和文は裏面をご覧下さい。

# INSTRUCTION MANUAL

# DIN Rail Mounted Indicating Controller DCL-33A

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For detailed usage, refer to the Instruction Manual for the DCL-33A. Please download the full Instruction Manual from Shinko website https://shinko-technos.co.jp/e/ → Support & Downloads → Downloads → Manuals

Thank you for purchasing our DCL-33A, DIN Rail Mounted Indicating Controller. This manual contains instructions for the mounting, functions, operations and notes when operating the DCL-33A. To ensure safe and correct use, thoroughly read and understand this manual before using this instrument. To prevent accidents arising from the misuse of this instrument, please ensure the operator receives this manual.

### **Safety Precautions** (Be sure to read these precautions before using our products.) The safety precautions are classified into 2 categories: "Warning" and "Caution".

Marning: Procedures which may lead to dangerous conditions and cause death or serious injury, if not carried out properly.

Caution: Procedures which may lead to dangerous conditions and cause superficial to medium injury or physical damage or may degrade or damage the product, if not carried out properly.

### Marning

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

### **!** SAFETY PRECAUTIONS

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

### **Compliance with Safety Standards**

### **⚠** Caution

- Always install the recommended fuse described in this manual externally.
- If the instrument is used in a manner not specified by the manufacturer, the protection provided by the instrument may be impaired.
- Use a device with reinforced insulation or double insulation for the external circuit connected to this product
- When using this product as a UL certified product, use a power supply conforming to Class 2 or LIM for the external circuit connected to the product.

### **(A)** Caution for Installation

This instrument is intended to be used under the following environmental conditions (IEC61010-1)]: Overvoltage category II, Pollution degree 2 Ensure the mounting location corresponds to the following conditions:

- A minimum of dust, and an absence of corrosive gases
  No flammable, explosive gases
- No mechanical vibrations or shocks
- No exposure to direct sunlight, an ambient temperature of 0 to 50°c (32 to 122°F) that does not change rapidly, and no icing.
- An ambient non-condensing humidity of 35 to 85 %RH
- · No large capacity electromagnetic switches or cables through which large current is flowing
- No water, oil or chemicals or where the vapors of these substances can come into direct contact with the unit
- Take note that the ambient temperature of this unit not the ambient temperature of the control panel – must not exceed 50°c (122°F) if mounted within a control panel, otherwise the life of electronic components (especially electrolytic capacitors) may be shortened.

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

# Warning on Model Label

## Caution

Failure to handle this instrument properly may result in minor or moderate injury or property damage due to fire, malfunction, malfunction, or electric shock. Please read this manual before using the product to ensure that you fully understand the product.

## **Specifications**

Power supply voltage	100 to 240 V AC 50/60 Hz, Allowable voltage fluctuation: 85 to 264 V AC 24 V AC/DC 50/60 Hz, Allowable voltage fluctuation: 20 to 28 V AC/DC				
	Thermocouple input: Within $\pm 0.2\%$ of each input span $\pm 1$ digit, or $\pm 2\%$ ( $4\%$ ), whichever is greater				
Base accuracy (at ambient temperature 23°c, for a single unit mounting)	However, R, S inputs, 0 to 200°C (32 to 392°F): Within ±6°C (12°F) B input, 0 to 300°C (32 to 572°F): Accuracy is not guaranteed. K, J, E, T, N inputs, Less than 0°C (32°F): Within ±0.4% of input span±1 digit, or ±4°C (8°F), whichever is greater				
mounting)	RTD input: Within ±0.1% of each input span±1 digit, or ±1°c (2°F), whichever is greater				
	DC voltage input: Within ±0.2% of each input span ±1 digit				
	Direct current input: Within ±0.2% of each input span±1 digit				
Input sampling period	125 ms				
Power consumption	100 to 240 V AC: Approx. 5 VA max. 24 V AC: Approx. 4 VA max. 24 V DC: Approx. 4 W max.				
Ambient Temperature, Humidity	0 to 50℃, 35 to 85 %RH (Non-condensing)				
Altitude	2,000 m or less				
Weight	Approx. 100 g				
Accessories	Instruction manual excerpt: 1 copy When W option is ordered: Connector harness W 3 m 1 length When W option (5A, 10A, 20A) is ordered: CT (CTL-6S) 1 piece When W option (50A) is ordered: CT (CTL-12-S36-10L1U) 1 piece When EI option is ordered: Connector harness AOJ 3 m 1 length When EA option is ordered: Connector harness AOJ 3 m 1 length				
	Relay contact: 1a, Control capacity: $3 \text{ A} 250 \text{ V} \text{ AC}$ (resistive load) $1 \text{ A} 250 \text{ V} \text{ AC}$ (inductive load $\cos\phi$ =0.4) Electrical life: $100,000 \text{ cycles}$				
Control output (OUT1)	Non-contact voltage (for SSR drive): 12 V DC ±15%  Max 40 mA (short circuit protected)  Direct current: 4 to 20 mA DC,				
	Load resistance: Max 550 $\Omega$ Output accuracy: Within $\pm0.3\%$ of output span Resolution: 12000				

