



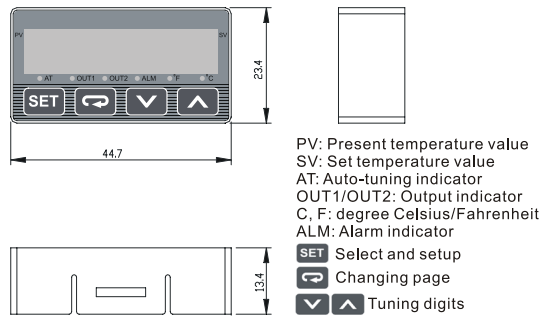
SCD Accessory: SCD-LED Instruction Sheet

Thank you very much for choosing SCD-LED. Please read this instruction sheet before using your SCD-LED to ensure proper operation. Keep this instruction sheet handy for quick reference.

1 Precaution

- Please hold the plastic terminal when installing SCD-LED to prevent electrostatic discharge (ESD).
- Prevent dust or metallic debris from falling into the device and cause malfunction. **DO NOT** modify or uninstall SCD-LED without being permitted. **DO NOT** use empty terminals.
- When installing SCD-LED, please make sure the power of SCD main unit is switched off and insert SCD-LED into the correct slot on SCD main unit.
- Make sure you install SCD-LED correctly before switching on the power; otherwise serious damage may occur.
- DO NOT** touch the terminals or repair the device when the power is on; otherwise an electric shock may occur.

2 Product Outline & Dimension



3 Electrical Specifications

Input power	DC +5V
Power consumption	Max. 0.5W
Display	Single row 7-segment LED display, two 4 bits PV: red SV: green
Keys	4 keys for selecting, changing pages and tuning
Terminal connection	Can only be inserted into the "Display and Setup Unit" slot on SCD main unit

4 Setting up Parameters

Switching modes: SCD-LED is in "operation mode" when the power is switched on, Press **SET** to enter "regulation mode". Press **SET** for more than 3 seconds in the operation mode to enter "initial setting mode". Press **SET** in the regulation mode or initial setting mode to return to the operation mode.

PV/SV: Displaying the present value and set value. Use **↓** **↑** to change the set value.

How to set up: Use **↔** in the three modes to select the parameter to be set up and **↓** **↑** to modify the settings. Press **SET** to save the setting.

How to switch modes by keys and set up parameters:



Regulation Mode	Operation Mode	Initial Setting Mode
PAGE Select channel Press ↔ ↓	1234 Use ↓ ↑ to set up target temperature (SV) Press ↔ ↓	INPT Set up input type Press ↔ ↓
AT Auto-tuning (Set it up when in PID control and RUN) Press ↔ ↓	r-S Control loop RUN/STOP Press ↔ ↓	TEMP Set up temperature unit Press ↔ ↓

