SA200

The SA200 is a new high performance temperature controller specifically designed for applications where panel space is critical yet maximum control performance is required!

- 1/32 DIN size with dual display
- Close vertical and horizontal mounting
- Digital communications with both MODBUS and RKC protocols
- Loop break alarm and temperature alarms
- Digital communications with both MODBUS and RKC protocols

Large, bright LCD displays

1/16 DIN

Actual size
1/32 DIN

Two controllers in the same space as the 1/16 DIN!

Panel cutout will be different from top of 1/16 DIN units

Designed for close vertical or horizontal mounting

The SA200 allows you to mount several units close together to make effective use of control board or panel space.

Digital communications MODBUS/ASII protocol (Optional)

The SA200 offers an optional RS-485 communications interface for networking to computers, PLCs and SCADA software. MODBUS or ASII protocol can be selected. Up to 32 units, including host computer, can be connected to a single communications port. Multi-point communication feature is selected, the external contact input is not selected.

Digital contact input for external switching (Optional)

An optional digital contact input is available for RUN/STOP and B/R/S/D switching. RUN/STOP switching can also be completed at the front key or via the RKC communications software. Contact input B/R/S/D is used when the communication feature is selected, the external contact input is not available.

Heat/cool control (Optional)

The heat/cool PID controller has heat and cool outputs for use when process generates heat exists. The controller allows the input of overlap or deadband settings which can contribute to energy savings.

Control loop break alarm and temperature alarms (Optional)

The control loop break alarm (LBA) monitors and protects an entire control loop including sensor, heater, and actuator. The temperature thermocouples or RTD failures, short circuits, or the failure of an operating device such as a mechanical or solid state relay.

The temperature alarms can be used to warn of when the temperature does not respond to a set time, the loop break alarm is activated. Conversely, when the PID value reaches 0% and the temperature does not respond accordingly, the loop break alarm is turned on.

In addition to the control loop break alarm, deviation (high, low, high/low), absolute (high, low), set value (high, low) and band alarms can be selected.

RKC self-tuning Advanced algorithm for optimum control

RKC self-tuning offers the most advanced algorithm for precise temperature control. Self-tuning is initiated at start-up and when process temperature is stable. Based on the step response, the PID parameters are calculated for the best control performance. With the unique RKC self-tuning, the controller evaluates whether PID parameters should be calculated or not based on the process. This allows for a fast self-tuning process. If it is determined that the existing PID parameters can achieve the best control for the process, the present PID parameters will be used. This allows for self-tuning to be completed in a short time and to be turned on/off in powerful cycling mode. Self-tuning is not available with heat/cool control.

In addition to self-tuning, the controller also has autotuning (AT) so that either function can be selected for optimum process control.

Waterproof and dustproof protection

The waterproof and dustproof feature protects the panel-mounted instrument in severe environments or wash-down conditions and conforms to IP66 (NEMA 4 equivalent) (Released soon).

Easy maintenance

The internal assembly of the SA200 can be removed from the front of a control board. It is easy to inspect, maintain or replace the instrument because it does not require access from the back of the panel.

SA200 Specifications

Inputs

Input	a) Thermocouple: K,J,E,T,R,S,B,N,PLII,W5Re/W26Re (JIS,ANSI,IEC,DIN)
	Input impedance: 1MΩ or more
	b) RTD: Pt100,JPt100 (JIS,JIS'89)
	c) DC voltage input: 0 to 5V DC, 1 to 5V DC, 0 to 10V DC
	Input impedance: 1MΩ or more (0 to 5V DC)
	*For DC current input, connect a 250 Ω resistor to the input terminals.
	*See Input and Range Code Table for details.
Sampling time	0.5 sec.
Influence of external resistance	Approx. 0.2μV/Ω (Thermocouple input)
Influence of lead resistance	Approx. 0.05%/Ω (Resistance bulb (RTD) input)
	*Maximum 150 Ω per wire.
Input break action	a) Thermocouple : Up-scale
	b) RTD : Up-scale
	c) DC voltage/current input : Down-scale
	*Input break action is turned off when control is in the RUN mode.
Input short action	Open input (Off)
PV bias	Open in output (Off)(-1999 to 2999)

