CP-UM-5289E

SDC35/36
Single Loop Controller
User's Manual
for Installation

Thank you for purchasing the SDC35/36.
Before operating the 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.

NOTICE

Be sure that the user receives this manual before the product is used.
Copying or duplicating the manual in part or in whole is forbidden.
The information and specifications in the manual are subject to change without notice.
Considerable effort has been made to ensure that this manual is free from inaccuracies and omissions. If you should find an error or omission, please contact Yamatake Corporation.
In no event is Yamatake Corporation liable to anyone for any indirect, special or consequential damages as a result of using this product.

This manual explains the handling precautions, mounting, wiring, PV range type, list of parameters and main specifications only. See the separate Installation & Configurations manual listed below for the detail handling procedures and the setting methods, etc. These manuals also contain information on using various functions. Please read if necessary.

SDC35/36 Single Loop Controller User's Manual for Basic Operations CP-SP-1150E

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

■ Unpacking

Check the following items when removing the SDC35/36 from its package:

Name	Part No.	Q'ty	Remarks
Mounting Bracket	81409654-001	2	
User's Manual	CP-UM-5289E	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 SDC35/36 can damage the SDC35/36 and lead to other hazards. Check that the SDC35/36 has been correctly wired before turning the power ON.
- Before wiring, or removing/mounting the SDC35/36, be sure to turn the power OFF.
  Failure to do so might cause electric shock or faulty operation.
- Do not touch electrically charged parts such as the power terminals.
  Doing so might cause electric shock.
- Do not disassemble the SDC35/36.
  Doing so might cause electric shock or faulty operation.

⚠ CAUTION

- Use the SDC35/36 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 SDC35/36 properly according to predetermined standards. Also wire the SDC35/36 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 SDC35/36 as relay terminals.
  Doing so might cause electric shock, fire or faulty operation.
- We recommend attaching the terminal cover (sold separately) after wiring the SDC35/36. Failure to do so might cause electric shock.
- Use the relays within the recommended service life.
  Failure to do so might cause fire or faulty operation.
- To avoid the risk of fire or device failure, use Yamatake Corporation's SurgeNon if there is a chance of power surges caused by lightning.
- Do not operate the keys with a mechanical pencil or other sharp-tipped object. Doing so might cause faulty operation.

Mounting

■ Location

Install the controller in a location that meets the following criteria:

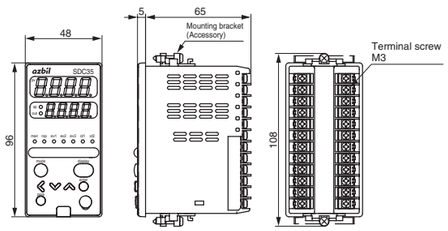
- Common mode voltages of I/O except power supply and relay contact output: The voltage to ground is 33Vr.m.s max., 46.7V peak max., and 70Vdc max.
- Neither high nor low temperature/humidity.
- No corrosive gases such as sulfide gas.
- Little dust or soot.
- Protected from direct sunlight, wind or rain.
- Little mechanical vibration and shock.
- Not close to a high voltage line, welding machine or other source of electrical noise.
- At least 15 meters away from a high voltage ignition device for a boiler.
- No strong magnetic field.
- No flammable liquid or gas.

■ Mounting Procedure

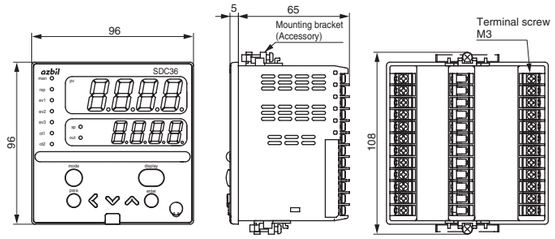
- The mounting must be horizontal within 10 degrees tilted in back side lowering or within 10 degrees tilted in back side rising.
- The mounting panel should be used with a thickness of less than 9 mm of firm board.

■ External Dimensions

- **C35** (unit: mm)



- **C36** (unit: mm)

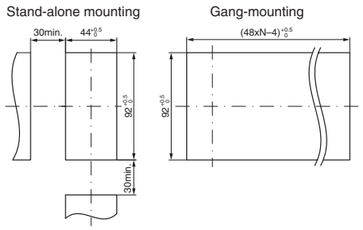


! Handling Precautions

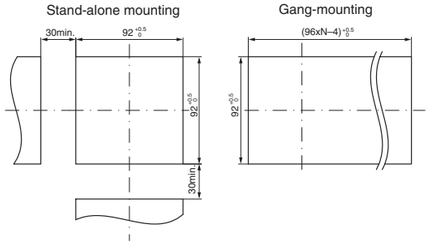
To fasten this controller onto the panel, tighten the mounting bracket screws, and then turn one more full turn when there is no play between the bracket and panel.
Excessively tightening the screws may deform the controller case.

■ Panel Cutout Dimensions

- **C35** (unit: mm)



- **C36**



! Handling Precautions

- When three or more units are gang-mounted horizontally, the maximum allowable ambient temperature is 40°C.

Wiring

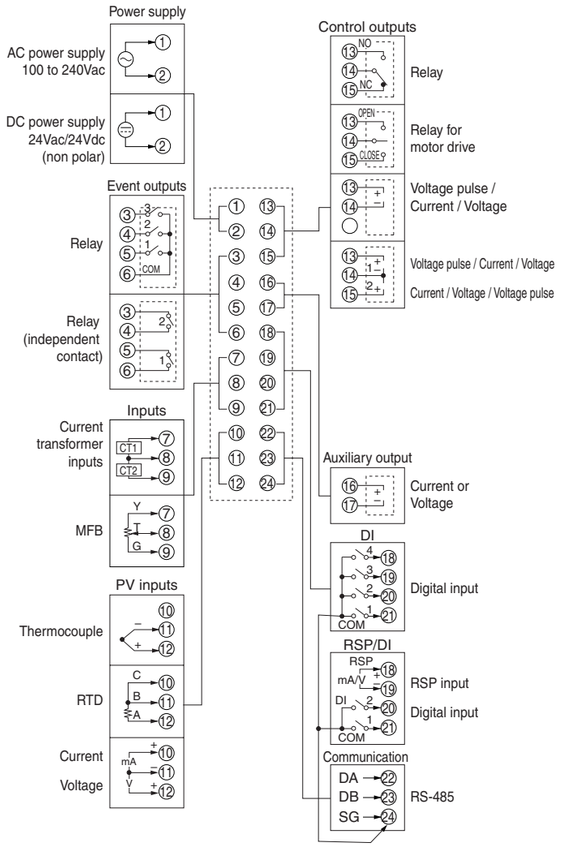
Be sure to provide a switch within operator reach for shutting OFF the main power supply to the controller in the main supply wiring.
Also, in case of AC power supply models, the main supply wiring also requires a time-lagged type (T) fuse (rated current: 0.5A, rated voltage: 250 V). (IEC127)
The following table shows the meaning of the symbols in the terminal wiring label on the controller side:

Symbols	Meaning
~	AC power supply
⎓	DC power supply
⚠	Caution, electric shock hazard
⚠	Caution

! Handling Precautions

- Before wiring the SDC35/36, 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 SCD35/36 has been completed.
- Use M3 crimp-type terminal lugs for wiring to terminal.
- Leave at least 50cm between I/O signal wires and power wires. Do not put them in the same electrical conduit or 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 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.
- When the power supply voltage of the motor which is connected to the motor drive relay output is 100/200Vac, use an auxiliary relay externally.
- Do not wire in the same duct for the motor drive terminals (13),(14),(15) and the MFB input terminals (7),(8), (9) and also do not use 6-core cable. Failure to follow the instruction might cause controller malfunction due to noise during motor startup operation.
- Regarding a device or equipment which is connected to this controller, use a model to which the basic insulation meeting with the power supply voltage and the maximum operating voltage of the I/O units is provided.
- The controller requires maximum 5 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.

