KP1000 SERIES

DIGITAL PROGRAM CONTROLLER

PERFORMANCE SPECIFICATION

CHINO

The KP1000 series is a 96x96mm digital program controller with the indicating accuracy of ±0.1%, the control cycle of approximately 0.1 seconds and maximum 19 program patterns (maximum 19 steps/pattern).
Various functions including the whole program pattern display screen and universal input are provided as standard.

■ FEATURES

●Large easy-to-view 5-digit display

Large easy-to-view 5-digit display
Process value (PV) and set value (SV) are displayed by large easy-to-view 5-digit display indicators. The resolution of 0.1°C is enabled for more than 1000°C.

●Outstanding controllability

Two types of PID algorithms, the position-type PID algorithm and the speed-type PID algorithm, have been installed. You can select the optimum PID algorithm for an object controlled.

●Operability inheriting previous models

The controller inherits the settings screen which has been familiarized for long time. You can set up it with operation which is not different from previous models. The performance of touching-keys has been improved and the outstanding operability has been realized.

●High-precision transmission signal output

The high-precision (0.1% of full scale) analog transmission signal output can be added.

●24V power supply voltage type provided

The power supply voltage 24V (AC/DC) type, which is advantageous in respect of safe, is available.

●Program pattern

Settings of maximum 19 steps per pattern and maximum 19 sets of patterns are enabled. Repeating of a whole program pattern, linking of program patterns and repeating of a specific step in a program pattern are enabled, too.

●Easily identifiable pattern progress display

By selecting the whole program pattern display screen in the operation screen, the shape of whole program pattern and the progressed pattern position are identifiable at a glance.

●Universal input

Various measurement ranges of DC voltage (up to maximum 10V) inputs, DC current input, thermocouple inputs and resistance thermometer inputs have been built-in.

●2 colors of casing available

You can select the color of casing from 2 colors of gray with OA equipment feeling and black with high-class feeling.

●Conforming to international safety standards and European directives (CE)

The controller is in conformity with European directives (CE), and is UL and c-UL approved.

●Conforming to RoHS

The controller is an environmental consideration product which does not contain directed hazardous substances such as lead, etc.

■ MODELS

KP1□□□C□□□–□□□

- Input signal
  - 0: Universal input
  - 4: 4-wire resistance thermometer
- Control mode (Output No. 1)
  - 1: ON-OFF pulse type PID
  - 2: ON-OFF servo type PID (Standard load specification)
  - 3: Current output type PID
  - 5: SSR drive pulse type PID
  - 6: Voltage output type PID
  - 8: ON-OFF servo type PID (Very light load specification)
- Control mode (Output No. 2) *
  - 0: None
  - 1: ON-OFF pulse type PID *1
  - 3: Current output type PID *1
  - 5: SSR drive pulse type PID *1
  - 6: Voltage output type PID *1
- Communications interface (1st zone) *
  - 0: None
  - R: RS232C
  - A: RS422A
  - S: RS485
  - T: 5 Time signal outputs
  - N: 4 Status signal + End signal outputs
  - D: 4 External drive inputs
  - P: Pattern selection input
  - M: 4 Time signal + End signal outputs
- Transmission signal output (2nd zone)*
  - 0: None
  - 1: 4-20mA
  - 2: 0-1V
  - 3: 0-10V
  - 4: Other
  - T: 5 Time signal outputs
  - N: 4 Status signal + End signal outputs
  - D: 4 External drive inputs
  - P: Pattern selecting input
  - M: 4 Time signal + End signal outputs
- External drive input (3rd zone) *
  - 0: None
  - 5: 4 Time signal outputs + End signal + 3 External drive inputs
  - 6: 5 Time signal outputs + 3 External drive inputs
  - 7: 4 Status signal outputs + 4 External drive inputs
  - 8: 3 External drive inputs + Pattern selecting input
  - T: 5 Time signal outputs
  - N: 4 Status signal outputs + End signal outputs
  - D: 4 External drive inputs
  - P: Pattern selecting input
  - M: 4 Time signal + End signal outputs
- Case color
  - G: Gray
  - B: Black*
- Panel sealing and terminal cover *
  - 0: None
  - 1: Terminal cover
  - 2: IP54 panel sealing + No terminal cover
  - 3: IP54 panel sealing + Terminal cover
- Power supply voltage
  - A: 100 to 240V (AC)
  - D: 24V AC / 24VDC

* Option

*1 The control mode (Output No.1) can be selected from 1, 3, 5 or 6 only.

Note: For options common to 1st zone, 2nd zone and 3rd zone, assign them in the order of [T], [N], [D], [P] and [M] from 3rd zone first.

■ MEASURING RANGES

●Universal input

Measuring ranges		Scale ranges
Thermocouples	B	0.0 to 1820.0℃
	R	0.0 to 1760.0℃ 0.0 to 1200.0℃
	S	0.0 to 1760.0℃
	K	-200.0 to 1370.0℃ 0.0 to 600.0℃ -200.0 to 300.0℃
	E	-270.0 to 1000.0℃ 0.0 to 700.0℃ -270.0 to 300.0℃ -270.0 to 150.0℃
	J	-200.0 to 1200.0℃ -200.0 to 900.0℃ -200.0 to 400.0℃ -100.0 to 200.0℃
	T	-270.0 to 400.0℃ -200.0 to 200.0℃
	WRe5-WRe26	0.0 to 2310.0℃
	W-WRe26	0.0 to 2310.0℃
	NiMo-Ni	-50.0 to 1410.0℃
	CR-AuFe	0.0 to 280.0K
	N	0.0 to 1300.0℃
	PR5-20	0.0 to 1800.0℃
	PtRh40-PtRh20	0.0 to 1880.0℃
	Platinel II	0.0 to 1390.0℃ 0.0 to 600.0℃
	U	-200.0 to 400.0℃
	L	-200.0 to 900.0℃
DC voltage	10mV	-10 to 10mV
	20mV	-20 to 20mV
	50mV	-50 to 50mV
	100mV	-100 to 100mV
	5V	-5 to 5 V
	10V	-10 to 10 V
DC current	20mA	0 to 20 mA
Resistance thermometer	JPt100	-200.0 to 649.0℃ -200.0 to 400.0℃ -200.0 to 200.0℃ -100.0 to 100.0℃
	Old Pt100	-200.0 to 649.0℃ -200.0 to 400.0℃ -200.0 to 200.0℃ -100.0 to 100.0℃
	JPt50	-200.0 to 649.0℃
	Pt100	-200.0 to 850.0℃ -200.0 to 400.0℃ -200.0 to 200.0℃ -100.0 to 100.0℃

●4-wire resistance thermometer

Measuring ranges		Scale ranges
Resistance thermometer	JPt100	-200.0 to 649.0℃ -200.0 to 400.0℃ -200.0 to 200.0℃ -100.0 to 100.0℃
	Old Pt100	-200.0 to 649.0℃ -200.0 to 400.0℃ -200.0 to 200.0℃ -100.0 to 100.0℃
	JPt50	-200.0 to 649.0℃
	Pt-Co	4.0 to 374.0K
	Pt100	-200.0 to 850.0℃ -200.0 to 400.0℃ -200.0 to 200.0℃ -100.0 to 100.0℃

[Standards]
K, E, J, T, R, S, B, N: IEC584 (1977, 1982), JIS C 1602 -1995, JIS C 1605 -1995
WRe5-WRe26, W-WRe26, NiMo-Ni, Platinel II,
CR-AuFe, PtRh40-PtRh20: ASTMVol.14.03
U, L: DIN43710-1985
Pt100 :IEC751 (1995), JIS C 1604 -1997
OldPt100 :IEC751 (1983), JIS C 1604 -1989, JIS C 1606 -1989
JPt100: JIS C 1604 -1981, JIS C 1606 -1986
JPt50: JIS C 1604 -1981

■ NAMES OF VARIOUS PARTS

Display

1. Operation status (RUN) indication
   Lights in operation.
2. Operation stop (STOP) indication
   Lights in the state of operation stop.
3. RESET indication
   Lights when operation is cancelled and returns to the start point.
4. Constant value operation (CONST) indication
   Light in constant value operation.
5. Pattern No. (PTN) indication
6. Alarm-standby (WAIT) indication
   Lights in alarm-standby status or when alarm is cancelled.
   Blinks when standby time alarm is activated.
7. Program remote (REM) indication
   Lights when operation is executed by external drive input.
8. Executing step number (STP) indication
   The step No. being executed is indicated.
   (Blinks in real temperature compensation operation.)
9. Error (ERR) indication
   Lights when sampling of input is abnormal.
10. Auto-tuning operation (AT) indication
    Lights in auto-tuning operation.
11. Manual operation (MAN1/MAN2) indication
    Lights when the output No.1 or No. 2 is in manual output operation.
12. Function (FNC) operation indication
    Lights when the function key is operated.
20. Process value (PV) indication
21. Set value (SV) indication
22. Time signal (TS1 to TS5) indication
    Alarm activation (AL1 to AL4) indication

