The DB600 series is a digital indicating controller with the indicating accuracy of ±0.1% and the control cycle of approximately 0.1 seconds. Various functions including universal input and multiple setting values (8 types) are provided as standard. There are three types of size:
DB670 --- 96 x 96mm, DB650 --- 48 x 96mm, DB630 --- 48 x 48mm

### FEATURES

- **Excellent control performance**
  PID control algorithm and Z control algorithm are selectable according to the application.
  PID control algorithm: Conventional control method
  Z control algorithm: Our new algorithm (patent with Iwate Univ.) which has evolved the PID control method. Especially, the effect can be expected such as overshoot suppression and speedy recovery in the event of disturbance control (during opening and closing of the electric furnace).

- **Large easy-to-view 5-digit 11 segments 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.

- **Highly-functional operation screen and settings screen**
  The controller inherits the operation screen and the settings screen adopting the LCD (liquid-crystal-display) which has been familiarized for long time. Furthermore, the screens have become high-definition and highly sophisticated.

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

- **What is Z control?**
  Z Control is applied from control algorithm of skunk cabbage (white arum).
  Skunk cabbage is a plant that generates heat to maintain body temperature at about 20°C in spite of changes in the outside temperature. Incorporating system of heating control by minimum energy to the controller.

- **Excellent control**
  Control algorithm (PID control, Z control)
  You can choose the control algorithm PID control and Z control depending on the controlled object or application.
  PID control
  Conventional control algorithm
  Z control
  It is our original control algorithm which we evolved from general PID control. Especially during heating control, it can suppress overshoot effect, shortening stabilization time, speed up of returning speed from disturbance (ex. the opening and closing of the oven door).

- **Achieve better control condition by new auto-tuning**
  Improved conventional auto-tuning and determine more appropriate control parameter setting.
  Compared to the conventional method, it can suppress overshooting and reduce of the settling time.

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

- **Various operating status in one glance**
  Operating condition
  Setting value ramp (option for program model)
  Analog bar output

- **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.

- **Program Operation (option)**
  Set 4 patterns, 12 steps. Patterns are repeatable and linkable.

- **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.

- **Easy parameter setting**
  Parameters can be easily setup by using exclusive engineering cable (RZ-EC4) (sold separately) and setting software (downloadable from web site)

- **Easy to connect with Mitsubishi PLC, MELSEC-Q Series by using FB (function block) library**
  Please download the FB library from Mitsubishi Electric Corporation homepage.
**MODELS**

**DB670**

| Control algorithm | 1: PID control  
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2: Z control</td>
</tr>
</tbody>
</table>

| Control output 1 | 1: ON-OFF pulse output type  
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2: ON-OFF servo output type</td>
</tr>
<tr>
<td></td>
<td>3: Current output type</td>
</tr>
<tr>
<td></td>
<td>5: SSR drive pulse output type</td>
</tr>
<tr>
<td></td>
<td>6: Voltage output type</td>
</tr>
</tbody>
</table>

| Control output 2 (Option) | 1: ON-OFF pulse output type *1  
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3: Current output type *1</td>
</tr>
<tr>
<td></td>
<td>6: Voltage output type *1</td>
</tr>
</tbody>
</table>

**DB650**

| Control algorithm | 1: PID control  
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2: Z control</td>
</tr>
</tbody>
</table>

| Control output 1 | 1: ON-OFF pulse output type  
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2: ON-OFF servo output type</td>
</tr>
<tr>
<td></td>
<td>3: Current output type</td>
</tr>
<tr>
<td></td>
<td>5: SSR drive pulse output type</td>
</tr>
<tr>
<td></td>
<td>6: Voltage output type</td>
</tr>
</tbody>
</table>

| Control output 2 (Option) | 1: ON-OFF pulse output type *1  
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3: Current output type *1</td>
</tr>
<tr>
<td></td>
<td>6: Voltage output type *1</td>
</tr>
</tbody>
</table>

**Communications Interface**

+ 5 External signal input points  
/ 5 Status output points (Open collector output) (Option)

| 0: None  
| A: RS422A + 5 External signal input points [D1]  
| S: RS485 + 5 External signal input points [D1]  
| B: RS422A + 5 Event output points [EV5 to 9]  
| C: RS485 + 5 Event output points [EV5 to 9]  

