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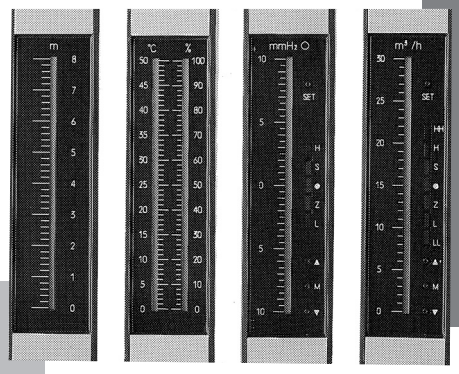
No. CP-UM-1221E

SIA, SIB, SIC, SID
Smart Indicator with LED Bar Graph
User's Manual



Thank you for purchasing the SIA, SIB, SIC and SID.

This manual contains information for ensuring the correct use of the SIA, SIB, SIC and SID. It also provides necessary information for installation, maintenance, and troubleshooting.

This manual should be read by those who design and maintain equipment that uses the SIA, SIB, SIC and SID. Be sure to keep this manual nearby for handy reference.

Yamatake Corporation

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 this user's manual in part or in whole is forbidden. The information and specifications in this 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.

CONTENTS

1. GENERAL

The Smart Indicator is a compact, lightweight, highly reliable, DIN-compatible LED bar graph indicator for process monitoring.

Features

- Bar graph with high-intensity custom LEDs.
- Three bar display colors: red, green and yellow, selectable.
- Easy alarm setting and zero span adjustment from the front panel.

