CONTROLLER

HA900
HA400

High-Speed

1 or 2 control loops
Digital Controller

CE,UL,CSA pending

RKC INSTRUMENT INC.

Ultra High Speed Temperature Control

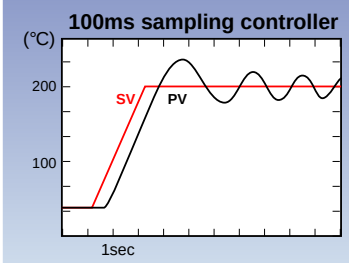
Sampling 0.025 sec

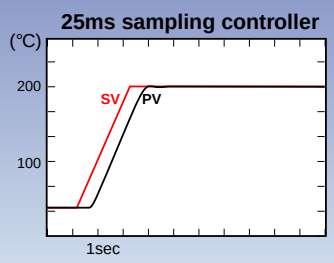
High-Speed Response

High-speed feedback control of 40 samples per second

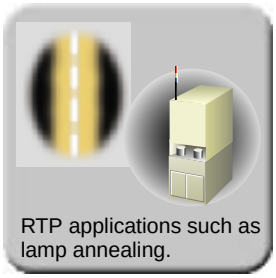
HA Series is a digital controller which provides a high speed sampling cycle time of 25ms (0.025 sec). Supplied with high resolution input and parameters settable in 1/100 sec, the HA Series is ideal for process applications with fast response requirements. These include RTP (Rapid Thermal Process) applications in semiconductor manufacturing, pressure, and flow rate.

HA400/900





Controller : HA900
Thyristor unit : THV series



RTP applications such as lamp annealing.

- Autotuning function

The Autotuning used on HA400/900 is suitable for a control system with a fast response. PID values can also be manually adjusted so that they may be further optimized for the processes.
Just for your information, this Autotuning is performs well for control systems in which temperature rises up to the set point in 30 seconds or faster. If the application is slower (e.g. 5 minutes to reach the set point), HA401/901 are recommended.

Multi-Function >>

High input resolution of 200,000 counts or more (approximately 18 bits), assures stable process control with high speed sampling and good response.
A maximum of two-channel control is available. The control mode is selectable from 1 loop, 2 loops, or cascade mode (available soon). All modes operate at 25msec sampling cycle time.

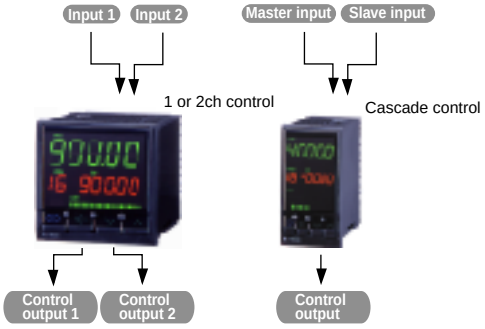
A multi-memory area function which accepts up to 16 sets of parameters is supplied as standard.
An easy-to-use ramp/soak controller can be set up by setting SV changing rate limiter and soak time.

Other features include a power feed forward function (PFF) that monitors supply voltage variation to compensate for control output, up to two communication ports that are also used for open network (DeviceNet, Profibus, PLC communication, available soon), and output logic function to build simple sequences between devices.

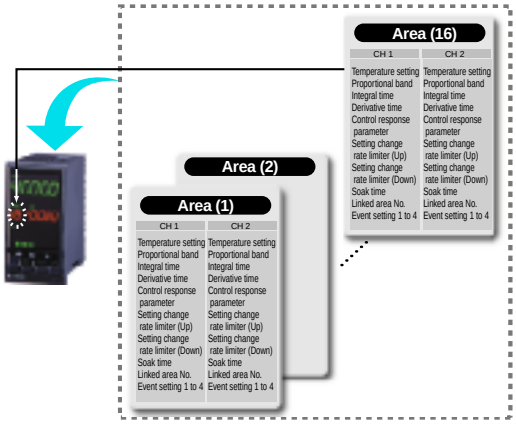
For various processes >>

Continuous voltage and current inputs are available for various process control applications such as pressure, flow rate, levels, in addition to temperature controls.

