FM Approved Product
High/Low Temperature Limit Controller

SA100L

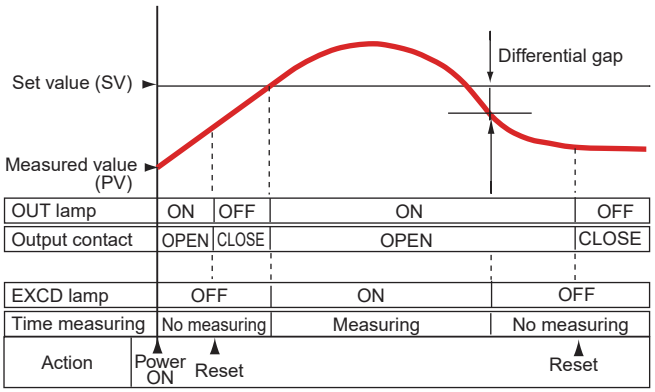
<FM Approved>

The FM (Factory Mutual) standard is a standard that originated in the United States to assess the safety and quality of equipment related to fire prevention. It is a certification that assesses the quality, capacity, durability, and other aspects of various equipment to prevent asset losses due to fires.
Compliance with the standard is required when used for systems that prevent excessive heating or fires. SA100L has obtained certification for FM3545: Temperature Limit SW, which is specifically designed for preventing overheating of equipment and other devices.

FM APPROVED

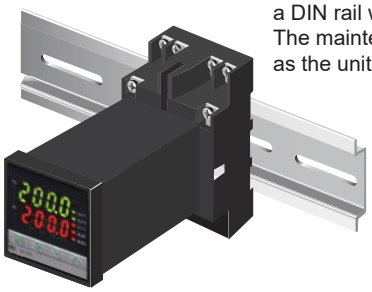
The SA200L provides over/under-temperature protection by interrupting or removing the power from the process whenever the temperature goes above or below the set value (high limit or low limit). The output can be slected as an alarm or to interrupt power to the heater circuit.
For safety reasons, the output is retained until reset operation is executed even when the measured value goes back to the normal range. Reset operation can be executed by front key operation, communication, or digital input.

The SA100L measures the time while the measured value goes above/below the set value, and it retains the peak value.



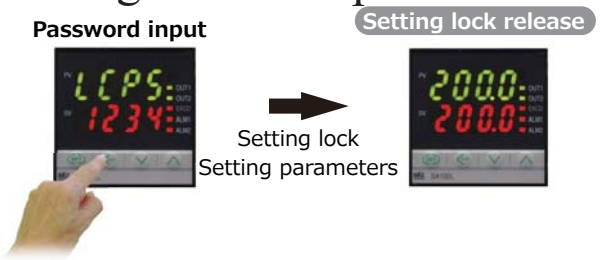
• Output contact is open when power is OFF.(De-energized output)

Simple Mounting on DIN Rail



The SA100L can be simply mounted on a DIN rail with DIN railmounting socket. The maintenance is also simple, as the unit can be removed from socket.

Setting lock with password



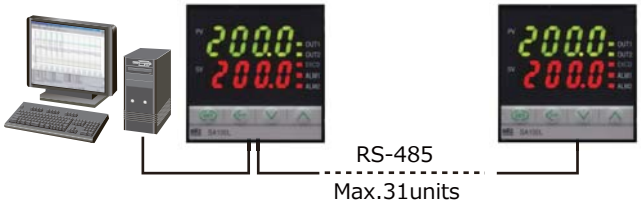
The setting lock function is equipped for safety reasons, which hides the setting parameters when locked and displays the setting parameters when a password is entered.

Analog Retransmission Output (Optional)

Output 1 → DC 4 to 20mA / DC 0 to 20mA
Measured value (PV),
Deviation (DEV),
Set value (SV)

The output 1 can be configured as an analog retransmission output. With this function, the measured value can be retransmitted as an analog current signal (4-20mA /0-20mA).

Digital Communications (Optional)



The SA100L offers an optional RS-485 communications interface for networking to computers. MODBUS or ANSI protocol can be selected. Up to 31 units, can be multi-dropped on one RS-485 communication line.

Specifications

Input

Input

a) Thermocouple : K,J,E,T,R,S,B,N(JIS/IEC),U,L(DIN)
PLⅡ(NBS),C(W5Re/W26Re)(JIS/IEC)
b) RTD : Pt100(JIS/IEC),JPt100(JIS)
c) DC voltage : 0 to 5V DC, 1 to 5V DC, 0 to 10V DC
d) DC current : 0 to 20mA DC, 4 to 20mA DC
•For DC current input, connect a 250 Ω resister to the input terminals.

