

DP1000G

GRAPHIC PROGRAM CONTROLLER



DP1000G series is a graphic program controller employed high visibility 5.6" TFT color LCD display. Maximum 200 types of program pattern (Maximum 4000 steps) are stored and performance pattern is selectable. Control cycle of 0.1 sec, 5 digits display, high speed and high accuracy of $\pm 0.1\%$ indicating accuracy are realized.



FEATURES

● Employing clear 5.6" TFT color LCD display

Graphic screen of pattern progress status, display of PV value/SV value/pattern/step/time and various monitor functions such as program progress enlarged display, enlarged data display and bargraph display are prepared.

● Easy program pattern settings on graphic screen

Maximum 200 patterns/Maximum 4000 steps settings, pattern repeat, linking between patterns and endless program setting are available.

● Parameter settings per step

Each parameter setting such as SV/PV start, guarantee soak and time signal is available per step.

● High performance and universal input

Input selection from each range of thermocouple, DC voltage/current and resistance thermometer are available and unit has performance of 5 digit display, accuracy rating of $\pm 0.1\%$ 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

Heating/cooling output is applicable as control output has ON-OFF pulse 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 are easy. Serial communications interface and transmission signal output are also prepared.

● Interchangeable with DP series

DP series are easily replaced with DP1000G which inherited characteristics of DP series such as function, operability and terminal arrangement/configuration.

MODELS

DP10□□G□□□□□□□□

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*
 - 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

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

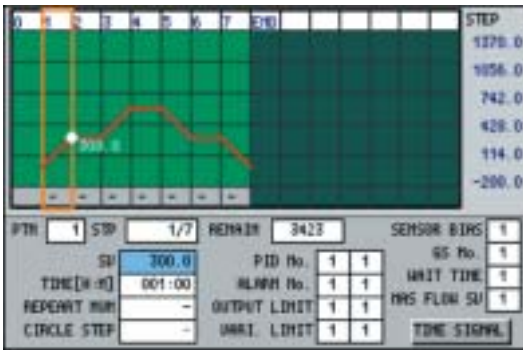


● **Bargraph screen**

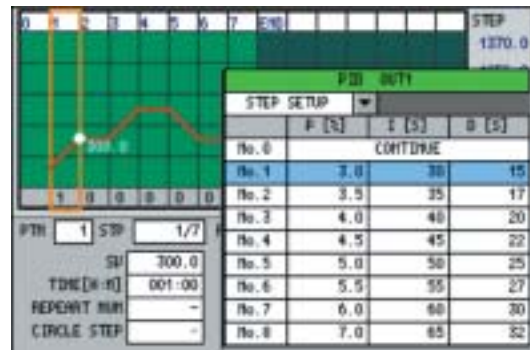
Bargraph display of PV/ SV/ MV



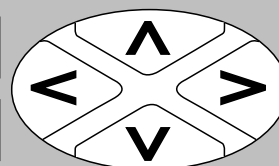
● **Pattern setting screen**



● **Step parameter setting screen**



KEY ARRANGEMENT



Direction key

INPUT SPECIFICATIONS

Input types: DC voltage --- $\pm 10\text{mV}$, $\pm 20\text{mV}$, $\pm 50\text{mV}$, $\pm 100\text{mV}$, $\pm 5\text{V}$, $\pm 10\text{V}$
 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
 Resistance thermometer --- Pt100, JPt100, old Pt100, Pt50, Pt-Co *3 wire and 4 wire

Accuracy rating: Refer to the table of measuring range and accuracy ratings
 Reference junction compensation accuracy: K, E, J, T, N, Platinel II --- $\pm 0.5^\circ\text{C}$ or less
 Other than above --- $\pm 1.0^\circ\text{C}$ or less

Sensor correction: Selectable by 0.1time resolution of the target resolution
 Sampling period: Approx 0.1 sec
 Burnout: Burnout available for thermocouple, DC voltage ($\pm 50\text{mV}$ 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) --- 100 Ω or less
 DC voltage input ($\pm 5\text{V}$, $\pm 10\text{V}$) --- 300 Ω or less
 Resistance thermometer (3 wire) --- 5 Ω or less per wire (4 wire) --- 100 Ω or less per wire

Input resistance: Thermocouple/DC voltage input --- 1M Ω or more
 DC current input --- Approx 100 Ω

Measuring current: Resistance thermometer input --- Approx 1mA
 Maximum allowable input: Thermocouple/DC voltage input --- $\pm 20\text{V}$ DC
 DC current input --- $\pm 30\text{mA}$