Display

Display method	LCD display
	PV : Green
	SV : Orange
	Output : Orange
	AL1, AL2, AL3(R,S) : Orange

Performance

Measuring accuracy	a) Thermocouple : ±0.2% of reading ± 1digit or ±2 C (F) (Within either range, whichever is larger)
	*Accuracy is not guaranteed between 0 and 399 C (F) if using R or S type T. and U type.
	*Accuracy is not guaranteed less than -100 C (F) (-199.9 F) for type T and U.
	*Accuracy is not guaranteed less than 0 C (F) for type B.
	b) RTD : ±0.1% of reading ± 1digit or ±0.1 C (F) (Within either range, whichever is larger)
	c) Voltage, Current Input : ±0.2% of span ± 1digit
Insulation resistance	500M Ω (500 VDC between power terminals and ground)
	50M Ω (500 VDC between power terminals and ground)
Dielectric voltage	1000 AC for one minute between measured terminals and ground
	500 AC for one minute between power terminals and ground

Control

Control method	a) PID control (with autotuning and self-tuning function) *Adaptive for reverse and direct action. Quick, slow (standard), or medium response selectable. Control cycle time and On/Off action differential gap can be also selectable. 0.2% (Voltage, current input)
	b) Heat/cool PID control (with autotuning function) *An cooling and water cooling type can be selected.
Setting range	a) Set value (SV): Same as input range
	b) Proportional band (P): 0 to 999.9
	*0 to 9999 at C or F is selected in Input Code Table.
	c) Cool side proportional band (P): 0 to 999.9 (Heat/cool PID control only)
	d) Integral time (I) : 0 to 3600 sec. (PID action when I=0)
	e) Derivative time (D) : 0 to 3600 sec. (P= action when D=0)
	f) Control cycle time : 1 to 120 sec.
	1 to 100% of heat side proportional band (P)
	(Integral action is OFF when AR=0.0)
	g) Manual reset value (MR) : -5.0 to 105.0 sec. (Re-set setting for current output)
	h) Cool side proportional band : 1 to 100 sec. (Heat/cool PID control only)
	i) Deadband(Overlap) : -span to +span (Within +span is selected)
Number of outputs	Two outputs
Output type	a) Relay contact output : 250V AC 3A (resistive load), Form A contact
	*Electrical life : 300,000 cycles or more (rockers lead)
	b) Voltage (Current) output for driving SSR (SCR) : 12V DC (20mA)
	*Measurement tolerance and output tolerance are not tested.

Alarms (Optional)

Number of alarms	3 points
Alarm type	a) Deviation High alarm
	b) Deviation Low alarm
	c) Deviation High/Low alarm
	d) Deviation Band alarm
	e) Process High alarm
	f) Process Low alarm
	g) Set value High alarm
	h) Set value Low alarm
	i) Loop break alarm (LBA)
	*Hold action can be added to deviation and process type.
	*Interlock function can be added to each output in ON.
Setting range	a) Deviation alarm : -span to +span (Within -1999 to 9999)
	b) Process alarm : Same as set value (SV)
	c) Loop break alarm (LBA)
	*Hysteresis: 0.1% of span (Thermocouple, RTD input) 0.1% (Voltage, current input)
LBA deadband	0 to 7999 (Thermocouple input) 0.0 to 799.9 (Voltage, current input)

Contact input (Optional)

Number of inputs	2 points
Contact input type	Non-voltage contact input (Open: OFF, Close: ON)
	*Contact input for STOP function (OFF: RUN, CLOSE : STOP)
Input rating	Non-voltage contact input
	Open: 1MΩ or more
	Close: 100Ω or less