2. DIMENSIONS AND INSTALLATION

1. External dimensions

Unit : mm

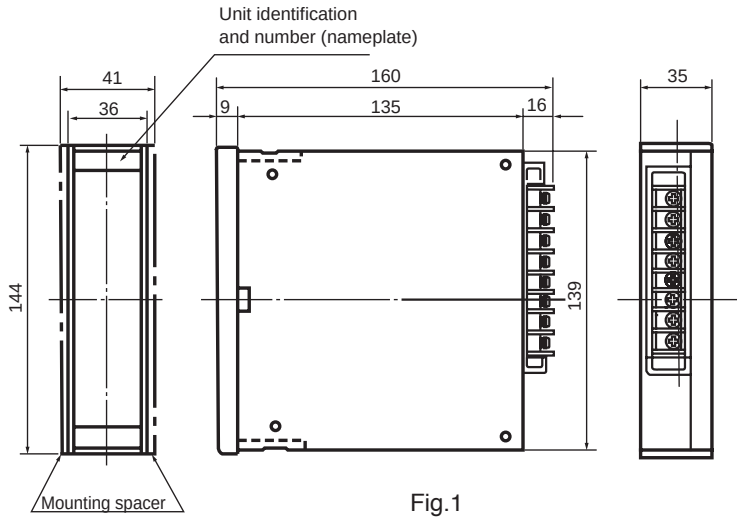


Fig.1

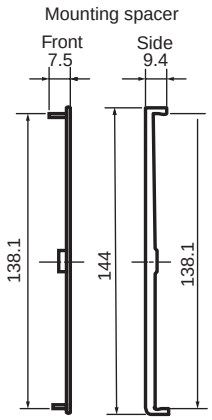


Fig.2

2. Panel dimensions

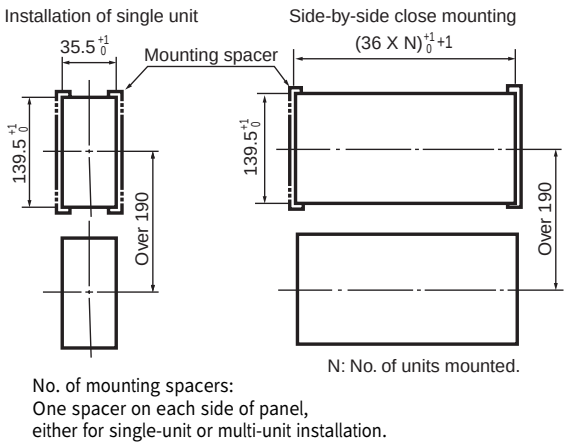


Fig.3

3. installation of panel

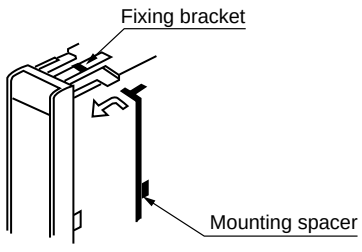


Fig.4

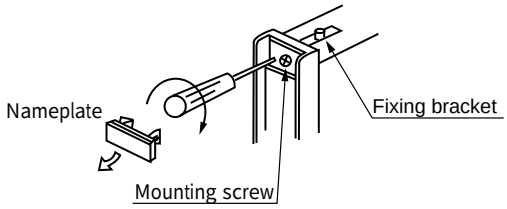


Fig.5

4. Panel mounting method

(1) Attach the included mounting spacers to the right and left sides of the instrument body.
(2) Insert the instrument body into the panel cutout.
(3) Mounting screws are located at the top and bottom behind the two nameplates. With a phillips head screwdriver, turn the screws clockwise to raise the fixing bracket the secure the instrument body in place.
(4) To remove the instrument from the panel, simply turn the screws counterclockwise.

5. Choose installation

Choose a location that meets the following requirements:

Operating conditions

Ambient temperature:	SIA, SIB: 0 to 50°C	SIC, SID: 0 to 45°C
Ambient humidity:	80% RH at 40°C	
Vibration resistance:	4.9m/s^2 (10 to 60Hz)	
Shock resistance:	490m/s^2	

Cautions

- Do not mount the instrument in an environment where these is flammable gas.
- Do not use the instrument in a highly corrosive atmosphere.
- Distance the instrument from any potential source of electrical interference: large-capacity electromagnetic switches, high-frequency generating units, SCR units, or the like.

3. WIRING

1. Cables

(1) For the input signal, use a shielded cable suitable for measuring-instrument use.
(2) Use a 600V vinyl insulated cable (IV cable) conforming to JIS C3307 for the 100/110Vac power supply.

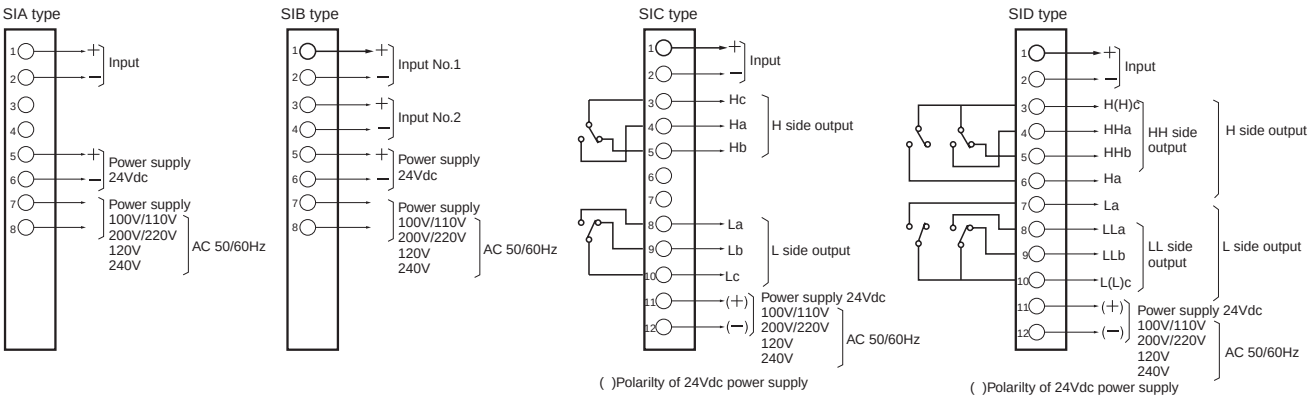
Cautions

- Leave space of more than 50cm between the input signal cable and the power line.
- Do not run the input signal cable and the power line in the same conduit, or in close proximity.
- Distance the input signal cable from the power, high voltage and load lines.
- The above conditions also apply to internal panel wiring.

2. Terminal connection

(1) Use solderless terminals that take M3 screws.
(2) The instrument is not equipped with a power switch. Mount one separately, if necessary.
(3) Connect wiring according to the terminal connection diagram. Make sure that the cables have been connected correctly.

Terminal connection diagram



4. ALARM SETTING AND ZERO SPAN ADJUSTMENT

1. Location

For SIA and SIB types:

The zero and span control knobs are accessible by removing the nameplates, acrylic cover and scale plate. Adjust the knobs according to the instructions in Section 4.3.

For SIC and SID types:

First remove the nameplates and acrylic cover. Set the alarm and adjust the zero and span knobs according to the instructions in Section 4.3.

