DP2000G
WIDE RANGE
GRAPHIC PROGRAM CONTROLLER

PERFORMANCE SPECIFICATION
CHINO

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.

MODELS

DP21□□G□□□−□□□

INPUT
1 : Thermocouple/mV/V/mA

Control mode (output No.1)
1 : ON-OFF pulse PID
2 : ON-OFF servo PID (standard load spec)
3 : Current output PID (general type 4 to 20mA DC)
5 : SSR drive pulse PID
6 : Voltage output PID (general type 0 to 10V DC)
8 : ON-OFF servo PID (minimal load spec)
A : Current output PID (high accuracy type 4 to 20mA DC)
B : Current output PID (high accuracy type 1 to 5mA DC)
C : Voltage output PID (high accuracy type 0 to 10V DC)

Control mode (output No.2)
0 : None
1 : ON-OFF pulse PID *1 *OP*
3 : Current output PID (general type 4 to 20mA DC) *1 *OP*
5 : SSR drive pulse PID *1 *OP*
6 : Voltage output PID (general type 0 to 10V DC) *1 *OP*
A : Current output PID (high accuracy type 4 to 20mA DC) *1 *OP*
B : Current output PID (high accuracy type 1 to 5mA DC) *1 *OP*
C : Voltage output PID (high accuracy type 0 to 10V DC) *1 *OP*

Communications interface
0 : None
R : RS232C (COM1) *OP*
S : RS485 (COM1) *OP*
A : RS422A (COM1) *OP*
B : RS232C (COM1) + RS232C (COM2) *OP*
C : RS485 (COM1) + RS232C (COM2) *OP*
D : RS422A (COM1) + RS232C (COM2) *OP*
E : RS232C (COM1) + RS485 (COM2) *OP*
F : RS485 (COM1) + RS485 (COM2) *OP*
G : RS422A (COM1) + RS485 (COM2) *OP*

Transmission signal output 1
0 : None
1 : 4 to 20mA *OP*
2 : 0 to 1V *OP*
3 : 0 to 10V *OP*
4 : 1 to 5V *OP*

Transmission signal output 2
0 : None *2
1 : 4 to 20mA *OP*
2 : 0 to 1V *OP*
3 : 0 to 10V *OP*
(Adding only transmission signal output 2 is not available)

Case color
G : Gray
B : Black *OP*

External input/ output signal
0 : None *OP*
1 : Digital input/ output (non voltage contact input)
2 : Digital input/ output (External power supply spec for only input) *OP*

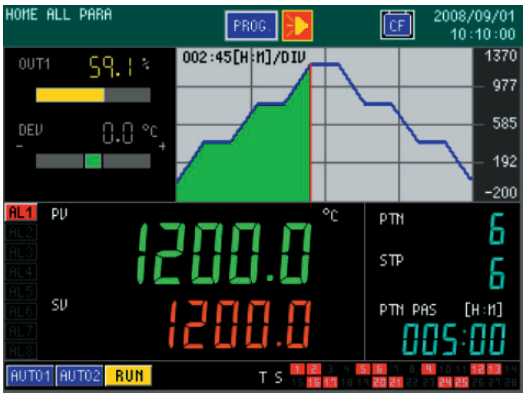
Transmitter power supply
0 : None
1 : Transmitter power supply *OP*

*1 Selectable when control mode (output1) is 1,3,5,6,A,B,C.
*2 COM1 is exclusive use for rear port, COM2 is rear port and front port switchable.
OP Option

