



## HA400 HA900 HA401 HA901



### General Description

The HA series are digital PID controllers with a high speed sampling time of 25 ms (0.025 sec) with high-resolution thermocouple, RTD or current voltage input, supplied with parameters settable in 1/100 sec.

A difference between HA400/900 and HA401/901 is in the autotuning. If the process is less than 30 seconds to setpoint, the HA400/900 is best suited with factory default values pre-set for fast process.

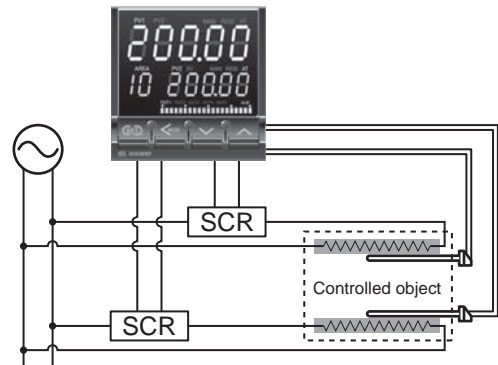
Applications in RTP (Rapid Thermal Process), RTA (Rapid Thermal Anneal) and temperature control of semiconductor manufacturing can be controlled by the HA series. The high speed sampling function also makes it suitable for other applications requiring fast control such as pressure or flow rate.

### Features

- ☆ Ultra High Speed Sampling 0.025 sec
- ☆ Two Channels in One Controller
- ☆ Ramp / Soak Program Control
- ☆ Cascade Control
- ☆ Power Feed Forward Function
- ☆ Communications

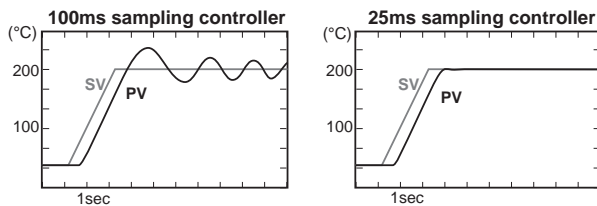
#### Two Channels in One Controller

Dual loop control can be performed with a single controller. All loops operate at 0.025ms sampling time.



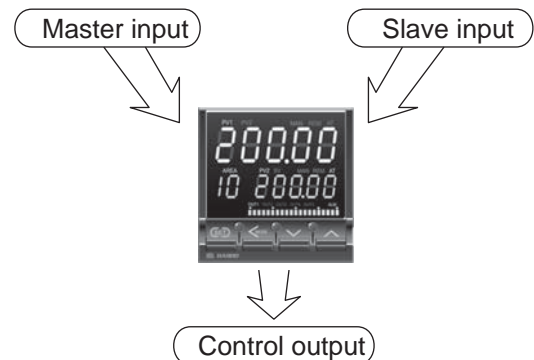
#### Ultra High Speed Sampling 0.025 sec

The HA series digital controller supplies feedback control 40 times in one second. It makes the HA series suitable for any application requiring fast control response and high accuracy. The PID parameters can be set in 1/100 unit which supports extremely fast and accurate control by the HA series.



#### Cascade Control in One Controller

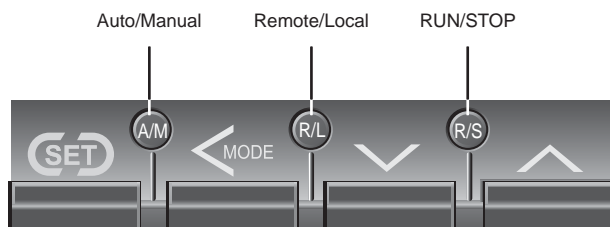
Cascade control can be performed with a single controller. Input type can be specified independently for each channel.



#### Direct Function keys

Direct function keys are marked for Auto/Manual, Remote /Local, and Run/Stop switching to eliminate error when entering changing patterns.

Used and Unused of each function key is also possible.

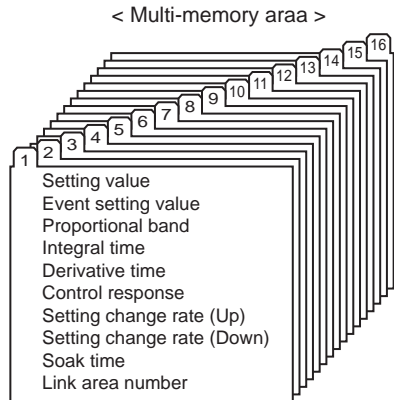


## Features

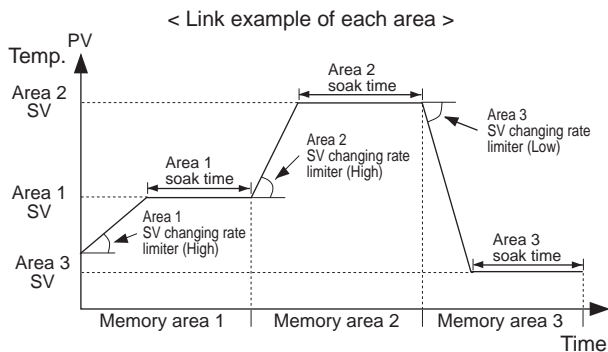
### Ramp / Soak Program Control

The HA Series high speed temperature controller has Multi-memory Area function which stores up to 16 sets of control parameters.

Parameters stored in each memory area are the control set value, event set value, PID values, control response, ramp-to-setpoint UP and DOWN, soak time, and link area number.

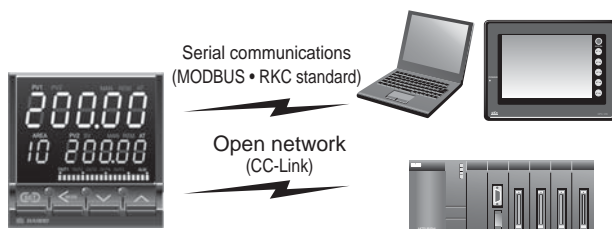


Up to 32-segment ramp/soak control is available by using the memory area function (ramp-to-set point UP and DOWN, soak time, link area number).



### Communications (Optional)

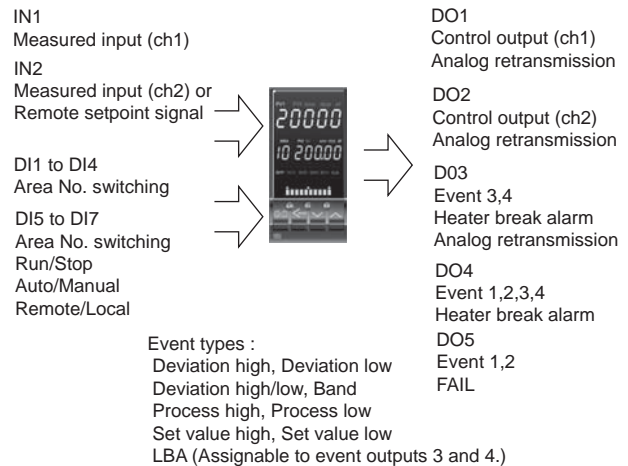
The HA Series incorporates a maximum of two communication ports. The communication method can be selected from serial communication (RS-485, RS-422A, RS-232C) and Open network (DeviceNet, Profibus, CC-Link).



### Numerous Inputs and Outputs

A maximum of two measuring inputs (one input can be used as a remote setpoint signal) and seven event inputs can be specified. A maximum of five outputs can be specified, and various output functions (control output, analog retransmission, event up to 4) can be allocated in output logic operation.

• Available inputs and outputs depend on the specifications.



- Sensor power supply output is also available.
  - 24V DC  $\pm$  5% (Max. 20mA)
  - Output from OUT3.
  - When sensor power supply output is specified, OUT4 and OUT5 can not be added.

### Suitable for Various Process Control

Using industry standard DC inputs (current and voltage), the HA Series can be used in process control applications including pressure, flow rate and levels.

### Autotuning

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.