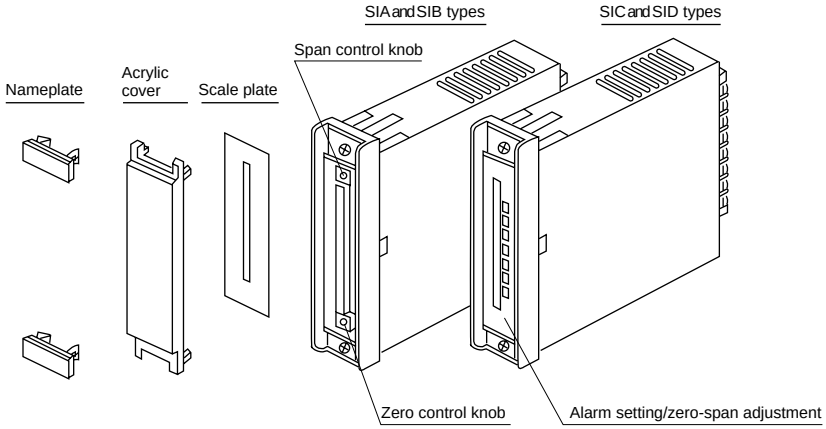


Fig.7

2. Alarm setting (SIC and SID)

2-1 Setting/indicating

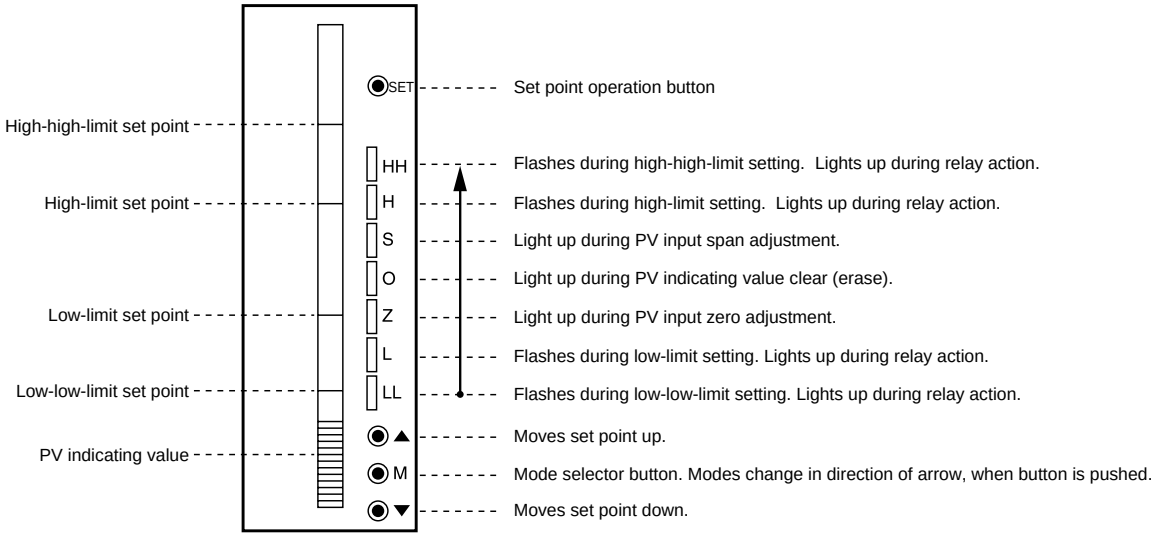


Fig.8

2.2 Selection of setting modes

(1) When the ◉M mode selector button is pushed, all LEDs either flash or light up and a setting mode can be selected.

(2) LL, L, H, and HH LEDs (▯) flash during mode selection and light up during relay action.

(3) When the ◉▲ or ◉▼ button is pushed, the setting mode shifts upward or downward. For rapid mode shifting, push and hold for at least 3 seconds.

(4) The PV indicating value can be erased by selecting the PV indicating value clear mode.

2.3 Setting of high-limit (H) and high-high limit (HH)

(1) Select either the high-limit (H) or high-high limit (HH) mode by pushing ◉M. The LED should flash.

(2) Set either a high or high-high limit value by moving the setting bar up ◉▲ or down ◉▼.

(3) Load a set point by pushing ◉SET. The LED should go out.

