indication
PV: PV indication
PVAL: PV+ Alarm output
oFF

ORAR OUT1 rate-of-change
0 to 100 %/sec
0

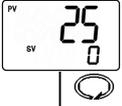
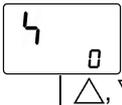
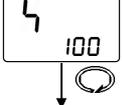
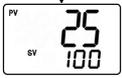
6. Running

After the unit is mounted to the control panel and wiring is completed, operate the unit following the procedure below.

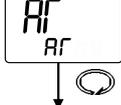
- (1) Turn the power supply to the ACS-13A ON.
- (2) Set up the unit. (Refer to "5. Operation Flowchart".) Setup should be done before using this controller: Setting the Input type, Alarm type, Direct/Reverse control, etc. in Setup mode. If the user's specification is the same as the default value of the ACS-13A, it is not necessary to set up the controller. Proceed to Step (3).
- (3) Input each set value. Input each set value. Refer to "5. Operation Flowchart" and "7. Basic Settings".
- (4) Turn the load circuit power ON. Control action starts so as to keep the control target at the SV.

7. Basic Settings

● Main setting mode (When setting SV to 100°C)

- (1)  Proceed to the Main setting mode. Press the  key in the PV/SV display mode. The unit proceeds to the Main setting mode.
- (2)  Set SV. Set SV with the  or  key.
- (3)  Register the SV. Register the SV by pressing the  key. The unit reverts to the PV/SV display mode.
- (4)  Control starts. Control starts so as to keep the measuring temperature at 100°C.

● Auto-tuning Perform/Cancel (PID control)

- (1)  Proceed to the Sub setting mode. Press and hold the  and  keys in the PV/SV display mode. The unit proceeds to the Sub setting mode.
- (2)  Select AT Perform/Cancel. Select AT Perform with the  key, or select AT Cancel with the  key.
- (3)  Confirm AT Perform/Cancel. Press the  key. The unit reverts to the PV/SV display mode.
- (4)  AT Perform/Cancel. While AT is performing, the AT indicator flashes, and it turns off if AT is cancelled.

- In order to decide each P, I, D and ARW value automatically, the auto-tuning process has been made to fluctuate to get an optimal value.
- Sometimes the auto-tuning process will not fluctuate if auto-tuning is performed at or near room temperature. Therefore auto-tuning might not finish normally.
- Auto-reset is available for P or PD action. Auto-reset is cancelled in approx. 4 minutes. It cannot be released while performing this function.

8. Specifications

Power supply voltage: 100 to 240 V AC 50/60 Hz, 24 V AC/DC 50/60 Hz

Allowable voltage fluctuation: 100 to 240 V AC; 85 to 264 V AC, 24 V AC/DC; 20 to 28 V AC/DC

Accuracy (Setting and Indication):

Thermocouple input: Within $\pm 0.2\%$ of each input span ± 1 digit, or within $\pm 2^\circ\text{C}$ (4°F), whichever is greater
 However, R, S inputs, 0 to 200°C (0 to 400°F): Within $\pm 6^\circ\text{C}$ (12°F)
 B input, 0 to 300°C (0 to 600°F): Accuracy is not guaranteed.
 K, J, E, T, N inputs, less than 0°C (32°F): Within $\pm 0.4\%$ of input span ± 1 digit

RTD input: Within $\pm 0.1\%$ of each input span ± 1 digit, or within $\pm 1^\circ\text{C}$ (2°F), whichever is greater

DC voltage, current inputs: Within $\pm 0.2\%$ of each input span ± 1 digit

Control output (OUT1):

Relay contact: 1a, Control capacity: 3 A 250 V AC (resistive load)

1 A 250 V AC (inductive load $\cos\phi=0.4$), Electrical life: 100,000 cycles

Non-contact voltage (for SSR drive): 12 V DC $\pm 15\%$, Max. 40 mA DC (short circuit protected)

Direct current: 4 to 20 mA DC, Load resistance, Max. 550 Ω

Alarm 1, Alarm 2 (A2 option), Heater burnout alarm output (W, W3 option):

Relay contact 1a, Control capacity: 3 A 250 V AC (resistive load), Electrical life: 100,000 cycles

Control output (OUT2) (D□ option):

Relay contact 1a, Control capacity: 3 A 250 V AC (resistive load), Electrical life: 100,000 cycles

Non-contact voltage (for SSR drive): 12 V DC $\pm 15\%$, Max. 40 mA DC (short circuit protected)

Contact input: Circuit current when closed: Approx. 12 mA

Power consumption: Approx. 8 VA

Ambient temperature: 0 to 50°C (32 to 122°F)

Ambient humidity: 35 to 85 %RH (No icing and non-condensing)

Weight: Approx. 120 g

Accessories included: Instruction manual: 1 copy, Mounting frame: 1 piece

Gasket A (Front mounted to the ACS-13A): 1 piece

CT (Current transformer):

CTL-6S: 1 piece [W (20A) option] CTL-12-S36-10L1U: 1 piece [W (50A) option]

CTL-6S: 2 pieces [W3 (20A) option] CTL-12-S36-10L1U: 2 pieces [W3 (50A) option]

Accessories sold separately: Terminal cover, USB communication cable (CMA)

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