## 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, R, S, B, E, T, N (JIS/IEC) PLII (NBS), W5Re/W26Re (ASTM)
      - Influence of external resistance : Approx. 0.25 $\mu$ V/ $\Omega$
      - Input break action : Up-scale / Down-scale (Selectable)
    - RTD : Pt100 (JIS/IEC), JPt100 (JIS)
      - Influence of input lead resistance : Approx. 0.01[ $^{\circ}$ C/ $\Omega$ ] of reading
      - Maximum 10 $\Omega$  per wire
      - Input break action : Up-scale
    - Low voltage : 0 to 1V DC, 0 to 100mV DC, 0 to 10mV DC
      - Input break action : Up-scale / Down-scale (Selectable)
    - Current : 4 to 20mA DC, 0 to 20mA DC
      - Input break action : Uncertain (indicates a value around 0mA)
  - b) High voltage input group
    - High voltage : 0 to 5V DC, 1 to 5V DC, 0 to 10V DC
      - Input break action : Uncertain (indicates a value around 0V)

#### 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

#### Square Root Extraction

Equation :  $PV = \sqrt{O}$  (Input value x PV ratio + PV bias)  
 Low level cut OFF : 0.00 to 25.00% of span

### Performance

#### Measuring Accuracy

- a) Thermocouple
  - Type : K, J, T, E, PLII
    - Less than -100 $^{\circ}$ C (-148 $^{\circ}$ F) :  $\pm 1.0^{\circ}$ C ( $\pm 1.8^{\circ}$ F)
    - 100 to 500 $^{\circ}$ C (-148 to 932 $^{\circ}$ F) :  $\pm 0.5^{\circ}$ C ( $\pm 0.9^{\circ}$ F)
    - More than 500 $^{\circ}$ C (932 $^{\circ}$ F) :  $\pm 0.1\%$  of Reading + 1 digit
  - Type : N, S, R, W5Re/W26Re
    - Less than -100 $^{\circ}$ C (-148 $^{\circ}$ F) :  $\pm 2.0^{\circ}$ C ( $\pm 3.6^{\circ}$ F)
    - 100 to 1000 $^{\circ}$ C (-148 to 1832 $^{\circ}$ F) :  $\pm 1.0^{\circ}$ C ( $\pm 1.8^{\circ}$ F)
    - More than 1000 $^{\circ}$ C (1832 $^{\circ}$ F) :  $\pm 0.1\%$  of Reading + 1 digit
  - Type : B
    - Less than 400 $^{\circ}$ C (752 $^{\circ}$ F) :  $\pm 70.0^{\circ}$ C ( $\pm 126^{\circ}$ F)
    - 400 to 1000 $^{\circ}$ C (752 to 1832 $^{\circ}$ F) :  $1.0^{\circ}$ C (1.8 $^{\circ}$ F)
    - More than 1000 $^{\circ}$ C (1832 $^{\circ}$ F) :  $\pm 0.1\%$  of Reading + 1 digit
- Cold junction temperature compensation error
  - $\pm 1.0^{\circ}$ C (1.8 $^{\circ}$ F) [at 23 $^{\circ}$ C $\pm 2^{\circ}$ C (73.4 $^{\circ}$ F $\pm 3.6^{\circ}$ F)]
  - Within  $\pm 1.5^{\circ}$ C ( $\pm 2.7^{\circ}$ F) [Between 0 and 50 $^{\circ}$ C (14 to 122 $^{\circ}$ F)]
- b) RTD
  - Less than 200 $^{\circ}$ C (392 $^{\circ}$ F) :  $\pm 0.2^{\circ}$ C ( $\pm 0.4^{\circ}$ F)
  - More than 200 $^{\circ}$ C (392 $^{\circ}$ F) :  $\pm 0.1\%$  of Reading + 1 digit
- c) DC voltage and DC current
  - $\pm 0.1\%$  of span

#### Insulation Resistance

More than 20M $\Omega$  (500V DC) between measured terminals and ground  
 More than 20M $\Omega$  (500V DC) between power terminals and ground

#### Dielectric Strength

1000V AC for one minute between measured terminals and ground  
 1500V AC for one minute between power terminals and ground

### Control

#### Control Method

- a) Brilliant PID control with enhanced autotuning.
    - Available for reverse and direct action.
  - b) Position proportioning control.
- a) or b) is selectable.

#### Major Setting Range

Set value : Same as input range.  
 Proportional band : 0 to input span (Temperature input)  
 0.0 to 1000.0% of span (Voltage, Current)

#### input

Integral time : 0.00 to 360.00sec. or 0.0 to 3600.0sec. (selectable)  
 Derivative time : 0.00 to 360.00sec. or 0.0 to 3600.0sec. (selectable)  
 Control response : Slow, Medium, Fast  
 Output limiter : -5.0 to +105.0% (High/Low individual setting)  
 Output change rate limiter : 0.0 to 100.0%/sec. (Up/Down individual setting)  
 Proportional cycle time : 0.1 to 100.0 sec.  
 Memory area : 16 sets

#### Motor Valve Control (position proportioning control type only)

Input resistance (feedback resistance) : 135 $\Omega$  as standard  
 POS sampling cycle : 0.075 sec.  
 Neutral zone : 0.1 to 10.0% (output), resolution 0.1%  
 Output : Relay output  
 Motor rotating speed : Suitable for ??? to ??? sec. (full open to full close)

- When motor valve control is used, neither heater break alarm nor power feed forward function is available.

### Output

#### Main Output

Number of output : Up to 3 points (OUT1 to OUT3)  
 Output function : OUT1, 2 : Control output  
 OUT3 : Event output or analog retransmission output (Optional)  
 Output type : Relay output :  
 Form A contact, 250V AC 3A (resistive load)  
 Voltage pulse output : 0/12V DC  
 (Load resistance : More than 600 $\Omega$ )  
 Current output : 4 to 20mA DC, 0 to 20mA DC  
 (Load resistance : Less than 600 $\Omega$ )  
 Continuous voltage output :  
 0 to 5V DC, 1 to 5V DC, 0 to 10V DC  
 (Load resistance : More than 1k $\Omega$ )  
 SSR (Triac) output (Rated current : 0.4A)

#### Sub Output (Optional)

Number of output : Up to 2 points (OUT4, OUT5)  
 Output function : Event output (Optional)  
 Output type : Relay output :  
 Form A contact, 250V AC 1A (resistive load)

#### Sensor Power Supply Output (Optional)

24V DC  $\pm 5\%$  (Max. 20mA)  
 • Output from OUT3.  
 • When sensor power supply output is specified, OUT4 and OUT5 can not be added.

### Event (Alarm) Output (Optional)

#### Number of Event Outputs

Up to 4 points (Event 1 to 4)

#### Alarms

Type : Deviation High, Low, High/Low, Band,  
 Process High, Low  
 Set value High, Low  
 Differential gap : 0 to input span

#### Heater Break Alarm (For single phase)

CT type : CTL-6-P-N(30A), CTL-12-S56-10L-N(100A)  
 Display range : 0.0 to 100.0A  
 Accuracy :  $\pm 5\%$  of input value or  $\pm 2A$  (whichever is larger)

#### Control Loop Break Alarm (LBA)

LBA time setting : 0.1 to 7200 sec. (OFF by setting zero)  
 LBA deadband : 0 to input span

#### Output

Assignable to main output (OUT3) or sub output (OUT4 to 5).

#### Other Functions

HOLD action (Valid for deviation/band/PV alarms only)  
 Selection of event action for input abnormality.

## Specifications

### Non-isolated Remote Setpoint Input (Optional)

- Only available in a 1 channel control type.

