CP-UM-5287E

Single Loop Controller SDC15 User's Manual "Installation"

Thank you for purchasing the SDC15.
Before operating this product described in this User's Manual, please take note of the following points regarding safety.
Be sure to keep this manual nearby for handy reference.

RESTRICTIONS ON USE

This product has been designed, developed and manufactured for general-purpose application in machinery and equipment.
Accordingly, when used in applications outlined below, special care should be taken to implement a fail-safe and/or redundant design concept as well as a periodic maintenance program.

- Safety devices for plant worker protection
- Start/stop control devices for transportation and material handling machines
- Aeronautical/aerospace machines
- Control devices for nuclear reactors

Never use this product in applications where human safety may be put at risk.

This manual explains handling precautions, mounting, wiring procedures, PV range types and main specifications only. See the user's manuals listed below for detailed handling procedures, setting methods, etc. These manuals also contain information on using various functions.

Single Loop Controller	SDC15 User's Manual Installation & Configurations CP-SP-1148E
Smart Loader Package	SLP-C35 for Single Loop Controller SDC15/25/26/35/36 User's Manual CP-UM-5290E

■ Unpacking

Check the following items when removing the SDC15 from its package:

Name	Part No.	Q'ty	Remarks
Mounting Bracket	81446403-001	1	For C15T only
Gasket	81409657-001	1	For C15T only
User's Manual	CP-UM-5287E	1	This Manual

SAFETY PRECAUTIONS

⚠ WARNING Warnings are indicated when mishandling this product might result in death or serious injury to the user.

⚠ CAUTION Cautions are indicated when mishandling this product might result in minor injury to the user, or only physical damage to this product.

⚠ WARNING

- Note that incorrect wiring of the SDC15 can damage the SDC15 and lead to other hazards.
  Check that the SDC15 has been correctly wired before turning the power ON.
- Before wiring, or removing/mounting the SDC15, be sure to turn the power OFF.
  Failure to do so might cause electric shock.
- Do not touch electrically charged parts such as the power terminals.
  Doing so might cause electric shock.
- Do not disassemble the SDC15.
  Doing so might cause electric shock or faulty operation.

⚠ CAUTION

- Do not operate the keys with a propelling pencil or sharp-tipped object.
  Doing so might cause faulty operation.
- Use the SDC15 within the operating ranges recommended in the specifications (temperature, humidity, voltage, vibration, shock, mounting direction, atmosphere, etc.).
  Failure to do so might cause fire or faulty operation.
- Do not block ventilation holes.
  Doing so might cause fire or faulty operation.
- Wire the SDC15 properly according to predetermined standards. Also wire the SDC15 using specified power leads according to recognized installation methods.
  Failure to do so might cause electric shock, fire or faulty operation.
- Do not allow lead clippings, chips or water to enter the controller case.
  Doing so might cause fire or faulty operation.
- Firmly tighten the terminal screws at the torque listed in the specifications.
  Insufficient tightening of terminal screws might cause electric shock or fire.
- Do not use unused terminals on the SDC15 as relay terminals.
  Doing so might cause electric shock, fire or faulty operation.
- We recommend attaching the terminal cover (sold separately) after wiring the SDC15.
  Failure to do so might cause electric shock, fire or faulty operation.
- Continued use of the relays after the recommended service life has expired might cause fire or faulty operation.
  Failure to do so might cause fire or faulty operation.
- Use Yamatake Corporation's "SURGENON" if there is the risk of power surges caused by lightning.
  Doing so might cause fire or faulty operation.

Mounting

■ Location

Install the controller in the following occasions:

- Common mode voltages for I/O excluding the power supply and relay contact output: The voltage to ground is 30Vr.m.s max., 42.4V peak max., and 60Vdc max.
- Not high or low temperature / humidity.
- Free from sulfide gas or corrosive gas.
- Less dust or soot.
- Appropriately processed locations to prevent direct sunlight, wind or rain.
- Less mechanical vibration and shock.
- Not close to the high voltage line, welding machine or electrical noise generating source.
- The minimum 15 meters away from the high voltage ignition device for a boiler.
- Less effect by the magnetic.
- No inflammable liquid or gas.