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: 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 (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
 • Sensor correction/mass flow target value 8 types

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

Additional function: Pattern link, circle function, pattern edit

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

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 --- 100 Ω to 2k Ω
 Contact protection --- Compact CR element built-in

Current output type: Output signal --- 4 to 20mA or 1 to 5mA
 Load resistance --- 750 Ω 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 $\pm 20\%$ (maximum 20mA)
 At OFF --- 0.8VDC or less

Voltage output type: Output signal --- 0 to 10 VDC
 Output resistance --- Approx 10 Ω
 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

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

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 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 loop error, fail, wait time alarm, end signal
 Delay or latch function is selectable

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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, bargraph 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)
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: 45VA

Reference operation condition:

Ambient temperature humidity range ---
21 to 25°C, 50 to 60%RH
Power voltage --- 100V AC $\pm 1.0\%$
Power frequency --- 50/60Hz $\pm 0.5\%$
Altitude --- Left/right $\pm 3^\circ$, forward/backward $\pm 3^\circ$
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 $\pm 2\%$
Altitude --- Left/right $\pm 10^\circ$, forward/backward $\pm 10^\circ$

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 --- 40G (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 20M Ω or more
Between primary terminal and protection conductor terminal --- 500V DC 20M Ω or more
Between primary terminal and secondary terminal --- 500V DC 20M Ω 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

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
Front bezel, case --- Gray or black

Color:

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 400 Ω or less)

0 to 1V DC (load resistance 50k Ω or more)

1 to 5V DC (load resistance 50k Ω or more)

0 to 10V DC (load resistance 50k Ω or more)

*1 to 5V DC for secondary transmission output

Output accuracy: Primary output --- $\pm 0.1\%$ of output span

Secondary output --- $\pm 0.3\%$ 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

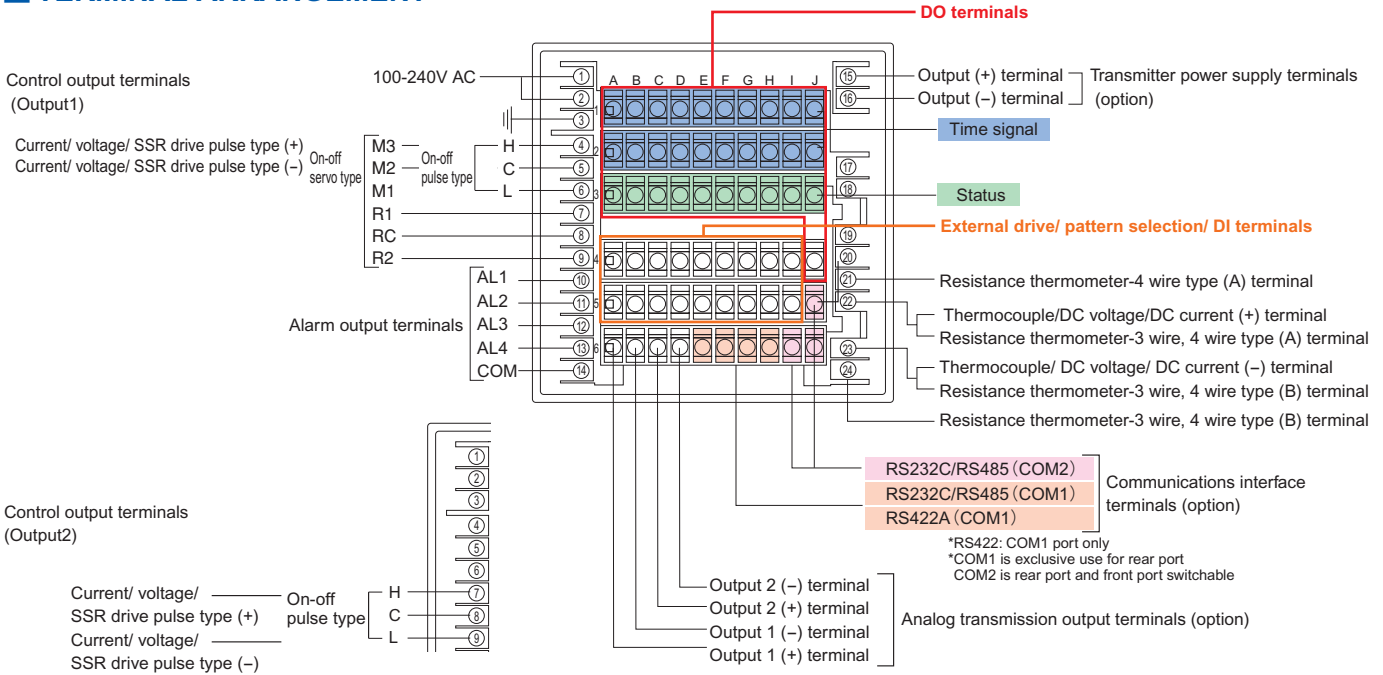
Communications type:

RS232C, RS422A, RS485

*COM2 for front and rear switching

Protocol: MODBUS/PRIVATE

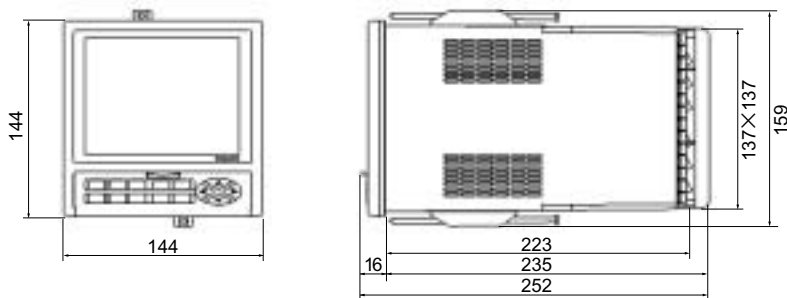
TERMINAL ARRANGEMENT



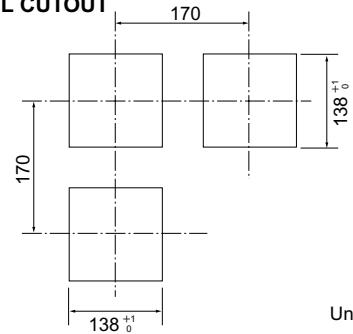
EXTERNAL INPUT/OUTPUT TERMINALS

Time signal output terminals	Status output terminals	External drive input terminals and pattern selection input (BCD code) terminals	
COM : 1A ○ TS 1 : 1B ○ [LOAD] TS 2 : 1C ○ [LOAD] TS 3 : 1D ○ [LOAD] TS 4 : 1E ○ [LOAD] TS 5 : 1F ○ [LOAD] TS 6 : 1G ○ [LOAD] TS 7 : 1H ○ [LOAD] TS 8 : 1I ○ [LOAD] TS 9 : 1J ○ [LOAD] COM : 2A ○ TS10 : 2B ○ [LOAD] TS11 : 2C ○ [LOAD] TS12 : 2D ○ [LOAD] TS13 : 2E ○ [LOAD] TS14 : 2F ○ [LOAD] TS15 : 2G ○ [LOAD] TS16 : 2H ○ [LOAD] TS17 : 2I ○ [LOAD] TS18 : 2J ○ [LOAD]	COM : 3A ○ RUN/STOP : 3B ○ [LOAD] ADV : 3C ○ [LOAD] RESET : 3D ○ [LOAD] WAIT : 3E ○ [LOAD] FAST : 3F ○ [LOAD] END : 3G ○ [LOAD] ALM-WAIT : 3H ○ [LOAD] ERROR : 3I ○ [LOAD] SV-UP : 3J ○ [LOAD] SV-DOWN : 4J ○ [LOAD]	External drive signal COM : 4A ○ RUN/STOP : 4B ○ ADV : 4C ○ RESET : 4D ○ WAIT : 4E ○ FAST : 4F ○ (BLK) : 4G ○ COM : 5A ○ 1 : 5B ○ 2 : 5C ○ 4 : 5D ○ 8 : 5E ○ 10 : 5F ○ 20 : 5G ○ 40 : 5H ○ 80 : 5I ○	Pattern selection input (BCD code) COM : 4A ○ RUN : 4B ○ STOP : 4C ○ RESET : 4D ○ ADV : 4E ○ (BLK) : 4F ○ (BLK) : 4G ○ COM : 5A ○ 100 : 4H ○ 200 : 4I ○ COM : 5A ○ 1 : 5B ○ 2 : 5C ○ 4 : 5D ○ 8 : 5E ○ 10 : 5F ○ 20 : 5G ○ 40 : 5H ○ 80 : 5I ○
	*COM: Common to time signal output		*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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