● Connection of C35/36



● I/O isolation

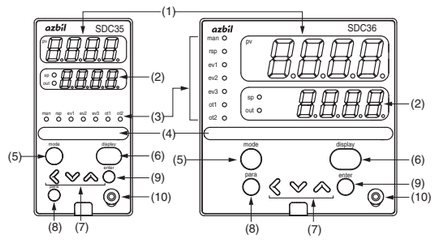
Items surrounded by solid lines are insulated from other signals.

Power supply	Internal circuit	Control output 1 Control output 2
PV input Current transfomer input 1 Current transfomer input 2 Motor feedback input Loader communication		Auxiliary output
Digital input 1 Digital input 2 Digital input 3 Digital input 4 RS-485 communication		Event output 1 (Note 1) Event output 2 (Note 1) Event output 3
RSP input		

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

Note 1 In case of independent contact, the part between the event output 1 and the event output 2 is isolated.

Part names and functions



(1) Upper display: Displays PV values (present temperature etc.) or setting items.
(2) Lower display: Displays SP values (set temperature, etc.) and other parameter values.
When the lower display shows the SP value, the “sp” lamp lights up. When the display shows the manipulated variable (MV), the “out” lamp lights up.
(3) Mode indicator
man: Lights when MANUAL (manual mode)
rsp: Lights when RSP mode (remote setup input)
ev1 to ev3: Lights when event relays are ON.
ot1 to ot2: Lights when the control output is ON.
(4) Multi-status indicator:
In the combination of the lighting condition and the lighting status as a group, the priority 3 groups can be set.
(5) [mode] key: The operation which has been set beforehand can be done by pushing the key for 1s or more.
(6) [display] key: Used to change the display contents in the operation display mode. Display is returned from bank setup display to operation display.
(7) < , ∨ , ∧ key: Used for incrementing numeric values and performing arithmetic shift operations.
(8) [para] key: Switchs the display.
(9) [enter] key: Used to set the setup values at the start of change and during the change.
(10) Loader connector: Connects to a personal computer by using a dedicated cable supplied with the Smart Loader Package.

PV range table

C01 Set value	Sensor type	Range	
1	K	-200 to +1200°C	-300 to +2200°F
2	K	0 to 1200°C	0 to 2200°F
3	K	0.0 to 800.0°C	0 to 1500°F
4	K	0.0 to 600.0°C	0 to 1100°F
5	K	0.0 to 400.0°C	0 to 700°F
6	K	-200.0 to +400.0°C	-300 to +700°F
7	K	-200.0 to +200.0°C	-300 to +400°F
8	J	0 to 1200°C	0 to 2200°F
9	J	0.0 to 800.0°C	0 to 1500°F
10	J	0.0 to 600.0°C	0 to 1100°F
11	J	-200.0 to +400.0°C	-300 to +700°F
12	E	0.0 to 800.0°C	0 to 1500°F
13	E	0.0 to 600.0°C	0 to 1100°F
14	T	-200.0 to +400.0°C	-300 to +700°F
15	R	0 to 1600°C	0 to 3000°F
16	S	0 to 1600°C	0 to 3000°F
17	B	0 to 1800°C	0 to 3300°F
18	N	0 to 1300°C	0 to 2300°F
19	PLII	0 to 1300°C	0 to 2300°F
20	Wre5-26	0 to 1400°C	0 to 2400°F
21	Wre5-26	0 to 2300°C	0 to 4200°F
22	Ni-NiMo	0 to 1300°C	0 to 2300°F
23	PR40-20	0 to 1900°C	0 to 3400°F
24	DIN U	-200.0 to +400.0°C	-300 to +700°F
25	DIN L	-100.0 to +800.0°C	-150 to +1500°F
26	Gold iron chromel	0.0K to 360.0K	0 to 360K

C01 Set value	Sensor type	Range	
41	Pt100	-200.0 to +500.0°C	-300 to +900°F
42	JPt100	-200.0 to +500.0°C	-300 to +900°F
43	Pt100	-200.0 to +200.0°C	-300 to +400°F
44	JPt100	-200.0 to +200.0°C	-300 to +400°F
45	Pt100	-100.0 to +300.0°C	-150 to +500°F
46	JPt100	-100.0 to +300.0°C	-150 to +500°F
47	Pt100	-100.0 to +200.0°C	-150 to +400°F
48	JPt100	-100.0 to +200.0°C	-150 to +400°F
49	Pt100	-100.0 to +150.0°C	-150 to +300°F
50	JPt100	-100.0 to +150.0°C	-150 to +300°F
51	Pt100	-50.0 to +200.0°C	-50 to +400°F
52	JPt100	-50.0 to +200.0°C	-50 to +400°F
53	Pt100	-50.0 to +100.0°C	-50 to +200°F
54	JPt100	-50.0 to +100.0°C	-50 to +200°F
55	Pt100	-60.0 to +40.0°C	-60 to +100°F
56	JPt100	-60.0 to +40.0°C	-60 to +100°F
57	Pt100	-40.0 to +60.0°C	-40 to +140°F
58	JPt100	-40.0 to +60.0°C	-40 to +140°F
59	Pt100	-10.00 to +60.00°C	-10 to +140°F
60	JPt100	-10.00 to +60.00°C	-10 to +140°F
61	Pt100	0.0 to 100.0°C	0 to 200°F
62	JPt100	0.0 to 100.0°C	0 to 200°F
63	Pt100	0.0 to 200.0°C	0 to 400°F
64	JPt100	0.0 to 200.0°C	0 to 400°F
65	Pt100	0.0 to 300.0°C	0 to 500°F
66	JPt100	0.0 to 300.0°C	0 to 500°F
67	Pt100	0.0 to 500.0°C	0 to 900°F
68	JPt100	0.0 to 500.0°C	0 to 900°F

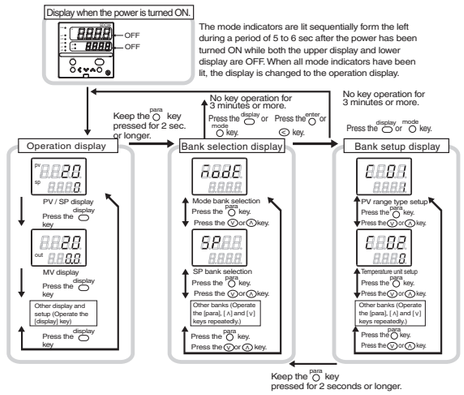
C01 Set value	Input type	Range
81	0. to 10mV	The scaling and the decimal point position can be changed variably in a range of -1999 to +9999.
82	-10 to +10mV	
83	0 to 100mV	
84	0 to 1V	
86	1 to 5V	
87	0 to 5V	
88	0 to 10V	
89	0 to 20mA	
90	4 to 20mA	

! Handling Precautions

- The accuracy is ±0.1%FS±1 digit, and ±0.2%FS±1 digit for a negative area of the thermocouple.
- The accuracy varies according to the range.
  The accuracy of the No.17 (sensor type B) is ±4.0%FS for a range of 260°C or less, ±0.4%FS for 260 to 800°C and ±0.2%FS for 800 to 1800°C. The PV values under 20°C are not shown.
  The accuracy of the No.15 (sensor type R) or No.16 (sensor type S) is ±0.2%FS for a range of 100°C or less, and ±0.15%FS for 100 to 1600°C.
  The accuracy of the No.23 (sensor type PR40-20) is ±2.5%FS for 0 to of 300°C, and ±1.5%FS for 300 to 800°C, ±0.5%FS for 800 to of 1900°C.
  The accuracy of the No.26 (sensor type gold iron chromel) is ±1.5K.
  The accuracy of the No. 55 to 62 and 81 are ±0.15%FS for each ranges.
  The accuracy of the No.19 (sensor type PLII) in the range of 0 to 32˚F does not meet the indication accuracy.
- The ranges with a decimal point show figures under decimal point.