Function keys

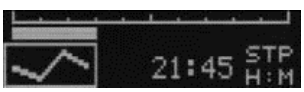
13. FNC key
    With the operation screen displayed, pressing it puts the controller in the operation key mode. With the settings screen displayed, pressing it puts the controller in the setting key mode and it operates to move the cursor backwards.
14. RUN key
    In the operation key mode, it operates as RUN key. With the settings screen displayed, pressing it puts the controller in the setting key mode and it is used for switching between the operation screen and the mode screen of Mode 0, or for switching from the settings screen to the mode screen.
15. STOP key
    In the operation key mode, it operates as STOP key. With the settings screen displayed, pressing it puts the controller in the setting key mode and it is used to switch the settings screen.
16. ADV (Advance) key
    In the operation key mode, it operates as ADV key. With the settings screen displayed, pressing it puts the controller in the setting key mode and it is used for moving the cursor and for selecting a parameter.
17. RESET key
    In the operation key mode, it operates as RESET key. With the settings screen displayed, pressing it puts the controller in the setting key mode and it is used for changing a setting value (or selecting a parameter) in descending order.
18. PTN (Pattern) key
    In the operation key mode, it operates as PTN key. With the settings screen displayed, pressing it puts the controller in the setting key mode and it is used for changing a setting value (or selecting a parameter) in ascending order.
19. A/M (Auto/Manual) key
    In the operation key mode, it operates as A/M key. With the settings screen displayed, pressing it puts the controller in the setting key mode and it is used for registering the settings.

24. Engineering port

Lower display

23. A wide variety of operation screens are prepared and arbitrarily-selection is enabled.
    On the whole program pattern display screen, the simultaneous display of the shape of whole program pattern and the progressed pattern position has been realized.

Output screen



Time screen


Pattern screen

■ INPUT SPECIFICATIONS

Input signal: Thermocouple
B, R, S, K, E, J, T, N, WRe5-WRe26, W-WRe26, NiMo-Ni, CR-AuFe, PR5-20, PtRh40-PtRh20, Platinel II, U, L
DC voltage
±10mV, ±20mV, ±50mV, ±100mV, ±5V, ±10V
DC 0 to 20 mA
Resistance thermometer
Pt100, JPt100, Old Pt100, JPt50, Pt-Co

Measuring range: Thermocouple 28 ranges,
DC voltage 6 ranges,
DC current 1 range,
Resistance thermometer 14 ranges.
*For details, refer to [Measurement ranges].

Accuracy rating: ± 0.1% of measurement range ± 1 digit
*For details, refer to [Detailed specifications of accuracy ratings].

Reference junction compensation accuracy:
K, E, J, T, N, Platinel II --- ±0.5°C or a value equivalent to ±20μV, whichever is greater
(at ambient temperature of 23°C ± 10°C)
Others --- ±1.0°C or a value equivalent to ± 40μV, whichever is greater

Resolution: Approximately 1/30000

Sampling rate: Approximately 0.1 seconds

Burnout: Upscale burnout is only enabled in thermocouple, DC voltage (±50mV or less) and resistance thermometer (3-wire type). For the burnout, the output value of Output No. 1 can be set arbitrarily, the output value of Output No. 2 is fixed at 0% and the high limit alarm is set at ON (for the upscale burnout).
(The burnout is disabled in DC voltage (±100mV or more), DC current, resistance temperature (4-wire type).

Input impedance:
Thermocouple 1MΩ or more
DC voltage 1MΩ or more
DC current Approximately 250Ω

Allowable signal source resistance:
Thermocouple 100Ω or less
DC voltage (mV) 100Ω or less
DC voltage (V) 300Ω or less

Allowable wire resistance (resistance thermometer):
5Ω or less (Same resistance for all wires)

Rated current (resistance thermometer):
Approximately 1mA

Maximum allowable input:
Thermocouple ±20V or less
DC voltage ±20V or less
DC current ±30mA or less, ±7.5V or less
Resistance thermometer 500Ω or less, ±5V or less

Maximum common mode voltage:
30VAC

Common mode rejection ratio:
130dB or more (50/60Hz)

Normal mode rejection ration:
50dB or more (50/60Hz)

■ DISPLAY SPECIFICATIONS

Display element:
Upper display LED
Lower display LCD (with back light) 108 x 24 dots

Display content:
Upper display
PV 5-digit, SV 5-digit, status indications, etc.
Lower display
MV, output status, settings screen, etc.

■ CONTROL SPECIFICATIONS

Control cycle: Approximately 0.1 seconds

Output type: ON-OFF pulse type, ON-OFF servo type, Current output type, SSR drive pulse type, Voltage output type

ON-OFF pulse type:
Output signal ON-OFF pulse conductive signal
Contact capacity
Resistive load 100 to 240VAC 30VDC 5A or less
Inductive load 100 to 240VAC 30VDC 2.5A or less
Smallest load 5VDC 10mA or more
Contact protection Small CR element built-in
ON-OFF pulse cycle 1 to 180 seconds

ON-OFF servo type:
Output signal ON-OFF servo conductive signal
Contact capacity of standard load
Resistive load 100 to 240VAC 30VDC 5A or less
Inductive load 100 to 240VAC 30VDC 2.5A or less
Smallest load 5VDC 10mA or more
Contact capacity of very light load
Resistive load 100 to 240VAC 30VDC 20mA or less
Inductive load 100 to 240VAC 30VDC 20mA or less
Smallest load 5VDC 1mA or more
Feedback resistance 100Ω to 2kΩ
Contact protection Small CR element built-in

Current output type:
Output signal 4 to 20mA
Load resistance 750Ω or less

SSR drive pulse type:

Output signal	ON-OFF pulse voltage signal
Output voltage	ON voltage 12VDC ± 20%
	OFF voltage 0.8VDC or less
Load current	20mA or less
Pulse cycle	1 to 180 seconds

Voltage output type:

Output signal	0 to 10V
Output impedance	Approx. 10Ω
Load resistance	50kΩ or more

Output limiter: -5.0 to 105.0%

Rate-of-change limiter for output:
0.1 to 100.0%

Output preset: With P action (Settings of I and D = 0), Output at PV = SV -100.0 to 100.0%
Output No. 2 is 0%.

Output deadband: In case of 2-position control (Setting of P = 0), Setting range 0.1 to 9.9%

Control action: With direct/reverse selection

Output at PV abnormality:
Over-range, under-range, abnormal internal data

Manual output operation:
Output by manual setting -5.0 to 105.0%
MAN → AUTO Balanceless bumpless
AUTO → MAN Keeping output at AUTO

■ SETTING SPECIFICATIONS

Number of patterns: 19 patterns
Pattern repetition ... Maximum 9999 times

Number of steps: 19 steps/pattern
Step repetition ... Maximum 99 times

Control relations:
PID 8 types
P 0 to 999.9%
I ∞, 1 to 9999 seconds
D 0 to 9999 seconds
A.R.W. (Anti reset windup)
High limit --- 0 to 100.0%
Low limit --- -100 to 0.0%

Output relations:
Output deadband
Output preset
Output limiter 8 types
Rate-of-change limiter for output 8 types

Alarm relations: Alarm value 4 points 8 types, alarm types, alarm deadband, alarm delay

■ ALARM SPECIFICATIONS

Number of alarm points:
4 points
Alarm types: Absolute value alarm, deviation alarm
Output signal: Relay output signal (a contact)
1 common terminal for AL1 and AL2, 1 common terminal for AL3 and AL4
Contact capacity
Resistance load 100 to 240VAC 30VDC 3A or less
Inductive load 100 to 240VAC 30VDC 1.5A or less
Smallest load 5VDC 10mA or more

■ GENERAL SPECIFICATIONS

Rated power voltage:
General power supply specifications 100 to 240VAC
24V Power supply specifications 24VAC/24VDC
Rated power supply frequency:
General power supply specifications 50/60Hz
24V Power supply specification 50/60Hz (24VAC)
Maximum power consumption:
General power supply specifications
Without options 100VAC 10VA
240VAC 15VA
With options 100VAC 15VA
240VAC 20VA
24V Power supply specifications
Without options 24VAC 10VA
24VDC 5W
With options 24VAC 15VA
24VDC 10W
Working temperature range:
-10 to 50°C
Working humidity range:
10 to 90%RH
Power failure countermeasures:
Settings stored in EEPROM (Rewrite count: One million times or less) and stored by a lithium battery for 5 years or more
Terminal screws: M3.5
Insulation resistance: Between primary terminals and secondary terminals
20MΩ or more (500VDC)
Between primary terminals and ground terminal
20MΩ or more (500VDC)
Between secondary terminals and ground terminal
20MΩ or more (500VDC)
Withstand voltage: Between primary terminals and secondary terminals
1500VAC (For 1 minute)
Between primary terminals and ground terminal
1500VAC (For 1 minute)
Between secondary terminals and ground terminal
500VAC (For 1 minute)
*Primary terminal: Terminals for power supply (100 to 240VAC), control output and alarm output
Casing: Fire-retardant polycarbonate
Color: Gray or black
Mounting: Panel mounting
External dimensions: 96 (H) x 96 (W) x 127 (D) mm
*The depth from the front panel is 120mm.
Weight: Without options Approximately 450g
With options Approximately 580g