2.4 Setting of low-limit (L) and low-low limit (LL)

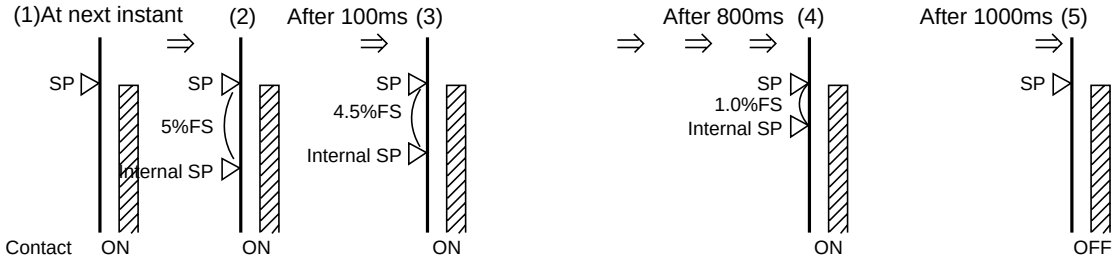
(1) Select either the low-limit (L) or low-low limit (LL) mode by pushing ◉M. The LED should flash.
(2) Set either a low or low-low limit value by moving the setting bar up ◉▲ or down ◉▼.
(3) Load a set point by pushing ◉SET. The LED should go out.

2.5 About the hysteresis of the alarm contacts

The hysteresis of the SIC and SID is different from the operating differential of a general temperature controller. It goes through the process described below.

(For a high-limit alarm)

(1) When the set point = the PV value, the relay contact turns ON.
(2) In the next instant, the internal set point decreases 5% FS.
(3) After 100ms, the internal set point increases 0.5% FS from the above (2) state, and comparison is made between the internal set point and the PV value. If the internal set point > PV value, the contact turns OFF.
(4) Afterwards, at 100ms intervals, the internal set point increases every 0.5% up to the value of (internal set point —1.0% FS), and each time the internal set point is compared to the PV value. If the internal set point > the PV value, the contact turns OFF.
(5) At 1000ms, the internal set point returns to the original set point.
When SP > PV value, the contact turns OFF.



Note: For a low-limit alarm, the process is reversed.

3. Zero and span adjustment

For SIA and SIB types:

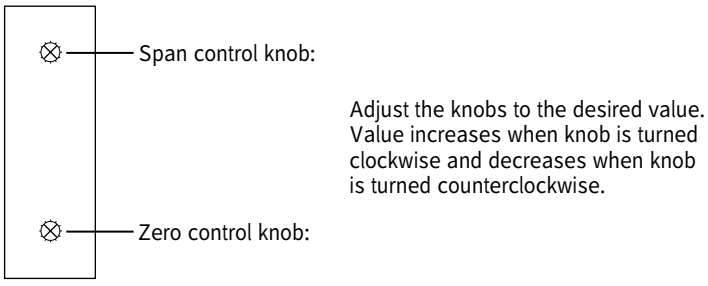


Fig.9

For SIC and SID types:

(1) Zero adjustment (See Fig.8)
1. Select the zero adjusting mode (Z) by pushing ◉M. The Z lamp should flash.
2. Set the desired value by moving the PV indicating bar up or down with ◉▲ or ◉▼.
3. Load a set point by pushing ◉SET. The LED should go out.

(2) Span adjustment (See Fig.8)
1. Select the span adjusting mode (S) by pushing ◉M. The S lamp should flash.
2. Set the desired value by moving the PV indicating lever up or down with ◉▲ or ◉▼.
3. Load a set point by pushing ◉SET. The LED should go out.