#### 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

#### Accuracy

0.1% of span

### Event Input (Optional)

#### 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

- Event input logic selection functional allocation table

	DI1	DI2	DI3	DI4	DI5	DI6	DI7
1	Memory area selection (1 to 16)				Area set	Run/Stop	Auto/Manual
2	Memory area selection (1 to 16)				Area set	Run/Stop	Remote/Local
3	Memory area selection (1 to 16)				Area set	Remote/Local	Auto/Manual
4	Memory area selection (1 to 8)		Area set		Run/Stop	Remote/Local	Auto/Manual
5	Memory area selection (1 to 8)		Area set	Remote/Local			
6	Memory area selection (1 to 8)		Area set	Auto/Manual			

### Analog Retransmission Output (Optional)

#### Number of Outputs

Up to 3 points

- Functions are assignable to OUT1 to OUT3.

#### Output types

- a) Measured value (PV)
- b) Deviation (DV)
- c) Set value (SV)
- d) Manipulated output value (MV)

### Communications (Optional)

**Number of communications :** 2 points

**Communication method :** COM1: RS-485, RS-232C  
COM2: RS-232C, RS-485, RS-422A  
CC-Link

**Communication speed :** 2400, 9600, 19200, 38400 BPS

**Protocol :** ANSI X3.28(1976) 2.5 A4  
MODBUS

#### 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

**Communication code :** ASCII(JIS) 7-bit code

**Maximum connection :** RS-485, RS-422A : 31  
(Address can be set from 0 to 99.)  
RS-232C : 1

### Waterproof/Dustproof (Optional)

Waterproof/dustproof protection : IP65

- Waterproof/dustproof protection only effective from the front in panel mounted installations.

### General Specifications

#### Supply Voltage

- a) 90 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:24VDC]

#### Power Consumption

- HA400 : Less than 22.5VA for AC type (at 240V AC)  
Less than 15.0VA for 24V AC type  
Less than 430mA for 24V DC type
- HA900 : Less than 24.0VA for AC type (at 240V AC)  
Less than 16.0VA for 24V AC type  
Less than 470mA for 24V DC type

#### Power Failure Effect

Not affected by power failure shorter than 20msec, otherwise reset to the initial state. (HOT or COLD start is selectable.)

#### Self-Diagnostic Function

CPU power check, Adjustment data check, EEPROM check, RAM check, etc..

#### Operating Environments :

-10 to 50°C [14 to 122°F]  
5 to 95% RH.  
Absolute humidity : MAX. W.C 29g/m<sup>3</sup> dry air at 101.3kPa.

**Memory Backup :** Backed up by non-volatile memory.  
Number of writing : Approx. 100,000 times

#### Net Weight

- HA400 : Approx. 360g
- HA900 : Approx. 460g

#### External Dimensions (W x H x D)

- HA400 : 48 x 96 x 100mm
- HA900 : 96 x 96 x 100mm

### Compliance with Standards

CE Mark  
UL/cUL Recognized  
RCM Mark



- Event output logic selection functional allocation table

	OUT1	OUT2	OUT3	OUT4	OUT5
1	CH1 control output	HBA1 (Energized) HBA2 (Energized)	Event3 (Energized) Event4 (Energized)	Event2 (Energized)	Event1 (Energized)
2	CH1 control output	HBA1 (De-energized) HBA2 (De-energized)	Event3 (De-energized) Event4 (De-energized)	Event2 (De-energized)	Event1 (De-energized)
3	CH1 control output	Event3 (Energized) Event4 (Energized) HBA1 (Energized) HBA2 (Energized)	Event2 (Energized)	Event1 (Energized)	FAIL (De-energized)
4	CH1 control output	Event3 (De-energized) Event4 (De-energized) HBA1 (De-energized) HBA2 (De-energized)	Event2 (De-energized)	Event1 (De-energized)	FAIL (De-energized)
5	CH1 control output	CH2 control output	Event4 (Energized) HBA2 (Energized)	Event3 (Energized) HBA1 (Energized)	Event1 (Energized) Event2 (Energized)
6	CH1 control output	CH2 control output	Event4 (De-energized) HBA2 (De-energized)	Event3 (De-energized) HBA1 (De-energized)	Event1 (De-energized) Event2 (De-energized)
7	CH1 control output	CH2 control output	Event3 (Energized) Event4 (Energized) HBA1 (Energized) HBA2 (Energized)	Event2 (Energized)	Event1 (Energized)
8	CH1 control output	CH2 control output	Event3 (De-energized) Event4 (De-energized) HBA1 (De-energized) HBA2 (De-energized)	Event2 (De-energized)	Event1 (De-energized)
10	CH1 control output (OPEN)	CH1 control output (CLOSE)	Event3 (Energized) Event4 (Energized) HBA1 (Energized) HBA2 (Energized)	Event2 (Energized)	Event1 (Energized)
11	CH1 control output (OPEN)	CH1 control output (CLOSE)	Event3 (De-energized) Event4 (De-energized) HBA1 (De-energized) HBA2 (De-energized)	Event2 (De-energized)	Event1 (De-energized)
12	CH1 control output	Event4 (Energized) HBA2 (Energized)	Event3 (Energized) HBA1 (Energized)	Event2 (Energized)	Event1 (Energized)

\* An output logic becomes OR output when two or more output functions are assigned to one output.

\* When three analog outputs are selected, the analog outputs are automatically assigned to OUT1 through OUT3 and it has priority over the output logic selection.



## Model and Suffix Code

### 1 channel control type

Specifications	Model and Suffix Code																	
Model	HA400 (48 x 96mm 1/8 DIN size)      - □ □ - □ □ □ - □ * □ □ □ - □ □ □ □ - □ / □ / □ HA900 (96 x 96mm 1/4 DIN size) HA401 (48 x 96mm 1/8 DIN size) HA901 (96 x 96mm 1/4 DIN size)																	
Input (IN1 : No 1 input)	See Input and Range code table      □																	
Non isolated type remote set value	Not supplied      0 See Remote input code table      □																	
Output 1 (Main output)	1 3	Relay contact output Voltage pulse output : 0/12V DC DC voltage : 0 to 5V DC voltage : 0 to 10V DC voltage : 1 to 5V DC current : 0 to 20mA DC current : 4 to 20mA SSR (Triac) output							M V 4 5 6 7 8 T									
Output 2 (Main output) * Not isolated from OUT1.	1 3	No output from OUT2 Relay contact output Voltage pulse output : 0/12V DC DC voltage : 0 to 5V DC voltage : 0 to 10V DC voltage : 1 to 5V DC current : 0 to 20mA DC current : 4 to 20mA SSR (Triac) output							N M V 4 5 6 7 8 T									
Power supply	24V AC/DC 100 to 240V AC							3 4										
Output 3 (Main output)	2 3	No output from OUT3 Relay contact output Voltage pulse output : 0/12V DC DC voltage : 0 to 5V DC voltage : 0 to 10V DC voltage : 1 to 5V DC current : 0 to 20mA DC current : 4 to 20mA SSR (Triac) output Sensor power supply output (Output 4 and 5 can not added)							N M V 4 5 6 7 8 T P									
Output 4, 5 (OUT4, 5 : Sub output)	2	No outputs from OUT4 and OUT5 OUT4 : Relay contact output, No output from OUT5 OUT4 and OUT5 : Relay contact output							N 1 2									
Event input 1 to 5	Not supplied Event input : 5 points (DI 1 to DI5)							N 1										
CT input, Power feed forward (PFF) input, Feedback resistance	Not supplied CT input 1 point (CTL-6-P-N) CT input 1 point (CTL-12-S56-10L-N) CT input 2 points (CTL-6-P-N) CT input 2 points (CTL-12-S56-10L-N) PFF input (Within transformer 100 to 120V AC type) PFF input (Within transformer 200 to 240V AC type) CT input 1 point (CTL-6-P-N) + PFF input (Within transformer 100 to 120V AC type) CT input 1 point (CTL-6-P-N) + PFF input (Within transformer 200 to 240V AC type) CT input 1 point (CTL-12-S56-10L-N) + PFF input (Within transformer 100 to 120V AC type) CT input 1 point (CTL-12-S56-10L-N) + PFF input (Within transformer 200 to 240V AC type) Feedback resistance input							N P S T U 1 2 3 4 5 6 F										
Communication 1 or Event input 6 to 7	Not supplied RS-232C (ANSI/RKC standard) RS-485 (ANSI/RKC standard) RS-485 (MODBUS) RS-232C (MODBUS) Event input : DI6 and DI7							N 1 5 6 8 D										
Communication 2	Not supplied RS-232C (ANSI/RKC standard) RS-422A (ANSI/RKC standard) RS-485 (ANSI/RKC standard) RS-485 (MODBUS) RS-422A (MODBUS) RS-232C (MODBUS) CC-Link							N 1 4 5 6 7 8 C										
Waterproof/Dustproof	Not supplied Waterproof/Dustproof protection							N 1										
Body color	White Black							N A										
Instrument version	Version symbol																Y	

<sup>1</sup> Only OUT1 can be used for control outputs. (Only OUT1 and OUT2 can be used for position proportioning control.)