Sampling Time

0.5 sec. 0.25sec (Selectable)

Input Digital Filter

1 to 100 sec (OFF when 0 is set.)

PV Bias

- span to +span (Within -1999 to 9999)

Performance

Measuring Accuracy

a) Thermocouple
±(1% of reading + 1 digit) or ±2°C (4°F) whichever is larger
•Accuracy is not guaranteed less than 399°C (0 and 799°F) for type R, S and B.
•Accuracy is not guaranteed less than -100.0°C (-158.0°F) for type T and U.
b) RTD
±(0.3% of reading + 1 digit) or ±0.8°C (1.6°F) whichever is larger
c) DC voltage and DC current
±(0.3% of span + 1 digit)

Outputs

Number of Outputs

2 points (Output 1 (OUT1), Output 2 (OUT2))

Output options

Output 1 (OUT1): Relay contact output or current output
Output 2 (OUT2): No output or relay contact output
*The output option is fixed at the time of order and cannot be changed after purchase.

Output type

Relay contact output (OUT1, OUT2)
a) Contact form: 1c contact
b) Contact capacity: AC 240 V 3 A (resistive load)
DC 30 V 1 A (resistive load)
c) Electrical life: 300,000 times or more (AC 240 V 2 A DC 30 V 1 A)
200,000 times or more (AC 240 V 3 A)

Current output (OUT1)
a) Output current: DC 0-20 mA, DC 4-20 mA
b) Output resolution: 10 bits or more
c) Allowable load resistance: 400Ω or less

Contact Input (Optional)

Number of Inputs

2 points

Input Rating

Non-voltage contact input. (OPEN : 500kΩ or more, CLOSE : 10Ω or less)

Analog Retransmission Output (Optional)

<Assigning transmission output to Output 1 (OUT1) is possible.>

Number of Outputs

1 point (Output 1)

Output types

Measured value (PV), Deviation (DEV), Limit set value (SV),
• Selectable

Output Signal

Current output (Output 1)
4 to 20mA DC, 0 to 20mA DC (Load resistance : Less than 400Ω)

Output scaling range

Measured and limit set values: Lower scale limit to upper scale limit
Deviation: ±Set span (however, within -1999 to +9999 digits)

Alarms (Up to 2 points) (Optional)

Alarm Type

Deviation High, Deviation Low, Deviation High-Low, Deviation Band
Process High, Process Low, Set value High, Set value Low

Setting Range

a) Deviation alarm : −span to +span (Within −1999 to 9999)
b) Process alarm : Same as set value (SV).
c) Set value alarm : Same as set value (SV).

Differential Gap

0(0.0) to span

Communications (Optional)

a) Communication method :Based on RS-485 (2-wire)
b) Communication speed : 2400, 4800, 9600, 19200, 38400, 57600 BPS
c) Protocol : ANSI X3.28(1976) 2.5 A4, MODBUS
d) Bit format
Start bit :1, Data bit :7 or 8 •For MODBUS 8 bit only
Parity bit :Without, Odd or Even, Stop bit :1 or 2
e) Maximum connection : 31 (Address can be set from 0 to 99.)

Waterproof/Dustproof (Optional)

Dustproof and waterproof protection : IP66
•Waterproof/dustproof protection only effective from the front in panel mounted installations.
•Waterproof/dustproof protection is not available when controllers are closely mounted.

General Specifications

Supply Voltage

a) 85 to 264V AC (Including supply voltage variation)
[Rating : 100 to 240V AC] (50/60Hz common)
b) 21.6 to 26.4V AC(Including supply voltage variation)
[Rating : 24V AC] (50/60Hz common)
c) 21.6 to 26.4V DC(Ripple rate 10% p-p or less)
[Rating : 24V DC]

Power Consumption

Less than 4VA (at 100V AC), 7VA (at 240V AC) for standard AC type
Less than 4VA for 24V AC type
Less than 100mA for 24V DC type

Power Failure Effect

A power failure of 20 ms or less will not affect the control action.
If power failure of more than 20 ms occurs, controller will restart.