Regulation Mode	Operation Mode	Initial Setting Mode
P PID proportional band (Set it up when in PID control) Press ↔ ↓	Ptern Set up start pattern (Set it up when in PID control) Press ↔ ↓	EP-H Set up upper limit of temperature Press ↔ ↓
Ti Set up PID Ti value (Set it up when in PID control) Press ↔ ↓	STEP Set up start step (Set it up when in PID program control) Press ↔ ↓	EP-L Set up lower limit of temperature Press ↔ ↓
Td Set up PID Td value (Set it up when in PID control) Press ↔ ↓	SP Set up the position of decimal point (Not for thermocouple R, S, B type) Press ↔ ↓	Ctrl Select control mode Press ↔ ↓
Pdof or CoF Set up PD/PID control offset (When in PID control, set up PdoF when Ti=0. AT sets up ioF automatically when Ti≠0.) Press ↔ ↓	ALIH or ALAH Without/with group INB Set up upper limit of Alarm 1 Press ↔ ↓	S-o1 Set up output 1 (Heating, cooling or proportional output) Press ↔ ↓
ES-1 Hysteresis for output 1 (Set it up when in ON/OFF control) Press ↔ ↓	ALIL or ALAL Without/with group INB Set up lower limit of Alarm 1 Press ↔ ↓	S-o2 Set up output 2 (Heating, cooling or alarm output) Press ↔ ↓
ES-2 Hysteresis for output 2 (Set it up when in ON/OFF control) Press ↔ ↓	AL2H Without group INB Set up upper limit of Alarm 2 Press ↔ ↓	AL1 or ALAN Without/with group INB Set up Alarm 1 mode Press ↔ ↓
Pd-1 Control cycle for output 1 (Set it up when in PID/programmable PID/manual control) Press ↔ ↓	AL2L Without group INB Set up lower limit of Alarm 2 Press ↔ ↓	AL2 Without group INB Set up Alarm 2 mode Press ↔ ↓
Pd-2 Control cycle for output 2 (Set it up when in PID/programmable PID/manual control) Press ↔ ↓	LoC For locking the keys on the panel Press ↔ ↓	CoPY Set up copy function Press ↔ ↓
CoEF Ratio of output 1 & output 2 when in dual output control. Pb2 = Pb1 × COEF (Set it up when in PID/programmable PID + dual output) Press ↔ ↓	OUT1 For displaying and tuning the value of output 1 (Displayed when in PID/programmable PID/manual control RUN) Press ↔ ↓	C-SL Select ASCII/RTU communication format Press ↔ ↓
DEAD Set up the overlapped area for dual output (dead band) (Set it up when in dual output) Press ↔ ↓	OUT2 For displaying and tuning the value of output 2 (Displayed when in PID/programmable PID/manual control RUN) Press ↔ ↓	C-no Set up communication address Press ↔ ↓
EPoF For tuning temperature offset Press ↔ ↓	Return to "target temperature" Press ↔ ▷	bPS Set up communication baud rate Press ↔ ↓
oNRY Set up upper limit for control output Press ↔ ↓		LEN Set up data length Press ↔ ↓
oNLn Set up lower limit for control output Press ↔ ↓		PrEY Set up parity bit Press ↔ ↓

Regulation Mode	Operation Mode	Initial Setting Mode
ALnd Set up delay time for alarm output Press ↔ ↓		StoP Set up stop bit Press ↔ ▷ Return to "set up input type"
CrH For tuning upper limit of analog output (Displayed when in analog output) Press ↔ ↓		
CrLo For tuning lower limit of analog output (Displayed when in analog output) Press ↔ ↓		
Prop Set up positive/negative proportional output (Set it up when in proportional output control) Press ↔ ▷ Return to "auto-tuning"		

5 Types of Input Sensors & Temperature Range

- Set up input sensor: Enter parameter **CnPE** (see "Setting up Parameters" section for details) in "initial setting mode" and select an input sensor (see Table 1).
- Set up temperature range: Enter parameter **EP-H** and **EP-L** (see "Setting up Parameters" section for details) in "initial setting mode" to set up the temperature range.
- Set up the position of decimal point: Enter parameter **SP** (see "Setting up Parameters" section for details) in "operation mode". The position of decimal point will change the temperature range. The screen displays only 4 digits; therefore, you have to set "0" in this parameter if you wish to display values bigger than 999 or smaller than -99. The setting will not be saved. Default = 1.

Input Sensor Type	Display	Range
Platinum resistance (Cu50)	Cu50	-50 ~ 150°C
Platinum resistance (Ni120)	n120	-80 ~ 300°C
Platinum resistance (Pt100)	Pt	-200 ~ 850°C
Platinum resistance (JPt100)	JPt	-20 ~ 400°C
Thermocouple TXK type	tXt	-200 ~ 800°C
Thermocouple U type	U	-200 ~ 500°C
Thermocouple L type	L	-200 ~ 850°C
Thermocouple B type	b	100 ~ 1,800°C
Thermocouple S type	S	0 ~ 1,700°C
Thermocouple R type	r	0 ~ 1,700°C
Thermocouple N type	n	-200 ~ 1,300°C
Thermocouple E type	E	0 ~ 600°C
Thermocouple T type	t	-200 ~ 400°C
Thermocouple J type	J	-100 ~ 1,200°C
Thermocouple K type	K	-200 ~ 1,300°C

Table 1

6 Setting up Control Output

For PID Control Application:

- Set up 2 outputs:** Enter parameter **S-o1** and **S-o2** in "initial setting mode" (see "Setting up Parameters" section for details). Set up one of the two parameters as **HERE** or **CoE** of control output.
- Set up control type:** Enter parameter **Ctrl** in "initial setting mode" (see "Setting up Parameters" section for details) and set it up as **Pd** (PID) control.
- Set up parameters:** In "regulation mode"
 - Parameter **AT**: Can be set up when parameter **r-S** is set as **rUn**. When **AT** is set as **on**, the program will calculate parameters **P**, **Ti**, **Td**, **CoF** and **CoEF** automatically and save them.
 - Parameter **P**, **Ti** and **Td**.

- Parameter **Pdof** and **Pdof**: **Pdof** can be set up when parameter **u** is set as "0". **Pdof** can be set up when **u** is not "0".
- Parameter **Pd-1** and **Pd-2**: **Pd-1** (control cycle for output 1) can be set up when parameter **S-o-1** is set as **HEAT** (heating) or **COOL** (cooling) output. **Pd-2** (control cycle for output 2) can be set up when parameter **S-o-2** is set as **HEAT** (heating) or **COOL** (cooling) output.
- Parameter **CoEF** and **dERd**: Can be set up when parameter **S-o-1** and **S-o-2** are set as **HEAT** (heating) or **COOL** (cooling) output. (The settings in **S-o-1** and **S-o-2** have to be different.)

For ON/OFF Control Application:

- Set up 2 outputs:** Enter parameter **S-o-1** and **S-o-2** in "initial setting mode" (see "Setting up Parameters" section for details). Set up one of the two parameters as **HEAT** or **COOL** of control output.
- Set up control type:** Enter parameter **Ctrl** in "initial setting mode" (see "Setting up Parameters" section for details) and set it up as **onof** (ON/OFF) control.
- Set up parameters:** In "regulation mode"
 - Parameters **ES-1** and **ES-2**: **ES-1** (hysteresis for output 1) can be set up when parameter **S-o-1** is set as **HEAT** (heating) **COOL** (cooling) output. **ES-2** (hysteresis for output 2) can be set up when parameter **S-o-2** is set as **HEAT** (heating) or **COOL** (cooling) output. You can only set up **ES-1** when **S-o-1** and **S-o-2** are set as **HEAT** or **COOL** at the same time.
 - Parameter **dERd**: Can be set up when parameter **S-o-1** and **S-o-2** are set as control output, and the settings in **S-o-1** and **S-o-2** are different, e.g. output 1 is **HEAT** (heating), and output 2 is **COOL** (cooling).

For Manual Control Application:

- Set up 2 outputs:** Enter parameter **S-o-1** and **S-o-2** in "initial setting mode" (see "Setting up Parameters" section for details). Set up one of the two parameters as **HEAT** or **COOL** of control output.
- Set up control type:** Enter parameter **Ctrl** in "initial setting mode" (see "Setting up Parameters" section for details) and set it up as **manu** (manual) control.
- Set up parameters:** In "regulation mode"
 - Parameter **Pd-1** and **Pd-2**: **Pd-1** (control cycle for output 1) can be set up when parameter **S-o-1** is set as **HEAT** (heating) or **COOL** (cooling) output. **Pd-2** (control cycle for output 2) can be set up when parameter **S-o-2** is set as **HEAT** (heating) or **COOL** (cooling) output.
 - Parameter **out-1** and **out-2** (in "operation mode"): **out-1** can be set up when parameter **S-o-1** is set as **HEAT** (heating) or **COOL** (cooling) output. **out-2** can be set up when parameter **S-o-2** is set as **HEAT** (heating) or **COOL** (cooling) output.