■ SAFETY STANDARD

CE: EN61326: 1997 +A1+A2+A3
EN61010-1: 2001 (Overvoltage category II, pollution degree 2)
* Under the test conditions of EMC directives, there may be variation of indication value or output value which is equivalent to maximum ±10% or maximum 2mV, whichever is greater..
UL: UL61010-1 2nd edition
c–UL: CAN/CSA C22.2 No.61010-1-04

■ REFERENCE OPERATING CONDITIONS

Ambient temperature: 23°C ±2°C
Ambient humidity: 55%RH ±5% (No dew condensation)
Power voltage: General power supply specifications
100VAC ±1%
24V power supply specifications
24VDC ±1%
Power supply frequency:
General power supply specifications
50/60Hz ±0.5%
24V power supply specifications
DC
Mounting angle: Forward or backward ±3°, lateral ±3°
Installation height: Altitude 2000m or below
Vibration: 0m/s^2
Shock: 0m/s^2
Mounting condition: Single-unit panel mounting (Space above, below, right and left of unit is needed.)
Wind: None
External noise: None
Warm up time: 30 minutes or longer

■ NORMAL OPERATING CONDITIONS

Ambient temperature: -10°C to 50°C (-10°C to 40°C for closed mounting)
Ambient humidity: 10 to 90%RH (no dew condensation)
Power voltage: General power supply specifications 90 to 264VAC
24V Power supply specifications 21.6 to 26.4VDC/AC
Power supply frequency:
General power supply specifications 50/60Hz ± 2%
24V Power supply specifications DC, 50/60Hz ± 2%
Mounting angle: Forward or backward ±10°, lateral ±10°
Installation height: Altitude 2000m or below
Vibration: 2m/s^2
Shock: 0m/s^2
Mounting condition: Single-unit panel mounting (Space above and below of the unit is needed.)
External noise: None
Rate of ambient temperature change:
10°C/hour or less

■ TRANSPORT CONDITIONS

Ambient temperature: -20°C to 60°C
Ambient humidity: 5 to 90%RH (no dew condensation)
Vibration: 4.9m/s^2 (10 to 60Hz)
Shock: 392m/s^2
Under the condition that the unit is packed for shipment by the factory

■ STORAGE CONDITIONS

Ambient temperature: -20°C to 60°C
For long term storage, the temperature should be 10°C to 30°C.
Ambient humidity: 5 to 90%RH (no dew condensation)
Vibration: 0m/s^2
Shock: 0m/s^2
Under the condition that the unit is packed for shipment by the factory

■ OPTIONS

●Transmission signal output

Output a signal corresponding to set value (SV), process value (PV), manipulated vale (MV), etc.

Number of output: 1 point

Output signal: 4 - 20mA (Load resistance 400Ω or less)
0 - 1V
(Output resistance Approx.10Ω, Load resistance 50kΩ or more)
0 - 10V
(Output resistance Approx.10Ω, Load resistance 50kΩ or more)

Output accuracy: ±0.1% of full scale

Output resolution: Approximately 1/30000

●Communications interface

With RS232C, RS422A or RS485, the setting and measured values of the controller can be transmitted to a master CPU and various parameters can be set by the master CPU.

Number of communications points:
1 point

Communications type: RS232C, RS422A, RS485

Communication speed: 2400/4800/9600/19200/38400 bps

Protocol: MODBUS (RTU), MODBUS (ASCII), PRIVATE

●Panel sealing

By mounting the controller to a panel, it has the panel sealing equivalent to [IP54 compliance].

●Terminal cover

It covers the terminals for safe. The cover is transparent.

●2-output type

2 kinds of output with direct and reverse actions are outputted and simultaneous control of heating/cooling is enabled.

Control period: Approx. 0.1 seconds

Output type: ON-OFF pulse type, Current output type, Voltage output type, SSR drive pulse type
Any combinations of these types are enabled.

Control system: PID system

●External drive input

Operation by external contact signal input is enabled.

Input signal: No-voltage contact, open-collector signal

Functions: 1. Run/Stop
2. Advance
3. Reset
4. Wait * Not available for 3 external drive inputs

● Pattern Selecting input

Selection of pattern No. by external contact signal input is enabled.

Input signal: No-voltage contact, open-collector signal

Function: Pattern No. selection 5 points

●Status signal output

Current operation status can be outputted.

Output signal: Open-collector signal

Functions: 1. Run/stop
2. Advance
3. Reset
4. Wait

●Time signal output

Time signal can be outputted for each preset pattern/step.

Output signal: Open-collector signal

Function: Time signal 5 points
* 4 points in case of time signal 4 points specification

●End signal output

Program operation end status can be outputted.

Output signal: Open-collector signal

Function: End

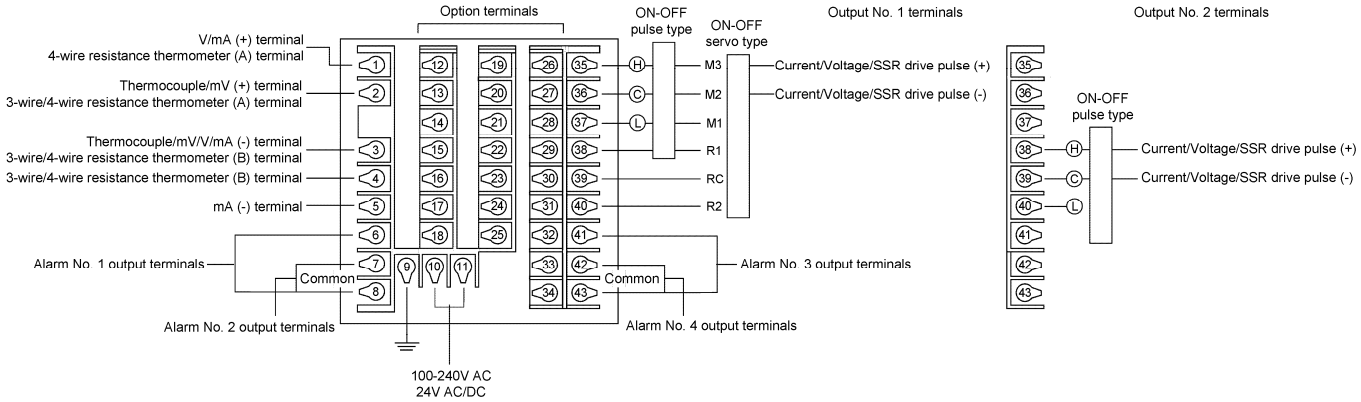
■ DETAILED SPECIFICATIONS OF ACCURACY RATING

Input type		Accuracy rating	Exceptional specifications
Thermocouple	B	±0.1%±1digit	Less than 400℃: Not specified / 400℃ to less than 800℃: ±0.2% ±1 digit
	R, S		0℃ to less than 400℃: ±0.2% ±1 digit
	N		
	K		-200℃ to less than 0℃: ±0.2% ±1digit or the value equivalent to ±60 μV, whichever is greater
	E		-270℃ to less than 0℃: ±0.2% ±1digit or the value equivalent to ±80 μV, whichever is greater
	J		-200℃ to less than 0℃: ±0.2% ±1digit or the value equivalent to ±80 μV, whichever is greater
	T		-270℃ to less than 0℃: ±0.2% ±1digit or the value equivalent to ±40 μV, whichever is greater
	U		-200℃ to less than 0℃: ±0.2% ±1digit or the value equivalent to ±40 μV, whichever is greater
	L		-200℃ to less than 0℃: ±0.2% ±1digit
	WRe5-WRe26		
	W-WRe26		0℃ to less than 400℃ ±0.3% ±1 digit
	NiMo-Ni		
	PlatinelⅡ		
	CR-AuFe	±0.2%±1digit	
	PR5-20		0K to less than 200K: ±0.5% ±1 digit / 20K to less than 50K: ±0.3% ±1 digit
	PtRh40-PtRh20		0℃ to less than 100℃: Not specified / 100℃ to less than 200℃: ±0.5% ±1 digit
DC voltage / DC current		±0.1%±1digit	0℃ to less than 400℃: ±1.5% ±1 digit / 400℃ to less than 800℃: ±0.8% ±1 digit
Resistance thermometer	Pt100 Old Pt100 JPt100	±0.1%±1digit	For the measuring range of [-100℃ to 100℃] only: ±0.15% ±1digit
	JPt50		
	Pt-Co	±0.15%±1digit	4K to less than 20K : ±0.5% ±1digit / 20K to less than 50K : ±0.3%±1digit

* The above ratings are the measurement range conversion accuracies under the reference operating conditions.
For thermocouple inputs, the reference junction compensation accuracy is added.