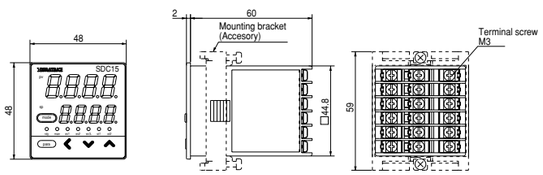
■ Mounting Procedure

- The mounting must be horizontal within 10 degrees tilted in back side lowering or within 10 degrees tilted in back side rising.
- In the case of panel mount type (C15T), the mounting panel should be used with a thickness of more than 2 mm of steel.

■ External Dimensions

● C15T (Panel Mount Type)

(unit: mm)

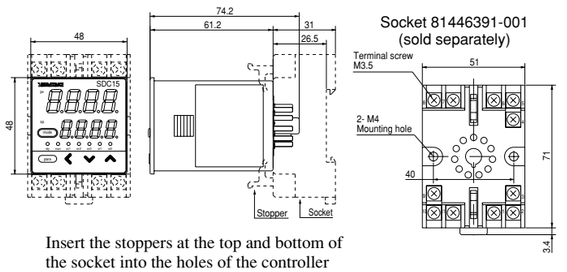


! Handling Precautions

To fasten this controller onto the panel, tighten a mounting bracket screws, and turn one more half turn when there is no play between the bracket and panel. Excessively tightening the screws may deform the controller case.

● C15S (Socket Mount Type)

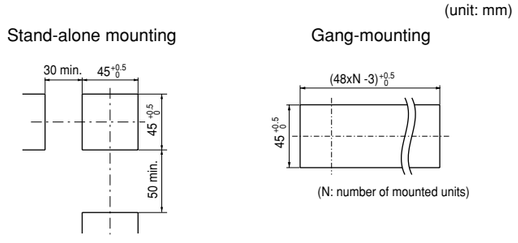
(unit: mm)



Insert the stoppers at the top and bottom of the socket into the holes of the controller body to firmly secure it to the socket.

● Panel Cutout Dimensions

(unit: mm)



! Handling Precautions

- When three or more units are gang-mounted horizontally, the maximum allowable ambient temperature is 40°C.
- For water-proof installation, install the attached gasket and then mount the device as a stand-alone device.
- Provide a space of at least 50mm or more above and below the controller.

Wiring

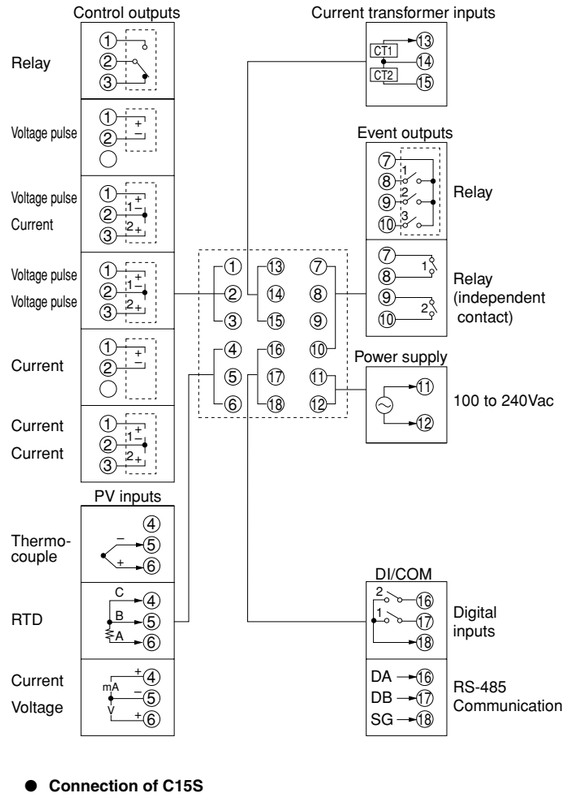
Be sure to provide a switch within operator reach for shutting OFF the main power supply to the controller in the main supply wiring.
Also, in case of AC power supply models, the main supply wiring also requires a time-lagged type (T) fuse (rated current: 0.2A, rated voltage: 250 V). (IEC127)
The following table shows the meaning of the symbols in the terminal wiring label on the controller side:

Symbols	Meaning
~	AC power supply
⚠	Caution, fear of electric shock
⚠	Caution

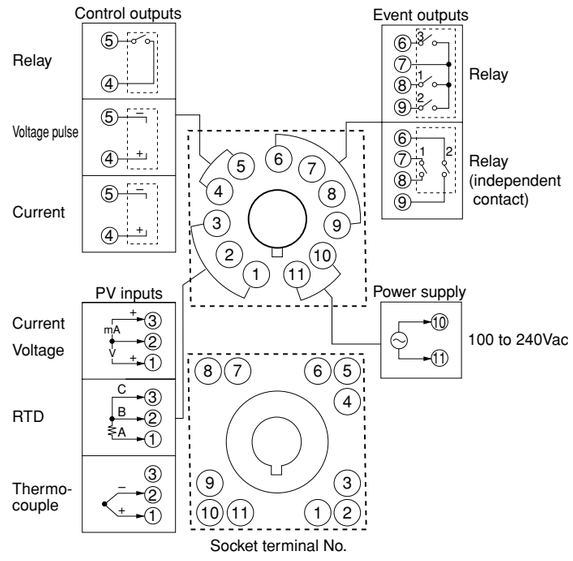
! Handling Precautions

- Before wiring the SDC15, verify the controller's model No. and terminal Nos. written on the label on the side of the body. Inspect all wiring once wiring work for the SCD15 has been completed.
- Use M3 crimp-type terminal lugs for wiring to terminal.
- Provide a distance of at least 50cm between I/O lead wires or communications lead wires and power lead wires of 100V min. Also, do not pass these lead wires through the same piping or wiring duct.
- Be careful not to allow any crimp-type terminal lugs to touch adjacent terminals.
- Prepare a heater current conductor to send a heater current through the current transformer.
  Do not use a heater current that exceeds the specified permissible current as this may damage the controller.
- The controller requires about 6 seconds to start up once the power is turned ON.
  The controller can be used once it has started up. However, it is recommended to allow a warm-up time of at least 30 minutes to attain the specified accuracy.
- The current transformer input cannot be used for phase control.
- There is no isolation provided between control output 1 and control output 2.
  Install an isolator as required.
- Do not connect a terminating resistor to either end of the RS-485 communications line.
  Doing so may interfere with communication.

● Connection of C15T



● Connection of C15S



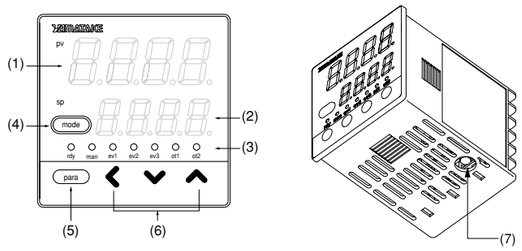
● I/O isolation

Items surrounded by solid lines are insulated from other signals.

Power supply		Internal Circuit	Control output 1 Control output 2	
PV input Current Transfomer input 1 Current Transfomer input 2 Loader communication			Event output 1 Event output 2 Event output 3	Event output 1 (independent contact)
Digital input 1 Digital input 2	RS-485 Communication			Event output 2 (independent contact)

Availability of input or output is based on a model number.

Part names and functions



(1) Upper display : Displays PV values (current temperature, etc.) or setup items.
(2) Lower display : Displays SP values (set temperature, etc.) and other values of setup items.
(3) Mode indicator rdy : Lights when READY (control stop)
man : Lights when MANUAL (manual mode)
ev1 to ev3 : Lights when event relays are ON.
ot1 to ot2 : Lights when the control output is ON.
(4) Mode key : The operation which was set beforehand can be done by pressing the key for 1s or more. Factory setting is RUN / READY selection.
(5) Para key : Switches the display.
(6) <, ∨, ∧keys : Used for incrementing numeric values and performing arithmetic shift operations.
(7) Loader connector: Connects to a personal computer with the special cable provided in the smart loader package.

