DP2000G series is a graphic program controller specially designed for wide range control. This control unit divides a control domain into a high region and a low region and controls extensively by changing two sensors for each region at a set point automatically. Good accuracy and stability are realized for both high and low temperature control by using an optimum sensor for each region. Automatic and Bumpless function realizes smooth control performance on switching the regions.

### FEATURES

- **Realizing wide range control by changing two sensors for high and low regions**
  Two sensors can be connected for each high and low region sensing. By switching to an appropriate sensor for each region, continuous control is available. Various changing types are selectable such as automatic change at a set point, changing by external input signal and the combination of both.

- **Employing clear 5.6" TFT color LCD display**
  Graphic screen of pattern progress status, display PV value/SV value/pattern/step/time and various monitor function such as trend display, enlarged data display and bar graph display are prepared.

- **Easy program pattern setting on graphic screen**
  Maximum 200 patterns, 199 steps/patterns (total 4000 steps) settings are available as well as pattern repeat, linking between patterns and endless program setting.

- **Parameter settings per step**
  Each parameter setting such as PID constant, alarm, guarantee soak and time signal is available per step.

- **High performance and universal input**
  Input selection from each range of thermocouple, DC voltage/current are available and unit has performance of 5 digits display, accuracy rating of ±0.1% and sampling period of 0.1sec.

- **Storing settings in CF card**
  Setting management is easy as all settings including setting program pattern and each parameter are stored in CF card and readout from it. PC software allows you to edit program pattern and parameter.

- **Various control application functions**
  2-output specification such as Heating/cooling output is applicable as control output has ON-OFF pulse type, ON/OFF servo type, current output type, SSR drive pulse type and voltage output type.

- **Abundant external input/output**
  Unit with external input 16 points and external output 28 points enables function assignment. Synchronized operation with peripherals is easy. Serial communications interface and transmission signal output are also prepared.

- **Interchangeable with DP series**
  DP series are easily replaced with DP2000G which has inherited characteristics of the DP series such as function, operability and terminal arrangement/configuration.
**OPERATION SCREEN**

- **Running status display at once**
  Running status display of pattern progress and PV/ SV/ MV/ variation.

- **Trend screen**
  Enlarged trend display of PV and SV.

- **Enlarged data screen**
  Enlarged display of PV/SV.

- **Bar-graph screen**
  Bar-graph display of PV/ SV/ MV.

- **Pattern setting screen**

- **Step parameter setting screen**

**KEY ARRANGEMENT**

```
A/M  RUN  RESET  DISP  ESC  
FNC  STOP  ADV  MENU  ENT  
```

Direction key
**INPUT SPECIFICATIONS**

Input points: 2 points (Range-L/Range-H)

Input types:
- DC voltage: ±10mV, ±20mV, ±50mV, ±100mV, ±35V, ±10V
- DC current: ±20mA

Thermocouple:

Accuracy rating:
- Refer to the table of measuring range and accuracy ratings

Sensor bias:
- K, E, J, T, N, Platinum: ±0.5% or less
- Other than above: ±1.0% or less

Input change:
- Input change by change 5V (automatic), external input signal or both.
- Function: Rampless (PV variation limit) at switching, PV start, Change error status, Range-H status, Dead band

Sampling period:
- Approx. 0.1 sec

Burnout:
- Burnout available for thermocouple, DC voltage (±50mV or less) and resistance thermometer
- Output value at burnout is settable to any value

Range setting:
- The useable range is settable within the measuring range (only for linear range)

Scaling:
- DC voltage/current input
  - Setting range: -99999 to 99999, decimal point specified
- Digital filter: 0 to -99.9sec

Allowable signal source:
- Thermocouple input: DC voltage input (100mV, ±50mV, ±100mV, ±35V, ±10V)
- DC voltage input: ±20mA
- Resistance thermometer: ±100mV, ±5V
- Other than above:
  - ±5V, ±10mV, ±20mV

Input resistance:
- Thermocouple/DC voltage input: ±1mA or more
- DC current input: ±20mV

Operation function:
- Square root calculation, Log operation

**PROGRAMMING SPECIFICATIONS**

Pattern set type:
- Target temp (SV)/Time or Ramp rate/Time
- Time setting: Hour/Minute/Second
- Ramp rate setting: Temperature/minute or temperature/time
- Number of steps: Up to 199 steps per pattern
- Number of patterns: Up to 200 patterns
- Total number of steps: Up to 4000 steps
- Repeat: Pattern --- Up to 9999 times, Step --- up to 99 times
- Step setup range: Target value --- Input scale range
- Ramp rate --- -99.999 to 99.999
- Time --- 0 to 9999 hours 99 minutes or 0 to 9999 minutes 59 seconds