* K, E, J, T, R, S, B, N : IEC584 (1977, 1982), JIS C 1602-1995, JIS C 1605-1995
WRe5-WRe26、W-WRe26, NiMo-Ni, Platinel II, CR-AuFe, PtRh40-PtRh20 : ASTM Vol.14.03
U, L : DIN43710-1985
Pt100 : IEC751 (1995), JIS C 1604-1997
Old dPt100 : IEC751 (1983), JIS C 1604-1989, JIS C 1606-1989
JPt100 : JIS C 1604-1981, JIS C 1606-1986
JPt50 : JIS C 1604-1981

■ TERMINAL ARRANGEMENT

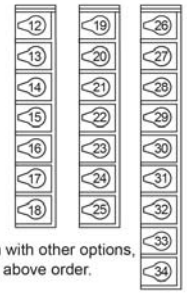


●Option terminals

Options common to each zone

T	N	D	P	M
TS1	RUN/STOP		PTN10	TS1
TS2	ADV	WAIT	PTN8	TS2
TS3	RESET	RESET	PTN4	TS3
TS4	WAIT	ADV	PTN2	TS4
TS5	END	RUN/STOP	PTN1	END
COM	COM	COM	COM	COM

1st ← 2nd ← 3rd zone



Based on combination with other options, assign the zone in the above order.

T: 5 Time signal outputs
N: 4 Status signal + End signal outputs
D: 4 External drive inputs
P: Pattern selecting input
M: 4 Time signal + End signal outputs

Communications interface (1st zone)

R	A	S
RD	RDA	SA
SD	RDB	SB
SG	SDA	SG
	SDB	
	SG	

R: RS232C
A: RS422A
S: RS485

Transmission signal output (2nd zone)

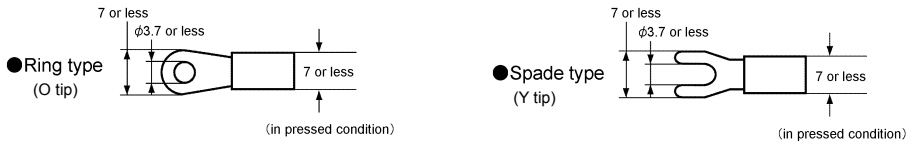
1,2,3,4

External drive input (3rd zone)

5	6	7	8
TS1	TS1	RUN/STOP	PTN10
TS2	TS2	ADV	PTN8
TS3	TS3	RESET	PTN4
TS4	TS4	WAIT	PTN2
END	TS5	WAIT	PTN1
RESET	RESET	RESET	RESET
ADV	ADV	ADV	ADV
RUN/STOP	RUN/STOP	RUN/STOP	RUN/STOP
COM	COM	COM	COM

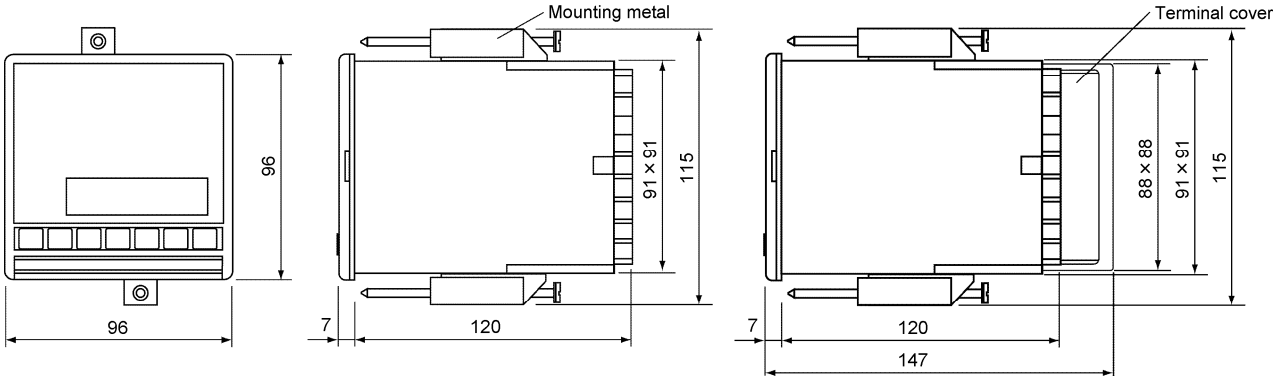
5: 4 Time signal + End signal outputs + 3 External drive inputs
6: 5 Time signal outputs + 3 External drive inputs
7: 4 Status signal outputs + 4 External drive inputs
8: 3 External drive inputs + Pattern selecting input

● ABOUT CRIMP STYLE TERMINALS

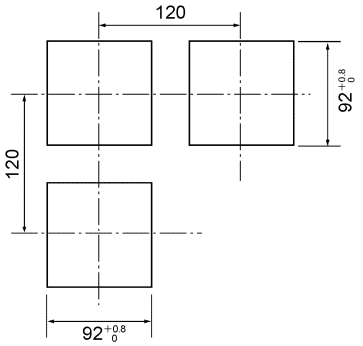


*Use terminal with insulation

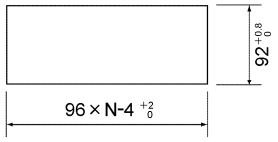
■EXTERNAL DIMENSIONS



●PANEL CUTOUT



●Closed mounting panel dimensions



N: Number of mounted instruments

Unit: mm

Specifications subject to change without notice. Printed in Japan (I) 2018. 7 Recycled Paper

CHINO CORPORATION
32-8 KUMANO-CHO, ITABASHI-KU, TOKYO 173-8632
PHONE: +81-3-3956-2171
FAX: +81-3-3956-0915
E-mail: inter@chino.co.jp
Website: http://www.chino.co.jp

KP2000 SERIES

DIGITAL PROGRAM CONTROLLER

PERFORMANCE SPECIFICATION
CHINO

The KP2000 series is a 96x96mm digital program controller with the indicating accuracy of ±0.1%, the control cycle of approximately 0.1 seconds and maximum 30 program patterns (maximum 19 steps/ pattern).
The configuration of highly functional system is enabled by various options including 2 transmission signal outputs, 2 communications ports and arbitrarily-allocation of digital inputs/outputs.

■ FEATURES

●Large easy-to-view 5-digit display

Process value (PV) and set value (SV) are displayed by large easy-to-view 5-digit display indicators. The resolution of 0.1°C is enabled for more than 1000°C.

●Outstanding controllability

Two types of PID algorithms, the position-type PID algorithm and the speed-type PID algorithm, have been installed. You can select the optimum PID algorithm for an object controlled.

●Program pattern

Settings of maximum 19 steps per pattern and maximum 30 sets of patterns are enabled. Repeating of a whole program pattern, linking of program patterns and repeating of a specific step in a program pattern are enabled, too.

●Versatile control functions provided

Versatile control functions, such as the automatic PID system, which executes control by PID parameters preset at every SV sections, and selection of the 2-output control system from PID system and split system for 2-output types, are available.

●Communications 2-port type provided

Models with 2 communications ports are available. In addition, speeding up and highly-functionalization of communications have been realized. For example, you can use 1 port for high order communications with a personal computer and another port for the communications remote (digital remote) function. The communications protocol can be arbitrarily selected from [MODBUS] and [PRIVATE].

●Transmission signal 2-output type provided

2 types of transmission signal output, the high-precision type (0.1% of full scale) and the general type (0.3% of full scale), are available. Transmission signal 2-output types with these 2 transmission signal outputs and models with transmitter power supply are available.

●DI/DO arbitrarily-allocation

When the digital input (DI) or the digital output (DO) is added, arbitrarily-allocation for assigning functions to those DI/DO's is enabled. It is the function enabling allocations such as [External drive input] to DI1 to DI3 and [Pattern selecting input] to DI4 to DI6.

●Output up to 8 points of time signals enabled

With the 8 digital outputs type added, up to 8 points of time signals can be outputted by allocating time signal TS1 to TS8.

●Heater disconnection alarm

The heater disconnection alarm can be added to ON-OFF pulse output types or SSR drive pulse types only.

By connecting the designated CT externally, the current value of heater is measured and can be indicated on the operation screen.

●Conforming to international safety standards and European directives (CE)

The controller is conformity with European directives (CE), and is UL and c-UL approved.

●Conforming to RoHS

The controller is an environmental consideration product which does not contain directed hazardous substances such as lead, etc.