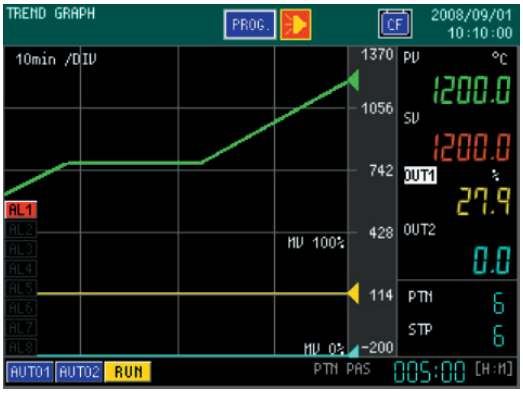
PSE-809A

OPERATION SCREEN

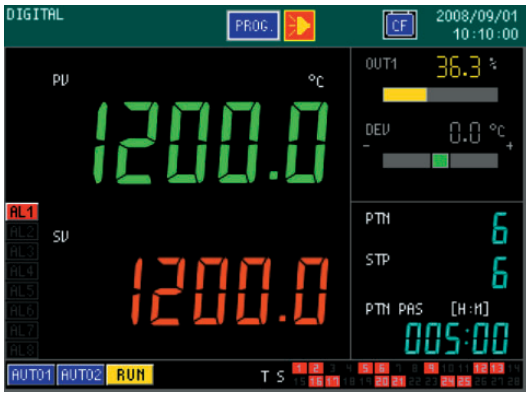
Running status display at once
Running status display of pattern progress and PV/ SV/ MV/ variation.



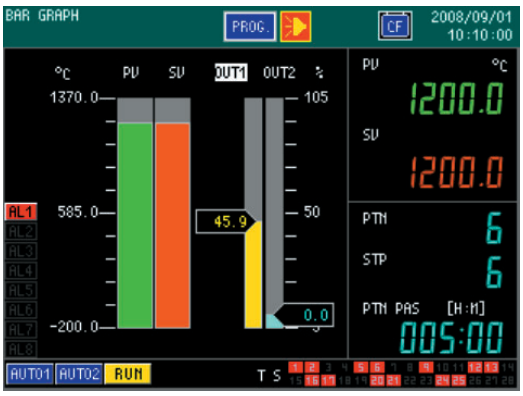
Trend screen
Enlarged trend display of PV and SV



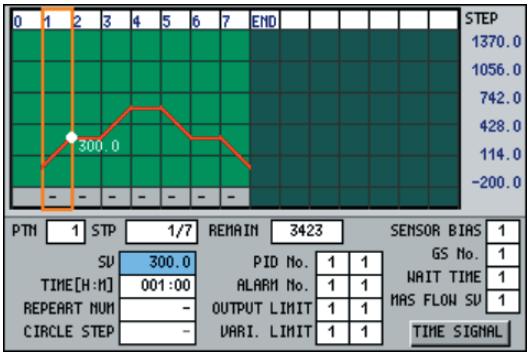
Enlarged data screen
Enlarged display of PV/SV



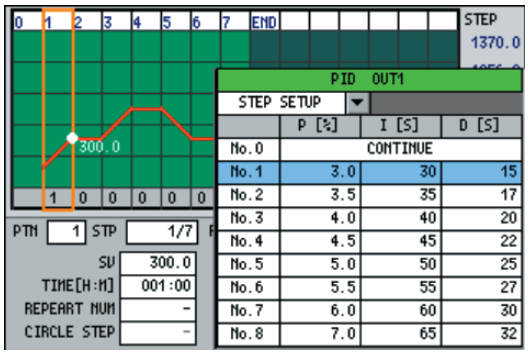
Bar-graph screen
Bar-graph display of PV/ SV/ MV