**Transmission signal output**

+ 2 Alarm event output points (Mechanical relay output)(Option)*5

| 0: None  
| 4: 4 to 20mA + 2 Event output points [EV3,4]*2  
| 6: 0 to 10V + 2 Event output points [EV3,4]*2  
| 7: 2 Event output points [EV3,4]*2  

**Remote signal input**

+ 2 External signal input points (Option)

| 0: None  
| 5: 4 to 20mA  
| 7: 0 to 10V  
| 8: 4 to 20mA + 2 External signal input points [DI6,7]*3  
| A: 0 to 1V + 2 External signal input points [DI6,7]*3  
| B: 2 External signal input points [DI6,7]*3  

**Programming function (Option)**

| : None  
| : Available |

2 Alarm event output points (Mechanical relay output)* Heater disconnection detection (Option)

| 0: None  
| 1: 2 Event output points [EV1,2]*2,4  
| 2: 2 Event output points [EV1,2]*2,4  
+ Heater disconnection detection *5

**Additional Function (Option)**

| 0: None  
| 1: Waterproof  
| A: Output scaling *6  
| B: Lower limit burnout  
| C: Square root calculation  
| D: Open loop system ON-OFF servo  
| E: Waterproof + Output scaling  
| F: Waterproof + Lower limit burnout *6  
| G: Waterproof + Square root calculation  
| H: Waterproof+ Open loop system ON-OFF servo  

**Power voltage**

| A: 100 to 240V AC  
| D: 24V AC/DC  

---

*1 It can be specified when Control output 1 is "1", "3", "5" or "6".
*2 Alarm event only functions on mechanical output so please confirm the event function.
*3 It can be specified when 2 Event output points + Heater disconnection detection is "0" or "1".
*4 When specification with Control output 2, number of event output points is only 1 point [EV2].
*5 It can be specified when Control output 1 and Control output 2 are both "1" or "5". It can be operated with Control output 1.
*6 Only PID control can be specified.
DB630

Control algorithm
1: PID control
2: Z control

Control output
1: ON-OFF pulse output type
3: Current output type
5: SSR drive pulse output type
6: Voltage output type

Communications interface
+ 1 External signal input point
5 External signal input points (Option)
0: None
S: RS485 + 1 External signal input points [DI 1 to 5]
D: 5 External signal input points [DI 1 to 5]

Programming function (Option)
-: None
P: Available

2 Alarm event output points (Option)
0: None
1: 2 Event output points (mechanical relay output) [EV1.2]*1

Additional Function (Option)
0: None
1: Waterproof
A: Output scaling*2
B: Lower limit burnout
C: Square root calculation
E: Waterproof + Output scaling*2
F: Waterproof + Lower limit burnout
G: Waterproof + Square root calculation