<sup>2</sup> Event (alarm) outputs, heater break alarm outputs are assignable to OUT3 - OUT5.

<sup>3</sup> 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, two or more outputs must be supplied.
- If heater break alarm is assigned to event function, current transformer (sold separately) is required.

#### Autotuning

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 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.



## Model and Suffix Code

### 2 channel control type

Specifications		Model and Suffix Code														
Model	HA400 (48 x 96mm 1/8 DIN size) HA900 (96 x 96mm 1/4 DIN size) HA401 (48 x 96mm 1/8 DIN size) HA901 (96 x 96mm 1/4 DIN size)	-	□	□	□	□	□	□	□	□	□	□	□	□	□	□
Input 1 (IN1 : No 1 input)	See Input and Range code table	□	:													
Input 2 (IN2 : No 2 input)	See Input and Range code table	□	:													
Output 1 (Main output)	1 3 Relay contact output Voltage pulse output : 0/12V DC DC voltage : 0 to 5V DC voltage : 0 to 10V DC voltage : 1 to 5V DC current : 0 to 20mA DC current : 4 to 20mA SSR (Triac) output	M	V													
		4	5	6	7	8	T									
Output 2 (Main output) * Not isolated from OUT1.	1 3 No output from OUT2 Relay contact output Voltage pulse output : 0/12V DC DC voltage : 0 to 5V DC voltage : 0 to 10V DC voltage : 1 to 5V DC current : 0 to 20mA DC current : 4 to 20mA SSR (Triac) output	N	M													
		V	4	5	6	7	8	T								
Power supply	24V AC/DC 100 to 240V AC	3	4													
Output 3 (Main output)	2 3 No output from OUT3 Relay contact output Voltage pulse output : 0/12V DC DC voltage : 0 to 5V DC voltage : 0 to 10V DC voltage : 1 to 5V DC current : 0 to 20mA DC current : 4 to 20mA SSR (Triac) output Sensor power supply output (Output 4 and 5 can not added)	N	M													
		V	4	5	6	7	8	T	P							
Output 4, 5 (OUT4, 5 : Sub output)	2 No outputs from OUT4 and OUT5 OUT4 : Relay contact output, No output from OUT5 OUT4 and OUT5 : Relay contact output	N	1	2												
Event input 1 to 5	Not supplied Event input : 5 points (DI 1 to DI5)	N	1													
CT input, Power feed forward (PFF) input, Feedback resistance	Not supplied CT input 1 point (CTL-6-P-N) CT input 1 point (CTL-12-S56-10L-N) CT input 2 points (CTL-6-P-N) CT input 2 points (CTL-12-S56-10L-N) PFF input (Within transformer 100 to 120V AC type) PFF input (Within transformer 200 to 240V AC type) CT input 1 point (CTL-6-P-N) + PFF input (Within transformer 100 to 120V AC type) CT input 1 point (CTL-6-P-N) + PFF input (Within transformer 200 to 240V AC type) CT input 1 point (CTL-12-S56-10L-N) + PFF input (Within transformer 100 to 120V AC type) CT input 1 point (CTL-12-S56-10L-N) + PFF input (Within transformer 200 to 240V AC type) Feedback resistance input	N	P	S	T	U										
		1	2	3	4	5	6	F								
Communication 1 or Event input 6 to 7	Not supplied RS-232C (ANSI/RKC standard) RS-485 (ANSI/RKC standard) RS-485 (MODBUS) RS-232C (MODBUS) Event input : DI6 and DI7	N	1	5	6	8	D									
Communication 2	Not supplied RS-232C (ANSI/RKC standard) RS-422A (ANSI/RKC standard) RS-485 (ANSI/RKC standard) RS-485 (MODBUS) RS-422A (MODBUS) RS-232C (MODBUS) CC-Link	N	1	4	5	6	7	8	C							
Waterproof/Dustproof	Not supplied Waterproof/Dustproof protection	N	1													
Body color	White Black	N	A													
Instrument version	Version symbol															Y

1 Only OUT1 and OUT2 can be used for control outputs.  
2 Event (alarm) outputs, heater break alarm outputs are assignable to OUT3 - OUT5.  
3 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, two or more outputs must be supplied.
  - If heater break alarm is assigned to event function, current transformer (sold separately) is required.

**Autotuning**  
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.

# High-Speed Digital Controller - 1 or 2 loops HA Series

## Range and Input Table

Thermocouple, RTD, Low voltage and Current group

Input	Code	Range		Resolution
K	K	-200 - 1372°C	-328 - 2501°F	1°C, 0.1°C, 1°F, 0.1°F (Selectable)
J	J	-200 - 1200°C	-328 - 2192°F	
T	T	-200 - 400°C	-328 - 752°F	
E	E	-200 - 1000°C	-328 - 1832°F	
PLII	A	0 - 1390°C	32 - 2534°F	
N	N	0 - 1300°C	32 - 2372°F	
S	S	-50 - 1768°C	-58 - 3214°F	
R	R	-50 - 1768°C	-58 - 3214°F	
W5Re/W26Re	W	0 - 2300°C	32 - 4172°F	
B	B	0 - 1800°C	32 - 3272°F	
Pt100 (3 wire)	D	-200 - 850°C	-328 - 1562°F	1°C, 0.1°C, 0.01°C 1°F, 0.1°F, 0.01°F (Selectable)
JPt100 (3 wire)		-200 - 600°C	-328 - 1112°F	
Pt100 (4 wire)	C	-200 - 850°C	-328 - 1562°F	
JPt100 (4 wire)		-200 - 600°C	-328 - 1112°F	
0 - 10mV DC	3	-19999 - 99999 (Programmable)		1, 0.1, 0.01, 0.001, 0.0001 (Programmable)
0 - 100mV DC				
0 - 1V DC				
0 - 20mA DC				
4 - 20mA DC	8			

High voltage group

0 - 5V DC	6	-19999 - 99999 (Programmable)		1, 0.1, 0.01, 0.001, 0.0001 (Programmable)
0 - 10V DC				
1 - 5V DC				

## Remote Signal Code Table

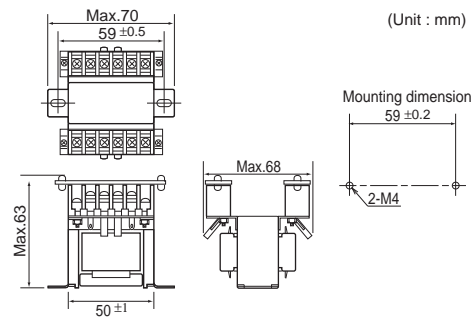
Not isolated from the No.1 input [IN1]

Input type	Code
	Low voltage group
High voltage group	V
	Y
Current group	

## Power Feedback Transformer (for Power Feed Forward Input)

- Supplied when power feed forward function is specified.
- When ordering transformer for replacement, please specify one of the following model codes :

Specification	Model Code
100 to 120V AC type	PFT - 01
200 to 240V AC type	PFT - 02

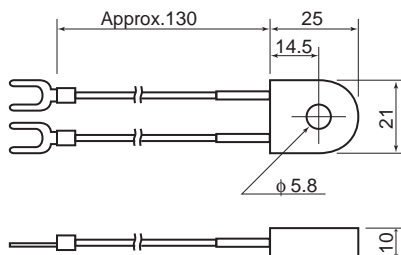


## Current Transformer (CT)

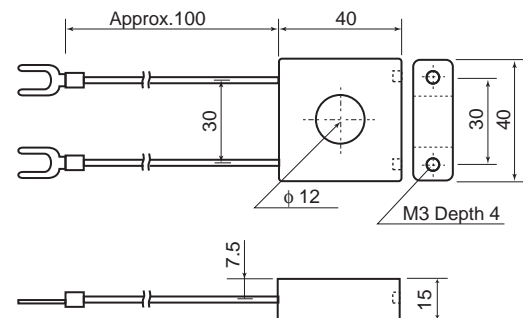
- Sold separately.