Target value (SV) correction:
- Set Target value (SV) to a constant deviation from the reference value
- Fast-forward:
- Program fast-forward function provided
- (FAST):
- Approx. 10 times or 60 times
- End output:
- Select either constant value control or fixed output
- (setting: 5 to 105%)

Parameter registration:
- Each parameter is selectable per step

Parameter setting change:
- Changeable during operation
- Target value, time, ramp rate, PID, ARW, guarantee soak, output limit, output variation limit, alarm, limit, mass flow SV

Additional function:
- Pattern link, circle function, pattern edit

**CONTROL SPECIFICATIONS**

Control switching period:
- Approx. 0.1 (initial value)/0.2/0.3/0.5 sec

Control type:
- ON-OFF pulse type, ON-OFF servo type, current output type, SSR drive pulse type, voltage type output type

PID value:
- Automatic setting by auto tuning or Manual setting
- P --- 0 to 9999.9 (for 2 position operation)
- I --- 0 to 9999 sec (for no I operation)
- D --- 0 to 9999 sec

Auto tuning:
- AT1 --- Set by the target value during operation
- AT2 --- Preset the step interval coaxial 8 types
- AT3 --- Preset 8 automatic selection types for SV interval
- AT4 to AT6 --- Setting for the 2 outputs type

On-off pulse type:
- Output signal: On-off pulse conductive signal (relay contact)
- Contact capacity:
  - Resistance load 100 to 240VAC
  - 30VDC, 5A or less
  - Inductive load 100 to 240AC 30VDC
  - Minimum load 10VDC, 10mA or more

On-off servo type:
- Output signal: On-off servo conductive signal
- Contact protection:
- Standard load spec
  - Resistance load --- 100 to 240VAC
  - 30VDC, 2.5A or less
  - Minimum load --- 5VDC, 1mA or more

Output limit:
- Output limit: Upper 0.0 to 105.0%, Lower 0.0 to 100.0%

Control operation:
- Position type and speed type selectable
- Manual operation: Output range --- 0.0 to 10.5%

Program actions on power:
- Select to continue or reset the program when recovering the power

Control operation:
- Position type and speed type selectable

I output specification:
- Independent PID, Any combination of 6 types from On-off pulse type, current output type, SSR drive type, voltage output type, output current type (high accuracy), voltage output type (high accuracy)

Heat and cooling control:
- Cooling proportional operation, matching box operation

Cascade primary controller:
- Output (°) = a x control operation value + b + c x set value
- a: 0.00 to 1.00, b: 0.00 to 100.0
- Output destination: control output 1/2, transmission output 1/2

**ALARM SPECIFICATIONS**

Number of set points:
- 4 points + 4 points (for extended assignment setting)

J judgment method:
- Upper alarm or lower alarm (with/without wait) using an absolute value
- Upper alarm or lower alarm (with/without wait) using an deviation
- Upper alarm or lower alarm (with/without wait) using an absolute value deviation
- Upper alarm or lower alarm (with/without wait) using an measured value change rate
- Upper or lower limit judgment of output value (with/without wait)
- Upper or lower limit judgment of set value (with/without wait)

Control lock error, fail, wait time alarm, end signal
- Delay or latch function is selectable
Setting range: -99999 to 99999, decimal point linked with scaling
Dead band: 0.1 times of set resolution
Delay setting range: 1 to 10 times
Output type: Relay contact output 4 points --- (A contact, 1 common)
Contact capacity --- Resistance load 100 to 240V AC 30VDC, 3A or less
Inductive load 100 to 240VAC 30VDC, 1.5A or less
External output signal assignment 4 points (for extended assignment setting)
Alarm reset: Alarm can be cleared during occurrence

### EXTERNAL OUTPUT SIGNAL SPECIFICATION

- Number of output: 28 points (function assignment per point)
- Output type: Open collector output (24V DC, up to 50mA)
- Time signal output:
  - Default assignment --- 18 points
  - Output type --- ALL-ON/ ALL-OFF / maximum of 30 types per step
- Status output:
  - Default assignment --- 10 points
  - Output type --- RUN/STOP, ADV, RESET, WAIT, FAST, END, ALM-WAIT, SV-UP, SW-DOWN
- Selective assignment --- Pattern/step No.-8CD output