Operating Environments : 0 to 50°C , 45 to 85% RH

Memory Backup : Backed up by non-volatile memory.
Number of writing : Approx. 100,000 times
Data retaining period : Approx. 10 years

Net Weight : Approx. 110g

Compliance with Standards

Safety standards

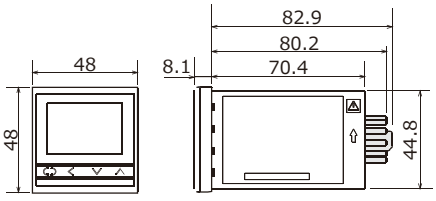
• UL: UL 61010-1
• cUL: CAN/CSA-C22.2 No.61010-1

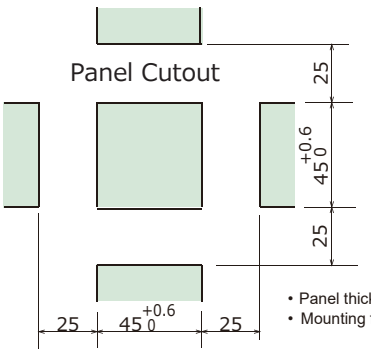
Other approved standards

• CE/UKCA marking: Electrical Safety: EN61010-1
EMC: EN61326-1
RoHS: EN IEC 63000
• RCM: EN55011
• FM: FM3545

External Dimensions

Unit : mm





• Panel thickness must be between 1-10mm.
• Mounting frame is optional.

Model and Suffix Code

Specifications	Model and Suffix Code
Model	Mounting on DIN Rail SA100 □ □ □ □ – □ □ – □ * □ □ – □ □ / □ □ / Y
Type	Limit Controller L
Input and Range	See Range and Input Code Table □ □ □
Output 1 (OUT 1) (Control, alarm or re-transmission output)	Relay contact output M 0-20mA output 7 4-20mA output 8
Output 2 (OUT 2) (Control or alarm output)	No output N Relay contact output M
Power supply voltage	24V AC/DC 3 100 to 240V AC 4
Alarm 1	No alarm N See Alarm Code Table □
Alarm 2	No alarm N See Alarm Code Table □
Communication Contact input	Not supplied N Digital communications : RS-485 (RKC standard) 5 Digital communications : RS-485 (MODBUS) 6 External contact input D
Waterproof/Dustproof	Not supplied N Waterproof/Dustproof protection 1
Output allocation code	See Output Allocation Code Table □ □
Instrument version	Version symbol Y

Range and Input Code Table

Thermocouple input (Field-programmable)

Input	Code	Range
K (JIS/IEC)	K 01	0 – 200℃
	K 02	0 – 400℃
	K 03	0 – 600℃
	K 04	0 – 800℃
	K 05	0 – 1000℃
	K 06	0 – 1200℃
	K 07	0 – 1372℃
	K 13	0 – 100℃
	K 14	0 – 300℃
	K 20	0 – 500℃
	K 17	0 – 450℃
	K 08	-199.9 – 300.0℃
	K 09	0.0 – 400.0℃
	K 10	0.0 – 800.0℃
	K 29	0.0 – 200.0℃
	K 37	0.0 – 600.0℃
	K 38	-199.9 – 800.0℃
	K A1	0 – 800℉
	K A2	0 – 1600℉
	K A3	0 – 2502℉
	K A9	20 – 70℉
	K A4	0.0 – 800.0℉
	K B2	-199.9 – 999.9℉
J (JIS/IEC)	J 01	0 – 200℃
	J 02	0 – 400℃
	J 03	0 – 600℃
	J 04	0 – 800℃
	J 05	0 – 1000℃
	J 06	0 – 1200℃
	J 10	0 – 450℃
	J 07	-199.9 – 300.0℃
	J 08	0.0 – 400.0℃
	J 09	0.0 – 800.0℃
	J 22	0.0 – 200.0℃
	J 23	0.0 – 600.0℃
	J 30	-199.9 – 600.0℃
	J A1	0 – 800℉
	J A2	0 – 1600℉
	J A3	0 – 2192℉
	J A6	0 – 400℉
	J B6	0.0 – 800.0℉
	J A9	-199.9 – 999.9℉
R[1] (JIS/IEC)	R 01	0 – 1600℃
	R 02	0 – 1769℃
	R 04	0 – 1350℃
	R A1	0 – 3200℉
	R A2	0 – 3216℉
S[1] (JIS/IEC)	S 01	0 – 1600℃
	S 02	0 – 1769℃
	S A1	0 – 3200℉
	S A2	0 – 3216℉
B[1] (JIS/IEC)	B 01	400 – 1800℃
	B 02	0 – 1820℃
	B A1	800 – 3200℉
	B A2	0 – 3308℉
E (JIS/IEC)	E 01	0 – 800℃
	E 02	0 – 1000℃
	E A1	0 – 1600℉
	E A2	0 – 1832℉
N (JIS/IEC)	N 01	0 – 1200℃
	N 02	0 – 1300℃
	N 06	0.0 – 800.0℃
	N A1	0 – 2300℉
	N A2	0 – 2372℉
	N A5	0.0 – 999.9℉
T[2] (JIS/IEC)	T 01	-199.9 – 400.0℃
	T 02	-199.9 – 100.0℃
	T 03	-100.0 – 200.0℃
	T 04	0.0 – 350.0℃
	T A1	-199.9 – 752.0℉
	T A2	-100.0 – 200.0℉
	T A3	-100.0 – 400.0℉
	T A4	0.0 – 450.0℉
	T A5	0.0 – 752.0℉
C [W5Re/W26Re] (ASTM)	W 01	0 – 2000℃
	W 02	0 – 2320℃
	W A1	0 – 4000℉
PLII (NBS)	A 01	0 – 1300℃
	A 02	0 – 1390℃
	A 03	0 – 1200℃
	A A1	0 – 2400℉
	A A2	0 – 2534℉
U[2] (DIN)	U 01	-199.9 – 600.0℃
	U 02	-199.9 – 100.0℃
	U 03	0.0 – 400.0℃
	U A1	-199.9 – 999.9℉
	U A2	-100.0 – 200.0℉
	U A3	0.0 – 999.9℉
L (DIN)	L 01	0 – 400℃
	L 02	0 – 800℃
	L A1	0 – 800℉
	L A2	0 – 1600℉