■ MODELS

KP2□□□□□□□□−□□□

- Input signal
  - 0: Universal input
  - 4: 4-wire resistance thermometer
- Control mode (Output No. 1)
  - 1: ON-OFF pulse type PID
  - 2: ON-OFF servo type PID (Standard load specification)
  - 3: Current output type PID
  - 5: SSR drive pulse type PID
  - 6: Voltage output type PID
  - 8: ON-OFF servo type PID (Very light load specification)
- Control mode (Output No. 2)*
  - 0: None
  - 1: ON-OFF pulse type PID *1
  - 3: Current output type PID *1
  - 5: SSR drive pulse type PID *1
  - 6: Voltage output type PID *1
- 1st zone*
  - 0: None
  - 9: Heater disconnection alarm*2
  - P: 6 Digital inputs
  - M: 4 Digital inputs + Heater disconnection alarm*2
  - T: 6 Digital outputs
  - N: 4 Digital outputs + Heater disconnection alarm*2
- 2nd zone*
  - 0: None
  - 1: Transmission signal output (High-precision type: 4 - 20mA)
  - 2: Transmission signal output (High-precision type: 0 - 1V)
  - 3: Transmission signal output (High-precision type: 0 - 10V)
  - 4: Transmission signal output (High-precision type: Others)
  - J: Transmission signal output (General type: 4 - 20mA)
  - K: Transmission signal output (General type: 0 - 1V)
  - L: Transmission signal output (General type: 0 - 10V)
  - 9: Heater disconnection alarm*2
  - P: 6 Digital inputs
  - M: 4 Digital inputs + Heater disconnection alarm*2
  - T: 6 Digital outputs
  - N: 4 Digital outputs + Heater disconnection alarm*2
- 2nd PLUS zone*
  - 0: None
  - J: 2nd transmission signal output (General type:4-20mA)*3
  - K: 2nd transmission signal output (General type:0-1V)*3
  - L: 2nd transmission signal output (General type:0-10V)*3
  - H: Transmitter power supply*4
- 3rd zone
  - 0: None
  - R: Communications 1 port (RS232C) + 3 Digital inputs
  - A: Communications 1 port (RS422A) + 1 Digital input
  - S: Communications 1 port (RS485) + 3 Digital inputs
  - B: Communications 2 ports (RS232C + RS232C) + 1 Digital input
  - C: Communications 2 ports (RS232C + RS422A) + 1 Digital input
  - D: Communications 2 ports (RS232C + RS485) + 1 Digital input
  - E: Communications 2 ports (RS485 + RS232C) +1 Digital input
  - F: Communications 2 ports (RS485 + RS422A) + 1 Digital input
  - G: Communications 2 ports (RS485 + RS485) + 1 Digital input
  - 9: Heater disconnection alarm*2
  - P: 6 Digital inputs
  - M: 4 Digital inputs+ Heater disconnection alarm*2
  - T: 6 Digital outputs
  - N: 4 Digital outputs + Heater disconnection alarm*2
  - U: 8 Digital inputs
  - V: 6 Digital inputs + Heater disconnection alarm*2
  - W: 8 Digital outputs
  - X: 6 Digital outputs + Heater disconnection alarm*2
  - Y: 3 Digital inputs + 5 Digital outputs
  - Z: 4 Digital inputs + 4 Digital outputs
- Case color
  - G: Gray
  - B: Black*
- Panel sealing and terminal cover *
  - 0: None
  - 1: Terminal cover
  - 2: IP54 panel sealing
  - 3: IP54 panel sealing + Terminal cover
- Power supply voltage
  - A: 100 to 240V (AC)
  - D: 24VAC/24VDC

* Option

*1 The control mode (Output No.1) can be selected from 1,3,5 or 6 only.

*2 Only available to the unit having output No.1 (or No.2) of 1or 5.
Multiple selection in different option zone is not available.
In case of pulse type in both Output No.1 and No.2, output No.1 makes alarm judgement.

*3 It can be selected when the 2nd zone is 1, 2, 3 or 4 only.

*4 It can be selected when the 2nd zone is 0, 1, 2, 3, 4, J, K or L only.

Note: For options common to 1st zone, 2nd zone and 3rd zone, assign them in the order of [9], [P] and [M] from 3rd zone first.

■ MEASUREMENT RANGES

●Universal input

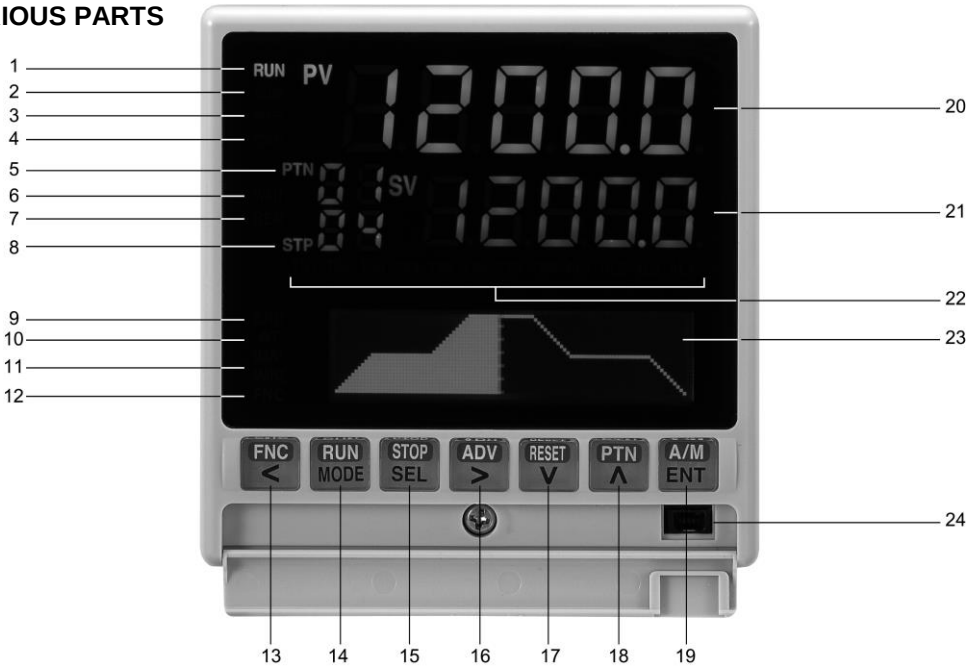
Measuring ranges		Scale ranges
Thermocouples	B	0.0 to 1820.0℃
	R	0.0 to 1760.0℃ 0.0 to 1200.0℃
	S	0.0 to 1760.0℃
	K	-200.0 to 1370.0℃ 0.0 to 600.0℃ -200.0 to 300.0℃
	E	-270.0 to 1000.0℃ 0.0 to 700.0℃ -270.0 to 300.0℃ -270.0 to 150.0℃
	J	-200.0 to 1200.0℃ -200.0 to 900.0℃ -200.0 to 400.0℃ -100.0 to 200.0℃
	T	-270.0 to 400.0℃ -200.0 to 200.0℃
	WRe5-WRe26	0.0 to 2310.0℃
	W-WRe26	0.0 to 2310.0℃
	NiMo-Ni	-50.0 to 1410.0℃
	CR-AuFe	0.0 to 280.0K
	N	0.0 to 1300.0℃
	PR5-20	0.0 to 1800.0℃
	PtRh40-PtRh20	0.0 to 1880.0℃
	Platinel II	0.0 to 1390.0℃ 0.0 to 600.0℃
	U	-200.0 to 400.0℃
	L	-200.0 to 900.0℃
DC voltage	10mV	-10 to 10mV
	20mV	-20 to 20mV
	50mV	-50 to 50mV
	100mV	-100 to 100mV
	5V	-5 to 5 V
	10V	-10 to 0 V
DC current	20mA	0 to 20 mA
Resistance thermometer	JPt100	-200.0 to 649.0℃ -200.0 to 400.0℃ -200.0 to 200.0℃ -100.0 to 100.0℃
	Old Pt100	-200.0 to 649.0℃ -200.0 to 400.0℃ -200.0 to 200.0℃ -100.0 to 100.0℃
	JPt50	-200.0 to 649.0℃
	Pt100	-200.0 to 850.0℃ -200.0 to 400.0℃ -200.0 to 200.0℃ -100.0 to 100.0℃

●4-wire resistance thermometer

Measuring ranges		Scale ranges
Resistance thermometer	JPt100	-200.0 to 649.0℃ -200.0 to 400.0℃ -200.0 to 200.0℃ -100.0 to 100.0℃
	Old Pt100	-200.0 to 649.0℃ -200.0 to 400.0℃ -200.0 to 200.0℃ -100.0 to 100.0℃
	JPt50	-200.0 to 649.0℃
	Pt-Co	4.0 to 374.0K
	Pt100	-200.0 to 850.0℃ -200.0 to 400.0℃ -200.0 to 200.0℃ -100.0 to 100.0℃

[Standards]
K,E,J,T,R,S,B,N:IEC584(1977,1982),JIS C 1602 -1995,JIS C 1605 -1995
WRe5-WRe26,W-WRe26,NiMo-Ni,Platinel Ⅱ,CR-AuFe,PtRh40-PtRh20:ASTMVol.14.03
U,L:DIN43710-1985
Pt100:IEC751(1995),JIS C 1604 -1997
OldPt100：IEC751(1983),JIS C 1604 -1989,JIS C 1606 -1989
JPt100:JIS C 1604 -1981,JIS C 1606 -1986
JPt50:JIS C 1604 -1981