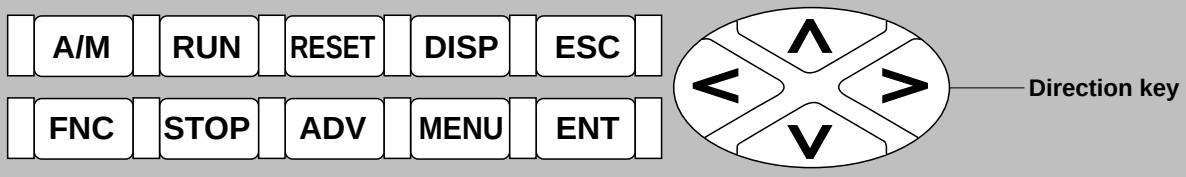
Pattern setting screen



Step parameter setting screen



KEY ARRANGEMENT



INPUT SPECIFICATIONS

Input points: 2 points (Range-L /Range-H)
Input types: DC voltage --- ±10mV, ±20mV, ±50mV, ±100mV, ±5V, ±10V
DC current --- 20mA
Thermocouple --- B, R, S, K, E, J, T, N, U, L, WRe5-WRe26, W-WRe26, NiMo-Ni, CR-AuFe, PR5-20, PtRh40-PtRh20,Platinel Ⅱ
Accuracy rating: Refer to the table of measuring range and accuracy ratings
Reference junction compensation accuracy:
K, E, J, T, N, Platinel Ⅱ --- ±0.5℃ or less
Other than above --- ±1.0℃ or less
Sensor bias: One kind (bias) for Range-H, Liner correction of 9 breaking points for Rang-L
Input change: Input change by change SV (automatic), external input signal or both.
Function: Bumpless (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)
User linearize table: Useable for DC voltage/ current input (19 break points)
Digital filter: 0 to −99.9sec
Allowable signal source:
Thermocouple input/ DC voltage (mV) --- 100Ω or less
DC voltage input (±5V, ±10V) --- 300Ω or less
Resistance thermometer (3 wire) --- 5Ω or less per wire
(4 wire) --- 100Ω or less per wire
Input resistance: Thermocouple/DC voltage input --- 1MΩ or more
DC current input --- Approx. 100Ω
Measuring current: Resistance thermometer input --- Approx. 1mA
Maximum allowable input: Thermocouple/DC voltage input --- ±20V DC
DC current input --- ±30mA
Operation function: Square roots calculation, Log operation

PROGRAMMING SPECIFICATIONS

Pattern set type: Target temp (SV)/Time or Ramp rate/Time
Time setting - Hour/Minute or Minute/Second
Ramp rate setting - Temperature/minute or temperature/second
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 999 hours 59 minutes or 0 to 999 minutes 59 seconds
Start temperature: Select either PV start or arbitrary set value start
Target value (SV) correction:
−99999 to 99999, decimal point linked with scaling
Fast-forward: (FAST) Program fast-forward function provided
(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
(Sequence programming)
- PID constant --- 8 types, or 8 automatic selection types for SV interval (including dead band, ARW upper/lower limits, and output preset)
- Output limit (upper/lower)/ output variation limit (upper/lower) 8 types for each, or 8 automatic selection types for SV interval
- Guarantee soak 8 types
- Wait time alarm 8 types
- Alarm 8 types for each (a set of 4points)
- Time signal 30 types, all ON, all OFF, reverse phase, repeat in a step
- Mass flow SV 8 types

Parameter setting change:
Changeable during operation
Target value, time, ramp rate, PID, ARW, guarantee soak, output limit, output variation limit, alarm, SV, 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 output type
PID value: Automatic setting by auto tuning or Manual setting
P --- 0 to 999.9% (0 for 2 position operation)
I --- 0 to 9999 sec (0 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 240V AC 30 VDC, 2.5A or less
Minimum load 5 VDC, 10mA or more
Contact protection---CR element built-in
On-off servo type: Output signal --- On-off servo conductive signal
Contact capacity--- Standard load spec
Resistance load --- 100 to 240VAC 30VDC 5A or less
Inductive load --- 100 to 240VAC 30VDC 2.5A or less
Minimum load --- 5VDC, 10mA or more
Minimal load spec
Resistance load --- 100 to 240 VAC 30VDC 20mA or less
Inductive load --- 100 to 240 VAC 30VDC 20mA or less
Minimum load --- 5VDC, 1mA or more
Feedback resistance --- 100Ω to 2kΩ
Contact protection --- Compact CR element built-in
Current output type: Output signal --- 4 to 20mA or 1 to 5mA
Load resistance --- 750Ω or less
Control output accuracy --- 0.1% for high accuracy type
SSR drive pulse type: Output signal --- On-off pulse voltage signal
At ON --- 12VDC±20% (maximum 20mA)
At OFF --- 0.8VDC or less
Voltage output type: Output signal --- 0 to 10 VDC
Output resistance --- Approx. 10Ω
Control output accuracy --- High accuracy type 0.1%
Output limit: Upper 0.0 to 105.0%, Lower −5.0 to 100.0%
Output variation limit: Up 0.01 to 100.00%
Down −0.01 to −100.00%
Output preset: Output setting in proportional operation when PV=SV
−100.0% to 100.00%
Output dead band: Dead band setting 0.0 to 9.9%
(0.1 to 9.9% for 2 position operation)
Control action: Direct/ reverse action switching
Guarantee soak: Deviation setting 0 to 99999, decimal point linked with scaling
Output at PV error: Individual setting of outputs at upper and lower limit errors
−5.0 to 105.0%
A.R.W: Upper 0.0 to 100.0%, lower −100.0 to 0.0%
Constant value operation:
Program (PROG) / constant (CONST) mode switching
Manual operation: Output range --- −5.0 to 105.0%
・Balanceless bumpless when switching from MAN to AUTO
・Output at AUTO kept when switching from AUTO to MAN
Program actions on repower:
Select to continue or reset the program when recovering the power
Control operation: Position type and speed type selectable
2 outputs specification: Independent PID, Any combination of 6 types from On-off pulse type, current output type, SSR drive type, voltage output type, current output type (high accuracy), voltage output type (high accuracy)
(No secondary output for ON-OFF servo type)
Heating and cooling control:
Cooling proportional operation, matching box operation
Cascade primary controller:
Output (%) =a x control operation value + b + c x set value
a, c: 0.00 to 1.00, b: −100.0 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)
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 a 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 loop 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 240VAC 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, ERR, SV-UP, SV-DOWN
Selective assignment --- Pattern/ step No.-BCD output
Alarm output: Selective assignment --- 8 types
Output type --- AL1 to AL8