Name	Range	Model Code
Current transformer for heater break alarm	0 - 30A	CTL-6-P-N
	0 - 100A	CTL-12-S56-10L-N

CTL-6-P-N



CTL-12-S56-10L-N



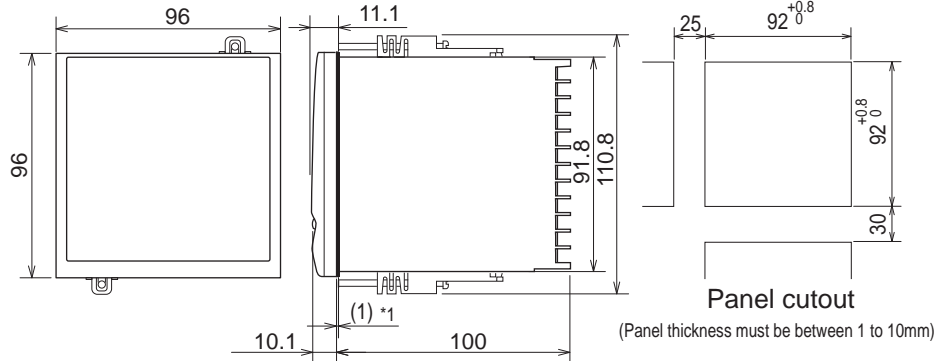
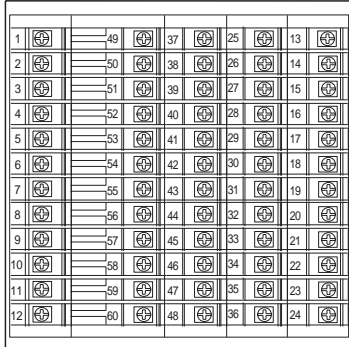
(Unit : mm)

# High-Speed Digital Controller - 1 or 2 loops HA Series

## External Dimensions and Rear Terminals

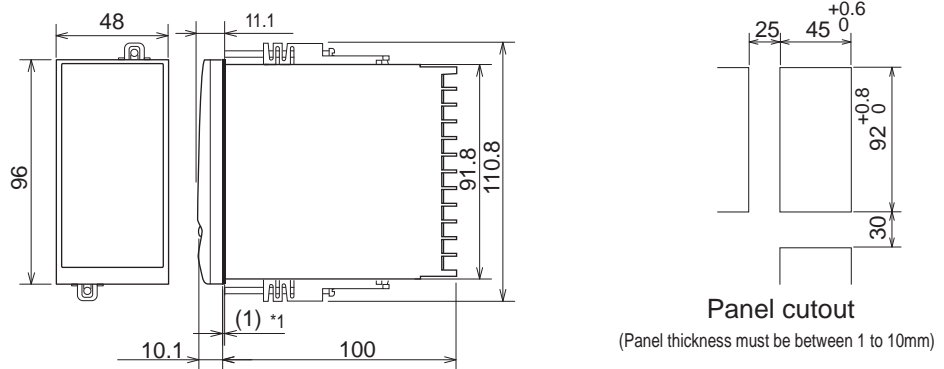
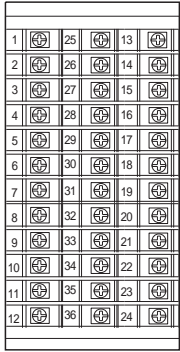
Unit : mm

### HA900, HA901



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

### HA400, HA401



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

No	Description	No	Description	No	Description
1	100 - 240V AC 24V AC 24V DC	49 37	Not used	25	SG SG SG
2	Power supply	50 38		26	T(A) T/R(A) SD
3	Relay contact output	51 39		27	T(B) (2) T/R(B) RD
4	Output 5 (OUT5) *	52 40		28	R(A)
5	Relay contact output	53 41		29	R(B) (1)
6	Output 4 (OUT4) *	54 42		30	COM (-)
7	Relay contact output	55 43		31	DI1
8	(1) Voltage pulse/Current/Voltage output (2) SSR (Triac) output (3) Sensor power supply output	56 44		32	DI2 Non-voltage contact input
9	Relay contact output	57 45		33	DI3
10	(1) Voltage pulse/Current/Voltage output (2) SSR (Triac) output	58 46		34	DI4
11	Relay contact output	59 47		35	COM (-)
12	(1) Voltage pulse/Current/Voltage output (2) SSR (Triac) output	60 48		36	DI5 Non-voltage contact input
				13	SG SG (A) COM (B)
				14	T/R (A) SD
				15	T/R (B) (1) RD (2)
				16	COM (A) OPEN (B) COM (C)
				17	CT1 CT2 (W) CT1 PFF
				18	CLOSE (C)
				19	Non isolated type remote input (A) No.2 Input (IN 1) (B)
				20	(3) (1) (2)-1 (3)
				21	No.1 Input (IN 1) (1) (2)-1 (3)
				22	No.1 Input (IN 1) (1) (2)-1 (3)
				23	(1) (2)-1 (3)
				24	(1) (2)-1 (3)

\* Functions (A) to (C) and types (1) to (3) must be specified when instrument is ordered as change can not be made in the field.

\* : Option





## HA930



## General Description

The HA930 strain gauge input make it ideal for melt pressure control. Featuring high speed sampling and control at 0.025 seconds (40Hz), PID parameters set in 1/100 unit, these controllers provide stable control for improved quality of extruded products.

\* Our controllers can be used with other brand of strain gauge sensors. Please contact RKC for more details.

## Features

- ☆ Strain gauge input type
- ☆ Ultra High Speed Sampling 0.025 sec
- ☆ 7 inputs and 5 outputs
- ☆ Two Channels in One Controller
- ☆ Communications

### Fast sampling of 40 times per second

Provides 0.025 second sampling cycle to measure and control fast changing processes like pressure.

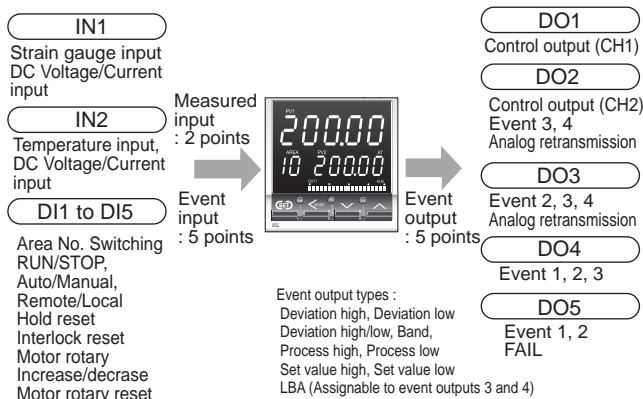
### Numerous functions to improve quality

PV transfer function is activated when switching from MAN (manual) to AUTO (automatic) to keep the ideal RPM which is found at Manual Mode.

To protect screws from abrupt change of RPM, HA430/930 provides Manual output transfer function at input abnormality, motor RPM driving output transfer function, forced reset input of Manual value.

### 7 inputs and 5 outputs

A maximum of two measured inputs and five event inputs can be specified. A maximum of five outputs can be specified, and various output functions (control output, analog retransmission, event up to 4) can be allocated in output logic operation.