■ NAMES OF VARIOUS PARTS



Display

1. Operation status (RUN) indication
   Lights in operation.
2. Operation stop (STOP) indication
   Lights in the state of operation stop.
3. RESET indication
   Lights when operation is cancelled and returns to the start point.
4. Constant value operation (CONST) indication
   Light in constant value operation.
5. Pattern No. (PTN) indication
6. Alarm-standby (WAIT) indication
   Lights in alarm-standby status or when alarm is cancelled.
   Blinks when standby time alarm is activated.
7. Program remote (REM) indication
   Lights when operation is executed by digital input.
8. Executing step number (STP) indication
   The step No. being executed is indicated.
   (Blinks in real temperature compensation operation.)
9. Error (ERR) indication
   Lights when sampling of input is abnormal.
10. Auto-tuning operation (AT) indication
    Lights in auto-tuning operation.
11. Manual operation (MAN1/MAN2) indication
    Lights when the output No.1 or No. 2 is in manual output operation.
12. Function (FNC) operation indication
    Lights when the function key is operated.
20. Process value (PV) indication
21. Set value (SV) indication
22. Time signal (TS1 to TS8) indication
    Alarm activation (AL1 to 4) indication

Function keys

13. FNC key
    With the operation screen displayed, pressing it puts the controller in the operation key mode. With the settings screen displayed, pressing it puts the controller in the setting key mode and it operates to move the cursor backwards.
14. RUN key
    In the operation key mode, it operates as RUN key. With the settings screen displayed, pressing it puts the controller in the setting key mode and it is used for switching between the operation screen and the mode screen of Mode 0, or for switching from the settings screen to the mode screen.
15. STOP key
    In the operation key mode, it operates as STOP key. With the settings screen displayed, pressing it puts the controller in the setting key mode and it is used to switch the settings screen.
16. ADV (Advance) key
    In the operation key mode, it operates as ADV key. With the settings screen displayed, pressing it puts the controller in the setting key mode and it is used for moving the cursor and for selecting a parameter.
17. RESET key
    In the operation key mode, it operates as RESET key. With the settings screen displayed, pressing it puts the controller in the setting key mode and it is used for changing a setting value (or selecting a parameter) in descending order.
18. PTN (Pattern) key
    In the operation key mode, it operates as PTN key. With the settings screen displayed, pressing it puts the controller in the setting key mode and it is used for changing a setting value (or selecting a parameter) in ascending order.
19. A/M (Auto/Manual) key
    In the operation key mode, it operates as A/M key. With the settings screen displayed, pressing it puts the controller in the setting key mode and it is used for registering the settings.

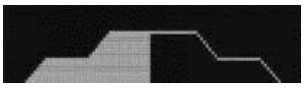
24. Engineering port

Lower display

23. A wide variety of operation screens are prepared and arbitrarily-selection is enabled.
    On the whole program pattern display screen, the simultaneous display of the shape of whole program pattern and the progressed pattern position has been realized.

Output screen

Time screen


Pattern screen

■ INPUT SPECIFICATIONS

Input signal: Thermocouple
B, R, S, K, E, J, T, N, WRe5-WRe26, W-WRe26, NiMo-Ni, CR-AuFe, PR5-20, PtRh40-PtRh20, Platinel II, U, L
DC voltage
±10mV, ±20mV, ±50mV, ±100mV, ±5V, ±10V
DC 0 to 20 mA
Resistance thermometer
Pt100, JPt100, Old Pt100, JPt50, Pt-Co

Measuring range: Thermocouple 28 ranges,
DC voltage 6 ranges,
DC current1 range,
Resistance thermometer 14 ranges.
*For details, refer to [Measurement ranges].

Accuracy rating: ± 0.1% of measurement range ± 1 digit
*For details, refer to [Detailed specifications of accuracy ratings].

Reference junction compensation accuracy:
K, E, J, T, N, Platinel II --- ±0.5°C or a value equivalent to ±20μV, whichever is greater
(at ambient temperature of 23°C ± 10°C)
Others --- ±1.0°C or a value equivalent to ± 40μV, whichever is greater

Resolution: Approximately 1/30000

Sampling rate: Approximately 0.1 seconds

Burnout: Upscale burnout is only enabled in thermocouple, DC voltage (±50mV or less) and resistance thermometer (3-wire type). For the burnout, the output value of Output No. 1 can be set arbitrarily, the output value of Output No. 2 is fixed at 0% and the high limit alarm is set at ON (for the upscale burnout).
(The burnout is disabled in DC voltage (±100mV or more), DC current, resistance temperature (4-wire type).

Input impedance:

Thermocouple	1MΩ or more
DC voltage	1MΩ or more
DC current	Approximately 250Ω

Allowable signal source resistance:

Thermocouple	100Ω or less
DC voltage (mV)	100Ω or less
DC voltage (V)	300Ω or less

Allowable wire resistance (resistance thermometer):
5Ω or less (Same resistance for all wires)

Rated current (resistance thermometer):
Approximately 1mA

Maximum allowable input:
Thermocouple ±20V or less
DC voltage ±20V or less
DC current ±30mA or less ±7.5V or less
Resistance thermometer 500Ω or less, ±5V or less

Maximum common mode voltage:
30VAC

Common mode rejection ratio:
130dB or more (50/60Hz)

Normal mode rejection ration:
50dB or more (50/60Hz)

■ DISPLAY SPECIFICATIONS

Display element: Upper display LED
Lower display LCD (with back light) 108 x 24 dots

Display content: Upper display
PV 5-digit, SV 5-digit, status indications, etc.
Lower display
MV, output status, setting screens, etc.

■ CONTROL SPECIFICATIONS

Control cycle: Approximately 0.1 seconds

Output type: ON-OFF pulse type, ON-OFF servo type, Current output type, SSR drive pulse type, Voltage output type

ON-OFF pulse type: Output signal ON-OFF pulse conductive signal
Contact capacity
Resistive load 100 to 240VAC 30VDC 5A or less
Inductive load 100 to 240VAC 30VDC 2.5A or less
Smallest load 5VDC 10mA or more
Contact protection Small CR element built-in
ON-OFF pulse cycle 1 to 180 seconds

ON-OFF servo type: Output signal ON-OFF servo conductive signal
Contact capacity of standard load
Resistive load 100 to 240VAC 30VDC 5A or less
Inductive load 100 to 240VAC 30VDC 2.5A or less
Smallest load 5VDC 10mA or more
Contact capacity of very light load
Resistive load 100 to 240VAC 30VDC 20mA or less
Inductive load 100 to 240VAC 30VDC 20mA or less
Smallest load 5VDC 1mA or more
Feedback resistance 100Ω to 2kΩ
Contact protection Small CR element built-in

Current output type: Output signal 4 to 20mA
Load resistance 750Ω or less

SSR drive pulse type:

Output signal	ON-OFF pulse voltage signal
Output voltage	ON voltage 12VDC ± 20%
	OFF voltage 0.8VDC or less
Load current	20mA or less
Pulse cycle	1 to 180 seconds

Voltage output type:

Output signal	0 to 10V
Output impedance	Approx 10Ω
Load resistance	50kΩ or more

Output limiter: -5.0 to 105.0%

Rate-of-change limiter for output:
0.1 to 100.0%

Output preset: With P action (Settings of I and D = 0), Output at PV = SV -100.0 to 100.0%
Output No. 2 is 0%.

Output deadband: In case of 2-position control (Setting of P = 0), Setting range 0.1 to 9.9%

Control action: With direct/reverse selection

Output at PV abnormality:
Over-range, under-range, abnormal internal data

Manual output operation:
Output by manual setting -5.0 to 105.0%
MAN → AUTO Balanceless bumpless
AUTO → MAN Keeping output at AUTO

■ SETTING SPECIFICATIONS

Number of patterns: 30 patterns
Pattern repetition ... Maximum 9999 times

Number of steps: 19 steps/pattern
Step repetition ... Maximum 99 times

Control relations: PID 8 types

P	0 to 999.9%
I	∞, 1 to 9999 seconds
D	0 to 9999 seconds

A.R.W. (Anti reset windup)
High limit --- 0 to 100.0%
Low limit --- -100 to 0.0%

Output relations: Output deadband
Output preset
Output limiter 8 types
Rate-of-change limiter for output 8 types

Alarm relations: Alarm value 4 points 8 types, alarm types, alarm deadband, alarm delay

■ ALARM SPECIFICATIONS

Number of alarm points:
4 points

Alarm types: Absolute value alarm, deviation alarm, absolute value deviation alarm, setting value alarm, output value alarm, FAIL, timer

Output signal: Relay output signal (a contact)
1 common terminal for AL1 and AL2, 1 common terminal for AL3 and AL4
Contact capacity
Resistance load 100 to 240VAC 30VDC 3A or less
Inductive load 100 to 240VAC 30VDC 1.5A or less
Smallest load 5VDC 10mA or more

■ GENERAL SPECIFICATIONS

Rated power voltage:
General power supply specifications 100 to 240VAC
24V Power supply specifications 24VAC/24VDC

Rated power supply frequency:
General power supply specifications 50/60Hz
24V Power supply specification 50/60Hz (24VAC)

Maximum power consumption:
General power supply specifications

Without options	100VAC 10VA
	240VAC 15VA
With options	100VAC 15VA
	240VAC 20VA

24V Power supply specifications

Without options	24VAC 10VA
	24VDC 5W
With options	24VAC 15VA
	24VDC 10W

Working temperature range:
-10 to 50°C

Working humidity range:
10 to 90%RH

Power failure countermeasures:
Settings stored in EEPROM (Rewrite count: One million times or less) and stored by a lithium battery for 5 years or more

Terminal screws: M3.5

Insulation resistance: Between primary terminals and secondary terminals
20MΩ or more (500VDC)
Between primary terminals and ground terminal
20MΩ or more (500VDC)
Between secondary terminals and ground terminal
20MΩ or more (500VDC)

Withstand voltage: Between primary terminals and secondary terminals
1500VAC (For 1 minute)
Between primary terminals and ground terminal
1500VAC (For 1 minute)
Between secondary terminals and ground terminal
500VAC (For 1 minute)
*Primary terminal: Terminals for power supply (100 to 240VAC), control output and alarm output

Casing: Fire-retardant polycarbonate

Color: Gray or black

Mounting: Panel mounting

External dimensions: 96 (H) x 96 (W) x 127 (D) mm
*The depth from the front panel is 120mm.