PV range table

C01 No.	Sensor type	Range
1	K	–200 to +1200°C
2	K	0 to 1200°C
3	K	0 to 800°C
4	K	0 to 600°C
5	K	0 to 400°C
6	K	–200 to +400°C
9	J	0 to 800°C
10	J	0 to 600°C
11	J	–200 to +400°C
13	E	0 to 600°C
14	T	–200 to +400°C
15	R	0 to 1600°C
16	S	0 to 1600°C
17	B	0 to 1800°C
18	N	0 to 1300°C
20	Wre5-26	0 to 1400°C
21	Wre5-26	0 to 2300°C
24	DIN U	–200 to +400°C
25	DIN L	–100 to +800°C

C01 No.	Sensor type	Range
41	Pt100	–200 to +500°C
42	JPt100	–200 to +500°C
43	Pt100	200 to +200°C
44	JPt100	–200 to +200°C
45	Pt100	–100 to +300°C
46	JPt100	–100 to +300°C
51	Pt100	–50.0 to +200.0°C
52	JPt100	–50.0 to +200.0°C
53	Pt100	–50.0 to +100.0°C
54	JPt100	–50.0 to +100.0°C
63	Pt100	0.0 to 200.0°C
64	JPt100	0.0 to 200.0°C
67	Pt100	0 to 500°C
68	JPt100	0 to 500°C

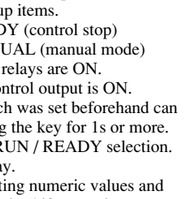
C01 No.	Sensor type	Range
84	0 to 1V	Scaling in the range of –1999 to +9999 Decimal point position changeable
86	1 to 5V	
87	0 to 5V	
88	0 to 10V	
89	0 to 20mA	
90	4 to 20mA	

! Handling Precautions
- The accuracy of the B thermocouple is ±5%FS for a range of 260°C or less, and ±1%FS for 260 to 800°C.
- For ranges with a decimal point, tenths are displayed on the line underneath point.
- Set by the number of setup C01 according to the type and range of the sensor used.

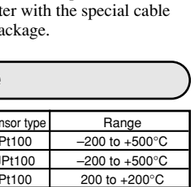
Setting the PV range type

(1) Turn on the power supply.

>> The upper and lower displays are OFF for 6 seconds after turning on the power supply. The mode display indicators will flash from the left sequentially while the device is starting up.

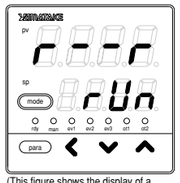


(2) When all the mode display indicators light up, the PV will be displayed on the upper display, and the SP will be displayed on the lower display (for AUTO mode). In MANUAL mode "oUt" will be written on the upper display and MV will be displayed on the lower display.



(This figure shows the display when in AUTO mode)

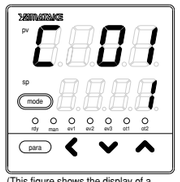
(3) Hold the [para] key down for at least 2 seconds to display the first parameter setting.



(This figure shows the display of a device with the control output of relay or voltage pulse for an initial value.)

(4) Release the [para] key, then press it and hold it for at least 2 seconds.

>> The setup setting 'C01' will appear on the upper display. 'C01' refers to the setting of the PV range type.



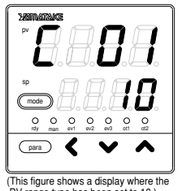
(This figure shows the display of a device with a PV output of thermo-couple input for an initial value.)

(5) Press the <, ∨, or ∧ key.

>> The numerical value on lower display will start to flash.

(6) Press the <, ∨, or ∧ key to get the value of "C01 number" that corresponds to the desired sensor type in the PV range table.
Release the key for more than 2 seconds after the desired numerical value is displayed.

>> The flashing will stop and setting of the PV range type is completed.