Communications (Optional)

Communication method	Two-wire half-duplex
	Half-duplex multi-drop connection
Protocol	a) ANSI X3.28/1976(1.5 or 2.5)
	*Fixed to 7 bits.
Synchronous method	Asynchronous
Communication speed	2400, 4800, 9600, 19200 BPS (Selectable)
Configuration	1 to 32 units
	*Maximum 31 units for MODBUS ASII only
Data length	a) Fixed to 7 bits : ASII
	b) Fixed to 8 bits : MODBUS
Stopmark connection	1bit (Address can be set from 0 to 99)

Dustproof and waterproof (Optional)

Dustproof and waterproof protection

Dustproof and waterproof protection are effective only from the front direction when installed on a panel. Waterproof protection and dustproof are not effective when controllers are closely installed.

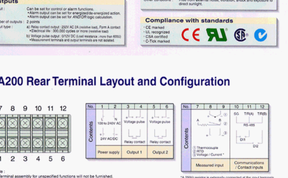
General specifications

Supply voltage	a) AC type : 85 to 264V AC (50/60Hz common) *including supply voltage variations (Within 100 to 240V AC)
	b) 24V AC type : 21 to 26.4V AC (50/60Hz common)
	*Supply voltage variations are included in the range.
	c) 24V DC type : 21 to 26.4V DC
	*Supply voltage variations are included in the range.
Power consumption	a) AC type : Maximum 10VA at 100V AC
	Maximum 15VA at 240V AC
	b) 24V AC type : Maximum 7VA
	c) 24V DC type : Maximum 100mA
Power failure	Effect on control : Less than one cycle time will affect the control output. If power failure is more than 20 ms, sources, controller will restart.
Memory backup	Backup method : Non-volatile memory
	Data rewriting period : Approx. 10 years
Ambient temperature	0 to 50 C (32 to 122 F)
Ambient humidity	20 to 90%RH
Weight	Approx. 110g
External dimensions	W48 X D48 X H 100(25mm) (1/32 DIN)
Operating environment	Free from corrosive and flammable gas and dust.
Other conditions	Free from external noise, vibration, shock and exposure to direct sunlight.
	*Operating altitude 2000 meters or less.

Compliance with standards

CE marked	CE
UL recognized	UL
CSA certified	CSA
C-Tick marked	C-Tick

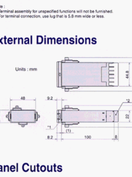
SA200 Rear Terminal Layout and Configuration



Note
*Terminal assembly for unspecified functions will not be furnished.
*For terminal connection, use lug-free to 5.8 mm wide or less.

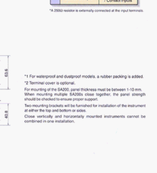
*1 Relay contact output
*2 Voltage (current) output for driving SSR (SCR)

External Dimensions



*1 For waterproof and dustproof models, a rubber packing is added.
*2 Terminal cover is optional.
For mounting of the SA200, panel thickness must be between 1~10 mm.
When mounting multiple SA200s close together, the panel strength should be enough to withstand the mounting force.
Allow sufficient space behind the panel for installation of the instrument or either the lug clearance or cable.
Close vertically and horizontally mounted instruments cannot be combined in one installation.

Panel Cutouts



Warning

If the SA200s have waterproof/dustproof options, protection may be compromised by close mounting. Close vertical mounting is not available when a shunt resistor for current input is used. When multiple instruments are vertically closely mounted, connecting two or more solderless terminal lugs to one terminal is not possible.