Setting the PV range type

The following shows the flow of key operation:



There are the standard type and special type in the data setup method.
Here, the method is explained in the standard type.

● Setting example of the PV range type

Display the C01 on the upper display in the bank setup mode for the setup bank.
When the [enter] key is pressed, the numerical value on the lower display will start to flash.
Move the digit or increase/decrease the numeric value by pressing the [<] [∨] [∧] keys.
When the [enter] key is pressed at the desired numeric value, the flashing will stop and the data will be set.

● Setting example of the SP1

Display the SP-1 on the upper display in the bank setup mode of the setup bank.
When the [enter] key is pressed, the numerical value on the lower display will start to flash.
Move the digit or increase/decrease the numeric value by pressing the [<] [∨] [∧] keys.
When the [enter] key is pressed at the desired numeric value, the flashing will stop and the data will be set.

For the details of the handling and setting method, refer to the following manual:

☞ Single Loop Controller SDC35/36 User's Manual “Installation & Configurations” CP-SP-1150E

Alarm code table

This table shows the alarm display and measures for the abnormal operation of this controller.

Alarm code	Failure name	Cause	Corrective action
AL01	PV input failure (over range)	Sensor line break, incorrect wiring, incorrect PV range type setting	Checking wiring or reset PV range type
AL02	PV input failure (under range)	Sensor line break, incorrect wiring, incorrect PV range type setting	
AL03	CJ failure failure	Terminal temperature is faulty (thermocouple).	Checking the ambient temperature.
	PV input failure	Sensor line break, incorrect wiring (RTD)	Checking wiring.
AL05	RSP input failure (Over range) (Displays in RSP mode)	Sensor line break, incorrect wiring, incorrect RSP range setting	Checking wiring or reset RSP range code.
AL06	RSP input failure (Under range) (Displays in RSP mode)	Sensor line break, incorrect wiring, incorrect RSP range setting	Checking wiring or reset RSP range code.
AL07	MFB input failure	Motor line break, incorrect wiring	Checking wiring or confirm the MFB input.
AL10	Motor adjustment failure	Motor line break, incorrect wiring, motor power supply failure.	Checking wiring, confirm the motor power supply, reset.
AL11	CT input failure (over-range) (CT input 1 or 2,or both)	A current exceeding the upper limit of the display range was measured. The number of CT turns or the number of CT power wire loops is incorrectly set, or wiring is incorrect.	Use a CT with the correct number of turns for the display range, reset the number of CT turns,reset the number of CT power wire loops, and/or check the wiring.
AL70	A/D conversion failure	Defective A/D converter	Replace unit.
AL95	Parameter failure	•Power turned OFF during fixing data •Data corrupted due to noise, etc.	Re-start the system. Reset data or replace unit. (AL95/97: setting data, AL96/98: tuning data)
AL96	Adjustment data	•Power turned OFF during fixing data •Data corrupted due to noise, etc.	
AL97	Parameter failure (RAM area)	Data corrupted due to noise, etc.	
AL98	Adjustment data failure (RAM area)	Data corrupted due to noise, etc.	
AL99	ROM failure	ROM (memory) error	Re-start the system. Replace unit.

Maintenance

Cleaning : When wiping out the SDC35/36, use the soft and dried cloth.
Parts replacement : Do not replace the parts.
Fuse replacement : On AC models, when replacing the fuse for the power, make sure that the replacement fuse complies with applicable standards. Use a time lag fuse (T) compliant with IEC127 and rated at 250V, 0.5A.

Model selection table

Basic model No.	Mounting	Control output	PV input	Power supply	Option 1	Option 2	Additions 1	Additions 2	Specifications	
C35									48X96 size model	
C36									96X96 size model	
	T								Panel mounting type	
									Control output 1	Control output 2
		R0							Relay contact output NO	Relay contact output NC
(Note 3)		R1							Relay contact output for motor drive OPEN side	Relay contact output for motor drive CLOSE side
		V0							Voltage pulse output (for SSR drive)	—
		VC							Voltage pulse output (for SSR drive)	Current output
		VD							Voltage pulse output (for SSR drive)	Voltage output
		VV							Voltage pulse output (for SSR drive)	Voltage pulse output (for SSR drive)
		C0							Current output	—
		CC							Current output	Current output
		CD							Current output	Voltage output
		DO							Voltage output	—
		DD							Voltage output	Voltage output
			U						Universal	
				A					AC model (100 to 240Vac) 50/60Hz	
				D					DC model (24Vac/24Vdc)	
					1				Event relay output 3 points	
					2				Event relay output 3 points, Auxiliary output (current output)	
					3				Event relay output 3 points, Auxiliary output (voltage output)	
					(Note 3) 4				Event output: 2 points (independent contact)	
					(Note 3) 5				Event output: 2 points (independent contact) Auxiliary output (current output)	
					(Note 3) 6				Event output: 2 points (independent contact) Auxiliary output (voltage output)	
						0			—	
					(Note 1,2)	1			Current transformer input: 2 points Digital input: 4 points	
					(Note 1,2)	2			Current transformer input: 2 points Digital input: 4 points, RS-485 communication	
					(Note 1,2)	3			Current transformer input: 2 points Digital input: 2 points, RSP input	
					(Note 1,2)	4			Current transformer input: 2 points Digital input: 2 points, RSP input, RS-485 communication	
							0		No additional treatment	
							D		Inspection certificate provided	
							T		Tropicalization treatment applied	
							K		Anti-sulfide treatment applied	
							B		Tropicalization treatment applied and Inspection certificate provided.	
							L		Anti-sulfide treatment applied and Inspection certificate provided.	
							Y		Complying with the traceability certification	
								0	IP65 inapplicable	

Note 1. A current transformer is sold separately.
Note 2. When the control output is R1, the current transformer input is not applied. MFB input is applied.
Note 3. Can not be selected for DC model.

Specifications

● PV Inputs
Thermocouple: K,J,E,T,R,S,B,N (JIS C1602-1995)
PL II (Engelhard Industries Data (ITS90))
WRe5-26 (ASTM E988-96(Reapproved 2002))
Ni-NiMo (ASTM E1751-00)
PR40-20 (Johnson Matthey Data)
DIN U,DIN L (DIN 43710-1985)
Gold iron chromel (Hayashidenko Data)
Resistance temperature detector (RTD):
Pt100 (JIS C1604-1997)
JPt100 (JIS C1604-1989)
DC voltage: 0 to 10mV, -10 to +10mV, 0 to 100mV, 0 to 1V, 1 to 5V, 0 to 5V, 0 to 10V
DC current: 0 to 20mA, 4 to 20mA
Sampling cycle: 100ms
Indication accuracy: ±0.1%FS±1digit,
±0.2%FS±1digit for a negative area of the thermocouple (at ambient temperature 23±2°C)
Cold junction compensation accuracy:
±0.5% (at ambient temperature 23±2°C)
±1.0% (at ambient temperature 15 to 35°C)
±1.5% (at ambient temperature 0 to 15 or 35 to 50°C)
Cold junction compensation method:
The compensation in the controller or the compensation at the outside of the controller (0°C only) can be selected.