#### Alarm output:

(Alarm, Loop break alarm and optional Heater burnout alarm utilize commor output terminals.)

The alarm action point is set by ±deviation from the SV (excluding Process alarm), and if the input goes outside the range, alarm is turned ON or OFF (High/ Low limit range alarm).

When De-energized action is selected in [Alarm Energized/De-energized], alarm is activated conversely

Setting accuracy: Same as base accuracy Action: ON/OFF action

Hysteresis: Thermocouple, RTD inputs: 0.1 to 100.0℃ (F)

DC voltage, current inputs: 1 to 1000 (The placement of the decimal point follows the selection.)

Output: Open collector, Control capacity: 0.1 A 24 V DC

Alarm type: High limit alarm, Low limit alarm, High/Low limits alarm, High/Low limits independent alarm, High/Low limit range alarm, High/Low limit range independent alarm, Process high alarm, Process low alarm, High limit with standby alarm. Low limit with standby alarm. High/Low limits with standby alarm, High/Low limits with standby independent

Energized/De-energized action are applied to the above alarms, totaling 24 alarm types. No alarm action can also be selected.

Alarm Energized/De-energized: Alarm output Energized/ De-energized can

	Alarm Energized	Alarm De-energized
EVT indicator (Red)	Lit	Lit
EVT output	ON	OFF

Alarm HOLD function: Once an alarm is activated, the alarm output is maintained until the power is turned off.

#### Loop break alarm output:

(Loop break alarm, Alarm and optional Heater burnout alarm utilize commo output terminals.)

Detects heater burnout, sensor burnout and actuator trouble. Setting range:

Loop break alarm time: 0 to 200 minutes

Loop break alarm span:

Thermocouple, RTD inputs: 0 to 150°C (F) or 0.0 to 150.0°C (F) DC voltage, current inputs: 0 to 1500 (The placement of the decimal point

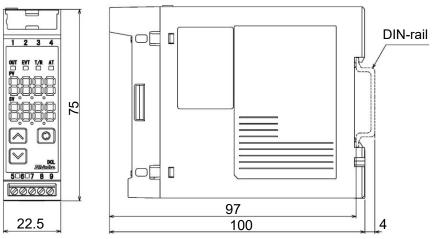
follows the selection ) Output: Open collector, Control capacity: 0.1 A 24 V DC

Heating/Cooling OUT2) (DC option)