SA200 Model and Suffix Code

Model and Suffix Code																	
Basic	AR-K 200 0-0-0 (100-240V AC)																
	AR-K 200 0-0-0 (24V AC/DC type)																
Control method	PID control with AT (direct action)																
	Heat/cool PID control with AT (air cooling)																
Input and Range Code	See Input and Range Code Table																
Output 1 (Control or alarm output)	Voltage (current) output for driving external SSR (SCR)																
Output 2 (Control or alarm output)	No output																
	Relay contact output																
Power supply voltage	100 to 240V AC																
	100 to 240V AC																
Alarm 1	See Alarm Code Table																
Alarm 2	See Alarm Code Table																
Communication (Contact input)	Not supplied																
	Digital communications : RS-485 (RKC standard)																
	Digital communications : RS-485 (MODBUS)																
	External contact input																
Waterproof and dustproof	Not supplied																
	Waterproof and dustproof (Released soon)																
Body color	Black																
	Gray																
Output allocation code	Standard output *1																
Output allocation code	Output allocation Code Table																
Special specification	Special specification																

*1 Standard output is the standard method output and standard output is selected. Out 1 will always be the control output and Out 2 will either be unused, Alarm 1 or Alarm 2 depending on the model code.
*Either AR or A is the chosen control method code, standard output is automatically selected. Out 1 will become heat side control output and Out 2 will be cool side control output.

Input and Range Code Table

Thermocouple input

Thermocouple input							
Input	Code	Range		Input	Code	Range	
K	0	0 to 400		B	0	0 to 1800	
	1	0 to 800		(JIS'89)	1	0 to 1700	
	2	0 to 1000			2	0 to 1600	
	3	0 to 1200			3	400 to 1800	
	4	0 to 1372			4	400 to 1700	
	5	0 to 1600			5	400 to 1600	
	6	0 to 1800			6	0 to 1820	
	7	0 to 400		N	7	0 to 400	
	8	0 to 800		(JIS'89)	8	0 to 800	
	9	0 to 1000			9	0 to 1000	
	A	0 to 1200			A	0 to 1200	
	B	0 to 1372			B	0 to 1300	
	C	0 to 1600			C	0 to 1372	
	D	0 to 1800			D	0 to 1600	
	E	0 to 400			E	0 to 1800	
	F	0 to 800			F	0 to 400	
	G	0 to 1000			G	0 to 800	
	H	0 to 1200			H	0 to 1000	
	I	0 to 1372			I	0 to 1200	
	J	0 to 1600			J	0 to 1300	
	K	0 to 1800			K	0 to 1372	
J	L	0 to 400			L	0 to 1600	
(JIS'88)	M	0 to 800			M	0 to 1800	
	N	0 to 1000			N	0 to 400	
	O	0 to 1200			O	0 to 800	
	P	0 to 1372			P	0 to 1000	
	Q	0 to 1600			Q	0 to 1200	
	R	0 to 1800			R	0 to 1300	
	S	0 to 400			S	0 to 1372	
	T	0 to 800			T	0 to 1600	
	U	0 to 1000			U	0 to 1800	
	V	0 to 1200			V	0 to 400	
	W	0 to 1300			W	0 to 800	
	X	0 to 1372			X	0 to 1000	
	Y	0 to 1600			Y	0 to 1200	
	Z	0 to 1800			Z	0 to 1300	
R	a	0 to 400		WRe5-26	a	0 to 400	
(JIS'89)	b	0 to 800		(ASTM'E988)	b	0 to 800	
	c	0 to 1000			c	0 to 1000	
	d	0 to 1200			d	0 to 1200	
	e	0 to 1300			e	0 to 1300	
	f	0 to 1372			f	0 to 1372	
	g	0 to 1600			g	0 to 1600	
	h	0 to 1800			h	0 to 1800	
	i	0 to 400		PLII	i	0 to 400	
	j	0 to 800		(Baldi)	j	0 to 800	
	k	0 to 1000			k	0 to 1000	
	l	0 to 1200			l	0 to 1200	
	m	0 to 1300			m	0 to 1300	
	n	0 to 1372			n	0 to 1372	
	o	0 to 1600			o	0 to 1600	
	p	0 to 1800			p	0 to 1800	

*1 Accuracy is not guaranteed between 0 and 399 C (F) and 799 F) for type R, S and B.