● Digital input
Input type: Dry contact or open collector
Allowable ON contact resistance: Max.250Ω
Allowable OFF contact resistance: Min.100kΩ
Allowable ON residual voltage: Max.1.0V
Terminal current (ON): Approx.7.5mA (in case of short circuit).
Approx.5.0mA (in case of contact resistance 250Ω)
Minimum hold time: 200ms or more

● Current transformer input
Number of input points: 2 points
Input object: Current transformer with 100 to 4,000 turns (availability is by 100-turn units)
Optional unit Model No.: QN206A (800 turns, hole diameter: 5.8mm)
Optional unit Model No.: QN212A (800 turns, hole diameter: 12mm)
Current measurement lower limit: 0.4Aac (800 turns, 1 time)
Formula; Number of turns ÷ (2000 x number of power wire loops)
Current measurement upper limit: 50.0Aac (800 turns, 1 time)
Formula; Number of turns ÷ (16 x number of power wire loops)
Allowable measured current: 70.0Aac (800 turns, 1 time)
Formula; Number of turns ÷ (16 x number of power wire loops) x 1.4
Display range lower limit: 0.0Aac
Display range upper limit: 70.0Aac (800 turns, 1 time)
Formula; Number of turns ÷ (16 x number of power wire loops) x 1.4
Display accuracy: ±5%FS
Display resolution: 0.1Aac

● Motor feedback potentiometer input (R1 model)
Allowable resistance: 100 to 2500Ω
Detection of line break: Displays AL07.

● RSP input
Input type: linear 0 to 20mA/4 to 20mA or linear 0 to 5V/1 to 5V/ 0 to 10V
Sampling cycle: 100ms
Indication accuracy: ±0.1%FS±1digit (at ambient temperature 23±2°C)
Operation at input break: Downscale + AL06

● Control outputs
• Relay output
Contact rating: NO side 250Vac/30Vdc, 3A (resistive load)
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
Min. open time / close times: 250ms
• Motor drive relay output (R1 model)
Output rating: 250Vac 8A (resistive load)
Life: Min. 120,000 operations
Min. switching specifications: 24Vdc, 40mA
• Voltage pulse output (for SSR drive)
Open circuit voltage: 19Vdc±15%
Internal resistance: 82Ω±0.5%
Allowable current: Max. 24mAdc
Min OFF time / ON time: 1ms when the time proportional cycle time is less than 10s. 250ms when the time proportional cycle time is more than 10s.
• Current output
Output type: 0 to 20mAdc or 4 to 20mAdc
Allowable load resistance: Max.600Ω
Output accuracy: ±0.1%FS (at ambient temperature 23±2°C) ±1%FS at 0 to 1mA
• Voltage output
Output type: 0 to 5Vdc/1 to 5V or 0 to 10V
Allowable load resistance: Min. 1000Ω
Output accuracy: ±0.1%FS (at ambient temperature 23±2°C) ±1%FS at 0 to 0.05V

● Auxiliary output
• Current output
Output type: 0 to 20mAdc or 4 to 20mAdc
Allowable load resistance: 600Ωmax.
Output accuracy: ±0.1%FS (at ambient temperature 23±2°C) ±1%FS at 0 to 1mA
• Voltage output
Output type: 0 to 5V/1 to 5Vdc or 0 to 10Vdc
Allowable load resistance: Min. 1000Ω
Output accuracy: ±0.1%FS (at ambient temperature 23±2°C) ±1%FS at 0 to 0.05V

● Event relay outputs (ev1 to 3)
Output rating: 250Vac/30Vdc 2A (resistive load)
Life: Min. 100,000 operations
Min. switching specifications: 5V, 10mA (reference value)

● 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 conditions
• Operating conditions
Ambient temperature: 0 to 50°C (Gang-mounting: 0 to 40°C)
Ambient humidity: 10 to 90%RH (non condensing)
Rated power supply voltage: AC model 100 to 240Vac, 50/60Hz
DC model 24Vac 50/60Hz, 24Vdc
Power supply voltage range: AC model 85 to 264Vac, 50/60±2Hz
DC model 21.6 to 26.4Vac 50/60±2Hz, 21.6 to 26.4Vdc
• Transport conditions
Ambient temperature: –20 to +70°C
Ambient humidity: 10 to 95%RH (non condensing)

● Other specifications
Power consumption: Max. 12VA for AC model
Max. 12VA for DC model at 24Vac
Max. 8W for DC model at 24Vdc
Non-detected power failure time: Max. 20ms (AC model)
No power failure allowed (DC model)
Altitude: 2000m or less
Mass: C35 Approx.250g (with mounting bracket)
C36 Approx.300g (with mounting bracket)
Terminal screw tightening torque: 0.4 to 0.6N·m
Applicable standards: EN61010-1, EN61326
Overvoltage category: Category II (IEC60364-4-443, IEC60664-1)
Allowable pollution degree: Pollution degree 2

Accessories and optional parts

Name	Model No.
Mounting bracket	81409654-001(Accessory)
Current transformer	QN206A(5.8mm hole dia.) / QN212A(12mm hole dia.)
Hard cover	81446915-001(for C35) / 81446916-001(for C36)
Soft cover	81441121-001(for C35) / 81441122-001(for C36)
Terminal cover	81446912-001(for C35) / 81446913-001(for C36)

SDC35/36 List of Parameters

[List of Operation Displays]

■ Operation Displays

Display	Item	Contents	Initial value	User level
Upper display: PV Lower display: SP	SP (Target value)	SP low limit (C07) to SP high limit (C08)	0	0
LSP 1 (Display example) Lower display: LSP	LSP No. (1st digit: Value at the right end digit)	1 to LSP system group (C30 Max. 8)	1	0
St.1- (Display example) Lower display: Step remaining time	Step operation remaining time	Setting is disabled. Upper display: The distinction by step No., ramp-up, ramp-down or soak is displayed at the side location of [St.]. Lower display: Displayed by the unit (either one of 0.1s, min.s, or h.min) based on the step operation time unit (C33).	—	0
Upper display: PV Lower display: MV	MV (Manipulated Variable)	–10.0 to +110.0% Setting is disabled in AUTO mode. (Numeric value does not flash.) Setting is enabled in MANUAL mode. (Numeric value flashes.)	—	0
HEAt	Heat MV (Manipulated Variable)	Setting is disabled –10.0 to +110.0%	—	0
Cool	Cool MV (Manipulated Variable)		—	0
Fb	MFB (Motor opening feedback value)	Setting is disabled. –10.0 to +110.0% For estimation, displayed by flashing in 0.1 to 100.0%.	—	0
Upper display: PV Rt1 (Display example)	AT progress display (1st digit = Numeric value at right end digit)	Setting is disabled. Except for 0: During execution of AT (Value is decreased.) 0: Completion of AT	—	0
Ct1	CT (Current transformer) current value 1	Setting is disabled.	—	0
Ct2	CT (Current transformer) current value 2	Setting is disabled.	—	0
E1	Internal event 1 main setting	Setting range is different depending on the internal event operation type.	0	0
E1.Sb	Internal event 1 sub-setting	–1999 to +9999U: Except below. 0 to 9999U: Setting value is an absolute value. –199.9 to +999.9%: For MV.	0	0
t1.-- (Display example)	Timer remaining time 1	Setting is disabled. Upper display: The distinction by ON delay or OFF delay is displayed at the side location of [t1.]. Lower display: Displayed by the unit (either one of 0.1s, s, or min) based on the internal event 1 delay time unit (E1. the 3rd digit of C3).	—	0
E2	Internal event 2 main setting	Setting range is different depending on the internal event operation type.	0	0
E2.Sb	Internal event 2 sub-setting	–1999 to +9999U: Except below. 0 to 9999U: Setting value is an absolute value. –199.9 to +999.9%: For MV.	0	0
t2.-- (Display example)	Timer remaining time 2	Setting is disabled. Upper display: The distinction by ON delay or OFF delay is displayed at the side location of [t2.]. Lower display: Displayed by the unit (either one of 0.1s, s, or min) based on the internal event 2 delay time unit (E2. the 3rd digit of C3).	—	0
E3	Internal event 3 main setting	Setting range is different depending on the internal event operation type.	0	0
E3.Sb	Internal event 3 sub-setting	–1999 to +9999U: Except below. 0 to 9999U: Setting value is an absolute value. –199.9 to +999.9%: For MV.	0	0
t3.-- (Display example)	Timer remaining time 3	Setting is disabled. Upper display: The distinction by ON delay or OFF delay is displayed at the side location of [t3.]. Lower display: Displayed by the unit (either one of 0.1s, s, or min) based on the internal event 3 delay time unit(E3. the 3rd digit of C3).	—	0