Weight: Without options Approximately 450g
With options Approximately 580g

■ SAFTY STANDARD

CE: EN61326: 1997 +A1+A2+A3
EN61010-1: 2001 (Overvoltage category II, pollution degree 2)
* Under the test conditions of EMC directives, there may be variation of indication value or output value which is equivalent to maximum ±10% or maximum 2mV, whichever is greater..

UL: UL61010-1 2nd edition

c–UL: CAN/CSA C22.2 No.61010-1-04

■ REFERENCE OPERATING CONDITIONS

Ambient temperature: 23°C ±2°C

Ambient humidity: 55%RH ±5% (No dew condensation)

Power voltage: General power supply specifications
100VAC ±1%
24V power supply specifications
24VDC ±1%

Power supply frequency:
General power supply specifications
50/60Hz ±0.5%
24V power supply specifications
DC

Mounting angle: Forward or backward ±3°, lateral ±3°

Installation height: Altitude 2000m or below

Vibration: 0m/s2

Shock: 0m/s2

Mounting condition: Single-unit panel mounting (Space above, below, right and left of unit is needed.)

Wind: None

External noise: None

Warm up time: 30 minutes or longer

■ NORMAL OPERATING CONDITIONS

Ambient temperature: -10°C to 50°C (-10°C to 40°C for closed mounting)

Ambient humidity: 10 to 90%RH (no dew condensation)

Power voltage: General power supply specifications 90 to 264VAC
24V Power supply specifications 21.6 to 26.4VDC/AC

Power supply frequency:
General power supply specifications 50/60Hz ± 2%
24V Power supply specifications DC, 50/60Hz ± 2%

Mounting angle: Forward or backward ±10°, lateral ±10°

Installation height: Altitude 2000m or below

Vibration: $2m/s^2$

Shock: $0m/s^2$

Mounting condition: Single-unit panel mounting (Space above and below of the unit is needed.)

External noise: None

Rate of ambient temperature change:
10°C/hour or less

■ TRANSPORT CONDITIONS

Ambient temperature: -20°C to 60°C

Ambient humidity: 5 to 90%RH (no dew condensation)

Vibration: $4.9m/s^2$ (10 to 60Hz)

Shock: $392m/s^2$

Under the condition that the unit is packed for shipment by the factory

■ STORAGE CONDITIONS

Ambient temperature: -20°C to 60°C
For long term storage, the temperature should be 10°C to 30°C.

Ambient humidity: 5 to 90%RH (no dew condensation)

Vibration: $0m/s^2$

Shock: $0m/s^2$

Under the condition that the unit is packed for shipment by the factory

■ OPTIONS

●Transmission signal output

Output a signal corresponding to set value (SV), process value (PV), manipulated vale (MV), etc.

Number of output: 1 point

Output signal: 4 - 20mA (Load resistance 400Ω or less)
0 - 1V
(Output resistance Approx.10Ω, Load resistance 50kΩ or more)
0 - 10V
(Output resistance Approx.10Ω, Load resistance 50kΩ or more)

Output accuracy: High-precision type ±0.1% of full scale
General type ±0.3% of full scale

Output resolution: High-precision type Approx. 1/30000
General type Approx. 1/15000

●Communications interface

With RS232C, RS422A or RS485, the setting and measured values of the controller can be transmitted to a master CPU and various parameters can be set by the master CPU.

Number of communications port:
2 ports

Communications type: RS232C, RS422A, RS485

Communication speed: 2400/4800/9600/19200/38400 bps

Protocol: MODBUS (RTU), MODBUS (ASCII), PRIVATE

●Heater disconnection alarm

It is the function for detecting heater disconnection by CT input.

Measurement range: 10 to 100A AC (50/60Hz)

Accuracy rating: ±5.0% of full scale ± 1 digit

Designated CT: Use [CTL-12-S36-8] made by URD Co., Ltd.

●Panel sealing

By mounting the controller to a panel, it has the panel sealing equivalent to [IP54 compliance].

●Terminal cover

It covers the terminals for safe. The cover is transparent.

●2-output type

2 kinds of output with direct and reverse actions are outputted and simultaneous control of heating/cooling is enabled.

Control period: Approx. 0.1 seconds

Output type: ON-OFF pulse type, Current output type, Voltage output type, SSR drive pulse type
Any combinations of these types are enabled.

Control system: PID system

●Digital input (DI)

The following switching is enabled by digital input signal.

Input signal: No-voltage contact, open-collector signal

External contact capacity:
5VDC 2mA

Functions:
1. Selection of pattern No. (6 points)
2. Manual output operation/automatic output operation (2 points)
3. Holding of PV
4. Run/stop
5. Advance
6. Reset
7. Wait
8. Fast
9. Start/reset of timer (4 points)
10. Alarm output cancellation
11. Preset manual/Automatic output operation

●Digital output (DO)

Time signal or status signal can be outputted externally open-collector signal.

Output signal: Open-collector signal

Capacity: 24VDC, Maximum 50mA

Functions:
1. Time signal (Maximum 8 points)
2. Run/stop
3. Advance
4. Reset
5. Wait
6. End

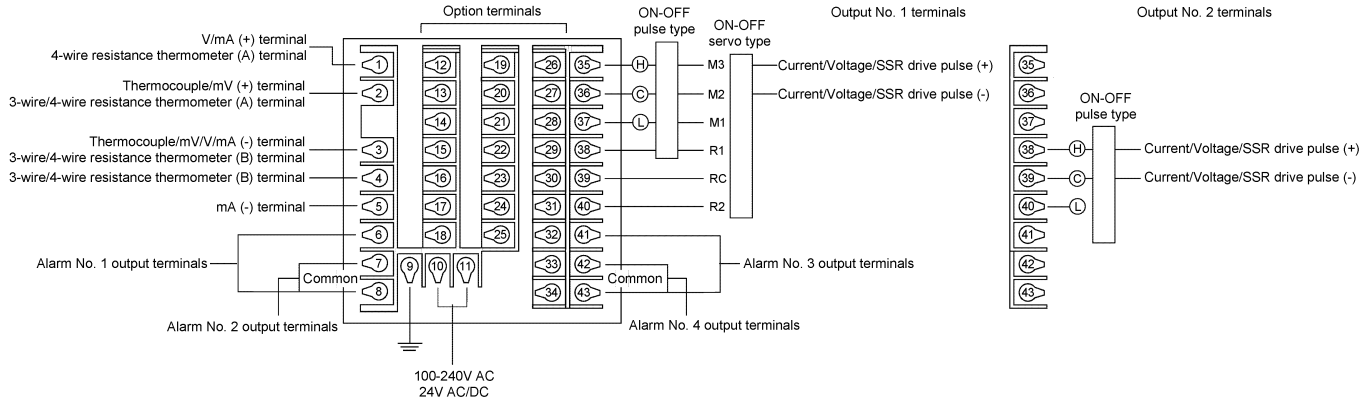
■ DETAILED SPECIFICATIONS OF ACCURACY RATING

Input type		Accuracy rating	Exceptional specifications
Thermocouple	B	±0.1%±1digit	Less than 400℃: Not specified / 400℃ to less than 800℃: ±0.2% ±1 digit
	R、S		0℃ to less than 400℃: ±0.2% ±1 digit
	N		
	K		-200℃ to less than 0℃: ±0.2% ±1digit or the value equivalent to ±60μV, whichever is greater
	E		-270℃ to less than 0℃: ±0.2% ±1digit or the value equivalent to ±80μV, whichever is greater
	J		-200℃ to less than 0℃: ±0.2% ±1digit or the value equivalent to ±80μV, whichever is greater
	T		-270℃ to less than 0℃: ±0.2% ±1digit or the value equivalent to ±40μV, whichever is greater
	U		-200℃ to less than 0℃: ±0.2% ±1digit or the value equivalent to ±40μV, whichever is greater
	L		-200℃ to less than 0℃: ±0.2% ±1digit
	WRe5-WRe26		
	W-WRe26		0℃ to less than 400℃ ±0.3% ±1 digit
	NiMo-Ni		
	Platinel Ⅱ		
	CR-AuFe	±0.2%±1digit	0K to less than 200K: ±0.5% ±1 digit / 20K to less than 50K: ±0.3% ±1 digit
	PR5-20		0℃ to less than 100℃: Not specified / 100℃ to less than 200℃: ±0.5% ±1 digit
	PtRh40-PtRh20		0℃ to less than 400℃: ±1.5% ±1 digit / 400℃ to less than 800℃: ±0.8% ±1 digit
DC voltage / DC current		±0.1%±1digit	
Resistance thermometer	Pt100 Old Pt100 JPt100	±0.1%±1digit	For the measuring range of [-100℃ to 100℃] only: ±0.15% ±1digit
	JPt50		
	Pt-Co	±0.15%±1digit	4K to less than 20K : ±0.5% ±1digit / 20K to less than 50K : ±0.3%±1digit

* The above ratings are the measurement range conversion accuracies under the reference operating conditions.
For thermocouple inputs, the reference junction compensation accuracy is added.