Power voltage
A: 100 to 240V AC
D: 24V AC/DC

MEASURING RANGES

<table>
<thead>
<tr>
<th>Input type</th>
<th>Measuring ranges</th>
<th>Measuring accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>B</strong></td>
<td>0.0 to 1820.0°C</td>
<td>Below 400°C: Out of specifications; 400°C to 800°C: ±0.2%FS±1digit</td>
</tr>
<tr>
<td><strong>R</strong></td>
<td>0.0 to 1760.0°C</td>
<td>Bellow 400°C: ±0.2%FS±1digit</td>
</tr>
<tr>
<td><strong>S</strong></td>
<td>0.0 to 1760.0°C</td>
<td>±0.1% of FS±1digit</td>
</tr>
<tr>
<td><strong>N</strong></td>
<td>0.0 to 1760.0°C</td>
<td>±0.1% of FS±1digit</td>
</tr>
<tr>
<td><strong>K1</strong></td>
<td>-200.0 to 1370.0°C</td>
<td>For below 0°C, ±0.2% of FS±1digit</td>
</tr>
<tr>
<td><strong>K2</strong></td>
<td>-200.0 to 500.0°C</td>
<td>For below 0°C, ±0.2% of FS±1digit</td>
</tr>
<tr>
<td><strong>E</strong></td>
<td>-200.0 to 900.0°C</td>
<td>For below 0°C, ±0.2% of FS±1digit</td>
</tr>
<tr>
<td><strong>J</strong></td>
<td>-200.0 to 1200.0°C</td>
<td>For below 0°C, ±0.2% of FS±1digit</td>
</tr>
<tr>
<td><strong>T</strong></td>
<td>-200.0 to 400.0°C</td>
<td>For below 0°C, ±0.2% of FS±1digit</td>
</tr>
<tr>
<td><strong>U</strong></td>
<td>-200.0 to 400.0°C</td>
<td>For below 0°C, ±0.2% of FS±1digit</td>
</tr>
<tr>
<td><strong>L</strong></td>
<td>-200.0 to 900.0°C</td>
<td>For below 0°C, ±0.2% of FS±1digit</td>
</tr>
<tr>
<td><strong>WRa5-WRe26</strong></td>
<td>0.0 to 2310.0°C</td>
<td>Below 400°C: ±0.4%FS±1digit</td>
</tr>
<tr>
<td><strong>W-WRe26</strong></td>
<td>0.0 to 2310.0°C</td>
<td>Below 400°C: ±0.4%FS±1digit</td>
</tr>
<tr>
<td><strong>Platinell</strong></td>
<td>0.0 to 1390.0°C</td>
<td>Below 400°C: ±0.3% of FS±1digit</td>
</tr>
<tr>
<td><strong>PtRh40-PtRh20</strong></td>
<td>0.0 to 1880.0°C</td>
<td>Below 400°C: out of specification; 400°C to 800°C: ±0.8%FS±1digit</td>
</tr>
<tr>
<td><strong>Au-Plt</strong></td>
<td>0.0 to 1000.0°C</td>
<td>±0.1% of FS±1digit</td>
</tr>
<tr>
<td><strong>Pt100</strong></td>
<td>-200.0 to 850.0°C</td>
<td>±0.1% of FS±1digit</td>
</tr>
<tr>
<td><strong>Jr100</strong></td>
<td>-200.0 to 649.0°C</td>
<td>±0.1% of FS±1digit</td>
</tr>
<tr>
<td><strong>Pt50</strong></td>
<td>-200.0 to 649.0°C</td>
<td>±0.1% of FS±1digit</td>
</tr>
</tbody>
</table>
| **DC voltage**
  20mV     | -20.00 to 20.00mV |
  100mV    | -100.00 to 100.00mV |
  5V       | -5.000 to 5.000mV  |
  10V      | -10.00 to 10.00mV  |

* Accuracy indicates the performance under reference operating condition.
* For thermocouple, the reference junction compensation accuracy is added to the above measured accuracy.
* To measure DC current, ranges is converted to DC voltage by optional current input reciving resistor [250Ω]
*1 Alarm event only functions on mechanical output so please confirm the event function.
*2 Only PID control can be specified.
### NAMES OF VARIOUS PARTS

#### Display

1. Measured value (PV) Parameter setting title
2. Setting value (SV) Operating condition / parameter setting value
   - Displays SV, operating status (output value, occurred event, auto tuning, etc.) and parameters.
3. Cursor for setting parameter
4. Analog bar
   - Displays Output value, CT measured value, feedback measured value, step time.
5. Output
   - O1: Displays output value status of output 1.
   - O2: Displays output value status of output 2. *ON-OFF servo output type O1 and O2 both displays output 1 status.
   - Always OFF when it is current output type / voltage output type
6. Event
7. Communication status display
   - Option model only
8. Operating status display
   - Constant value operation (program operation OFF)
   - Program operation (program operation ON)
   - Option model only
9. Setting value ramp display
   - Constant value operation (program operation OFF)
   - Program operation (program operation ON)
   - Option model only
10. Pattern No. (program operation ON)
    - Option model only
11. Execution No./Step No.
    - Constant value operation (program operation OFF)
    - Program operation (program operation ON)
    - Option model only
12. Operation screen display
    - Lights when displaying [PV/SV], [PV/OUT], [PV/OUT2]