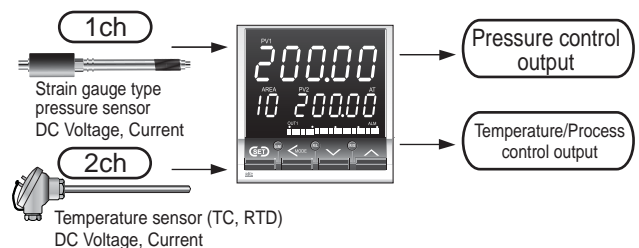
### Easy zero and span adjustments

Auto-zero and span adjustments are available from the front panel.

The span adjustment is accomplished by setting the sensor rated output value (gain setting).

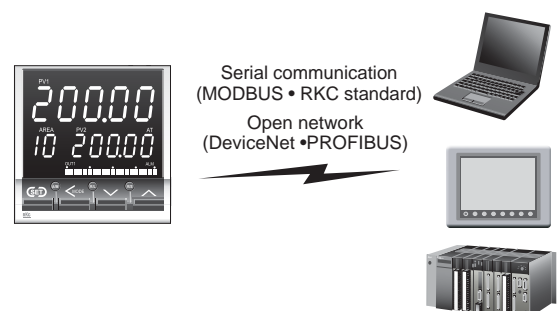
### Temperature and Pressure control with a single instrument

The HA930 provide dual loop control with a single instrument. The first loop is assigned to a strain gauge input and the second loop to a temperature input (TC, RTD, and mV/V/mA).



### Communications

Communication function can be selected from serial communication (RS-232C, RS-422A, RS-485) and Open network (DeviceNet, PROFIBUS).





## Specifications

### Input

#### Number of inputs

- 2 points (IN1 to IN2)
  - Isolated between each channel
  - 2nd input (IN2) can be used as a remote input

#### Input

- a) Strain gauge type pressure sensor (Only IN1)
  - Bridge impressed voltage : 8V DC  $\pm 3\%$ , 80ppm/ $^{\circ}\text{C}$ , 30mA(MAX)
- b) Temperature input, Voltage/Current input group
  - 1) Temperature input (Only IN2)
    - Thermocouple : K, J, E, T, R, S, B, N (JIS/IEC)  
PLII (NBS), W5Re/W26Re (ASTM)
    - RTD : Pt100 (JIS/IEC), JPt100 (JIS)
      - 3 wire system
  - 2) Low voltage : 0 to 1V DC, 0 to 100mV DC, 0 to 10mV DC  
Current : 4 to 20mA DC, 0 to 20mA DC  
(Input impedance : 50 $\Omega$ )
  - c) High voltage group  
High voltage : 0 to 5V DC, 1 to 5V DC, 0 to 10V DC
    - Universal input within group

#### Sampling Time

0.025 sec

#### Zero point adjustment

-5.0 to +5.0mV (Pressure sensor input)

#### Gain setting

0.500 to 4.000mV/V (Pressure sensor input)

#### 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

#### Square Root Extraction

Equation :  $PV = \sqrt{O}$  (Input value x PV ratio + PV bias)  
Low level cut OFF : 0.00 to 25.00% of span

### Performance

#### Measuring Accuracy

- a) Strain gauge type input (Pressure input)
  - $\pm(0.1\%$  of Span)
- b) Thermocouple
  - Type : K, J, T, E, PLII
    - Less than  $-100^{\circ}\text{C}$  ( $-148^{\circ}\text{F}$ ) :  $\pm 1.0^{\circ}\text{C}$  ( $\pm 1.8^{\circ}\text{F}$ )
    - $-100$  to  $500^{\circ}\text{C}$  ( $-148$  to  $932^{\circ}\text{F}$ ) :  $\pm 0.5^{\circ}\text{C}$  ( $\pm 0.9^{\circ}\text{F}$ )
    - More than  $500^{\circ}\text{C}$  ( $932^{\circ}\text{F}$ ) :  $\pm(0.1\%$  of Reading + 1 digit)
  - Type : N, S, R, W5Re/W26Re
    - Less than  $-100^{\circ}\text{C}$  ( $-148^{\circ}\text{F}$ ) :  $\pm 2.0^{\circ}\text{C}$  ( $\pm 3.6^{\circ}\text{F}$ )
    - $-100$  to  $1000^{\circ}\text{C}$  ( $-148$  to  $1832^{\circ}\text{F}$ ) :  $\pm 1.0^{\circ}\text{C}$  ( $\pm 1.8^{\circ}\text{F}$ )
    - More than  $1000^{\circ}\text{C}$  ( $1832^{\circ}\text{F}$ ) :  $\pm(0.1\%$  of Reading + 1 digit)
  - Type : B
    - Less than  $400^{\circ}\text{C}$  ( $752^{\circ}\text{F}$ ) :  $\pm 70.0^{\circ}\text{C}$  ( $\pm 126^{\circ}\text{F}$ )
    - $400$  to  $1000^{\circ}\text{C}$  ( $752$  to  $1832^{\circ}\text{F}$ ) :  $1.0^{\circ}\text{C}$  ( $1.8^{\circ}\text{F}$ )
    - More than  $1000^{\circ}\text{C}$  ( $1832^{\circ}\text{F}$ ) :  $\pm(0.1\%$  of Reading + 1 digit)
- c) Cold junction temperature compensation error
  - $\pm 1.0^{\circ}\text{C}$  ( $1.8^{\circ}\text{F}$ ) [at  $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$  ( $73.4^{\circ}\text{F} \pm 3.6^{\circ}\text{F}$ )]
  - Within  $\pm 1.5^{\circ}\text{C}$  ( $\pm 2.7^{\circ}\text{F}$ ) [Between  $0$  and  $50^{\circ}\text{C}$  ( $14$  to  $122^{\circ}\text{F}$ )]
- d) RTD
  - Less than  $200^{\circ}\text{C}$  ( $392^{\circ}\text{F}$ ) :  $\pm 0.2^{\circ}\text{C}$  ( $\pm 0.4^{\circ}\text{F}$ )
  - More than  $200^{\circ}\text{C}$  ( $392^{\circ}\text{F}$ ) :  $\pm(0.1\%$  of Reading + 1 digit)
- e) DC voltage and DC current
  - $\pm(0.1\%$  of span)

#### Insulation Resistance

More than 20M $\Omega$  (500V DC) between measured terminals and ground  
More than 20M $\Omega$  (500V DC) between power terminals and ground

#### Dielectric Strength

1000V AC for one minute between measured terminals and ground  
1500V AC for one minute between power terminals and ground

### Control

#### Control Method

Brilliant PID control with enhanced autotuning.  
• Available for reverse and direct action.

#### Control Method

Brilliant PID control with enhanced autotuning.  
• Available for reverse and direct action.

#### Major Setting Range

Set value : Same as input range.  
Proportional band : 0 to input span (Temperature input)  
0.0 to 1000.0% of span (Voltage, Current)

#### input

Integral time : 0.00 to 360.00sec. or 0.0 to 3600.0sec. (selectable)  
Derivative time : 0.00 to 360.00sec. or 0.0 to 3600.0sec. (selectable)  
Control response : Slow, Medium, Fast  
Output limiter : -5.0 to +105.0% (High/Low individual setting)  
Output change rate limiter : 0.0 to 100.0%/sec. (Up/Down individual setting)  
Proportional cycle time : 0.1 to 100.0 sec.  
Memory area : 16 sets

#### Other functions

PV transfer function  
This is a function to set the PV to the SV when the operation mode has been changed from a Manual to an Auto mode to suppress rapid change in output.  
Manual output transfer function at input abnormality  
When the input exceeds the input abnormality decision point, the output reached at that time is maintained.  
MV transfer function  
In this function, an output value is stored when the operation mode is changed from MAN to AUTO mode, and when the mode changes from AUTO to MAN via digital input, the stored output value is retrieved.