### EXTERNAL INPUT SIGNAL SPECIFICATION

- Number of inputs: 16 points (function assignable per point except external drive input)
- Input type:
  - Non voltage contact (contact capacity 12V DC, 2mA or more)
  - External power supply specification 12/24V DC ON when power is applied (up to 12mA/point)
- External drive input:
  - Default assignment --- 5 points
  - Input type --- RUN/STOP, ADV, RESET, WAIT, FAST
  - Selective assignment --- Circle pulse (program operation)
- Pattern select input:
  - Default assignment --- 10 points
  - Input type --- 10 types of 1, 2, 4, 8, 10, 20, 40, 80, 100, 200 select method --- Select the number from 1 to 200 using BCD code

### DISPLAY SPECIFICATION

- Screen:
  - 5.6"TFT color LCD
- Display content:
  - Operation screen
  - Home screen --- Pattern progress, pattern/step No.
  - Numeric data, status, time signal, alarm
  - Enlarged data screen, bar-graph screen, trend screen, D2/D1 screen
- Setting screen --- Pattern/sequence setting, various parameter setting, memory card management setting, maintenance, setting lock, communications, setting change during operation
- LCD backlight:
  - 4 brightness adjustment levels

### SETTING AND OPERATION SPECIFICATION

- Operation key type:
  - MENU, DISP, DIRECTION key, ENT, ESC, FNC, RUN, STOP, ADV, RESET, A/M
- Setting and operation method:
  - Setting --- Menu calling / cursor selection method
- Operation --- Direct key operation (combined with FNC)
- Menu setting:
  - Mode 0 (Execution steps setting)
  - Mode 1 (Operation status selection / Input change setting)
  - Mode 2 (Pattern and sequence)
  - Mode 3 (PID/Alarm)
  - Mode 4 (Output control)
  - Mode 5 (Input)
  - Mode 6 (Time signal/guarantee soak)
  - Mode 7 (Transmission)
  - Mode 8 (IC communications)
  - Mode 9 (Memory card)
  - Mode 10 (Enhanced setup)
  - Mode 11 (Maintenance)
  - Mode 12 (Help)

### SOFTWARE

- Software D-P parameter editing software
- Program pattern editing / file management / printing
- Setting parameter editing / file management / printing
- CF card reading / storing for DP-G

### OPTION SPECIFICATION

- Transmission signal output
  - Number of outputs: Up to 2 points
  - Output signal:
    - 4 to 20mA DC (load resistance 4000 ohm or less)
    - 0 to 1V DC (load resistance 50k ohm or more)
    - 1 to 5V DC (load resistance 50k ohm or more)
    - 0 to 10V DC (load resistance 50k ohm or more)
    - +1 to 5V DC for secondary transmission output
- Output accuracy:
  - Primary output --- ±0.1% of output span
  - Secondary output --- ±0.3% of output span

- Transmitter power supply (Insulation type)
  - Power voltage: 240V DC
  - Current capacity: Up to 30mA

- Communications interface
  - Number of communications points: Up to 2 points
  - Communications type:
    - RS232C, RS422A, RS485
    - COM2 for front and rear switching
  - Protocol: MODBUS/PRIVATE

### GENERAL SPECIFICATION

- Rated power voltage: 100 to 240V AC 50/60Hz (universal power supply)
- Maximum power consumption: 50VA
- Reference operation condition:
  - Ambient temperature humidity range --- 21 to 25°C, 5 to 60%RH
  - Power voltage --- 100V AC ±1.0%
  - Power frequency --- 50/60Hz ±0.5%
  - Attitude --- Left/right ±3°, forward/backward ±3°
  - Warm-up time --- 30 minutes or more
- Normal operation condition:
  - Ambient temperature humidity range --- -10 to 50°C, 10 to 90%RH
  - Power voltage --- 90 to 264V AC
  - Power frequency --- 50/60Hz ±2%
  - Attitude --- Left/right ±10°, forward/backward ±10°
- Transportation condition:
  - At the packed condition on shipment from our factory
  - Ambient temperature humidity range --- -20 to 60°C, 5 to 90%RH (No dew condensation)
  - Vibration --- 10 to 60Hz 0.5g (4.9m/s²) or less
  - Impact --- 400 (352m/s²) or less
- Storage condition:
  - Ambient temperature humidity range --- -20 to 60°C, 5 to 90%RH (No dew condensation)
  - Power failure protection:
    - The settings are kept using EEPROM and lithium battery backed up RAM
  - Insulation resistance:
    - Between secondary terminal and protection conductor terminal --- 500V DC 10M ohm
    - Between primary terminal and protection conductor terminal --- 500V DC 20M ohm or more
    - Between primary terminal and secondary terminal --- 500V DC 20M or more
  - Withstand voltage:
    - Between secondary terminal and protection conductor terminal --- 500V AC for 1 minute
    - Between primary terminal and protection conductor terminal --- 1500V AC for 1 minute
    - Between primary terminal and secondary terminal --- 1500V AC for 1 minute
  - *Primary terminal: Power supply (100-240V AC), control output terminals, and alarm output terminals
  - *Secondary terminal: All terminals other than primary terminal
  - Protection:
    - Conformed to IP54
  - Case assembly material:
    - Case, Front bezel, input/output terminal board
    - Fire-retardant polycarbonate resin
  - External input/output, transmission output, communications terminal board --- PBT
  - Color:
    - Front bezel, case --- Gray or black
  - Terminal cover:
    - Standard provision
  - Weight:
    - Approx 1.7kg
  - Mounting:
    - Panel mounting
  - Terminal screw:
    - M3.5 (M3 for external input/output, transmission output, communications terminal board)
### Measuring Ranges