#### Function keys

13. [MODE] key: Depending on the screen of which key is pressed at, following screen is displayed.
   - Displays operation initial screen, when displaying operation screen expect for operation initial screen.
   - Displays initial screen of MODE, when displaying operation initial screen of operation screen.
   - Displays operation initial screen, when displaying initial screen of setting screen.
   - Displays initial screen of setting screen, when displaying setting screen expect for initial screen.
14. [SELECT] key (REVERSE): Switches operation screen or MODE screen in reverse direction
15. [CANCEL] key: While setting changing of parameter (dot at first digit of setting value blinks), setting changing can be canceled. After the cancelation, dot blinking of setting value turns OFF.
16. [A/M] key: Switches AUTO/MAN of output 1/output 2. Operates while displaying operation screen. It cannot be operated while displaying setting screen.
   - >: Moves cursor for setting parameter to the right when setting numeric value on the parameter setting screen. It cannot be operated while displaying operation screen.
17. [v] key: Decreases (decrement changing of parameter) setting parameter and initial screen of each setting screen.
18. [A] key: Increases (increment changing of parameter) setting parameter and initial screen of each setting screen.
19. [ENTER] key: Registers setting / changing parameter. After the registration, dot blinking of setting value of setting changing parameter turns OFF.
20. [SELECT] key: Switches operation screen and MODE screen to the forward direction.
EASY PARAMETER SETTING
Parameters can be set easily using exclusive engineering cable (sold separately) and DB setting software (download from our homepage).

● Engineering cable
USB engineering cable (RZ-EC4)

● Infrared communication engineering cable (RZ-EC5)*
Since it is connected from unit front side by infrared communication, you can set the parameters in the mounted state.
*Applicable to DB650, DB670

DB600 setting software
DB600 setting software is a software that enables reading and editing the parameters directly from the unit or parameters edited and saved beforehand can be applied to the unit. Simple data acquisition is also possible.

<table>
<thead>
<tr>
<th>Compatible OS</th>
<th>Parameter setting screen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows 7 (32bit/64bit) Japanese/English</td>
<td></td>
</tr>
<tr>
<td>Windows 8.1 (32bit/64bit) Japanese/English</td>
<td></td>
</tr>
<tr>
<td>Windows 10 (32bit/64bit) Japanese/English</td>
<td></td>
</tr>
<tr>
<td>NET Framework 4 or later has to be installed on the above OS</td>
<td></td>
</tr>
</tbody>
</table>

USEFUL COMMUNICATION INTERFACE FOR BUILDING INSTRUMENTATION SYSTEM
Communication interface (RS422A, RS485)
Able to connect to PLC via communication controller SC7D and able to load the data or set the parameters. (Option). Remote operations and parameter management using PLC is also possible.

FUNCTION BLOCK PREPARED FOR EASY CONNECTION WITH PLC
DB600 series related circuit block is prepared as parts under Mistubishi Electric PLC sequence program. Supports efficiency and standardization in the development field.

Function details
<table>
<thead>
<tr>
<th>Reading from DB600</th>
<th>Writing from DB600</th>
</tr>
</thead>
<tbody>
<tr>
<td>PV,SV and other various setting parameters</td>
<td>SV and various other setting parameters</td>
</tr>
</tbody>
</table>

Applicable models
<table>
<thead>
<tr>
<th>Mistubishi PLC MELSEC-Q series</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sequencer CPU unit (high performance model, universal model)</td>
</tr>
<tr>
<td>Serial communication unit (QJ71C24N (CH2 only)), QJ71C24N-R4</td>
</tr>
<tr>
<td>Software: GX Works2 (Ver. 1.09K or later)</td>
</tr>
</tbody>
</table>

Usage example
Writing execution parameters
Reading various setting parameters from multiple DB600
Writing program pattern/selection of patterns
Indication of running operation

DIGITAL TRANSMISSION/DIGITAL REMOTE FUNCTION
Master unit digitally transmits the SV and slave unit receives it as remote SV. Realization of no transmission error remote operation.
Can be combined with conventional unit (DB1000, KP1000) also.

<table>
<thead>
<tr>
<th>DB650 digital remote (slave unit)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital remote function</td>
</tr>
<tr>
<td>MODBUS</td>
</tr>
<tr>
<td>Private</td>
</tr>
</tbody>
</table>
### USEFUL FUNCTIONS

#### PROGRAM FUNCTION (OPTION)

Control is performed by the preset value and required time, 1 pattern max. 12 steps. Max. 4 kinds of pattern can be set.

Repetitions and linking is also possible.

#### MULTI OUTPUT SWITCHING (OPTION*)

Calculation result of output 1 can be output to either SSR drive pulse output, current output/voltage output or ON-OFF pulse output (EV2).