[List of Parameter Setting Displays]

■ Mode bank
Bank selection: ModE

Display	Item	Contents	Initial value	User level
A--M	AUTO/MANUAL mode selection	AUto : AUTO mode MAn : MANUAL mode	AUTO	0
r---r	RUN/READY mode selection	rUn : RUN mode rdy : READY mode	RUN	0
L---r	LSP/RSP mode selection	LSP : LSP mode rSP : RSP mode	LSP	0
At	AT Stop/Start selection	At. oF : AT Stop At. on : AT Start	AT Stop	0
do.LE	Release all DO latches	LE. on : Latch continue LE. oF : Latch release	Latch continue	0
C.di1	Communication DI 1	di. oF : OFF di. on : ON	OFF	0

■ SP bank
Bank selection: SP

Display	Item	Contents	Initial value	User level
rSP	RSP	Setting is disabled.	—	0
Pid.r	PID group No.	1 to 8	1	1
SP-1 to SP-8	SP of LSP1 group to SP of LSP8 group	SP low limit (C07) to SP high limit (C08)	0	0
Pid.1 to Pid.8	PID group No. (for LSP1 to 8)	1 to 8	1	1
rAP.1 to rAP.8	Ramp (for LSP1 to 8)	0 to 9999 (The decimal point position is determined by the PV decimal point position and the SP ramp unit.)	0	1
tim.1 to tim.8	Time (for LSP1 to 8)	0.0 to 999.9 (when step operation time unit is 0.1s.) 0 to 9999 (when step operation time unit is 1s or 1min.)	0	1

User level details 0: Display in basic/standard/high function,
1: Display in standard/high function,
2: Display in high function.

Initial value may vary depending on model No.

■ Event bank
Bank selection: Ev

Display	Item	Contents	Initial value	User level
E1 to E8	Internal event 1 to 8, main setting	–1999 to +9999 The decimal point position varies by meeting the internal event operation type. 0 to 9999 for some operation type.	0	0
E1.Sb to E8.Sb	Internal event 1 to 8, sub-setting	0 to 9999 The decimal point position varies by meeting the internal event operation type.	0	0
E1.HY to E8.HY	Internal event 1 to 8, hysteresis	0.0 to 999.9 (For the delay time unit 0.1s)	5	0
E1.on to E8.on	Internal event 1 to 8, ON delay	0 to 9999 (Except for the delay time unit 0.1s)	0	2
E1.oF to E8.oF	Internal event 1 to 8, OFF delay		0	2

■ PID bank
Bank selection: Pid

Display	Item	Contents	Initial value	User level
P-1 to P-8	Proportional band (PID1 to 8 group)	0.1 to 999.9%	5.0	0
I-1 to I-8	Integration time (PID1 to 8 group)	0 to 9999s or 0.0 to 999.9s (0: No integral control action)	120	0
d-1 to d-8	Derivative time (PID1 to 8 group)	0 to 9999s or 0.0 to 999.9s (0: No derivative control action)	30	0
rE-1 to rE-8	Manual reset (PID1 to 8 group)	–10.0 to +110.0%	50.0	0
oL-1 to oL-8	MV low limit (PID1 to 8 group)	–10.0 to +110.0%	0.0	1
oH-1 to oH-8	MV high limit (PID1 to 8group)	–10.0 to +110.0%	100.0	1
P-1C to P-8C	Cool-side proportional band (PID1 to 8 group)	0.1 to 999.9%	5.0	0
I-1C to I-8C	Cool-side integration time (PID1 to 8 group)	0 to 9999s or 0.0 to 999.9s (0: No integral control action)	120	0
d-1C to d-8C	Cool-side derivative time (PID1 to 8 group)	0 to 9999s or 0.0 to 999.9s (0: No derivative control action)	30	0
oL.1C to oL.8C	Cool-side MV low limit (PID1 to 8 group)	–10.0 to +110.0%	0.0	1
oH.1C to oH.8C	Cool-side MV high limit (PID1 to 8 group)	–10.0 to +110.0%	100.0	1

■ Parameter bank
Bank selection: PArA

Display	Item	Contents	Initial value	User level
CtrL	Control method	0: ON/OFF control 1: PID fixed	0 or 1	0
At.oL	MV low limit at AT	–10.0 to +110.0%	0.0	0
At.oH	MV high limit at AT	–10.0 to +110.0%	100.0	0
diFF	ON/OFF control differential	0 to 9999U	5	0
oFFS	ON/OFF control operating point offset	–1999 to 9999U	0	2
FL	PV filter	0.0 to 120.0s	0.0	0
rR	PV ratio	0.001 to 9.999	1.000	1
bi	PV bias	–1999 to +9999U	0	0
FL2	RSP filter	0.0 to 120.0s	0.0	0
rR2	RSP ratio	0.001 to 9.999	1.000	1
bi2	RSP bias	–1999 to +9999U	0	0
CyU	Time proportional cycle unit 1	0: 1s unit 1: 0.5s fixed (Cycle time is disabled.) 2: 0.2s fixed (Cycle time is disabled.) 3: 0.1s fixed (Cycle time is disabled.)	0	2
Cy	Time proportional cycle1	5 to 120s (*1) 1 to 120s (*2)	10 or 2	0
CyU2	Time proportional cycle unit 2	0: 1s unit 1: 0.5s fixed (Cycle time is disabled.) 2: 0.2s fixed (Cycle time is disabled.) 3: 0.1s fixed (Cycle time is disabled.)	0	2
Cy2	Time proportional cycle 2	5 to 120s (*1) 1 to 120s (*2)	10 or 2	0
bP.tY	Time proportional operation type	0: Controllability aiming type 1: Actuator life aiming type (Only one ON/OFF operation within time proportional cycle time)	0 or 1	2
oUtL	MV variation limit	0.0 to 999.9%/s (0.0: No limit)	0.0	2
SPU	SP ramp-up	0.0 to 999.9U (0.0: No ramp)	0.0	2
SPd	SP ramp-down		0.0	2

*1 When the output includes the relay ouput.
*2 When the output does not include the relay output.

■ Extension tuning bank
Bank selection: Et

Display	Item	Contents	Initial value	User level
At.tY	AT type	0: Normal (Standard control characteristcis) 1: Immediate response (Control characteristcis immediately responding to the external disturbance.) 2: Stable (Control characteristics with less up/down function of PV)	1	0
uF.bd	Just-FiTTER setting band	0.00 to 10.00	0.30	2
SP.tS	SP lag constant	0.0 to 999.9	0.0	2
At-P	AT proportional band tuning factor	0.00 to 99.99	1.00	2
At-I	AT integration time tuning factor	0.00 to 99.99	1.00	2
At-d	AT derivative time tuning factor	0.00 to 99.99	(Note)	2
CtLr.A	Control algorithm	0: PID (conventional PID) 1: RationaLOOP (high performance type)	0	1
uF.oU	Just-FiTTER overshoot suppression factor	0 to 100	0	1

(Note) Position proportional control model: 0.00, Nonposition propor. types: 1.00

■ Zone bank
Bank selection: ZonE

Display	Item	Contents	Initial value	User level	Remarks
Zn-1	Zone1	–1999 to +9999U	9999U	2	Displayed when the zone PID operation is used (C24≠0).
Zn-2	Zone2		9999U	2	
Zn-3	Zone3		9999U	2	
Zn-4	Zone4		9999U	2	
Zn-5	Zone5		9999U	2	
Zn-6	Zone6		9999U	2	
Zn-7	Zone7		9999U	2	
Zn.dF	Zone hysteresis	0 to 9999	5U	2	

[List of Setup Setting Displays]