(This figure shows a display where the PV range type has been set to 10.)

(7) When the [mode] key is pressed, or the [para] key is pressed at least 2 seconds, or the key operation is inactive for over 3 minutes, the controller display indication is returned to the step (2).

For details on handling and setting procedures other than the setting procedure of the PV input range, refer to the following user's manuals:,

☞ Single Loop Controller SDC15 User's Manual "Basic Operations" CP-SP-1147E
Single Loop Controller SDC15 User's Manual "Installation & Configurations" CP-SP-1148E

Alarm code table

This table shows a list of malfunction alarms and countermeasures to take in each case.

Alarm code	Error	Cause	Countermeasure
AL01	PV input error (over range)	Sensor line break, incorrect wiring, incorrect range code setting	Check wiring or reset range code.
AL02	PV input error (under range)	Sensor line break, incorrect wiring, incorrect range code setting	Check wiring or reset range code.
AL03	CJ failure	Terminal temperature compensation unit failure (thermocouple)	Replace unit.
	PV input error	Sensor line break, incorrect wiring (RTD)	Check wiring.
AL70	A/D conversion error	Defective A/D converter	Replace unit.
AL95	Parameter error	• Power turned OFF during fixing of data • Data corrupted due to noise, etc.	Reset data.
AL96	Adjustment data error	• Power turned OFF during fixing of data • Data corrupted due to noise, etc.	Reset data.
AL97	Parameter error (RAM area)	Data corrupted due to noise, etc.	Reset data.
AL98	Adjustment data error (RAM area)	Data corrupted due to noise, etc.	Reset data.
AL99	ROM error	Data corrupted due to noise, etc.	Replace unit.

Maintenance

Cleaning: When wiping out the SDC15, use the soft and dried cloth.
Parts replacement: Do not replace the parts.
Fuse replacement: When replacing the fuse for the power supply wires, make sure that the replacement fuse complies with all applicable safety standards.
Standard IEC127, Cutoff Speed Delayed operation type (T), Rated Voltage 250V, Rated Current 200mA

Model selection table

Basic model No.	Mounting	Control output	PV input	Power supply	Optional functions	Additional processing	Specifications	
C15								
	T						Panel mount type	
(Note 4)	S						Socket mount type	
							Control output 1	Control output 2
	(Note 2)	R0					Relay contact output	None
		V0					Voltage pulse output (for SSR drive)	None
	(Note 1)	VC					Voltage pulse output (for SSR drive)	Current output
	(Note 1)	VV					Voltage pulse output (for SSR drive)	Voltage pulse output (for SSR drive)
		C0					Current output	None
	(Note 1)	CC					Current output	Current output
			T				Thermocouple input (K, J, E, T, R, S, B, N, PL II, Wre5-26, DINU, DINL)	
			R				RTD input (Pt100/JPt 100)	
			L				DC voltage /DC current input (0 to 1Vdc, 1 to 5Vdc, 0 to 5Vdc, 0 to 10Vdc, 0 to 20mAdc, 4 to 20mAdc)	
				A			AC Model (100 to 240Vac) 50/60Hz	
				D			DC Model (24Vac/dc) (available soon)	
					00		None	
					01		Event relay outputs: 3 point	
				(Note 1) (Note 3)	02		Event relay outputs: 3 point Current transformer inputs: 2 point Digital inputs (RSW): 2 point	
				(Note 1) (Note 3)	03		Event relay outputs: 3 point Current transformer inputs: 2 point RS-485 communication	
					04		Event relay outputs: 2 point (independent contact)	
				(Note 1)	05		Event relay outputs: 2 point (independent contact)	
				(Note 3)			Current transformer inputs: 2 point (independent contact) Digital inputs: 2 point	
				(Note 1)	06		Event relay outputs: 2 point (independent contact)	
				(Note 3)			Current transformer inputs: 2 point RS-485 communication	
						00	No additional processing	
						D0	Inspection Certificate provided	
						Y0	Complying with the traceability certification	