### Output

#### Main Output

Number of output : Up to 3 points (OUT1 to OUT3)  
Output function : OUT1, 2 : Control output  
OUT3 : Event output or analog retransmission output (Optional)  
Output type : Relay output :  
Form A contact, 250V AC 3A (resistive load)  
Voltage pulse output : 0/12V DC  
(Load resistance : More than 600 $\Omega$ )  
Current output : 4 to 20mA DC, 0 to 20mA DC  
(Load resistance : Less than 600 $\Omega$ )  
Continuous voltage output :  
0 to 5V DC, 1 to 5V DC, 0 to 10V DC  
(Load resistance : More than 1k $\Omega$ )  
SSR (Triac) output (Rated current : 0.4A)

#### Sub Output (Optional)

Number of output : Up to 2 points (OUT4, OUT5)  
Output function : Event output (Optional)  
Output type : Relay output :  
Form A contact, 250V AC 1A (resistive load)

#### Sensor Power Supply Output (Optional)

24V DC  $\pm 5\%$  (Max.24mA)  
• Output from OUT3.  
• When sensor power supply output is specified, OUT4 and OUT5 can not be added.

### Event (Alarm) Output (Optional)

#### Number of Event Outputs

Up to 4 points (Event 1 to 4)

#### Alarms

Type : Deviation High, Low, High/Low, Band, Process High, Low  
Set value High, Low  
Differential gap : 0 to input span

#### Control Loop Break Alarm (LBA)

LBA time setting : 0.1 to 7200 sec. (OFF by setting zero)  
LBA deadband : 0 to input span

#### Output

Assignable to main output (OUT3) or sub output (OUT4 to 5).

#### Other Functions

HOLD action (Valid for deviation/band/PV alarms only)  
Selection of event action for input abnormality.

## Specifications

### 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

#### Accuracy

0.1% of span

\* Only available in a 1 channel control type.

### Event Input (Optional)

#### 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

• Event input logic selection functional allocation table

	DI1	DI2	DI3	DI4	DI5
A	Memory area selection (1 to 16)				Area set
B	Memory area selection (1 to 8)			Area set	Run/Stop
C	Memory area selection (1 to 8)			Area set	Remote/Local
D	Memory area selection (1 to 8)			Area set	Remote/Local
E	Memory area selection (1 to 8)			Area set	Peak/Bottom hold reset
F	Memory area selection (1 to 8)			Area set	Interlock release
G	Memory area selection (1 to 4)		Area set	Run/Stop	Auto/Manual
H	Memory area selection (1 to 4)		Area set	Run/Stop	Remote/Local
I	Memory area selection (1 to 4)		Area set	Remote/Local	Auto/Manual
J	Memory area selection (1 to 4)		Area set	Peak/Bottom hold reset	Interlock release
K	Auto/Manual	Run/Stop	Remote/Local	Peak/Bottom hold reset	Interlock release
L	Auto/Manual	CH1 manual output down	CH1 manual output up	CH1 manual output 0% reset	Run/Stop
M	Auto/Manual	CH2 manual output down	CH2 manual output up	CH2 manual output 0% reset	Run/Stop

### Analog Retransmission Output (Optional)

#### Number of Outputs

Up to 3 points

• Functions are assignable to OUT1 to OUT3.

#### Output types

- a) Measured value (PV)
- b) Deviation (DV)
- c) Set value (SV)
- d) Manipulated output value (MV)

### Communications (Optional)

Number of communications : 2 points

Communication method : COM1: RS-485, RS-232C  
COM2: RS-232C, RS-485, RS-422A  
DeviceNet, PROFIBUS

Communication speed : 2400, 9600, 19200, 38400 BPS

Protocol : ANSI X3.28(1976) 2.5 A4  
MODBUS

#### 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

Communication code : ASCII(JIS) 7-bit code

Maximum connection : RS-485, RS-422A : 31  
(Address can be set from 0 to 99.)  
RS-232C : 1

### Waterproof/Dustproof

Waterproof/dustproof protection : IP65

•Waterproof/dustproof protection only effective from the front in panel mounted installations.

### General Specifications

#### Supply Voltage

- a) 90 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:24VDC]

#### Power Consumption

Less than 24.0VA for AC type (at 240V AC)  
Less than 16.0VA for 24V AC type  
Less than 470mA for 24V DC type

#### Power Failure Effect

Not affected by power failure shorter than 20msec, otherwise reset to the initial state. (HOT or COLD start is selectable.)

#### Self-Diagnostic Function

CPU power check, Adjustment data check, EEPROM check, RAM check, etc..

#### Operating Environments

-10 to 50°C [14 to 122°F]  
5 to 95% RH.(No condensing)  
• Absolute sensitivity : Max. W.C 29g/m<sup>3</sup> dry air at 101.3kPa

Memory Backup : Backed up by non-volatile memory.  
Number of writing : Approx. 100,000 times

#### Net Weight

Approx. 460g

#### External Dimensions (W x H x D)

96 x 96 x 100mm

### Compliance with Standards

CE Mark  
UL/cUL Recognized  
C-Tick Mark



• Event output logic selection functional allocation table

	OUT1	OUT2	OUT3	OUT4	OUT5
A	CH1 control output	Event 3,4 (Energized)	Event 2 (Energized)	Event 1 (Energized)	FAIL (De-energized)
B	CH1 control output	Event 3, 4 (De-energized)	Event 2 (De-energized)	Event 1 (De-energized)	FAIL (De-energized)
C	CH1 control output	CH2 control output	Event 4 (Energized)	Event 3 (Energized)	Event 1,2 (Energized)
D	CH1 control output	CH2 control output	Event 4 (De-energized)	Event 3 (De-energized)	Event 1, 2 (De-energized)
E	CH1 control output	CH2 control output	Event 3,4 (Energized)	Event 2 (Energized)	Event 1 (Energized)
F	CH1 control output	CH2 control output	Event 3, 4 (De-energized)	Event 2 (De-energized)	Event 1 (De-energized)
G	CH1 control output	Event 4 (Energized)	Event 3 (Energized)	Event 2 (Energized)	Event 1 (Energized)

\* An output logic becomes OR output when two or more output functions are assigned to one output.

\* When three analog outputs are selected, the analog outputs are automatically assigned to OUT1 through OUT3 and it has priority over the output logic selection.

# Resin Pressure Digital Controller HA930

## Model and Suffix Code

### 1 channel control type

Specifications	Model and Suffix Code																						
Model	HA930 (96 x 96mm 1/4 DIN size)											-	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Input 1 (IN1 : No 1 input)	CZ-100P/200P input CZ-GP100 input or 0.500 to 4.000mV/V output type pressure sensor (Maximum supply voltage : More than 8V DC) Voltage/Current DC input (See voltage/current Input code table)											H	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Non isolated type remote set value	Not supplied See Remote input code table											0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Output 1 (Main output)	See output code table											<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Output 2 (Main output) * Not isolated from OUT1.	No output from OUT2 See output code table											N	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Power supply	24V AC/DC 100 to 240V AC											3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Output 3 (Main output)	No output from OUT3 See output code table											N	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Output 4, 5 (OUT4, 5 : Sub output)	No outputs from OUT4 and OUT5 OUT4 : Relay contact output, No output from OUT5 OUT4 and OUT5 : Relay contact output											N	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Event input 1 to 5	Not supplied Event input : 5 points (DI 1 to DI5)											N	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Communication	Not supplied RS-232C (ANSI/RKC standard) RS-422A (ANSI/RKC standard) RS-485 (ANSI/RKC standard) RS-485 (MODBUS) RS-422A (MODBUS) RS-232C (MODBUS) DeviceNet PROFIBUS											N	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Body color	White Black											N	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Instrument version	Version symbol												<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

#### <Remarks>

- OUT 1 can be used for control outputs.
- Event (alarm) outputs are assignable to OUT 2 - OUT 5.
- Analog output (PV, SV, etc) are assignable to OUT 1 -OUT 3.
- If two isolated analog outputs are required, use OUT 1 (or OUT 2) and OUT 3.