■ Setup bank
Bank selection: StUP

Display	Item	Contents	Initial value	User level
C01	PV input range type	Thermocouple: 1 to 26 RTD: 41 to 68 DC current/voltage: 81 to 84, 86 to 90	88	0
C02	Temperature unit	0: Centigrade (°C) 1: Fahrenheit (°F)	0	0
C03	Cold junction compensation (T/C)	0: Cold junction compensation is performed. (Internal) 1: Cold junction compensation is not performed. (External)	0	2
C04	Decimal point position	0: No decimal point 1: One digit after decimal point 2: Two digits after decimal point 3: Three digits after decimal point (Select '0' or '1' for the thermocouple/RTD range with decimal point)	0	0
C05	PV range low limit	When the PV input range type is thermocouple or RTD, the setting is disabled although range low limit is displayed. –1999 to +9999U when the PV input range type is DC voltage/current.	0	0
C06	PV range high limit	When the PV input range type is thermocouple or RTD, the setting is disabled although range high limit is displayed. –1999 to +9999U when the PV input range type is DC voltage/current.	1000	0
C07	SP low limit	PV input range low limit to PV input range high limit	0	1
C08	SP high limit		1000	1
C09	Squarer root extraction dropout	0.0 to 100.0% (0.0: No square root extraction)	0.0	2
C10	RSP range type	0: 4 to 20mA 1: 0 to 20mA 2: 0 to 5V 3: 1 to 5V 4: 0 to 10V	0	0
C11	RSP range low limit	–1999 to +9999U	0	0
C12	RSP range high limit		1000	0
C14	Control action (direct/reverse)	0: Heat control (reverse action) 1: Cool control (direct action)	0	0
C15	Selection of MV at PV alarm occurrence	0: Control operation is continued. 1: MV at PV alarm occurrence is outputted.	0	2
C16	MV at PV alarm occurrence	–10.0 to +110.0%	0.0	2
C17	MV at READY (at heat-side for heat/cool control)	–10.0 to +110.0%	0.0	1
C18	MV at READY (at cool-side)	–10.0 to +110.0%	0.0	1
C19	Operation at MANUAL change	0: Bump-less 1: Preset	0	1
C20	Preset MANUAL value	–10.0 to +110.0% (Used even at MANUAL mode when power is ON.)	0.0 or 50.0	1
C21	PID operation initialization function selection	0: Automatic 1: Not initialized 2: Initialized (when SP value different from current value is inputted.)	0	2
C22	PID operation initial MV	–10.0 to +110.0%	0.0 or 50.0	2
C23	Control parameter decimal point	0: No decimal point 2: One digit after decimal point (Decimal point of integration time or derivative time)	0	2
C24	Zone PID action selection	0: Disabled 1: Selection by SP 2: Selection by PV	0	2
C26	Heat/cool control selection	0: Disabled. 1: Enabled.	0	0
C27	Heat/cool selection	0: Normal 1: Energy saving	0	1
C28	Dead zone	–100.0 to +100.0%	0.0	0
C29	Heat/cool control selection point	–10.0 to +110.0%	50.0	2
C30	LSP setting system	1 to 8	1	0
C31	SP ramp type	0: Standard 1: Multi-ramp 2: Step operation. Step is stopped when power is re-supplied. (READY) 3: Step operation. Step is recovered when power is re-supplied.	0	2
C32	SP ramp unit	0: 0.1U/s 1: 0.1U/min 2: 0.1U/h	1	2
C33	Step operation time unit	0: 0.1s 1: 1s (Displayed in min.s in console.) 2: 1min (Displayed in h.min in console.)	0	2
C34	Step operation PV start	0: Disabled. 1: Enabled.	0	2
C35	Step operation loop	0: Stop (Not looped.) 1: Looped. 2: Final step continued. (Not looped.)	0	2
C36	CT1 operation type	0: Heater burnout detection 1: Current value measurement	0	0
C37	CT1 output	0: Control output 1 1: Control output 2 2: Event output 1 3: Event output 2 4: Event output 3	0	0
C38	CT1 measurement wait time	30 to 300ms	30	0
C39	CT2 operation type	Same as CT1.	0	0
C40	CT2 output	Same as CT1.		
C41	CT2 measurement wait time	Same as CT1.	30	0
C42	Control output 1 range	Current output: 1: 4 to 2mA 2: 0 to 20mA Continuous voltage output: 1: 1 to 5V 2: 0 to 5V 3: 0 to 10V	1	0
C43	Control output 1 type	0: MV 1: Heat MV (for heat/cool control) 2: Cool MV (for heat/cool control) 3: PV 4: PV before ratio bias filter 5: SP 6: Deviation (PV-SP) 7: CT1 current value 8: CT2 current value 9: MFB (Including estimation MFB) 10: SP+MV 11: PV+MV	0	0
C44	Control output 1 scaling low limit	–1999 to +9999 (The decimal point position and unit may vary depending on the control output 1 type.)	0.0	0
C45	Control output 1 scaling high limit		100.0	0
C46	Control output 1 MV scalable bandwidth	0 to 9999 (Available when control output 1 type is 10 or 11.)	200	0
C47	Control output 2 range type	Same as control output 1.	1	0
C48	Control output 2 type		3	0
C49	Control output 2 scaling low limit	–1999 to +9999 (The decimal point position and unit may vary depending on the control output 2 type.)	0	0
C50	Control output 2 scaling high limit		1000	0
C51	Control output 2 MV scalable bandwidth	0 to 9999 (Available when control output 2 type is 10 or 11.)	200	0
C52	Auxiliary output range	Same as control output 1.	1	0
C53	Auxiliary output type		3	0
C54	Auxiliary output scaling low limit	–1999 to +9999 (The decimal point position and unit may vary depending on the auxiliary output type.)	0	0
C55	Auxiliary output scaling high limit		1000	0
C56	Auxiliary output MV scalable bandwidth	0 to 9999 (Available when auxiliary output type is 10 or 11.)	200	0
C57	Position proportional control method selection	0: MFB control + estimated position control 1: MFB control 2: Estimated position control (MFB disabled) 3: Estimated position control (MFB disabled) + position adjustment at power supply ON	0	0
C58	Position proportional control dead zone	0.5 to 25.0%	10.0	0
C59	Position proportional control long life	0: Controllability aiming type 1: Potentiometer life aiming type	1	0
C60	Position proportional control tuning start	0: Stop 1: Start	0	0
C61	Position proportional full-close tuning value	0 to 9999	1000	0
C62	Position proportional full-open tuning value	0 to 9999	3000	0
C63	Position proportional full-open time	5.0 to 240.0s	30.0	0
C64	Communication type	0: CPL 1: MODBUS ASCII format 2: MODBUS RTU format	0	0
C65	Station address	0 to 127 (Communication is disabled when "0" is set.)	0	0
C66	Transmission speed	0: 4800bps 1: 9600bps 2: 19200bps 3: 38400bps	2	0
C67	Data format (data length)	0: 7bit 1: 8bit	1	0
C68	Data format (parity)	0: Even parity 1: Odd parity 2: No parity	0	0
C69	Data format (stop bits)	0: 1bit 1: 2bits	0	0
C70	Communication minimum response time	1 to 250ms	3	2
C71	Key operation mode/type	0: Standard type 1: Special type	0	2
C72	Mode key function	0: Invalid 1: AUTO/MANUAL selection 2: RUN/READY selection 3: AT Stop/Start 4: LSP group selection 5: Release of all DO latches 6: LSP/RSP selection 7: Communication DI1 selection 8: Invalid	1	0
C73	Mode display setup	Whether the mode bank setup display is enabled or disabled is determined by the sum of the following weighting: Bit 0: AUTO/MANUAL display 0: Disabled, +1: Enabled Bit 1: RUN/READY display 0: Disabled, +2: Enabled Bit 2: LSP/RSP display 0: Disabled, +4: Enabled Bit 3: AT stop/start display 0: Disabled, +8: Enabled Bit 4: DO latch release 0: Disabled, +16: Enabled Bit 5: Communication DI1 ON/OFF display 0: Disabled, +32: Enabled Other invalid setup: 0, +64, +128	255	1