* K、E、J、T、R、S、B、N : IEC584 (1977、1982)、JIS C 1602-1995、JIS C 1605-1995
WRe5-WRe26、W-WRe26、NiMo-Ni、Platinel Ⅱ、CR-AuFe、PtRh40-PtRh20 : ASTM Vol.14.03
U、L : DIN43710-1985
Pt100 : IEC751 (1995)、JIS C 1604-1997
Old dPt100 : IEC751 (1983)、JIS C 1604-1989、JIS C 1606-1989
JPt100 : JIS C 1604-1981、JIS C 1606-1986
JPt50 : JIS C 1604-1981
WRe5-WRe26、W-WRe26、NiMo-Ni、Platinel Ⅱ、CR-AuFe、PtRh40-PtRh20 : ASTM Vol.14.03

■ TERMINAL ARRANGEMENT

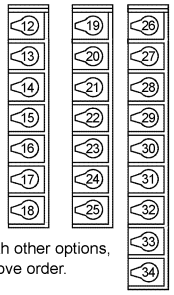


●Option terminals

Options common to each zone

9	P	M	T	N
CT	DI	CT	DO	CT
CT	DI	CT	DO	CT
	DI	DI	DO	DO
	DI	DI	DO	DO
	DI	DI	DO	DO
	DI	DI	DO	DO
	COM	COM	COM	COM

1st ← 2nd ← 3rd zone

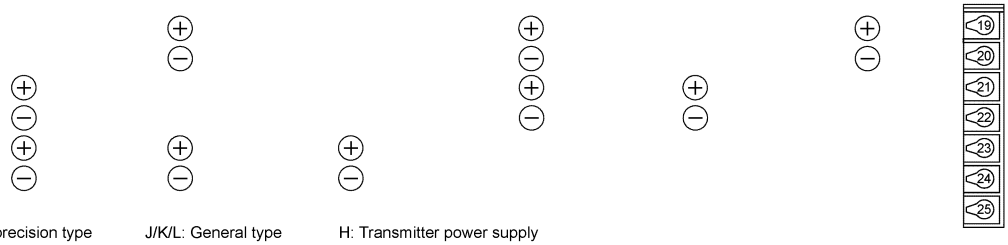


Based on combination with other options, assign the zone in the above order.

9: Heater disconnection alarm P: 6 Digital inputs
M: 4 Digital inputs + Heater disconnection alarm
T: 6 Digital outputs N: 4 Digital outputs + Heater disconnection alarm

Transmission signal output (2nd zone)

1/2/3/4 + H	J/K/L + H	H	J/K/L + 1/2/3/4	1/2/3/4	J/K/L



1/2/3/4: High-precision type J/K/L: General type H: Transmitter power supply

Communications interface + Digital input (3rd zone)

R	A	S	B	C	D	E	F	G
RD	RDA	SA	RD1	RD1	RD1	SA1	SA1	SA1
SD	RDB	SB	SD1	SD1	SD1	SB1	SB1	SB1
SG	SDA	SG	SG1	SG1	SG1	SG1	SG1	SG1
DI	SDB	DI	RD2	RDA2	SA2	RD2	RDA2	SA2
DI	SG	DI	SD2	RDB2	SB2	SD2	RDB2	SB2
DI	DI	DI	SG2	SDA2	SG2	SG2	SDA2	SG2
COM	COM	COM		SDB2			SDB2	
			DI	DI	DI	DI	DI	DI
			COM	COM	COM	COM	COM	COM

R: Communications RS232C + 3 Digital inputs
A: Communications RS422A + 1 Digital input
S: Communications RS485 + 3 Digital inputs
B: Communications RS232C + Communications RS232C + 1 Digital input
C: Communications RS232C + Communications RS422A + 1 Digital input
D: Communications RS232C + Communications RS485 + 1 Digital input
E: Communications RS485 + Communications RS232C + 1 Digital input
F: Communications RS485 + Communications RS422A + 1 Digital input
G: Communications RS485 + Communications RS485 + 1 Digital input

●Option terminals (continued)

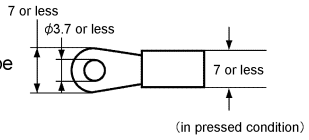
Digital input/output + Heater disconnection alarm (3rd zone)

U	V	W	X	Y	Z	
DI	CT	DO	CT	DO	DO	26
DI	CT	DO	CT	DO	DO	27
DI	DI	DO	DO	DO	DO	28
DI	DI	DO	DO	DO	DO	29
DI	DI	DO	DO	DO	DI	30
DI	DI	DO	DO	DI	DI	31
DI	DI	DO	DO	DI	DI	32
DI	DI	DO	DO	DI	DI	33
COM	COM	COM	COM	COM	COM	34

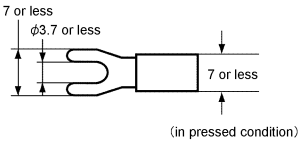
U: 8 Digital inputs
V: 6 Digital inputs + Heater disconnection alarm
W: 8 Digital outputs
X: 6 Digital outputs + Heater disconnection alarm
Y: 3 Digital inputs + 5 Digital outputs
Z: 4 Digital inputs + 4 Digital outputs

● ABOUT CRIMP STYLE TERMINALS

●Ring type

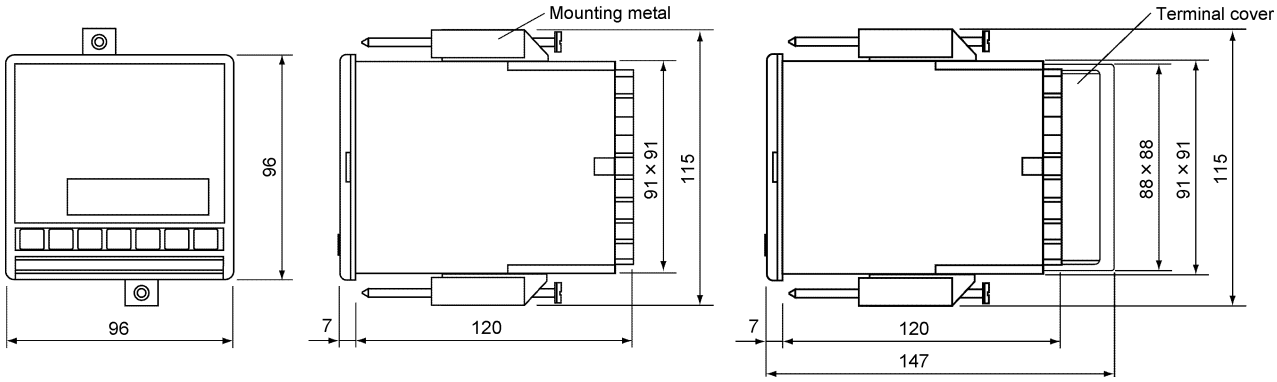


●Spade type

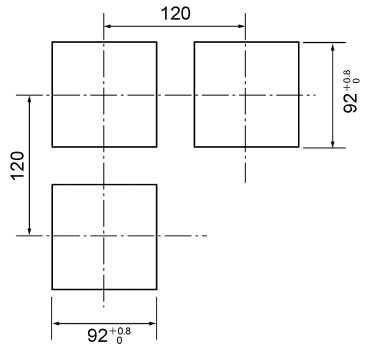


*Use terminal with insulation

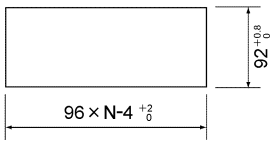
■EXTENAL DIMENSIONES



●PANEL CUTOUT



●Closed mounting panel dimensions



N: Number of mounted instruments

Unit: mm

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CHINO CORPORATION
32-8 KUMANO-CHO, ITABASHI-KU, TOKYO 173-8632
PHONE: +81-3-3956-2171
FAX: +81-3-3956-0915
E-mail: inter@chino.co.jp
Website: http://www.chino.co.jp