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) External A/M switching, alarm reset, PV hold, SV hold
Pattern select input: Default assignment --- 10 points
Input type --- 10 types of 1, 2, 4, 8, 10, 20, 40, 80, 100, 200
Selection 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, DO/DI 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 (Communications)
Mode 9 (Memory card)
Mode 10 (Enhanced setup)
Mode 11 (Maintenance)
Mode 12 (Help)
Operation: Operation start/stop (RUN/STOP), operation reset (RESET), Stepping operation (ADV), auto/manual switching (A/M), Fast-forwarding (FAST)
Display operation: Switching between operation screens
HOME screen (registered operation screen) automatic display
Engineering port: Serial port on the front panel
(Custom cable connection)

MEMORY CARD SPECIFICATION (Card is optional)

Memory media: Compact flash (CF) card
Memory size: Up to 2 GB
Saved data: Setup parameters, program patterns
All data (for auto loading)
Function: Save/read/delete/verify
For program patterns, individual or all pattern save/delete selectable
Card format (simple format)

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℃, 50 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℃, 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℃, 5 to 90%RH (No dew condensation)
Vibration --- 10 to 60Hz 0.5G (4.9m/s²) or less
Impact --- 40G (352m/s²) or less
Storage condition: Ambient temperature humidity range --- -20 to 60℃, 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 20MΩ or more
Between primary terminal and protection conductor terminal --- 500V DC 20MΩ or more
Between primary terminal and secondary terminal ---500V DC 20MΩ or more
Withstand voltage: Between secondary terminal and protection conductor terminal --- 500V AC for 1minute
Between primary terminal and protection conductor terminal --- 1500V AC for 1minute
Between primary terminal and secondary terminal ---1500V AC for 1minute
*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)

SOFTWARE

DP-G 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 400Ω or less)
0 to 1V DC (load resistance 50kΩ or more)
1 to 5V DC (load resistance 50kΩ or more)
0 to 10V DC (load resistance 50kΩ 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: 24V 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