* This function can be set when the model is as below. (Inside the [] is arbitrary)

```
DB65L []53[] 1
DB65L []53[] 2
DB65L []56[] 1
DB65L []56[] 2
DB67L []53[] 1
DB67L []53[] 2
DB67L []56[] 1
DB67L []56[] 2
```

Output 1: SSR drive pulse output type
Output 2: Current output or voltage output type
Mechanical relay output: 2 Alarm event output points [EV2] (+ heater disconnection detection)

#### Terminal output when multi output switching is set

<table>
<thead>
<tr>
<th>Setting values of multi output switching</th>
<th>Normal output setting</th>
<th>SSR drive pulse output setting</th>
<th>Current output/voltage output setting</th>
<th>ON-OFF pulse output setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control output 1 terminal output</td>
<td>Control output 1 calculation result [MV 1]</td>
<td>Control output 1 calculation result [MV 1]</td>
<td>0% output</td>
<td>0% output</td>
</tr>
<tr>
<td>Control output 2 terminal output</td>
<td>Control output 2 calculation result [MV 2]</td>
<td>0% output</td>
<td>Control output 1 calculation result [MV 1]</td>
<td>0% output</td>
</tr>
<tr>
<td>EV2 terminal output</td>
<td>EV2 event judgement result</td>
<td>EV2 event judgement result</td>
<td>EV2 event judgement result</td>
<td>Output control output 1 calculation result [MV 1] is output by ON-OFF pulse signal</td>
</tr>
</tbody>
</table>

*2 If it is ON-OFF pulse output type setting, then EV2 event judgement result (including heater alarm) will not be output from EV2 terminal.

If using ON-OFF pulse output setting and alarm event output (including heater alarm) by DB65L/DB67L, please select alarm event output (EV3, EV4).

### INPUT SPECIFICATIONS

**Input type:**
- Thermocouple
- B, R, S, N, K, E, J, T, U, L, WRe5-WRe26, W-WRe26, Platinell II, PtRh40-PtRh20, Au-Pt
- DC voltage: ±20mV, ±100mV, ±5V, ±10V
- Resistance thermometer: Pt100, Pt100, Pt50

**Measuring range:**
- Thermocouple: 16 ranges, DC voltage: 4 ranges, Resistance thermometer: 5 ranges

**Temperature unit:** °C

**Accuracy rating:** ±0.1% of FS ± 1 digit of measuring range

For details, refer to “measuring ranges and accuracy ratings”

**Reference junction compensation accuracy:** ±1.0°C (ambient temperature 23°C ± 10°C)

±0.0°C (temperatures other than above)

**Sampling rate:** Approx. 0.1 seconds

**Burnout:**
- Upper limit burnout is provided as standard for thermocouple, resistance thermometer and DC voltage (20mV).
- Output 1 produces PV abnormal output and output 2 is fixed to 0% when burnout occurs.
- Upper limit alarm event is output.

**Input impedance:**
- Thermocouple: 1MΩ or more
- DC voltage: Approx. 1MΩ

**Allowable wire resistance:**
- Resistance thermometer: 10Ω/1 wire or less
- (resistance of 3 wires should be equal to one another)

**Resistance thermometer measurement current:**
- Approx. 1mA

**Maximum allowable input:**
- Thermocouple ±10VDC
- DC voltage (mV): ±10V DC
- DC voltage (V): ±20V DC
- Resistance thermometer ±5V DC

**Maximum common mode voltage:**
- 30VAC

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

**Series mode rejection ratio:**
- 50dB or more (50/60Hz)

### CONTROL SPECIFICATIONS

**Control interval:** Approx. 0.1 seconds

**Output type:** ON-OFF pulse output, ON-OFF servo output (DB65L and DB67L only), Current output, SSR drive pulse output, Voltage output

**ON-OFF pulse type:**
- Contact type: 1a contact
- Pulse cycle: Approx. 1 to 180 seconds
- Contact capacity: Resistive load 240VAC 3A
- Inductive load: 30VDC 3A
- Minimum load: 5VDC 10mA
ON-OFF servo output type:
- Contact type: 1a contact
- Feedback resistance: 100Ω to 2kΩ
- Contact capacity: Resistive load 240VAC 3A

Inductive load:
- 240VAC 1.5A
- 30VDC 1.5A
- Minimum load: 5VDC 10mA

Current output type:
- Output specification: 4 to 20mA DC
- Load resistance: 600Ω or less
- SSR drive pulse output type:
  - Pulse cycle: Approx. 1 to 180 seconds
  - Output specification: ON 12V DC ±20%
    - (load current: 21mA or less)
  - OFF 0.8V DC or less
- Voltage output type:
  - Output specification: 0 to 10V DC
  - Output resistance: Approx. 10Ω
- Load resistance: 50KΩ or more