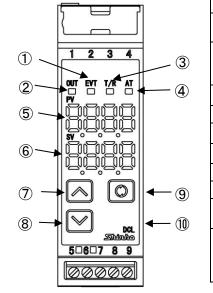
**EVT** output

Output: Open collector. Control capacity: 0.1 A 24 V DC

# **External Dimensions** (Scale: mm)



### Name and Functions

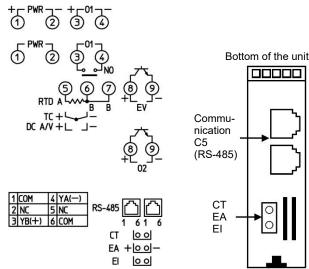


No.	Name	Description
1	EVT indicator	The red LED lights when Event output (Alarm, Loop break alarm or optional Heater burnout alarm) is ON. The red LED also lights when Cooling output is ON if Heating/Cooling control option is ordered.
2	OUT indicator	The green LED lights when OUT (control output) is ON (when Heating output is ON if Heating/Cooling control option is ordered). For Direct current output, flashes in 125 ms cycles corresponding to the output MV.
3	T/R indicator	The yellow LED flashes during Serial communication TX output (transmitting).
4	AT indicator	The yellow LED flashes while auto-tuning (AT) is performing.
⑤	PV Display	Indicates the PV (process variable), or setting characters in setting mode with a red LED.
6	SV Display	Indicates the SV (desired value), output MV (manipulated variable) or each set value in each setting mode with a green LED.
7	UP key	Increases the numeric value.
8	DOWN key	Decreases the numeric value.
9	MODE key	Switches the setting mode or registers the set data. (Registers the set data by pressing the MODE key.)
10	SUB-MODE key	Enters Auxiliary function setting mode 2 in combination with the MODE key.  If 'Control output OFF' is selected in [SUB-MODE key function]: Turns all outputs OFF as if the power were turned OFF.  If 'Auto/Manual control' is selected in [SUB-MODE key function]: Switches the Auto/Manual control.  If 'Alarm HOLD cancel' is selected in [SUB-MODE key function]: Cancels Alarm HOLD.

# Caution

- When setting the specifications and functions of this unit, connect mains power cable to terminals 1 and 2 first, then set them referring to "Key Operation Flowchart", before "Mounting to the Control Panel" and "Wiring"
- Do not pull or bend the lead wire on the terminal side when wiring or after wiring, as it could cause malfunction.

# **Terminal Arrangement**



Name	Description		
PWR	Description  100 to 240 V AC or 24 V AC/DC		
(POWER SUPPLY)	For 24 V DC, ensure polarity is correct.  Control output (OUT1)		
TC	Thermocouple		
RTD	Resistance temperature detector		
DC	Direct current or DC voltage For Direct current input (when "Externally mounted 50 $\Omega$ shunt resister" is selected), connect a 50 $\Omega$ shunt resistor between input terminals.		
EV	Event output Outputs when Alarm, Loop break alarm or Heater burnout alarm (W option) is ON.		
O2	Cooling output (DC option)		
RS-485	Serial communication (C5 option)		
CT	Current transformer input (W option)		
EA	External setting input (EA option)		
El	DI1 input (El option)		

When using ferrules, use the following ferrules made by Phoenix Contact GMBH & CO.

Recommend	ded Ferrules	s and Crimping Pliers				
Terminal Number	Terminal Screw	Ferrules with Insulation Sleeve	Conductor Cross Sections Tightening Torque		Crimping Pliers	
1 to 4 5 to 9		AI 0.25-8 YE	0.2 to 0.25 mm <sup>2</sup>		CRIMPFOX ZA 3 CRIMPFOX UD 6	
	M2.6	AI 0.34-8 TQ	0.25 to 0.34 mm <sup>2</sup>			
		AI 0.5-8 WH	0.34 to 0.5 mm <sup>2</sup>	0.5 to 0.6 N·m		
		AI 0.75-8 GY	0.5 to 0.75 mm <sup>2</sup>	0.5 (0 0.6 N-111		
		AI 1.0-8 RD	0.75 to 1.0 mm <sup>2</sup>			
		AI 1.5-8 BK	1.0 to 1.5 mm <sup>2</sup>			
		AI 0.25-8 YE	0.2 to 0.25 mm <sup>2</sup>			
	M2.0	AI 0.34-8 TQ	0.25 to 0.34 mm <sup>2</sup>	0.22 to 0.25 N·m		
		AI 0.5-8 WH	0.34 to 0.5 mm <sup>2</sup>			