■MEASURING RANGES

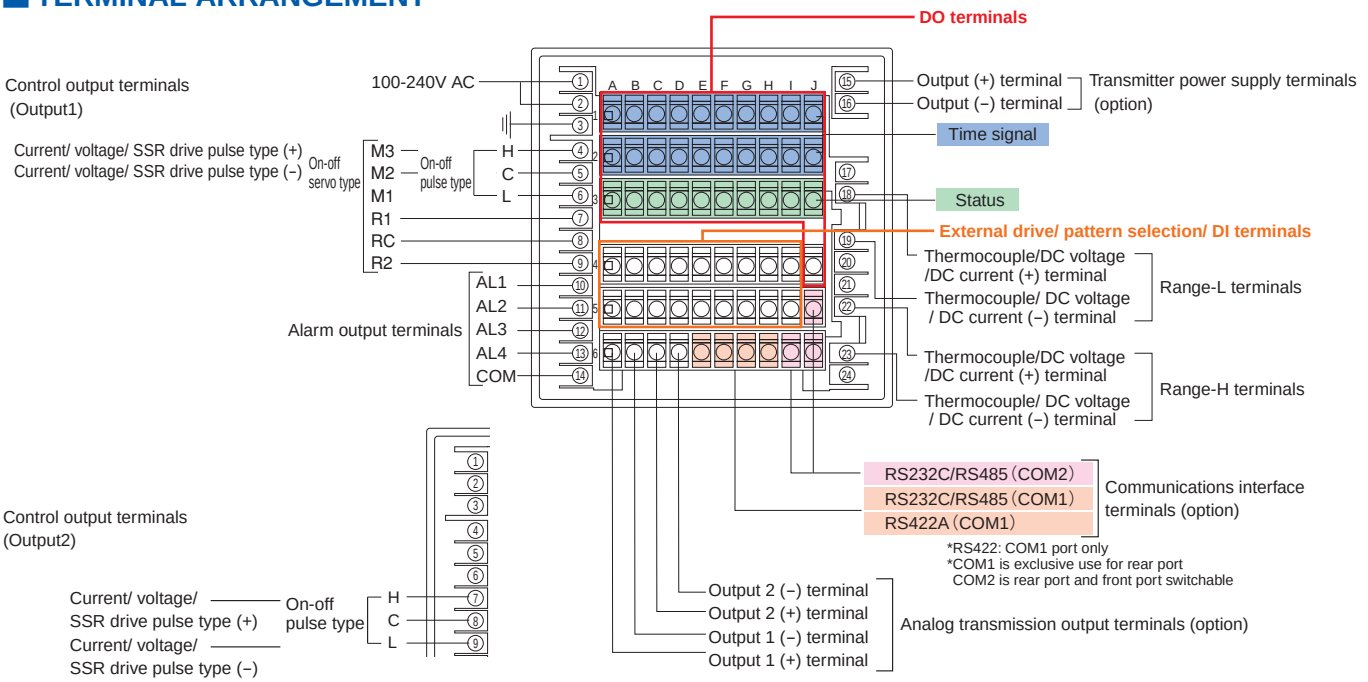
Measuring range		Scale range
T/C	B	0.0 to 1820.0ºC
	R	0.0 to 1760.0ºC
		0.0 to 1200.0ºC
	S	0.0 to 1760.0ºC
	K	-200.0 to 1370.0ºC
		0.0 to 600.0ºC
		-200.0 to 300.0ºC
	E	-270.0 to 1000.0ºC
		0.0 to 700.0ºC
		-270.0 to 300.0ºC
		-270.0 to 150.0ºC
	J	-200.0 to 1200.0ºC
		-200.0 to 900.0ºC
		-200.0 to 400.0ºC
		-100.0 to 200.0ºC
	T	-270.0 to 400.0ºC
		-200.0 to 200.0ºC
	WRe5-WRe26	0.0 to 2310.0ºC
	W-WRe26	0.0 to 2310.0ºC
	NiMo-Ni	-50.0 to 1410.0ºC
	CR-AuFe	0.0 to 280.0K
	N	0.0 to 1300.0ºC
	PtRh40-PtRh20	0.0 to 1880.0ºC
	Platinel Ⅱ	0.0 to 1390.0ºC
		0.0 to 600.0ºC
	U	-200.0 to 400.0ºC
	L	-200.0 to 900.0ºC
DC voltage	10mV	-10 to 10mV
	20mV	-20 to 20mV
	50mV	-50 to 50mV
	100mV	-100 to 100mV
DC current	5V	-5 to 5 V
	10V	-10 to 10 V
	20mA	0 to 20 mA

■ ACCURACY RATINGS

Input type		Accuracy rating	Exception
T/C	B	±0.1%±1digit	0 to 400ºC : Not defined
			400 to 800ºC : ±0.2%±1digit
	R、S		0 to 400ºC : ±0.2%±1digit
	N		
	K		-200 to 0ºC: ±0.2%±1digit
			or ±60μV-equivalent value, whichever is greater
	E		-270 to 0ºC: ±0.2%±1digit
			or ±80μV-equivalent value, whichever is greater
	J		-200 to 0ºC:±0.2%±1digit
			or ±80μV-equivalent value, whichever is greater
	T		-270 to 0ºC: ±0.2%±1digit
			or ±40μV-equivalent value, whichever is greater
	U		-200 to 0ºC: ±0.2%±1digit
			or ±40μV-equivalent value, whichever is greater
	L		-200 to 0ºC: ±0.2%±1digit
	WRe5-WRe26		
	W-WRe26		0 to 400ºC: ±0.3%±1digit
	NiMo-Ni		
	Platinel Ⅱ		
	CR-AuFe	±0.2%±1digit	0 to 20K: ±0.5%±1digit
			20 to 50K: ±0.3%±1digit
	PtRh40-PtRh20		0 to 400ºC: ±1.5%±1digit
			400 to 800ºC: ±0.8%±1digit
DC voltage / current		±0.1%±1digit	