(continued on back page)

Display	Item	Contents	Initial value	User level
C74	PV/SP value display setup	Whether the basic display is enabled or disabled is determined by the sum of the following weighting: Bit 0: PV display 0: Disabled, +1: Enabled Bit 1: SP display 0: Disabled, +2: Enabled Bit 2: LSP group No. display 0: Disabled, +4: Enabled Other invalid setup: 0, +8	15	1
C75	MV display setup	Whether the basic display is enabled or disabled is determined by the sum of the following weighting: Bit 0: MV display 0: Disabled, +1: Enabled Bit 1: Heat MV/cool MV display 0: Disabled, +2: Enabled Bit 2: MFB display 0: Disabled, +4: Enabled Bit 3: AT progress display 0: Disabled, +8: Enabled	15	1
C76	Event setting value display setup	0: In the operation display mode, the internal event setting value is not displayed. 1: In the operation display mode, the internal event 1 setting value is displayed. 2: In the operation display mode, the internal event 1 to 2 setting value is displayed. 3: In the operation display mode, the internal event 1 to 3 setting value is displayed.	0	1
C77	Event remaining time display setup	0: In the operation display mode, the ON/OFF delay remaining time of the internal event is not displayed. 1: In the operation display mode, the ON/OFF delay remaining time of the internal event 1 is displayed. 2: In the operation display mode, the ON/OFF delay remaining time of the internal event 1 to 2 is displayed. 3: In the operation display mode, the ON/OFF delay remaining time of the internal event 1 to 3 is displayed.	0	1
C78	CT input current value display setup	0: In the operation display mode, the CT current value is not displayed. 1: In the operation display mode, the CT1 current value is displayed. 2: In the operation display mode, the CT1 to 2 current value is displayed.	0	1
C79	User level	0: Basic configuration 1: Standard configuration 2: High function configuration	1	0
C80	LED monitor	0: Disabled 1: Flashing at RS-485 communication signal transmission 2: Flashing at RS-485 communication signal receiving 3: OR (logical sum) of all DI status 4: Flashing at READY	0	2
C81	MS indicating lamp ON condition (1st priority)	0: Normally open (Normally OFF=0) 1: Normally close (Normally ON=1) 2 to 9: Internal event 1 to 8 10 to 13: Undefined 14:MV1 (ON/OFF, time proportional 1, heat-side, OPEN-side output) 15: MV2 (time proportional 2, cool-side, CLOSE-side output) 16 to 17: Undefined 18 to 21: DI1 to DI4 22 to 25: Undefined 26 to 30: Internal contact 1 to 5 31 to 33: Undefined 34 to 37: Communication DI1 to DI4 38:MANUAL 39:READY 40:RSP 41:AT 42:During ramp 43:Undefined 44:Alarm 45:PV alarm 46:Undefined 47:Mode key function selection status 48:Event output 1 status 49:Control output 1 status	39	2
C82	MS indicating lamp ON status (1st priority)	0: Lit 1: Slow flashing 2: 2 times flashing 3: Fast flashing 4: Left → Right 5: Right → Left 6: Right to left going and returning 7: Deviation OK 8: Deviation graph 9: MV graph 10: Heat-side MV graph 11: Cool-side MV graph 12: MFB graph 13: DI monitor 14: Internal contact monitor 15: Internal event monitor	1	2
C83	MS indicating lamp ON condition (2nd priority)	Same as MS indicating lamp ON condition (1st priority)	44	2
C84	MS indicating lamp ON status (2nd priority)	Same as MS indicating lamp ON status (1st priority)	6	2
C85	MS indicating lamp ON condition (3rd priority)	Same as MS indicating lamp ON condition (1st priority)	1	2
C86	MS indicating lamp ON status (3rd priority)	Same as MS indicating lamp ON status (1st priority)	9	2
C87	MS indicating lamp deviation range	0 to 9999U	5	2
C88	Special function	0 to 15 (0 at power supply ON.)	0	2
C89	Zener barrier adjustment	Rewriting by adjustment is enabled. Numerical value inputting manually is disabled	0.00	2
C90	CT1 number of winding	0: turns 1 to 40: Setting value multiplied by one hundred becomes number of winding.	8	2
C91	CT1 number of power wire loops	0: 1time 1 to 6: number of times	1	2

Display	Item	Contents	Initial value	User level
C92	CT2 number of winding	0: 800 turns 1 to 40: Setting value multiplied by one hundred becomes number of winding.	8	2
C93	CT2 number of power wire loops	0: 1time 1 to 6: number of times	1	2

■ Event assignment bank
Bank selection: EvCF

Display	Item	Contents	Initial value	User level
E1.C1 to E8.C1	Operation type of internal event 1 to 8 Configuration 1 Operation type	0: No event 1: PV high limit 2: PV low limit 3: PV high/low limit 4: Deviation high limit 5: Deviation low limit 6: Deviation high/low limit 7: Deviation high limit (Final SP reference) 8: Deviation low limit (Final SP reference) 9: Deviation high/low limit (Final SP reference) 10: SP high limit 11: SP low limit 12: SP high/low limit 13: MV high limit 14: MV low limit 15: MV high/low limit 16: CT1 heater burnout/over-current 17: CT1 heater short-circuit 18: CT2 heater burnout/over-current 19: CT2 heater short-circuit 20: Loop diagnosis 1 21: Loop diagnosis 2 22: Loop diagnosis 3 23: Alarm (status) 24: READY (status) 25: MANUAL (status) 26: RSP (status) 27: During AT execution (status) 28: During SP ramp (status) 29: Control direct action (status) 30: Invalid 31: During motor opening estimation (status) 32: Timer (status) 33: MFB high/low limit	0	0
E1.C2 to E8.C2	Internal event 1 to 8 Configuration 2	Digits are called as 1st digit, 2nd digit, 3rd digit and 4th digit from the right end digit.	0000	0
	1st digit: Direct /Reverse	0: Direct 1: Reverse	0	
	2nd digit: Stand-by	0: None 1: Standby 2: Standby + Standby at SP change	0	
	3rd digit: EVENT state at READY	0: Continue 1: Forced OFF	0	
	4th digit: Undefined	0	0	
E1.C3 to E8.C3	Internal event 1 to 8 Configuration 3	Digits are called as 1st digit, 2nd digit, 3rd digit and 4th digit from the right end digit.	0000	2
	1st digit: Alarm OR	0: No event 1: Alarm direct + OR operation 2: Alarm direct + AND operation 3: Alarm reverse + OR operation 4: Alarm reverse + AND operation	0	
	2nd digit: Special OFF	0: As normal execution 1: Event OFF at the event setting value (main)=0	0	
	3rd digit: Delay time unit	0: 0.1s 1: 1s 2: 1min	0	
	4th digit: Undefined	0	0	