RTD input (Field-programmable)

Input	Code	Range
Pt100 (JIS/IEC)	D 01	-199.9 – 649.0℃
	D 02	-199.9 – 200.0℃
	D 03	-100.0 – 50.0℃
	D 04	-100.0 – 100.0℃
	D 05	-100.0 – 200.0℃
	D 06	0.0 – 50.0℃
	D 07	0.0 – 100.0℃
	D 08	0.0 – 200.0℃
	D 09	0.0 – 300.0℃
	D 10	0.0 – 500.0℃
	D A1	-199.9 – 999.9℉
	D A2	-199.9 – 400.0℉
	D A3	-199.9 – 200.0℉
	D A4	-100.0 – 100.0℉
	D A5	-100.0 – 300.0℉
	D A6	0.0 – 100.0℉
	D A7	0.0 – 200.0℉
	D A8	0.0 – 400.0℉
	D A9	0.0 – 500.0℉
JPt100 (JIS)	P 01	-199.9 – 649.0℃
	P 02	-199.9 – 200.0℃
	P 03	-100.0 – 50.0℃
	P 04	-100.0 – 100.0℃
	P 05	-100.0 – 200.0℃
	P 06	0.0 – 50.0℃
	P 07	0.0 – 100.0℃
	P 08	0.0 – 200.0℃
	P 09	0.0 – 300.0℃
	P 10	0.0 – 500.0℃

Voltage/Current DC input[3] (Field-programmable)

Input	Code	Range
0 to 5V	4 01	0.0 – 100.0%
0 to 10V	5 01	0.0 – 100.0%
1 to 5V	6 01	0.0 – 100.0%
0 to 20mA	7 01	0.0 – 100.0%
4 to 20mA	8 01	0.0 – 100.0%

[1] Type R,S and B input : Accuracy is not guaranteed less than 399°C (751°F).
[2] Type T and U input : Accuracy is not guaranteed less than -100.0°C (-148.0°F).
[3] DC current input : A 250 Ω resistor is externally connected at the input terminals.

Alarm Code Table

A	Deviation High	B	Deviation Low	C	Deviation High - Low	D	Deviation Band
E	Deviation High with Hold	F	Deviation Low with Hold	G	Deviation High - Low with Hold	H	Process High
J	Process Low	K	Process High with Hold	L	Process Low with Hold	V	Set value High
W	Set value Low						