For Programmable PID Application:

- Set up 2 outputs:** Enter parameter **S-o-1** and **S-o-2** in "initial setting mode" (see "Setting up Parameters" section for details). Set up one of the two parameters as **HEAT** or **COOL** of control output.
- Set up control type:** Enter parameter **Ctrl** in "initial setting mode" (see "Setting up Parameters" section for details) and set it up as **proB** (programmable) control.
- Set up parameters:** In "regulation mode"
 - Parameter **P**, **i** and **d**.
 - Parameter **Pdof**: **Pdof** can be set up when parameter **u** is set as "0".
 - Parameter **Pd-1** and **Pd-2**: **Pd-1** (control cycle for output 1) can be set up when parameter **S-o-1** is set as **HEAT** (heating) or **COOL** (cooling) output. **Pd-2** (control cycle for output 2) can be set up when parameter **S-o-2** is set as **HEAT** (heating) or **COOL** (cooling) output.
 - Parameter **CoEF** and **dERd**: Can be set up when parameter **S-o-1** and **S-o-2** are set as **HEAT** (heating) or **COOL** (cooling) output. (The settings in **S-o-1** and **S-o-2** have to be different.)
 - Parameter **Ptern** and **StEP** (in "operation mode"): Can be set up when parameter **r-S** is set as **StoP** or **PStEP**.

For Proportional Output Application:

- In this application, output 1 has to be analog output.
- Set up output function:** Enter parameter **S-o-1** in "initial setting mode" (see "Setting up Parameters" section for details) and set it as **prop** (proportional) output.
 - Set up parameters:** In "regulation mode"
 - Parameter **prop**

For Upper/Lower Limits of Control Output:

- Set up upper limit:** Enter parameter **onRH** in "regulation mode" (see "Setting up Parameters" section for details). Range: Lower limit ~ 100%.
- Set up lower limit:** Enter parameter **onLN** in "regulation mode" (see "Setting up Parameters" section for details). Range: 0 ~ upper limit %.

For Alarm Application:

- Set up output function (only when there is group INB):** Enter parameter **S-o-2** in "initial setting

- mode" (see "Setting up Parameters" section for details) and set it as **ALAN** (alarm) output.
- Set up alarm type:** Enter parameter **ALAN** (with INB) or **ALAR** and **ALAR2** (without INB) in "initial setting mode". See Table 2 for more details on the alarm output.
 - Set up parameters:** In "operation mode"
 - Parameter **ALAH** and **ALAL**: Can be set up when there is group INB.
 - Parameter **AL1H**, **AL1L**, **AL2H** and **AL2L**: Can be set up when there is no group INB.
 - Set up delay alarm output:** Enter parameter **ALnd** in "regulation mode" (unit: second). The alarm will be enabled only when the temperature reaches the alarm output condition, and the condition remains until the delay time is reached.

SCD main unit offers 2 groups of alarm output, each with 12 alarm modes in the initial setting mode. When SV is higher or lower than SV, the alarm output will be enabled. See the table in the next column for the explanations on the 12 alarm output modes.

Note: AL-H and AL-L include AL1H, AL2H and AL1L, AL2L.

SV	Alarm Mode	Alarm Output Operation
0	No alarm	OFF
1	Alarm output is enabled when the temperature reaches upper and lower limits: The alarm will be enabled when PV exceeds SV + AL-H or falls below SV - AL-L.	ON OFF AL-L SV AL-H
2	Alarm output will be enabled when the temperature reaches the upper limit: The alarm will be enabled when PV exceeds SV + AL-H.	ON OFF SV AL-H
3	Alarm output will be enabled when the temperature reaches the lower limit: The alarm will be enabled when PV falls below SV - AL-L.	ON OFF AL-L SV
4	Alarm output will be enabled when PV is between SV + AL-H and SV - AL-L.	ON OFF AL-L SV AL-H
5	Alarm output will be enabled when the temperature reaches the absolute value of the upper and lower limits: The alarm will be enabled when PV exceeds AL-H or falls below AL-L.	ON OFF AL-L AL-H
6	Alarm output will be enabled when the temperature reaches the absolute value of the upper limit: The alarm will be enabled when PV exceeds AL-H.	ON OFF AL-H
7	Alarm output will be enabled when the temperature reaches the absolute value of the lower limit: The alarm will be enabled when PV falls below AL-L.	ON OFF AL-L
8	Upper/lower limit standby alarm: The alarm will be enabled when PV reaches SV and further exceeds SV + AL-H or falls below SV - AL-L.	ON OFF AL-L SV AL-H
9	Upper limit standby alarm: The alarm will be enabled when PV reaches SV and further exceeds SV + AL-H.	ON OFF SV AL-H
10	Lower limit standby alarm: The alarm will be enabled when PV reaches SV and further falls below SV - AL-L.	ON OFF AL-L SV
11	Upper limit hysteresis alarm: The alarm will be enabled when PV exceeds SV + AL-H. The alarm will be disabled when PV falls below SV.	ON OFF AL-L SV AL-H
12	Lower limit hysteresis alarm: The alarm will be enabled when PV falls below SV - AL-L. The alarm will be disabled when PV exceeds SV.	ON OFF AL-L SV AL-H