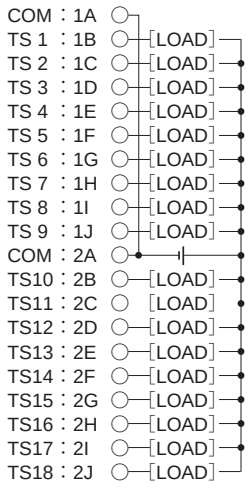
*Accuracy converted to the measuring range under the reference operation condition.
Reference junction compensation accuracy is added to thermocouple.
*K, E, J, T, R, S, B, N : IEC584 (1977, 1982), JIS C 1602-1995, JIS C 1605-1995,
WRe5-WRe26, W-WRe26, NiMo-Ni, Platinel**2**, CR-AuFe, PtRh40-PtRh20 : ASTM Vol.14.03 U, L : DIN43710-1985

TERMINAL ARRANGEMENT

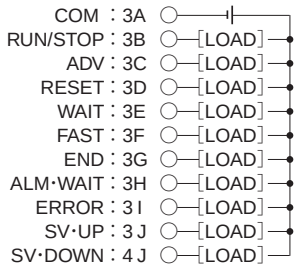


EXTERNAL INPUT/OUTPUT TERMINALS

Time signal output terminals



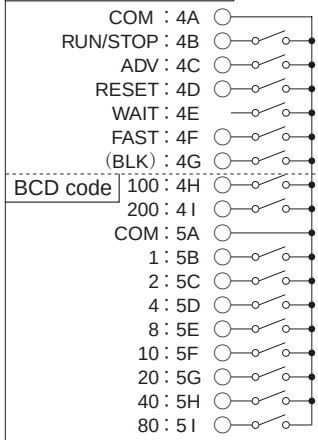
Status output terminals



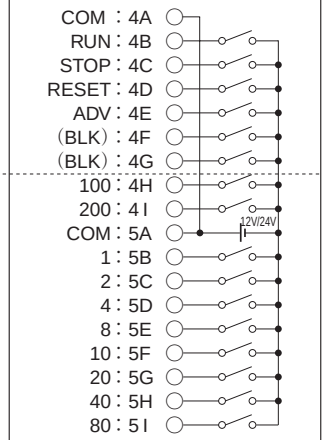
*COM: Common to time signal output

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

External drive signal

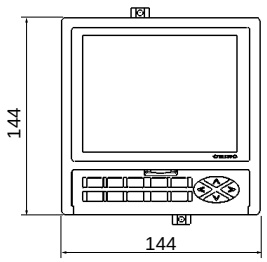


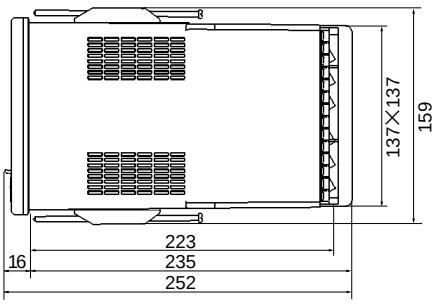
BCD code



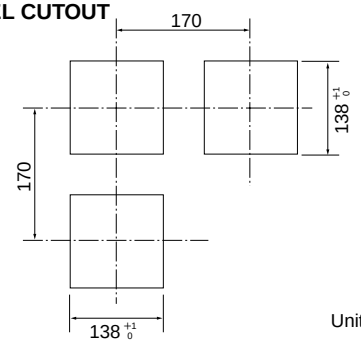
*External power supply spec
Applicable to equivalent of DP-I spec

DIMENSIONS





PANEL CUTOUT



Unit: mm

Specifications subject to change without notice. Printed in Japan (I) 2018. 8

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