Note 1. Can not be selected for the C15S.
Note 2. Only 1a contact applicable for the C15S
Note 3. Current transformer sold separately
Note 4. Socket sold separately

Specifications

● PV Inputs
Input type : Refer to PV range table
Sampling cycle : 500ms
Accuracy : ±0.5%FS±1digit, ±1%FS±1digit for a negative area of the thermocouple (at ambient temperature 23±2°C)

● Digital input
Input type : Dry contact or open collector
Allowable ON contact resistance : Max.250Ω
Allowable OFF contact resistance : Min.100kΩ
Allowable ON voltage : Max.1.0V
Terminal current (ON) : Approx.7.5mA (when short-circuited.), Approx.5.0mA at the point of contact resistance 250 (Ω)
Minimum hold time : 1s or more

● Current transformer input
Input type : Current transformer 800Turns
QN206A (5.8mm hole dia.) Sold separately
QN212A (12mm hole dia.) Sold separately
Range of measurement current : 0.4A to 50.0A
Accuracy : ±5%FS±1digit
Indication range : 0.0A to 70.0A

● Control Outputs
• Relay output
Output rating : Control output NO side 250Vac/30Vdc, 3A (resistive load)
Control output NC side 250Vac/30Vdc, 1A (resistive load)
Life : NO side Min. 50,000 operations
NC side Min. 100,000 operations
Min. switching specifications : 5V, 100mA
• Voltage pulse output (for SSR drive)
Open circuit voltage : 19Vdc±15%
Internal resistance : 82Ω
Allowable current : Max. 24mAdc
• Current output
Output type : 0 to 20mAdc or 4 to 20mAdc current output Not guaranteed for 0 to 1mA.
Allowable load resistance : Max.600Ω
Output accuracy : ±0.5%FS (at ambient temperature 23±2°C)

● Event relay outputs (ev1 to 3)
Output rating : 250Vac/30Vdc 2A (resistance load)
Life : Min. 100,000 operations
Min. switching specifications : 5V, 100mA

● RS-485 communication
Transmission line : 3-wire system
Transmission speed : 4800, 9600, 19200, 38400bps
Communication protocol : CPL and MODBUS conforming
Terminating resistor : Do not connect a terminating resistor.

● Environmental condition
• Operating conditions
Ambient temperature : 0 to 50°C (Gang-mounting: 0 to 40°C)
Ambient humidity : 10 to 90%RH (no condensation allowed)
Power supply voltage : AC Model 85 to 264Vac, 50/60Hz±2Hz
• Transport conditions
Ambient temperature : –20 to +70°C
Ambient humidity : 10 to 95%RH (no condensation allowed)

● Other specifications
Sealing : Case front side IP66 equivalent (Only for stand-alone mounting on a panel when an attached gasket is used.)
Power consumption : Max. 12VA (100Vac:8VA, 264Vac:12VA) (6VA for 100Vac and 9VA for 264Vac to our company SDC10 equivalent function)
Mass : Panel mount type Approx.150g (with mounting bracket)
Socket mount type Approx.200g (with socket)
Terminal screw tightening torque : 0.4N·m
Applicable standards : EN61010-1, EN61326-1
Category : Category II (IEC664-1, EN61010-1)
Allowable pollution degree : Pollution degree 2

Accessories and optional parts

Name	Model No.
Mounting bracket (for C15T)	81446403-001 (Accessory)
Gasket	81409657-001 (Accessory)
Current transformer	QN206A (5.8mm hole dia.)
	QN212A (12mm hole dia.)
Socket (for C15S)	81446391-001
Hard cover	81446442-001
Terminal cover	81446898-001

Specifications are subject to change without notice.

YAMATAKE

Yamatake Corporation
Control Products Division
Head office : Totate International Building
2-12-19 Shibuya Shibuya-ku Tokyo 150-8316 Japan
Inquiries to : International Business Division
Phone : 81-3-3486-2331, Fax : 81-3-3486-2300 (Sales)
Phone : 81-466-20-2307, Fax : 81-466-27-9264 (Customer Service)
http://www.yamatake.com

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