**SETTING SPECIFICATIONS**
- SV related: SV 8 types for constant operation (Max. 5 digits display)
- SV rate-of-change: 0 to 9999 seconds
- Control relations: PID 8 kinds
  - P: 0.0 to 999.9%
  - I: 1 to 9999 seconds
- Output related: Output dead band, output reset, output limiter 8 kinds, and output rate of amount limiter

**DISPLAY SPECIFICATIONS**
- Display: Segment type LCD (LED backlight)

**GENERAL SPECIFICATIONS**
- Rated power voltage: 100 to 240V AC
  - 24V AC/DC
- Rated power supply frequency: 50/60Hz
- Maximum power consumption:
  - 100 to 240V AC (without option) DB630 100V AC 4VA
  - 240V AC 5VA
  - DB650 100V AC 4VA
  - 240V AC 6VA
  - DB670 100V AC 4VA
  - 240V AC 8VA
  - DB680 100V AC 5VA
  - 240V AC 7VA
  - DB650 100V AC 7VA
  - 240V AC 10VA
  - DB670 100V AC 10VA
  - 240V AC 19VA
  - DB670 240V AC 12VA
  - 24V AC/DC (without option) DB630 24V AC 3VA
  - 24V DC 2W
  - DB650 24V AC 4VA
  - 24V DC 3W
  - DB670 24V AC 4VA
  - 24V DC 3W
  - DB680 24V AC 7VA
  - 24V DC 5W
  - DB670 24V AC 8VA
  - 24V DC 6W
- Countermeasure against power failure:
  - Store setting contents in non-volatile memory.
  - (Rewrite: 1 million times)
- Insulation resistance:
  - Between the primary and secondary terminals 20MΩ or more (500V DC)
  - *Primary terminal: Power terminal (100 to 240V AC) EV1 to 4 output terminals (relay output), ON-OFF pulse output terminal (relay output), ON-OFF servo output terminal (M3, M2, M1) Secondary terminal: Power terminal 24V AC/DC, all terminals expect primary terminals
- Withstand voltage:
  - Between the primary and secondary terminals 1500V AC (1 minute)
- Casing:
  - Fire-retardant polycarbonate (UL94V-2)
- Color:
  - Grey
- Mounting:
  - Panel mounting type
- External dimensions:
  - DB630 48(W) x 48(H) x 88(D)mm
  - Depth from panel surface is 80mm
  - DB650 48(W) x 96(H) x 73(D)mm
  - Depth from panel surface is 65mm
- DB670 96(W) x 96(H) x 73(D)mm
  - Depth from panel surface is 65mm
- Weight:
  - DB630 (Without option) Approx. 120g
  - (With option) Approx. 135g
  - DB650 (Without option) Approx. 150g
  - (With option) Approx. 230g
  - DB670 (Without option) Approx. 240g
  - (With option) Approx. 330g
- Terminal screw: M3.0
- Engineering port:
  - DB630 At the bottom of the case
  - DB650 At the top of the case
  - DB670 At the top of the case
- Infrared engineering port (DB650 and DB670): Front

**REFERENCE OPERATING CONDITIONS**
- Ambient temperature: 23°C ± 2°C
- Ambient humidity: 55%RH ± 5% (no condensation)
- Power voltage: 100VAC ± 1%, 24V DC ± 1%
- Power supply frequency: 50/60Hz ± 0.5%
- Mounting orientation:
  - Backward / forward ±3°, laterally ±3°
- Installation height: 2000mm or below
- Vibration:
  - 0m/s²
- Shock:
  - 0m/s²
- Installation condition:
  - Single panel mounting (space required around)
- Wind:
  - None
- External noise:
  - None
- Warm up time:
  - At least 30 minutes

**NORMAL OPERATING CONDITIONS**
- Ambient temperature:
  - -10°C to 50°C (-10°C to 40°C for close installation)
  - Maximum ambient humidity (ambient temperature -10 to 31°C):
  - 90%RH (no condensation)
  - Decreases linearly from 90% RH at 31°C, or to 50% RH at 50°C
- Minimum ambient humidity:
  - 20%RH
- Power voltage:
  - 100 to 240V AC
  - 90 to 264V AC
- Power supply frequency:
  - 24V AC/DC 21.6 to 26.4V AC/DC
- Mounting orientation:
  - Backward/forward ±1°, laterally ±1°
- Installation height:
  - 2000mm or below
- Vibration:
  - 0m/s²
- Shock:
  - 0m/s²
- Installation condition:
  - Panel mounting (space above and below)
- External noise:
  - None
- Ambient temperature variation ratio:
  - 10°C/hour or less