# **Key Operation Flowchart**

#### Basic Operation Procedure

Set the input type, Alarm 1 type and SV1 (desired value), following the procedure below. Setting item numbers (1), (2), (3), (4), (5), (6), (7) and (8) are indicated on the flowchart. [Step 1] Turn the load circuit power OFF, and turn the power to the Operation before RUN DCL-33A ON. Select an input type and Alarm 1 type, etc. in Auxiliary function setting mode 2. (1) Select an input type in [Input type]. (2) Select Alarm 1 type in [Alarm 1 type]. If any Alarm 1 type except ( ) is selected, (3) to (6) will be indicated. Set them if necessary. [Step 2] Auxiliary function setting Note: If Alarm 1 type is changed, the Alarm 1 value will default to 0 (0.0). Therefore, set the alarm value again. mode 2 (3) Select either Energized or De-energized in [Alarm 1 Energized/De-energized]. (4) Select either Holding or Not holding in [Alarm 1 HOLD function].

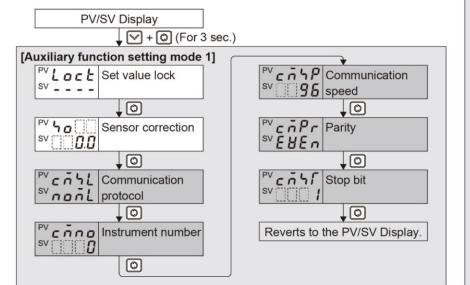
(5) Set Alarm 1 hysteresis in [Alarm 1 hysteresis]. (6) Set Alarm 1 delay time in [Alarm 1 delay time]

[Step 5] RUN	keep the control target at SV1 (desired value).
PV/SV Display  ↓ ◎	PV/SV Display  O (For 3 sec.)
Main setting mode]	Output MV (manipulated
8) PV <b>4</b>	variable) indication
SV (Desired value)	
	Reverts to the PV/SV Display.
Reverts to the PV/SV Displ	ay.

[Step 4] Main setting mode (8) Set SV1 (desired value) in [SV1 (desired value)]

[Step 3] Sub setting mode (7) Set Alarm 1 value in [Alarm 1 value].

#### PV/SV Display JA+0 [Sub setting mode] c\_b OUT2 PV R [ AT Perform/Cancel **3** proportional cycle ィ 与 E 「 Manual reset OUT1 proportional sv 2.5 band PV P \_ b OUT2 proportional sv ... band PV **R I** Alarm 1 value Heater burnout Integral time sv [] 2 0 0 alarm value PV d Derivative time PV L P \_ [ Loop break 🛭 alarm time PV L P \_ H Loop break ARW 🛭 alarm band OUT1 Reverts to the PV/SV Display. **3** proportional cycle 0



#### Alarm Type

High limit alarm	The alarm action is $\pm$ deviation setting from the SV. The alarm is activated if the input value reaches the high limit set value.
Low limit alarm	The alarm action is $\pm$ deviation setting from the SV. The alarm is activated if the input value drops below the low limit set value.
High/Low limits alarm	Combines High limit and Low limit alarm actions. When input value reaches the high limit set value or drops below the low limit set value, the alarm is activated.
High/Low limit range alarm	When input value is between the low limit and high limit set values, the alarm is activated.
Process alarm	Within the scale range of the controller, alarm action points can be set at random and if the input reaches the randomly set action point, the alarm is activated.
High/Low limits independent	High limit and low limit set values can be set respectively. The alarm is activated when the input value exceeds the high limit set value or drops below the low limit set value.
High/Low limit range independent	High limit and low limit set values can be set respectively. The alarm is activated when the input value is between the low limit and high limit set values.
High limit with standby, Low limit with standby, H/L limits with standby, H/L limits with standby independent	After the power supply to the instrument is turned on, even if the input enters the alarm action range, the alarm is not activated. If SV is changed while the controller is running, the alarm is not activated even if the input is in the alarm action range. (If the controller is allowed to keep running, the standby function will be released once the input exceeds the alarm action point.)