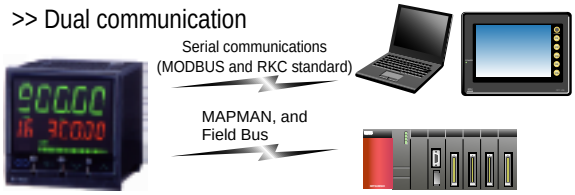
>> Various control modes



>> 16 sets of multi-memory area



>> Dual communication



Specifications

Input

Number of inputs	2 points (IN1 to IN2) • Isolated between each channel • 2nd input (IN2) can be used as a remote input • Cascade connection available
Input	• Universal input a) Low voltage input group Thermocouple : K, J, E, T, R, S, B, N (JIS/IEC) PLII (NBS), W5Re/W26Re (ASTM) RTD : Pt100 (JIS/IEC), JPt100 (JIS) Low voltage : 0 to 1V DC, 0 to 100mV DC, 0 to 10mV DC Current : 4 to 20mA DC, 0 to 20mA DC b) High voltage group High voltage : 0 to 5V DC, 1 to 5V DC, 0 to 10V DC
Sampling time	0.025 sec.
Input digital filter	0.01 to 10.00 sec. (OFF when 0 is set.)
PV bias	-span to +span
PV ratio	0.500 to 1.500

Non-isolated remote setpoint input (Optional)

Input	a) 0 to 1V DC, 0 to 100mV DC, 0 to 10mV DC b) 0 to 5V DC, 1 to 5V DC, 0 to 10V DC c) 4 to 20mA DC, 0 to 20mA DC • Not available when a 2-loop type is selected.
Accuracy	0.1% of span

Control

Control method	Brilliant PID control (with autotuning) • Direct action/Reverse action, Position proportioning action (released soon) selectable
Setting range	a) Proportional band : Temperature input, 0 to input span(℃,℉) Voltage • Current input, 0.0 to 1000.0% of input span b) Integral time : 0.00 to 360.00 sec or 0.0 to 3600.0 sec (selectable) c) Derivative time : 0.00 to 360.00 sec or 0.0 to 3600.0 sec (selectable) d) Control response : Slow, Medium, Fast e) Output limiter : -5.0 to +105.0% (High/Low individual setting) f) Output change rate limiter : 0.0 to 100.0% /sec (Up/down individual setting) d) Proportional cycle : 0.1 to 100.0 sec e) Memory area : 16 sets Setting items 1) Set value (SV), 2) Event 1 to 4, 3) Proportional band, 4) Integral time 5) Derivative time 6) Control response 7) Setting change rate limiter (High/Low) 8) Soak time : 0 min 0.00 sec to 9 min 59.99 sec or 0 hr 0 min 00 sec to 9 hr 59 min 59 sec (selectable) 9) Linking area number : OFF, 1 to 16

Output

Main output	a) Number of output : Up to 3 points (OUT1 to OUT3) b) Output function OUT1, 2 : Control output OUT3 : Event output or analog retransmission output (Option) c) Output type 1) Relay contact output, Form a contact, 250V AC 3A (resistive load) 2) Voltage pulse output DC 0/12V (Load resistance : more than 600Ω) 3) Current output 4 to 20mA DC, 0 to 20mA DC (Load resistance : less than 600Ω) 4) Continuous voltage output 0 to 5V DC, 1 to 5V DC, 0 to 10V DC (Load resistance : more than 1kΩ) 5) SSR (Triac) output, (Rated current : 0.4A) • Please specify 1) to 5) at the time of ordering
Sub output (Option)	a) Number of output : Up to 2 points (OUT4 to OUT5) b) Output function : Event output (Option) c) Output type : Relay contact output, Form a contact, 250V AC 1A (resistive load)

Event input

Number of inputs	Up to 7 points
Input rating	Non-voltage contact input
Functions	a) Memory area selection b) Run/Stop switching c) Remote/Local switching d) Auto/Manual switching

Analog retransmission output (Optional)

Number of outputs	Up to 3 points • Functions are assignable to OUT1 to OUT3.
Output function	Measured value (PV)/Setting value (SV)/Manipulated value (MV) Deviation value (DEV)

Event (Alarm) output (Optional)

Number of event outputs	Up to 4 points (Event 1 to 4)
Event types	Deviation high, Deviation low, Deviation high/low, Band, Process high, Process low, Set value high, Set value low, LBA • LBA is assignable to event outputs 3 and 4.
Output	Assignable to main output (OUT3) or aux.output (OUT4 to 5).
Other functions	a) HOLD action (Valid for deviation/band/PV alarms only) b) Selection of event action for input abnormality.