Model and Suffix Code

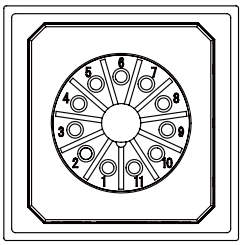
Output Allocation Code Table

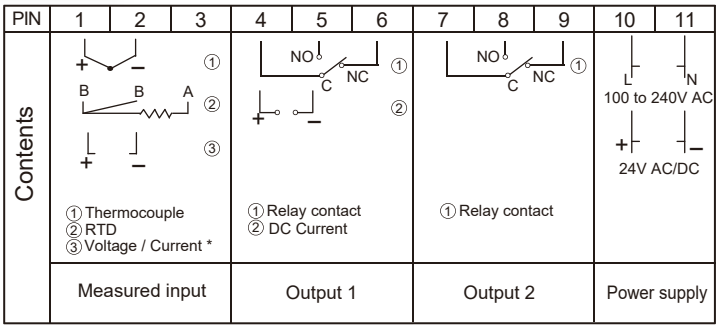
Code	Specifications	
	Output 1	Output 2
No code	Standerd*1	
0 2	Limit Control output (De-energized)	*AND* logic output of Alarm 1 and Alarm 2 (Energized)
0 3	Limit Control output (De-energized)	Alarm 1 output (Energized)
0 4	Limit Control output (De-energized)	*OR* logic output of Alarm 1 and Alarm 2 (De-energized)
0 5	Limit Control output (De-energized)	*AND* logic output of Alarm 1 and Alarm 2 (De-energized)
0 6	Limit Control output (De-energized)	Alarm 1 output (De-energized)
0 7	Limit Control output (De-energized)	No output
0 8	Limit Control output (Energized)	*OR* logic output of Alarm 1 and Alarm 2 (Energized)
0 9	Limit Control output (Energized)	*AND* logic output of Alarm 1 and Alarm 2 (Energized)
1 0	Limit Control output (Energized)	Alarm 1 output (Energized)
1 1	Limit Control output (Energized)	*OR* logic output of Alarm 1 and Alarm 2 (De-energized)
1 2	Limit Control output (Energized)	*AND* logic output of Alarm 1 and Alarm 2 (De-energized)
1 3	Limit Control output (Energized)	Alarm 1 output (De-energized)
1 4	Limit Control output (Energized)	No output
1 6	Retransmission output	Limit Control output (Energized)

*1 When Output 1 = M
Output 1: Limit output (non-energized)
Output 2: Alarm 1 / Alarm 2 *OR* output (energized).

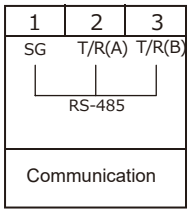
*1 When Output 1 = 7 or 8
Output 1: Retransmission output.
Output 2: Limit output (non-energized).

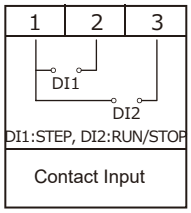
Rear Layout





*A 250Ω resistor is externally connected at the input terminals.

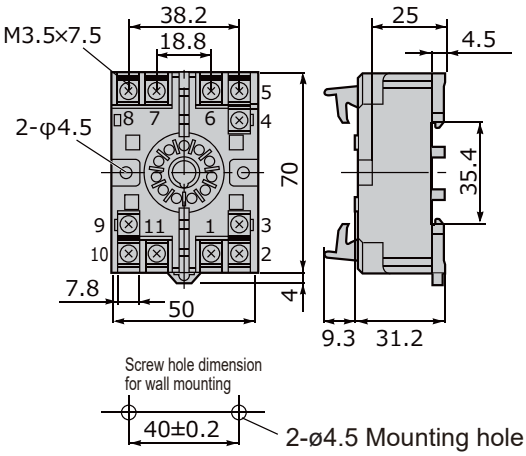




Communication function and contact input are optional.
Connect connector to bottom of instrument.
A connector and connector cable for connecting the input block is necessary to be prepared by the customer.
Housing: XHP-3 (J.S.T. Mfg. Co., Ltd. product)
Recommended cable size: AWG30 to 22

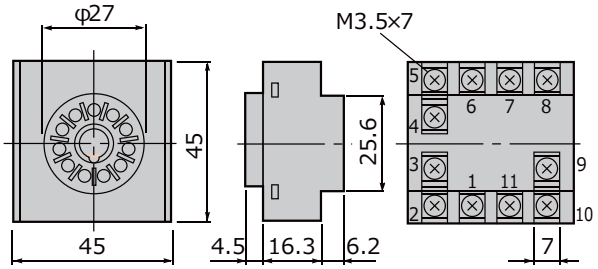
• Socket (Optional) External Dimensions

DIN rail mounting socket type
Model : TP411X(Fuji Electric product)



Screw hole dimension for wall mounting

Rear terminal socket type
Model : TP411SBA (Fuji Electric product)



Safety Warning

- Before operating this product, read the instruction manual carefully to avoid incorrect operation.
- This product is intended for use with industrial machines, test and measuring equipment. It is not designed for use with medical equipment.
- If it is possible that an accident may occur as a result of the failure of the product or some other abnormality, an appropriate independent protection device must be installed.
- When installing this product, avoid the following:
  Direct exposure to sunlight. Direct contact with water.
  Corrosive environments. Hazardous areas containing explosive or flammable gases.
  Vibration or shock.
  Areas subject to electrical noise caused by inductive interference, static electricity or magnetic fields.

Caution for counterfeit products

Please be cautious of purchasing counterfeit products.
Please understand that we shall not be liable for any damage and/or accident caused by the use of counterfeit products.

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