5. SPECIFICATIONS AND MODEL NUMBERS

Model	Model No.	SIA	SIB	SIC	SID
	No. of indicating points	1	2	1	1
	Alarm	–	–	High/low limit	High-high limit/ low-low limit
Input	Input type	Current: 4 to 20mA, and 0 to 1mAdc. Voltage: 0 to 1Vdc, and 0 to 5Vdc.			
	Response speed	0.5s (90% response)			
	Input impedance	4 to 20mA input: 10Ω. 0 to 1mAdc input: 200Ω. 1 to 5Vdc, 1 to 5Vdc and 0 to 5Vdc: 1MΩ.			
	Input adjustment range	±10% FS (for both ZERO and SPAN)			
Indication	Indication method	Red, green or yellow LED bar dots (color selectable) Flashing display (SIA and SIB only) when input is complete.			
	Number of bar dots	101			
	Effective scale length	100mm			
	Indication range	0 to 100% FS			
	Indication accuracy	±1% FS ±1 digit			
Alarm setting unit (SIC and SID)	Setting range	High/low limit	High limit value (H): 100% FS to (low limit value +1% FS)		
			Low limit value (L): (high limit value -1% FS) to 0%		
		High-high limit/low-low limit	High-high limit value (HH): 100% FS to (high limit value +1% FS)		
			High limit value (H): (high-high limit value -1% FS to (low limit value +1% FS)		
			Low limit value (L): (high limit value -1% FS) to (low-low limit value +1% FS)		
			Low-low limit value (LL): (low limit value -1% FS) to 0%		
	Setting accuracy	±1% FS ±1 digit			
	Output and rating	Non-voltage contact (SIC: 2C, SID: 2c+2a), 125Vac 0.5A and 30Vdc 2A (resistive load). Contact life: 500,000 cycle min. (at rated load).			
	Power failure compensation	Settings are safely stored in nonvolatile RAM.			
	Ambient temperature	0 to 50°C		0 to 45°C	
General specifications	Power consumption	AC power: 5VA 24Vdc power: 2W	AC power: 5VA 24Vdc power: 4W		
	Insulation resistance	50MΩ min. by DC500V megger between circuit and case		10MΩ min. by DC500V megger between circuit and case	
	Dielectric strength	2000Vac for 1 min between circuit and case. AC power: 1500Vac for 1 min between power and input terminal. 24Vdc power: 500Vac for 1 min between power and input terminal. 500Vac for 1 min between input No. 1 and input No. 2.		1500Vac for 1 min between circuit and case. AC power: 1500Vac for 1 min between power and input terminal. 24Vdc power: 1500Vac for 1 min between power and input terminal, between output contact and case, between output contact and power, and between output contact and circuit.	
	Mass (weight)	Approx. 500g	Approx. 590g	Approx. 400g	
	Vibration resistance	4.9m/s^2 max. (10 to 60Hz)			
	Shock resistance	490m/s^2 max.			
	Case and cover materials	Case: ABS resin. Cover: acrylic resin. Nameplate: ABS resin.			
	Standard color	Scale: black colored aluminum. Bezel and case: moss green (Munsell 2.5GY3/1).			
	Mounting	Flush-mounted on indoor panel			
	Mounting angle	0 to 90° (in any direction)			
	Standard accessories	Mounting spacers (2 units)			
Additional treatment	Selectable	With inspection certificate and/or tropicalization			

SI Series Model Selection Guide

Model [I] [II] [III] [IV] [V] [VI]

I	II	III	IV		V		VI	
Basic Model Number	Power Supply Voltage	Input	No.1 Display Colour	No.1 Display Range	No.2 Display Colour	No.2 Display Range	Additional Processing	
SIA								1 display
SIB								2 displays
SIC								1 display High/low limit alarm
SID								1 display High-high limit/ low-low limit alarm
	1							100V/110Vac 50/60Hz
	2							200V/220Vac 50/60Hz
	5							120Vac 50/60Hz
	6							40Vac 50/60Hz
	8							24Vdc
		C						4 to 20mAdc
		F						0 to 1mAdc
		L						0 to 1Vdc
		V						1 to 5Vdc
		Y						0 to 5Vdc
			R					Red
			G					Green
			Y					Yellow
			See Range Code select Table ▶					
					R			Red
					G			Green
					Y			Yellow
					See Range Code select Table ▶			
							—	None
							D	Inspection certificate provided
							T	Tropicalization treatment
							B	Tropicalization treatment + Inspection certificate provided
							Y	Complying with the traceability certification

Range Code select Table

Selection		Description																		
Unit	Model	A	C	D	H	I	O	X	Y	Z	U	S	T	V	W	-	-	-	-	-
		m^3/h[N]	%	m^3/h	l/min	°C	pH	m	mm	-	ppm	hPa	Pa	kPa	MPa	-	-	-	-	-
Mantissa	Model	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	G	H	I	J
		1	2	3	4	5	6	7	8	9	15	25	35	4	55	65	75	85	95	14
Index	Model	7	8	9	0	1	2	3	4	5	6	-	-	-	-	-	-	-	-	-
		10^{-3}	10^{-2}	10^{-1}	10^{0}	10^{1}	10^{2}	10^{3}	10^{4}	10^{5}	10^{6}	-	-	-	-	-	-	-	-	-
Hi/Lo	Model	X									W									
Range limits		When the low limit value of the range is 0									When the range is "- (low limit value) to + (high limit value)". However, the absolute high and low limit values must be the same.									

Example:

(1) I: SIA, II: 8, III: C, IV: R A32X, VI: T

Range: 0 to 300 Nm^3/h

- A (Unit)
- 3 (Mantissa)
- 2 (Index) → 3×10^2
- X (0 low limit)

(2) I: SIB, II: 8, III: C, IV: R A32X, V: G S50W, VI: T

Range: ± 5 hPa

- S (Unit)
- 5 (Mantissa)
- 0 (Index) → 5×10^0
- W (± limit)

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