Heater break alarm : HBA (Optional) (Available soon)

Number of alarm	2 points
CT type	CTL-6-P-N, CTL-12-S56-10L-N (Specify when ordering)
Display accuracy	±5% of input value or ±2A (whichever is larger)
Output	Assignable to main output (OUT3) or aux.outputs (OUT4 to 5).

Communications (Optional)

Number of communication	Max. 2 communication ports.
Communication method	Based on RS-485/RS-485/RS-232C • Please specify at the time of ordering.
Protocol	a) ANSI X3.28 sub-category 2.5 A4 (RKC standard) b) MODBUS • Selectable
Maximum connection	31 units

• Open network (DeviceNet/Profibus) coming soon.

Other functions

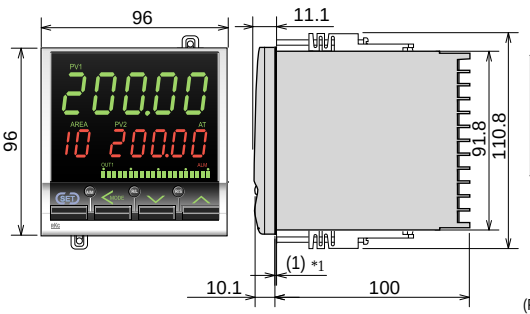
Feed back resistance input (Optional)	Standard : 135Ω
Power feed forward input (Optional)	Exclusive power feed transformer is required. (Available soon)
Waterproof/Dustproof (Optional)	IP65 • Waterproof/Dustproof protection only effective from the front panel mounted installation.

General Specifications

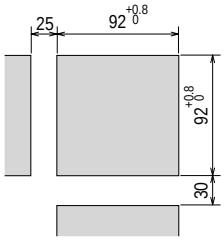
Supply voltage	a) 90 to 264V AC [Rating: 100-240V AC] (50/60Hz) b) 24V AC±10% [including supply voltage variation] (50/60Hz) c) 24V DC±10% [including supply voltage variation]
Power consumption	a) 100-240V AC type HA900: 19VA (240V), 13VA (100V) HA400: 17VA (240V), 12VA (100V) b) 24V DC/AC types HA900: 12VA (24V AC), 300mA (24V DC) HA400: 11VA (24V AC), 270mA (24V DC)
Ambient temperature	-10 to 50℃ (14 to 122℉)
Ambient humidity	20 to 85%RH (No dew condensation)
Weight	HA900 : 460g HA400 : 360g

External Dimensions (Unit:mm)

HA900

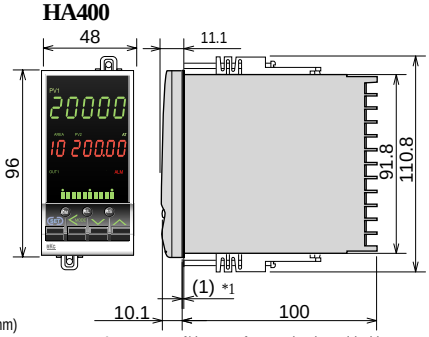


*1 IP65 waterproof/dustproof protection is molded into case and can not be added in the field.



< Panel cutout >
(Panel thickness must be between 1 to 10mm)

HA400



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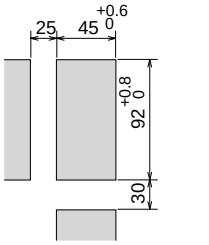

< Panel cutout >
(Panel thickness must be between 1 to 10mm)