Table 2

7 Setting up Communication

- Set up communication:** Enter parameter **C-SL**, **C-no**, **bPS**, **LEN**, **PREY** and **StoP** in "initial setting mode" (see "Setting up Parameters" section for details) and select your desired communication settings.
- SCD series temperature controller is able to set up or read communication settings through SCD-LED.

8 Setting up Channel

- Select channel:** Enter parameter **PRdE** in "regulation mode" (see "Setting up Parameters" section for details) and select the channel to be monitored.
- How does it work:** SCD main unit has maximum 8 channels which can be connected to 8 input sensors at the same time. The 8 input channels belong to group INA and INB, each group with 4 input channels. INB is optional accessory; therefore if INB is not inserted in SCD, SCD will only show 4 channels.

9 Setting up Copy Function

- Set up the function:** Enter parameter **CoPY** in "initial setting mode" (see "Setting up Parameters"

section for details) and select the function you desire.

- How does it work:** The copy function allows a SCD main unit to copy its parameters (including the values set in the parameter and communication settings) to another SCD main unit through SCD-LED. Follow the steps below:
 - Insert SCD-LED into the SCD main unit to be copied. Enter parameter **CoPY** in "initial setting mode" and select **CoPY**, and SCD-LED will read the parameters in the SCD main unit. Next, you will see **Good** on the screen, indicating that the copy is successful. **FAIL** indicates the copy fails. Press **▲** to return to "operation mode" and you will see the present temperature value (PV) and set temperature value (SV).
 - Switch off SCD and withdraw SCD-LED. Insert SCD-LED into another SCD main unit. Enter parameter **CoPY** in "initial setting mode" and select **CoPY**. SCD-LED will write the parameters into it. Next, you will see **Good** on the screen, indicating that the writing-in is successful. **FAIL** indicates the writing-in fails. Press **▲** to return to "operation mode" and you will see the present temperature value (PV) and set temperature value (SV).

10 Locking the Keys on Panel

- Lock the keys:** Enter parameter **LoL** in "operation mode" (see "Setting up Parameters" section for details) and select the function you desire.
- How does it work:** **LoL** indicates locking all the keys on the panel. **LoL2** indicates that you can only modify the set temperature value (SV), and all other functions are locked.
- Press **SET** and **CoPY** at the same time to unlock the keys.

11 Analog Output & Temperature Tuning

- Set up analog output tuning:** Enter parameter **CrHL** and **CrLo** in "regulation mode" (see "Setting up Parameters" section for details) and tune the parameter to the desired output value.
- Temperature offset tuning:** Enter parameter **EPoF** in "regulation mode" and tune the parameter to the displayed temperature value.
- How does it work:**
 - Tuning analog output: For example, if you would like to have accurate 4 ~ 20mA of output, you can set up output 0% by manual control, connect the output to ampere meter and tune parameter **CrLo** making the meter point to 4mA. Next, set up output 100% by manual control and tune parameter **CrHL** making the meter point to 20mA.
 - Tuning temperature offset: This allows the displayed temperature to plus or minus 1 offset value.

12 Error Message

Error	PV	SV
Input sensor not connected	no	CoLd
Internal communication error	CoLo	FAIL
Output error	Err	out
Input error	Err	CoPE
Storage error	Err	Proñ
Channel disabled	dCS	PRdE
Channel being initialized	dTE	CoLd

13 How to Install

- Remove all the terminal blocks on the panel.
- Uncover the panel and insert SCD-LED to the "operation interface" slot.
- Cover up the panel.
- Insert the terminal blocks back to their positions.