RTD input

RTD input			
Input	Code	Range	
Pt100 (JIS'89)	0	-199.9 to 850.0	
	1	-199.9 to 500.0	
	2	-199.9 to 300.0	
	3	-199.9 to 200.0	
	4	-199.9 to 100.0	
	5	-199.9 to 50.0	
	6	-199.9 to 20.0	
	7	-199.9 to 10.0	
	8	-199.9 to 0.0	
	9	-199.9 to 20.0	
	A	-199.9 to 50.0	
	B	-199.9 to 100.0	
	C	-199.9 to 200.0	
	D	-199.9 to 300.0	
	E	-199.9 to 500.0	
	F	-199.9 to 850.0	
JPt100 (JIS'89)	a	-199.9 to 850.0	
	b	-199.9 to 500.0	
	c	-199.9 to 300.0	
	d	-199.9 to 200.0	
	e	-199.9 to 100.0	
	f	-199.9 to 50.0	
	g	-199.9 to 20.0	
	h	-199.9 to 10.0	
	i	-199.9 to 0.0	
	j	-199.9 to 20.0	
	k	-199.9 to 50.0	
	l	-199.9 to 100.0	
	m	-199.9 to 200.0	
	n	-199.9 to 300.0	
	o	-199.9 to 500.0	
	p	-199.9 to 850.0	

Voltage/Current DC input

Voltage/Current DC input		
Input	Code	Range
0 to 5V	1	0.0 to 100.0%
1 to 5V	2	0.0 to 100.0%
0 to 10V	3	0.0 to 100.0%
0 to 20mA	4	0.0 to 100.0%
4 to 20mA	5	0.0 to 100.0%

Note : For DC current input, connect a 250 Ω resistor to the input terminals.

SA200 Alarm Code Table

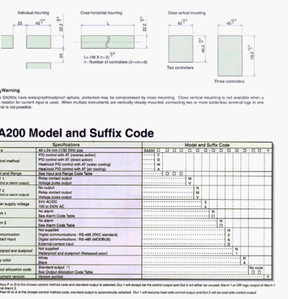
A	Deviation High	B	Deviation Low
C	Deviation High/Low	D	Deviation Band with hold
E	Process Low	F	Process High with hold
G	Set value Low	H	Set value High

J	Deviation High - Low	K	Deviation Band - Low
L	Deviation High/Low with hold	M	Deviation Band with hold
N	Process Low with hold	O	Loop break alarm *1

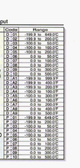
*1 Loop break alarm is not available with Heat/cool PID control type.

Output Allocation Code Table

Code	Specifications					
	Control methods		Control output		Alarm output	
0-0	PID control + Alarm *1		Control output		Alarm 1 output (Energized)	
0-1	PID control + Alarm *1		Control output		Alarm 1 output (De-energized)	
0-2	PID control + Alarm *1		Control output		Off-type output of Alarm 1 and Alarm 2 (De-energized)	
0-3	PID control + Alarm *1		Control output		Alarm 1 output of Alarm 1 and Alarm 2 (De-energized)	
0-4	PID control + Alarm *1	Control output + Alarm 1 *2			Alarm 2 output (Energized)	
0-5	PID control + Alarm *1		Control output		Alarm 2 output (De-energized)	
0-6	PID control + Alarm *1		Control output		Alarm 1 output (Energized)	
0-7	PID control + Alarm *1		Control output		Alarm 1 output (De-energized)	
0-8	Alarm 1 + Alarm 2		Alarm 1 output (Energized)		Alarm 2 output (Energized)	
0-9	Alarm 1 + Alarm 2		Alarm 1 output (De-energized)		Alarm 2 output (De-energized)	



Note: Relay contact output : 250V AC 3A (resistive load), Form A contact



Accessory

Name	Model code
Shunt resistor for DC current input	AD150-8
Vertical cover	PA4200-03