● Model and Suffix Code

● 1 channel control type

Specifications	Suffix Code (96 X 96mm 1/4 DIN size) **HA900** / (48 X 96mm 1/8 DIN size) **HA400** -□ □-□ □-□*□ □-□ □ □ □-□/□/□
Input (IN1 : No1 input)	See input code table □
Non isolated type remote set value	Not supplied 0
	See Remote input code table □
Output 1 (Main output)	See output code table □
Output 2 (Main output) * Not isolated from OUT1.	No output from OUT2 N
	See output code table □
Power supply	24V AC/DC 3
	100 to 240V AC 4
Output 3 (Main output)	No output from OUT3 N
	See output code table □
Output 4, 5 (OUT4, 5: Sub output)	No outputs from OUT4 and OUT5 N
	Output 4 : Relay contact output, No output from OUT5 1
	Output 4 and 5 : Relay contact output 2
Event input 1 to 5	Not supplied N
	Event input : 5 points (DI1 to DI5) 1
CT input, Power feed forward (PFF) input, Feedback transformer	Not supplied N
	CT input 1 point (CTL-6-P-N) P
	CT input 1 point (CTL-12-S56-10L-N) S
	CT input 2 points (CTL-6-P-N) T
	CT input 2 points (CTL-12-S56-10L-N) U
	PFF input (With transformer 100 to 120V AC type) 1
	PFF input (With transformer 200 to 240V AC type) 2
	CT 1 point (CTL-6-P-N) + PFF input (With transformer 100 to 120V AC type) 3
	CT 1 point (CTL-6-P-N) + PFF input (With transformer 200 to 240V AC type) 4
	CT 1 point (CTL-12-S56-10L-N) + PFF input (With transformer 100 to 120V AC type) 5
	CT 1 point (CTL-12-S56-10L-N) + PFF input (With transformer 200 to 240V AC type) 6
	Feedback resistance input F
Communication 1 or Event input 6 to 7	Not supplied N
	RS-232C (ANSI/RKC standard) 1
	RS-485 (ANSI/RKC standard) 5
	RS-485 (MODBUS) 6
	RS-232C (MODBUS) 8
	Event input : DI6 and DI7 supplied D
Communication 2	Not supplied N
	RS-232C (ANSI/RKC standard) 1
	RS-422A (ANSI/RKC standard) 4
	RS-485 (ANSI/RKC standard) 5
	RS-485 (MODBUS) 6
	RS-422A (MODBUS) 7
	RS-232C (MODBUS) 8
	DeviceNet A
	PROFIBUS B
Waterproof/Dustproof	Not supplied N
	Waterproof/Dustproof protection 1
Body color	White N
	Black A
Instrument version	Version symbol Y

● 2 channel control type

Specifications	Suffix Code (96 X 96mm 1/4 DIN size) **HA900** / (48 X 96mm 1/8 DIN size) **HA400** -□ □-□ □-□*□ □-□ □ □ □-□/□/□
Input 1 (IN1 : No1 input)	See Input code table □
Input 2 (IN2 : No2 input)	See Remote input code table □
Output 1 (Main output)	See output code table □
Output 2 (Main output) * Not isolated from OUT1.	No output from OUT2 N
	See output code table □
Power supply	24V AC/DC 3
	100 to 240V AC 4
Output 3 (Main output)	No output from OUT3 N
	See output code table □
Output 4, 5 (OUT4, 5 : Sub output)	No outputs from OUT4 and OUT5 N
	Output 4 : Relay contact output, No output from OUT5 1
	Output 4 and 5 : Relay contact output 2
Event input 1 to 5	Not supplied N
	Event input : 5 points (DI1 to DI5) 1
CT input, Power feed forward (PFF) input, Feedback transformer	Not supplied N
	CT input 1 point (CTL-6-P-N) P
	CT input 1 point (CTL-12-S56-10L-N) S
	CT input 2 points (CTL-6-P-N) T
	CT input 2 points (CTL-12-S56-10L-N) U
	PFF input (With transformer 100 to 120V AC type) 1
	PFF input (With transformer 200 to 240V AC type) 2
	CT 1 point (CTL-6-P-N) + PFF input (With transformer 100 to 120V AC type) 3
	CT 1 point (CTL-6-P-N) + PFF input (With transformer 200 to 240V AC type) 4
	CT 1 point (CTL-12-S56-10L-N) + PFF input (With transformer 100 to 120V AC type) 5
	CT 1 point (CTL-12-S56-10L-N) + PFF input (With transformer 200 to 240V AC type) 6
	Feedback resistance input F
Communication 1 or Event input 6 to 7	Not supplied N
	RS-232C (ANSI/RKC standard) 1
	RS-485 (ANSI/RKC standard) 5
	RS-485 (MODBUS) 6
	RS-232C (MODBUS) 8
	Event input : DI6 and DI7 supplied D
Communication 2	Not supplied N
	RS-232C (ANSI/RKC standard) 1
	RS-422A (ANSI/RKC standard) 4
	RS-485 (ANSI/RKC standard) 5
	RS-485 (MODBUS) 6
	RS-422A (MODBUS) 7
	RS-232C (MODBUS) 8
	DeviceNet A
	PROFIBUS B
Waterproof/Dustproof	Not supplied N
	Waterproof/Dustproof protection 1
Body color	White N
	Black A
Instrument version	Version symbol Y

<Remarks>
- Only OUT 1 and OUT 2 can be used for control outputs.
- Event (alarm) outputs, heater break alarm outputs are assignable to OUT3-OUT5.
- Analog output (PV, SV, etc) are assignable to OUT1-OUT3.