#### Character Indication

AT Perform/Cancel	Input Type	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	H/L limits alarm	_ □ 片 Converter	SV Rise/Fall rate start type
AT Cancel	上	F Pt100 -199.9 - 999.9°F	H/L limit range	Event input DI allocation (*3)	与書与に SV start
AT Perform	上 K -199.9 - 400.0°C		Process high alarm	∭ <i>☐ ☐ ☐</i> No event	[무남니다 PV start
Set value lock		F Pt100 -300 - 1500°F	구무나 Process low alarm	Set value memory	Control output OUT1/EVT
Unlock	, R 0-1760°C		High limit with standby	Control ON/OFF	<u>□</u> ;;;   OUT1
<u> </u>	5 0-1760°C	니근 [] H 4-20 mA -1999-9999(*1)	Low limit with standby	☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐	EHT EVT
<u>L □ ∈ </u>		☐ ☐ ☐ ☐ ☐ 0-20 mA -1999–9999(*1)	H/L limits with standby	Preset output 1	Heater burnout alarm output
<u> </u>	E Γ E -200 - 800°C	☐ /H 0-1V -1999-9999	H/L limits independent	014/011	Enabled/Disabled
Communication protocol	T -199.9 - 400.0°C	- h/		Preset output 2	Disabled
Shinko protocol	□ □ N -200 - 1300°C	/ 5 H 1 - 5 V -1999 - 9999	H/L limit range independent alarm	014/011	남동식 Enabled
Modbus ASCII mode	PL 2 E PL-II 0-1390°C	☐ I☐	11/1	Auto/Manual control	Loop break alarm output Enabled/Disabled
nodr Modbus RTU mode	C(W/Re5-26) 0 - 2315°C	나근다! 4-20 mA -1999–9999(* <b>2</b> )	H/L limits with standby independent alarm	Integral action Holding	Disabled
Shinko protocol (Block Read/Write)		☐ ☐ ☐ ; 0-20 mA -1999–9999(*2)	A1 - A4 Energized/De-energized	Set value memory	성문식 Enabled
Marillana A COUL and also	JPt100 -199.9 - 500.0°C	Decimal point place		Control ON/OFF	A1 - A4 output Enabled/Disabled
(Block Read/Write)	Pt100 -200 - 850°C	No decimal point	Fig. Energized	Direct/Reverse action	Disabled
Madhus PTI I made		1 digit after point	A1 - A4 HOLD function	Preset output 1	남는 도 Enabled
(Block Read/Write)		2 digits after point	Not holding	D 1 1 10	SUB-MODE key function
Communication speed	E F K -199.9 - 750.0°F	3 digits after point	Holding	Preset output 2	□ F F Control output OFF
근'닉 2400 bps	-320 - 1800°F	OUT2 cooling method	Direct/Reverse action	☐☐ / ☐ Auto/Manual control	Auto/Manual control
11 48 4800 bps	F R 0-3200°F	吊: 一 Air cooling	HERT Reverse action	☐ / ☐ Integral action Holding	무너무 F Alarm HOLD cancel
9600 bps	- F S 0-3200°F	☐¦	EDD! Direct action	A1 - A4 value 0 Enabled/Disabled	Auto/Manual control after
192 19200 bps	<u></u>	□ R   Water cooling	Output status when input errors occur	□ □ □ Disabled	power ON
□∃8Ч 38400 bps	E F E -320 - 1500°F	A1 - A4 type	Output OFF	무를 Enabled	Automatic control
Parity	F T -199.9 - 750.0°F	No alarm action	Output ON	Remote/Local	「ニョー」 Manual control
ngnE No parity		High limit alarm	Controller/Converter	Lock Local	
EHEn Even	-320 - 2300°F 	Low limit alarm	□ □ □ □ Controller	rEn/ Remote	
odd Odd		CLILLI LOW INTIC GIGHT			r (*2) Built-in 50Ω shunt resistor

#### About Setting Item

- Upper left : PV Display: Indicates setting characters. Lower left: SV Display: Indicates the factory default. Right side: Indicates the setting item.
- : This setting item is optional, and appears only when the option is ordered.