### Range and Input Table

#### Low voltage and Current group

Input	Code	Range	Resolution
0 - 10mV DC	3	-19999 - 99999 (Programmable)	1, 0.1, 0.01, 0.001, 0.0001 (Programmable)
0 - 100mV DC			
0 - 1V DC			
-10 - 10mV DC			
-100 - 100mV DC			
0 - 20mA DC			
4 - 20mA DC	8		

#### High voltage group

Input	Code	Range	Resolution
0 - 5V DC	6	-19999 - 99999 (Programmable)	1, 0.1, 0.01, 0.001, 0.0001 (Programmable)
0 - 10V DC			
1 - 5V DC			
-5 - 5V DC			
-10 - 10V DC			
-1 - 1V DC			

### Remote Signal Code Table

Not isolated from the No.1 input [IN1]

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

Configurable within group

### 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



## Model and Suffix Code

### 2 channel control type

Specifications	Model and Suffix Code																				
Model	HA930 (96 x 96mm 1/4 DIN size) <span style="float: right;">-□ □-□ □-□*□ □-□ □-□/□</span>																				
Input 1 (IN1 : No 1 input)	CZ-100P/200P input CZ-GP100 input or 0.500 to 4.000mV/V output type pressure sensor (Maximum supply voltage : More than 8V DC) Voltage/Current DC input (See Input and Range code table)								H												
Input 2 (IN2 : No 2 input)	See Input and Range code table <span style="float: right;">□ □</span>																				
Output 1 (Main output)	See output code table <span style="float: right;">□ □</span>																				
Output 2 (Main output) * Not isolated from OUT1.	No output from OUT2 See output code table <span style="float: right;">N □</span>																				
Power supply	24V AC/DC 100 to 240V AC								3	4											
Output 3 (Main output)	No output from OUT3 See output code table Sensor power supply output *1								N	□											
Output 4, 5 (OUT4, 5 : Sub output) *1	No outputs from OUT4 and OUT5 OUT4 : Relay contact output, No output from OUT5 OUT4 and OUT5 : Relay contact output								N	1	2										
Event input 1 to 5	Not supplied Event input : 5 points (DI 1 to DI5)											N	1								
Communication	Not supplied RS-232C (ANSI/RKC standard) RS-422A (ANSI/RKC standard) RS-485 (ANSI/RKC standard) RS-485 (MODBUS) RS-422A (MODBUS) RS-232C (MODBUS) DeviceNet PROFIBUS												N	1	4	5	6	7	8	A	B
Body color	White Black																		N	A	
Instrument version	Version symbol																				Y

\*1 When sensor power supply output is specified, output 4 and 5 can not added.

<Remarks>

- OUT 1 and OUT 2 can be used for control outputs.
- Event (alarm) outputs are assignable to OUT 2 - OUT 5.
- Analog output (PV, SV, etc) are assignable to OUT 1 - OUT3.
- If two isolated analog outputs are required, use OUT 1 (or OUT 2) and OUT3.

### Range and Input Table

#### ● Input 1 (IN1 : No 1 input)

Low voltage and Current group

Input	Code	Range	Resolution
0 - 10mV DC	3	-19999 - 99999 (Programmable)	1, 0.1, 0.01, 0.001, 0.0001 (Programmable)
0 - 100mV DC			
0 - 1V DC			
-10 - 10mV DC			
-100 - 100mV DC	8		
0 - 20mA DC			
4 - 20mA DC			

High voltage group

Input	Code	Range	Resolution
0 - 5V DC	6	-19999 - 99999 (Programmable)	1, 0.1, 0.01, 0.001, 0.0001 (Programmable)
0 - 10V DC			
1 - 5V DC			
-5 - 5V DC			
-10 - 10V DC			
-1 - 1V DC			

#### ● Input 2 (IN2 : No 2 input)

Thermocouple, RTD, Low voltage and Current group

Input	Code	Range	Resolution	
K	K	-200 - 1372°C / -328 - 2501°F	1°C, 0.1°C, 1°F, 0.1°F (Selectable)	
J	J	-200 - 1200°C / -328 - 2192°F		
T	T	-200 - 400°C / -328 - 752°F		
E	E	-200 - 1000°C / -328 - 1832°F		
PLII	A	0 - 1390°C / 32 - 2534°F		
N	N	0 - 1300°C / 32 - 2372°F		
S	S	-50 - 1768°C / -58 - 3214°F		
R	R	-50 - 1768°C / -58 - 3214°F		
W5Re/W26Re	W	0 - 2300°C / 32 - 4172°F		
B	B	0 - 1800°C / 32 - 3272°F		
Pt100 (3 wire)	D	-200 - 850°C / -328 - 1562°F		
JPt100 (3 wire)		-200 - 600°C / -328 - 1112°F		
0 - 10mV DC	3	-19999-99999 (Programmable)		1, 0.1, 0.01, 0.001, 0.0001 (Programmable)
0 - 100mV DC				
-10 - 10mV DC				
-100 - 100mV DC				
0 - 20mA DC	8			
4 - 20mA DC				

High voltage group

Input	Code	Range	Resolution
0 - 5V DC	6	-19999-99999 (Programmable)	1, 0.1, 0.01, 0.001, 0.0001 (Programmable)
0 - 10V DC			
1 - 5V DC			
-5 - 5V DC			
-10 - 10V DC			
-1 - 1V DC			

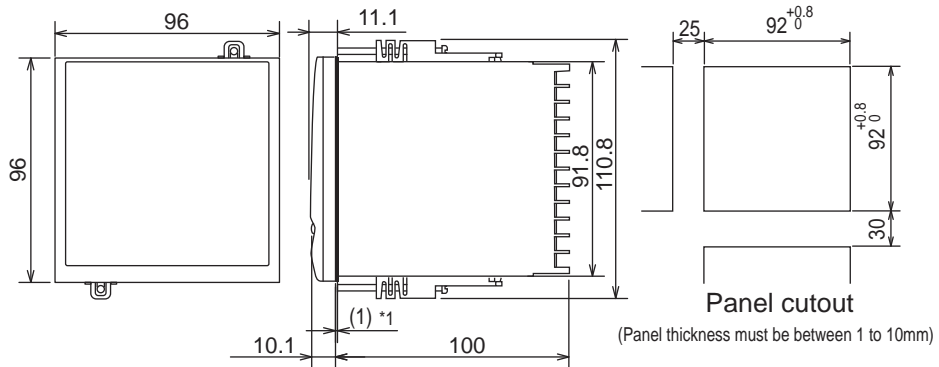
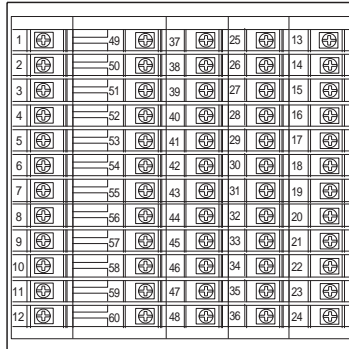
### Output Code Table

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



## External Dimensions and Rear Terminals

Unit : mm



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

No	Description	No	Description	No	Description
1	Power supply	25	Communication	13	No used
2	Power supply	26	Communication	14	Input 1 (IN1)
3	Output 5 (OUT5)	27	Communication	15	Input 1 (IN1)
4	Output 5 (OUT5)	28	Communication	16	Shield
5	Output 4 (OUT4)	29	Communication	17	Sensor supply voltage +
6	Output 4 (OUT4)	30	Event input 1 to 4	18	Sensor supply voltage -
7	Output 3 (OUT3)	31	Event input 1 to 4	19	Input 1 (IN1)
8	Output 3 (OUT3)	32	Event input 1 to 4	20	Input 1 (IN1)
9	Output 2 (OUT2)	33	Event input 1 to 4	21	No used
10	Output 2 (OUT2)	34	Event input 1 to 4	22	No used
11	Output 1 (OUT1)	35	Event input 5	23	Input 1 (IN1)
12	Output 1 (OUT1)	36	Event input 5	24	Input 1 (IN1)