<Caution>
- If two isolated analog outputs are required, use OUT1 (or OUT2) and OUT3. OUT1 and OUT2 are not isolated.
- To use as a position proportioning controller (available soon), two or more outputs must be supplied.
- If heater break alarm is assigned to event function, current transformer (CT is sold separately) are required.

● Input Code Table

Input type		Range	Code	Measuring accuracy	Resolution
Low voltage group (Thermocouple, RTD, voltage, current)	K	-200 to 1372℃, -328 to 2501℉	K	* Less than -100℃ (-148℉): ±1.0℃ (±1.8℉) -100 to 500℃ (-148 to 932℉): ±0.5℃ (±0.9℉) More than 500℃ (932℉): ±(0.1% of Reading+1digit)	1℃, 0.1℃ 1℉, 0.1℉ (Selectable)
	J	-200 to 1200℃, -328 to 2192℉	J		
	T	-200 to 400℃, -328 to 752℉	T		
	E	-200 to 1000℃, -328 to 1832℉	E		
	PLII	0 to 1390℃, 32 to 2534℉	A		
	N	0 to 1300℃, 32 to 2372℉	N	* -50 to 1000℃ (-58 to 1832 ℉): ±1.0℃ (±1.8℉) More than 1000℃ (1832 ℉): ±(0.1% of Reading+1digit)	
	S	-50 to 1768℃, -58 to 3214℉	S		
	R	-50 to 1768℃, -58 to 3214℉	R		
	W5Re/W26Re	0 to 2300℃, 32 to 4172℉	W		
	B	0 to 1800℃, 32 to 3272℉	B	Less than 400℃ (752℉): ±70.0℃ (±126℉) * 400 to 1000℃ (752 to 1832℉): ±1.0℃ (±1.8℉) More than 1000℃ (1832 ℉): ±(0.1% of Reading+1digit)	
	Pt100 (3 wire)	-200 to 850℃, -328 to 1562℉	D	Less than 200℃ (±392℉) : ±0.2℃ (±0.4℉) More than 200℃ (±392℉) : ±(0.1% of Reading+1digit)	1℃, 0.1℃,0.01℃, 1℉, 0.1℉,0.01℉, (Selectable)
	JPt100 (3 wire)	-200 to 600℃, -328 to 1112℉			
	Pt100 (4 wire)	-200 to 850℃, -328 to 1562℉	C		
	Pt100 (4 wire)	-200 to 600℃, -328 to 1112℉			
	0 to 10mV DC	-20000 to 20000 (Programmable)	3	±(0.1% of Span)	1, 0.1, 0.01, 0.001, 0.0001 (Programmable)
	0 to 100mV DC				
	0 to 1V DC				
	0 to 20mA DC		8		
	4 to 20mA DC				
High voltage group	0 to 5V DC	-20000 to 20000 (Programmable)	6		
	0 to 10V DC				
	1 to 5V DC				

* Cold junction temperature compensation error : ±1.0℃(±1.8℉) [at 23℃±2℃(73.4℉±3.6℉],
Within ±1.5℃(±2.7℉) [Between 0 and 50℃(14 to 122℉)]

**4-wire RTD input type is available only on a single loop type.

● Remote Signal Code Table

(* Not isolated from the No.1 input [IN1])

Input type		Code
Low voltage group	0 to 10mV DC	G
	0 to 100mV DC	
	0 to 1V DC	
High voltage group	0 to 5V DC	V
	0 to 10V DC	
	1 to 5V DC	
Current group	0 to 20mA DC	Y
	4 to 20mA DC	

● Output Code Table

Output Type	Code
Relay contact output	M
Voltage pulse output DC0/12V	V
Continuous voltage output DC 0 to 5V	4
Continuous voltage output DC 0 to 10V	5
Continuous voltage output DC 1 to 5V	6
Current output DC 0 to 20mA	7
Current output DC 4 to 20mA	8
SSR (Triac) output	T

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.
  - An ambient temperature lower than 0℃ or higher than 50℃
  - Areas subject to high humidity. Ambient humidity should not be lower than 45% or higher than 85%RH
  - 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.

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