<table>
<thead>
<tr>
<th>Measuring range</th>
<th>Scale range</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>0.0 to 1820.0ºC</td>
</tr>
<tr>
<td>R</td>
<td>0.0 to 1760.0ºC</td>
</tr>
<tr>
<td>R</td>
<td>0.0 to 1200.0ºC</td>
</tr>
<tr>
<td>S</td>
<td>0.0 to 1760.0ºC</td>
</tr>
<tr>
<td>K</td>
<td>-200.0 to 1370.0ºC</td>
</tr>
<tr>
<td>E</td>
<td>-270.0 to 1000.0ºC</td>
</tr>
<tr>
<td>J</td>
<td>-200.0 to 1200.0ºC</td>
</tr>
<tr>
<td>T</td>
<td>-270.0 to 400.0ºC</td>
</tr>
<tr>
<td>WRe5-WRe26</td>
<td>0.0 to 2310.0ºC</td>
</tr>
<tr>
<td>W-WRe26</td>
<td>0.0 to 2310.0ºC</td>
</tr>
<tr>
<td>NiMo-Ni</td>
<td>-50.0 to 1410.0ºC</td>
</tr>
<tr>
<td>CR-AuFe</td>
<td>0.0 to 280.0K</td>
</tr>
<tr>
<td>N</td>
<td>0.0 to 1300.0ºC</td>
</tr>
<tr>
<td>PtRh40-PtRh20</td>
<td>0.0 to 1880.0ºC</td>
</tr>
<tr>
<td>Platinel II</td>
<td>0.0 to 1390.0ºC</td>
</tr>
<tr>
<td>U</td>
<td>-200.0 to 400.0ºC</td>
</tr>
<tr>
<td>L</td>
<td>-200.0 to 900.0ºC</td>
</tr>
</tbody>
</table>

#### DC voltage
- 10mV: -10 to 10mV
- 20mV: -20 to 20mV
- 50mV: -50 to 50mV
- 100mV: -100 to 100mV

#### DC current
- 5V: -5 to 5V
- 10V: -10 to 10V
- 20mA: 0 to 20mA

### Accuracy Ratings

**Input type** | **Accuracy rating** | **Exception**
---|---|---
B | ±0.1% ±1 digit | 0 to 400ºC: Not defined 400 to 800ºC: ±0.2% ± digit 0 to 400ºC: ±0.2% ± digit
R, S | ±0.1% ±1 digit | 0 to 400ºC: ±0.2% ± digit
N | ±0.1% ±1 digit | 0 to 400ºC: ±0.2% ± digit
K | ±0.1% ±1 digit | 0 to 400ºC: ±0.2% ± digit
E | ±0.1% ±1 digit | 0 to 400ºC: ±0.2% ± digit
J | ±0.1% ±1 digit | 0 to 400ºC: ±0.2% ± digit
T | ±0.1% ±1 digit | 0 to 400ºC: ±0.2% ± digit
U | ±0.1% ±1 digit | 0 to 400ºC: ±0.2% ± digit
L | ±0.1% ±1 digit | 0 to 400ºC: ±0.2% ± digit
WRe5-WRe26 | ±0.2% ± digit | 0 to 20K: ±0.5% ± digit 20 to 50K: ±0.3% ± digit
W-WRe26 | ±0.2% ± digit | 0 to 400ºC: ±0.5% ± digit 400 to 800ºC: ±0.8% ± digit
NiMo-Ni | ±0.2% ± digit | 0 to 400ºC: ±0.5% ± digit
Platinel II | ±0.2% ± digit | 0 to 400ºC: ±0.5% ± digit
CR-AuFe | ±0.2% ± digit | 0 to 400ºC: ±0.5% ± digit
PtRh40-PtRh20 | ±0.2% ± digit | 0 to 400ºC: ±0.5% ± digit