!(\*1) Externally mounted 50Ω shunt resistor (\*2) Built-in 50Ω shunt resistor (\*3) 001 to 007: Works when contacts are closed (Input ON). Press and hold the key and key (in that order).

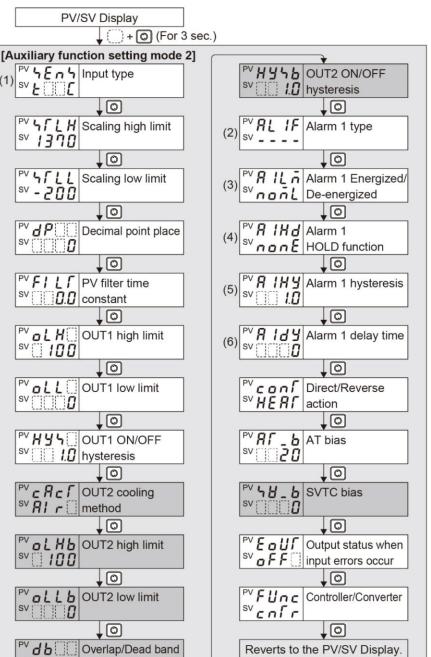
ONS to 014: Works when contacts are closed (input OFF).

• 🗹 + 🔘 (For 3 sec): Press and hold the 💟 key and 🔘 key (in that order) together for approx. 3 seconds.

• Set or select each item with the 🔊 or 💟 key, and register the value with the 🔘 key.

• 🜓 🖸 : If the 🔘 key is pressed, the unit proceeds to the next item, illustrated by an arrow.

key for approx. 3 seconds in any mode.



0.0

PV/SV Display
↓ A + V (For 3 sec
[Auxiliary function setting mode 3]
PV E I n Event input
SV DI allocation
PV <b>\ 2</b>
PV R I = R Alarm 1 value 0
Enabled/Disabled
PV R IH Alarm 1 high limit
sv alarm value
PV R L 2 F Alarm 2 type
sv
<b>↓</b>
PV R 2 = R Alarm 2 value 0
sv n o Enabled/Disabled
PV # 2 Alarm 2 value
PV R 2 H Alarm 2 high limit
sv alarm value
<b>↓</b> ◎
PV R 2 L n Alarm 2 Energized/
SV nonL De-energized
PV R 2 H d Alarm 2
SV n a n E HOLD function
PV D 3444
PV # 2 H Y   Alarm 2 hysteresis
PV R 2 d Y Alarm 2 delay time

	• \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	_
C.	To revert to the PV/SV Display, press the	
(		
	PV RL 3F Alarm 3 type	
	SV	
	PV R 3 = R Alarm 3 value 0	
	sv n a Enabled/Disabled	
	PV <b>A 3</b> Alarm 3 value	
	Alarm 3 high limit	
	Littie diamit value	
	PV A 3L n Alarm 3 Energized/	
	sv nonL De-energized	
	<b>↓</b> ◎	
	PV <b>R 3 H d</b> Alarm 3	
	SV nonE HOLD function	
	PV R 3 H Y Alarm 3 hysteresis	
	sv [ ] I.Ū	
	PV <b>R 3 d y</b> Alarm 3 delay time	
	sv	
	<b></b>	
	PV RL YF Alarm 4 type	
	sv	
	PV R Y = R Alarm 4 value 0	
	sv n a Enabled/Disabled	
	↓ o	
	PV <b>A Y</b> Alarm 4 value	
	sv	
	<b>↓</b> ◎	
	PV <b>R Y H</b> Alarm 4 high limit	
	sv alarm value	