■ DI assignment bank
Bank selection: di

Display	Item	Contents	Initial value	User level
di1.1 to di5.1	Internal contact 1 to 5 Operation type	0: No function 1: LSP group selection (0/+1) 2: LSP group selection (0/+2) 3: LSP group selection (0/+4) 4: PID group selection (0/+1) 5: PID group selection (0/+2) 6: PID group selection (0/+4) 7: RUN/READY selection 8: AUTO/MANUAL selection 9: LSP/RSP selection 10: AT Stop/Start 11: Invalid 12: Control action direct/reverse selection (As per setting/opposite operation of setting) 13: SP ramp Enabled/Disabled 14: PV Hold (No-hold/Hold) 15: PV maximum value hold (No-hold/Hold) 16: PV minimum value hold (No-hold/Hold) 17: Timer Stop/Start 18: Release of all DO latches (Continue/Release) 19: Advance (No advance/Advance) 20: Step hold (No hold/Hold)	0	0
di1.2 to di5.2	Internal contact 1 to 5 Input bit operation	0: Disabled. (Input of default) 1: Function 1 ((A and B) or (C and D)) 2: Function 2 ((A or B) and (C or D)) 3: Function 3 (A or B or C or D) 4: Function 4 (A and B and C and D)	0	2
di1.3 to di5.3	Internal contact 1 to 5 Input assignment A	0: Normally open (OFF, 0) 1: Normally close (ON, 1) 2: DI1 3: DI2 4: DI3 5: DI4 6 to 9: Undefined 10: Internal event 1	2 to 5 or 0	2
di1.4 to di5.4	Internal contact 1 to 5 Input assignment B	11: Internal event 2 12: Internal event 3 13: Internal event 4 14: Internal event 5 15: Internal event 6 16: Internal event 7 17: Internal event 8	0	2
di1.5 to di5.5	Internal contact 1 to 5 Input assignment C	18: Communication DI1 19: Communication DI2 20: Communication DI3 21: Communication DI4 22: MANUAL mode 23: READY mode 24: RSP mode 25: During AT execution 26: During SP ramp	0	2
di1.6 to di5.6	Internal contact 1 to 5 Input assignment D	27: Undefined 28: Alarm is enabled. 29: PV alarm is enabled. 30: Undefined 31: Mode key function selection status 32: Event output 1 status 33: Control output 1 status	0	2
di1.7 to di5.7	Internal contact 1 to 5 Polarity A to D	Digits are called as 1st digit, 2nd digit, 3rd digit and 4th digit from the right end digit.	0000	2
	1st digit: Polarity A (Polarity of input assignment A)	0: Direct 1: Reverse	0	
	2nd digit: Polarity B (Polarity of input assignment B)		0	
	3rd digit: Polarity C (Polarity of input assignment C)		0	
	4th digit: Polarity D (Polarity of input assignment D)		0	
di1.8 to di5.8	Internal contact 1 to 5 Polarity	0: Direct 1: Reverse	0	2
di1.9 to di5.9	Internal contact 1 to 5 Internal event No.assignment	0: Every internal event 1 to 8: Internal event numbers	0	2

■ DO assignment bank
Bank selection: do

Display	Item	Contents	Initial value	User level
o1t.1 to o5t.1 Ev1.1 to Ev3.1	Control output 1 to 2, event output 1 to 3 Operation type	0: Input of default 1: MV1 (ON/OFF control output, time proportional output, heat-side proportional output of heat/cool control) 2: MV2 (cool-side proportional output of heat/cool control) 3: Function 1 ((A and B) or (C and D)) 4: Function 2 ((A or B) and (C or D)) 5: Function 3 (A or B or C or D) 6: Function 4 (A and B and C and D)	0	2
o1t.2 to o5t.2 Ev1.2 to Ev3.2	Control output 1 to 2, event output 1 to 3 Output assignment A	0: Normally open (OFF, 0) 1: Normally close (ON, 1) 2: Internal event 1 3: Internal event 2 4: Internal event 3 5: Internal event 4 6: Internal event 5 7: Internal event 6 8: Internal event 7 9: Internal event 8	14 to 15 or 2 to 4	2
o1t.3 to o5t.3 Ev1.3 to Ev3.3	Control output 1 to 2, event output 1 to 3 Output assignment B	10 to 13: Undefined 14: MV1 15: MV2 16 to 17: Undefined 18: DI1 19: DI2 20: DI3 21: DI4 22 to 25: Undefined 26: Internal contact 1	0	2
o1t.4 to o5t.4 Ev1.4 to Ev3.4	Control output 1 to 2, event output 1 to 3 Output assignment C	27: Internal contact 2 28: Internal contact 3 29: Internal contact 4 30: Internal contact 5 31 to 33: Undefined 34: Communication DI1 35: Communication DI2 36: Communication DI3 37: Communication DI4 38: MANUAL mode	0	2
o1t.5 to o5t.5 Ev1.5 to Ev3.5	Control output 1 to 2, event output 1 to 3 Output assignment D	39: READY mode 40: RSP mode 41: During AT execution 42: During SP ramp 43: Undefined 44: Alarm is enabled. 45: PV alarm is enabled. 46: Undefined 47: Mode key function selection status 48: Event output 1 status 49: Control output 1 status	0	2

Display	Item	Contents	Initial value	User level
o1t.6 to o5t.6 Ev1.6 to Ev3.6	Control output 1 to 2, event output 1 to 3 Polarity A to D	Digits are called as 1st digit, 2nd digit, 3rd digit and 4th digit from the right end digit.	0000	2
	1st digit: Polarity A	0: Direct 1: Reverse	0	
	2nd digit: Polarity B		0	
	3rd digit: Polarity C		0	
	4th digit: Polarity D		0	
o1t.7 to o5t.7 Ev1.7 to Ev3.7	Control output 1 to 2, event output 1 to 3 Polarity	0: Direct 1: Reverse	0	2
o1t.8 to o5t.8 Ev1.8 to Ev3.8	Control output 1 to 2, event output 1 to 3 Latch	0: Disabled 1: Enabled (Latch at ON) 2: Enabled (Latch at OFF, except at the time of initialization after power ON)	0	2

■ User function bank
Bank selection: UF

Display	Item	Contents	Initial value	User level
UF-1	User function definition 1	This is the display in upper display. The setup exception is as follows: ----: Yet to be registered. P-_: Proportional band of the PID group in use I-_: Integration time of the PID group in use d-_: Derivative time of the PID group in use rE-_: Manual reset of the PID group in use oL-_: MV low limit of the PID group in use oH-_: MV high limit of the PID group in use P-_C: Cool-side proportional band of the PID group in use I-_C: Cool-side integration time of the PID group in use d-_C: Cool-side derivative time of the PID group in use oL_C: Cool-side MV low limit of the PID group in use oH_C: Cool-side of MV high limit of the PID group in use	----	1
UF-2	User function definition 2		----	1
UF-3	User function definition 3		----	1
UF-4	User function definition 4		----	1
UF-5	User function definition 5		----	1
UF-6	User function definition 6		----	1
UF-7	User function definition 7		----	1
UF-8	User function definition 8		----	1

■ Lock bank
Bank selection: Loc

Display	Item	Contents	Initial value	User level
Loc	Key lock	0: All settings are enabled. 1: Mode, event, operation display, SP, UF, lock, manual MV, and mode key can be set. 2: Operation display, SP, UF, lock, manual MV, and mode key can be set. 3: UF, lock, manual MV, and mode key can be set.	0	0
C.Loc	Communication lock	0: RS-485 communication read/write is enabled. 1: RS-485 communication read/write is disabled.	0	2
L.Loc	Loader lock	0: Loader communication read/write is enabled. 1: Loader communication read/write is disabled.	0	2
PASS	Password display	0 to 15 5: Password 1A to 2B display	0	0
PS1A	Password 1A	0000 to FFFF (hexadecimal value)	0000	0
PS2A	Password 2A	0000 to FFFF (hexadecimal value)	0000	0
PS1b	Password 1B	0000 to FFFF (hexadecimal value)	0000	0
PS2b	Password 2B	0000 to FFFF (hexadecimal value)	0000	0

■ Instrument information bank
Bank selection: id

Display	Item	Contents	Initial value	User level
id01	ROM ID	2 fixed	—	2
id02	ROM version 1	XX. XX (2 digits after decimal point)	—	2
id03	ROM version 2	XX. XX (2 digits after decimal point)	—	2
id04	SLP support Information		—	2
id05	EST support version		—	2
id06	Manufacturing date code (year)	Year-2000. Ex.: "3" means the year 2003.	—	2
id07	Manufacturing date code (month, day)	Month + Day ÷ 100 Ex.: "12.01" means the 1st day of December	—	2
id08	Serial No.		—	2

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Specifications are subject to change without notice.

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