**TRANSPORT CONDITIONS**
- Ambient temperature:
  - -20°C to 60°C
- Ambient humidity: 5 to 95%RH (no condensation)
  - 4.9m/s² or less (10 to 60Hz)
  - Shock:
  - 392m/s² or less (under factory packing condition)

**STORAGE CONDITIONS**
- Ambient temperature:
  - -20°C to 60°C
  - *10 to 30°C for long-term storage
- Ambient humidity 5 to 95%RH (no condensation)
- Vibration:
  - 0m/s²
- Shock:
  - 0m/s² (under factory packing condition)

**STANDARD**
- Safety: EN61010-1, EN61020-303 (CE marking)
  - UL61010-1, UL61020-303 (UL)
  - CAN/CSA C22.2 No.61010-1(c-UL)
- Setup category: CAT.II, pollution degree: 2
- EMC compliant:
  - CE marking EN61326-1 Class A Table 2
  - *Test result of output value varies by the amount equivalent to ±10% of FS or ±2mV, whichever is larger, during testing.
  - Environment regulation:
  - RoHS directive
### Options

#### Programing function
- **Patterns:** 4 patterns (Max. 9,999 times repeatable)
- **Steps:** 12 steps / pattern
- **Start range:** Target value → Input scale range
- **Time:** 0 to 999 hours 59 minutes or 0 to 999 minutes 59 seconds
- **Select either PV start or SV start (arbitrary value settable)
- **End output:** Select either constant value control (setting: -5 to 105%)

#### Event function

<table>
<thead>
<tr>
<th>No. of events</th>
<th>EV1 to 4 (Mechanical relay)</th>
<th>EVS to 9 (Open collector)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Event that can be allotted</td>
<td>Event status</td>
<td>Status event</td>
</tr>
<tr>
<td>Output points</td>
<td>Max. 4 points</td>
<td>Max. 5 points</td>
</tr>
<tr>
<td>Contact capacity (Mechanical relay output)</td>
<td>Resistance load: 240V AC 3A/300V DC 3A</td>
<td>24V DC 50mA</td>
</tr>
<tr>
<td></td>
<td>Inductive load: 240V AC 1.5A/30V DC 1.5A</td>
<td>Minimum load: 5V DC 10mA</td>
</tr>
<tr>
<td>Alarm event</td>
<td>Absolute value alarm, deviation alarm, absolute value deviation alarm, set point alarm, output value alarm, heater disconnection alarm (only when control output 1 or 2 is ON-OFF pulse output or SSR drive pulse output), Timer1, Timer2, FAIL</td>
<td></td>
</tr>
<tr>
<td>Status event</td>
<td>Constant value operation RUN, preset manual, remote input, SV rising, SV falling, program operation (step switching, step 1 to 12, RUN, STOP, ADVANCE, RESET, END, SV hold)</td>
<td></td>
</tr>
</tbody>
</table>

#### Transmission signal output
- **Output point:** 1 point
- **Output signal:** 4 to 20mA DC (load resistance 400Ω or less)
- **Accuracy:** ±0.3% of full scale
- **Output updating interval:** Approx. 0.1 seconds
- **Insulation:** Non-isolated between the adjustment output 1 and 2 (ON-OFF pulse output type excluded)

#### External signal input
- **Input point:** DB630 5 points maximum, COM shared
- **Input point:** DB650 7 points maximum, COM shared
- **Input point:** DB670 7 points maximum, COM shared
- **Input signal:** Non voltage contact
- **External contact capacity:** 5V DC 2mA
- **Function:** Constant value operation RUN/READY switch, AUTO/MAN switch, preset manual, timer 1, timer 2, alarm event reset, execution No. selection, program/constant value operation switch, program operation RUN/STOP switch, program operation ADVANCE, program operation reset, program pattern selection

#### Remote signal input
- **Input point:** 1 port
- **Input signal:** 4 to 20mA DC (Input impedance Approx. 50Ω)
- **Maximum allowable input:** DC current ±30mA or less
- **Accuracy:** ±0.3% of full scale ±1dig
- **Sampling rate:** Approx. 0.1 seconds
- **External signal switch:** R/L, (Remote/Local)

#### Communications interface
- **com point:** 1 port
- **Type:** DB630, RS485
- **Protocol:** MODBUS-RTU, MODBUS-ASCII, Private (used for digital transmission/digital remote input)
- **Function:** Host communication/digital transmission/digital remote input

#### Z control algorithm
Our original control algorithm. Compatible of both suppressing overshoot effect and response time of returning back from disturbance. Parameter setting is same as conventional PID setting.