*Accuracy converted to the measuring range under the reference operation condition.
Reference junction compensation accuracy is added to thermocouple.
WRe5-WRe26, W-WRe26, NiMo-Ni, Platinel II, CR-AuFe, PtRh40-PtRh20 : ASTM Vol.14.03
U, L : DIN43710-1985*
TERMINAL ARRANGEMENT

Control output terminals
(Output1)

Current/voltage/ SSR drive pulse type (+) On-off pulse type
Current/voltage/ SSR drive pulse type (-)

External input/output terminals

Control output terminals
(Output2)

Current/voltage/ SSR drive pulse type (+) On-off pulse type
Current/voltage/ SSR drive pulse type (-)

EXTERNAL INPUT/OUTPUT TERMINALS

Time signal output terminals
Status output terminals
External drive input terminals and pattern selection input (BCD code) terminals

DO terminals

Transmitter power terminals

Alarm output terminals

Communications interface terminals (option)

Analog transmission output terminals (option)

EXTERNAL INPUT/OUTPUT TERMINALS

Time signal output terminals

<table>
<thead>
<tr>
<th>COM</th>
<th>TS 1</th>
<th>TS 2</th>
<th>TS 3</th>
<th>TS 4</th>
<th>TS 5</th>
<th>TS 6</th>
<th>TS 7</th>
<th>TS 8</th>
<th>TS 9</th>
<th>TS 10</th>
<th>TS 11</th>
<th>TS 12</th>
<th>TS 13</th>
<th>TS 14</th>
<th>TS 15</th>
<th>TS 16</th>
<th>TS 17</th>
<th>TS 18</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1B</td>
<td>1C</td>
<td>1D</td>
<td>1E</td>
<td>1F</td>
<td>1G</td>
<td>1H</td>
<td>1I</td>
<td>1J</td>
<td>2B</td>
<td>2C</td>
<td>2D</td>
<td>2E</td>
<td>2F</td>
<td>2G</td>
<td>2H</td>
<td>2I</td>
<td>2J</td>
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<tr>
<td>LOAD</td>
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<td>LOAD</td>
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</tr>
</tbody>
</table>

Status output terminals

<table>
<thead>
<tr>
<th>COM</th>
<th>RUN/STOP</th>
<th>ADV</th>
<th>RESET</th>
<th>WAIT</th>
<th>FAST</th>
<th>END</th>
<th>ALM/WAIT</th>
<th>ERROR</th>
<th>SV/UP</th>
<th>SV/DOWN</th>
<th>LOAD</th>
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</thead>
<tbody>
<tr>
<td>3A</td>
<td>3B</td>
<td>3C</td>
<td>3D</td>
<td>3E</td>
<td>3F</td>
<td>3G</td>
<td>3H</td>
<td>3I</td>
<td>3J</td>
<td>3K</td>
<td>3L</td>
</tr>
</tbody>
</table>

External drive input terminals and pattern selection input (BCD code) terminals

External drive signal

<table>
<thead>
<tr>
<th>COM</th>
<th>RUN/STOP</th>
<th>ADV</th>
<th>RESET</th>
<th>WAIT</th>
<th>FAST</th>
<th>END</th>
<th>ALM/WAIT</th>
<th>ERROR</th>
<th>SV/UP</th>
<th>SV/DOWN</th>
<th>LOAD</th>
</tr>
</thead>
<tbody>
<tr>
<td>4A</td>
<td>4B</td>
<td>4C</td>
<td>4D</td>
<td>4E</td>
<td>4F</td>
<td>4G</td>
<td>4H</td>
<td>4I</td>
<td>4J</td>
<td>4K</td>
<td>4L</td>
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</table>

BCD code

<table>
<thead>
<tr>
<th>COM</th>
<th>100°H</th>
<th>200°H</th>
<th>300°H</th>
<th>400°H</th>
<th>500°H</th>
<th>600°H</th>
<th>700°H</th>
<th>800°H</th>
<th>900°H</th>
<th>1000°H</th>
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<tbody>
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<td>5A</td>
<td>1</td>
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<td>2</td>
<td>3</td>
<td>4</td>
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<td>40</td>
<td>50</td>
<td>60</td>
<td>70</td>
<td>80</td>
<td>90</td>
<td>100</td>
</tr>
</tbody>
</table>

DIMENSIONS

PANEL CUTOUT

Unit: mm

Specifications subject to change without notice. Printed in Japan (I) 2018.8

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