#### 2 output specification
- **Output type:** ON-OFF pulse output type, current output type, and voltage output type. Any combination is possible.
- **Insulation:** Not insulated between the 2 outputs (except ON-OFF pulse type)
- **Control method:** PID type, split type

#### Heater disconnection detection
Measures heater current using an external current transformer (CT) to detect disconnection.
- **Input points:** 1 point
- **Input CT range:** 0 to 65.0mA AC (50/60Hz)
- **Heater current measuring range:** 5.0 to 50.0A AC
- **Input signal:** 5.0 to 50.0A (50 / 60Hz)
- **Accuracy:** ±5.0% of FS ±1digit
- **Designated CT:** Manufactured by U.R.D.Co. LTD. "CTRL-6-S-H" LTA-P207 (800 turns, hole diameter 5.8mm), sold separately

#### Open loop type ON-OFF servo output
Time control without using control motor feedback resistor when it is ON-OFF servo output.

#### Output scaling (Only PID control can be specified)
Scales the control output.

#### Lower limit burnout
When it is burnout, PV display will off scale to lower limit and lower limit alarm will be output

#### Square root calculation
Calculates square root for liner input

#### Damp proof coating
Damp proofing coating to the internal PCB

#### Water proofing
Attach to panel to have "IP54 equivalent" water proofing

#### °F value calculation
Calculates the PV and SV in °F

#### Accessories (sold separately)
- **Terminal cover (model DB630/RZ-TC2, DB650/RZ-TC3, DB670/RZ-TC3)**
- **Front protection cover (model DB630/RZ-PC2, DB650/RZ-PC3, DB670/RZ-PC4)**

#### Current input receiving resistors 250Ω (model EZ-RX250)
Used at the time of direct current input (4 To 20mA)

#### Contact protection element (model CX-CR1 for light load, CX-CR2 for heavy load)
Attach to relay output terminal of ON-OFF output pulse and ON-OFF servo output type to protect the relay contact from noise.

#### USB engineering cable (model RZ-EC4)
For connecting to PC and setting parameters using DB600 software

#### Infrared communication engineering cable (model RZ-EC5, DB650/670 only)
Cable for infrared communication from the front side of the unit to PC. Parameters can be set by using DB600 software

#### Current transformer dia. 5.8 mm (for 50A) (model LTA-P207)
Designated current transformer used for heater disconnection detection. Manufactured by U.R.D.Co. LTD. "CTRL-6-S-H"
### TERMINAL ARRANGEMENT

#### DB670

<table>
<thead>
<tr>
<th>1</th>
<th>Measuring input +</th>
<th>13</th>
<th>Communication RDA</th>
<th>SA</th>
<th>25</th>
<th>EV3</th>
<th>37</th>
<th>Servo M3</th>
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</thead>
<tbody>
<tr>
<td>2</td>
<td>Measuring input A+</td>
<td>14</td>
<td>Communication RDB</td>
<td>SB</td>
<td>26</td>
<td>EV3 COM</td>
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<td>Servo M2</td>
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<tr>
<td>3</td>
<td>Measuring input B+</td>
<td>15</td>
<td>Communication SDA</td>
<td>SB</td>
<td>27</td>
<td>EV4</td>
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<td>4</td>
<td>Measuring input b</td>
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<td>Communication SDB</td>
<td>SG</td>
<td>28</td>
<td>EV4 COM</td>
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<td>Servo R1</td>
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<tr>
<td>5</td>
<td>Control output 1+</td>
<td>17</td>
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<td>SG</td>
<td>29</td>
<td>Transmission output +</td>
<td>41</td>
<td>Servo RC</td>
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EXTENAL DIMENSIONS

DB670

PANEL CUTOUT

DB650

PANEL CUTOUT

DB630

PANEL CUTOUT

Specifications subject to change without notice. Printed in Japan (1) 2019. 11