### Contents

1. MODEL NO. ............................................. 1
   1.1 FUNCTIONAL DESCRIPTION ...................... 2
   3. FUNDAMENTALS OF DATA SETTING ............... 3
   4. OPERATION MODE STATUS TRANSITION .......... 4
      4-1 Setting in RUN program operation mode ..... 4
         a) Program setting group ................... 4
         b) Pattern setting group ................. 5
         c) Segment setting group ................. 5
         d) Time signal setting group .......... 5
      4-2 FIX : Setting in fixed set-point control mode ... 6
      4-3 MAN : Setting in manual control mode ....... 7
   5. MEMORY SETTING GROUP/COMMON SETTING ..... 6
      5-1 PID memory No. setting group ............ 6
      5-2 Alarm memory No. setting group .......... 6
      5-3 Common setting group .................... 7
   6. SET DATA EXAMPLE ............................. 8
      6-1 Program pattern setting method ............ 8
      6-2 Pattern linking method .................. 8
      6-3 Fixed set-point control setting method .... 8
   7. PRIOR TO OPERATION .......................... 9
      7-1 Setting in the user initial setting mode ..... 9
      7-2 Opening adjustment ....................... 9
         (For the position proportioning type) ..... 9
      7-3 How to use pattern card ................. 9
   8. HOW TO START PROGRAM OPERATION .......... 10
   9. DESCRIPTION OF MAIN FUNCTIONS ........... 10, 11, 12
   10. WIRING ........................................ 13
      10-1 Rear terminals .......................... 13
      10-2 Wiring example .......................... 13
      10-3 Cautions for wiring ..................... 13
   11. SPECIFICATIONS ................................ 14
   12. DIMENSIONS .................................. 15
   13. DATA ENTRY FORMAT .......................... 16

### 1. MODEL NO.

The REX-P250 Model No. is shown inside the controller.

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Spec. code</th>
</tr>
</thead>
<tbody>
<tr>
<td>REX-P250</td>
<td>PID operation</td>
<td>H</td>
</tr>
<tr>
<td></td>
<td>PID operation with auto-tuning</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td>Position proportioning PID operation</td>
<td>V</td>
</tr>
<tr>
<td>Type of control operation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type of alarm operation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>With no alarm</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>With 1 alarm</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>With 2 alarms</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>Type of input</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thermocouple input</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>RTD input</td>
<td>R</td>
<td></td>
</tr>
<tr>
<td>Voltage/current input *1</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>*1 For the contents in □, refer to the signal code table.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type of control output</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relay contact output</td>
<td>M</td>
<td></td>
</tr>
<tr>
<td>Voltage pulse output</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Current output</td>
<td>R</td>
<td></td>
</tr>
<tr>
<td>Continuous voltage output</td>
<td>E</td>
<td></td>
</tr>
<tr>
<td>TRIAC driving trigger output</td>
<td>G</td>
<td></td>
</tr>
<tr>
<td>Case color</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>Analog input</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>Heater break alarm function</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Analog output</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>Signal level selection</td>
<td>□</td>
<td></td>
</tr>
<tr>
<td>[Refer to the signal code table]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication function</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>RS-232C</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>RS-422A</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

<Signal code table>

| 1 : 0 to 10mV | 6 : 1 to 5V |
| 2 : 0 to 100mV | 7 : 0 to 20mA |
| 3 : 0 to 1V   | 8 : 4 to 20mA |
| 4 : 0 to 5V   | 9 : Others   |
| 5 : 0 to 10V  |            |
### Display Unit

1. **Measured-value (PV) display unit**
   Displays measured-value (PV).

2. **Set-value (SV)/character display unit**
   Displays set-value and its characters. It can also be used as a setting display or setting digit shift key.

### Indication lamps

3. **Control output indication lamp (OUT)**
   Lights up when control output is activated.

4. **Open side output indication lamp (OPEN)**
   Lights up when the open side control output is ON in the position proportioning type.

5. **Closed side output indication lamp (CLOSE)**
   Lights up when the closed side control output is ON in the position proportioning type.

6. **Computer mode indication lamp (COMP)**
   Lights up when the controller is in the computer mode (in communication with the host computer).

7. **Fail indication lamp (FAIL)**
   Lights up if an error occurs in this unit.

8. **Time signal No. 1 output indication lamp (TS1)**
   Lights up when time signal No. 1 output is ON. It flashes when time signal No. 1 setting is being checked.

9. **Time signal No. 2 output indication lamp (TS2)**
   Functions in the same way as the time signal 1 (TS1) output indication lamp.

10. **Time signal No. 3 output indication lamp (TS3)**
    Functions in the same way as the time signal 1 (TS1) output indication lamp.

11. **Time signal No. 4 output indication lamp (TS4)**
    Functions in the same way as the time signal 1 (TS1) output indication lamp.

12. **Pattern mode indication lamp (PTN)**
    When this lamp is lit, the 16 lamps of act as pattern No. indication lamps.

13. **Time signal mode indication lamp (TS)**
    When this lamp is lit, the 16 lamps of act as time signal No. indication lamps.

14. i) **Pattern No. indication lamps (16)**
    When the "Pattern mode indication lamp (PTN)" lights, the activated pattern No. or setting is indicated.

    ii) **Time signal No. indication lamp (16)**
    When the "Time signal mode indication lamp (TS)" lights, the activated time signal in a certain segment is indicated.

15. **Segment display lamps (SEG)**
    The segment No. in program progress or that during setting lights up.

### Operation keys + Indication lamps

16. **Computer mode key (COMP)**
    Pressing this key twice (within 3 sec) in succession can perform communication with Host Computer.

17. **Auto-tuning key (AT)**
    Pressing this key twice (within 3 sec) in succession activates the auto-tuning function.

18. **Step key (STEP)**
    Pressing this key twice (within 3 sec) in succession progresses the program by one segment.

19. **Hold key (HOLD)**
    Pressing this key twice (within 3 sec) in succession stops program progress.

20. **Pattern key (PTN)**
    Pattern setting group display key

21. **Segment key (SEG)**
    Segment setting group display key

22. **Time signal key (TS)**
    Time signal setting group display key

23. **Setting digit shift key**
    Pressing this key shifts the set-value changeable digit, and also selects segment end and continuation.

24. **Set-value decrement key**
    This key is used for set-value change.

25. **Set-value increment key**
    This key is used for set-value change.

### Operation keys

26. **Reset key and lamp (RESET)**
    Pressing this key twice (within 3 sec) in succession sets the controller to the reset mode and simultaneously lights the lamp.

27. **Run key and lamp (RUN)**
    Pressing this key twice (within 3 sec) in succession sets the controller to the program control mode and simultaneously lights the lamp.

28. **Fix key and lamp (FIX)**
    Pressing this key twice (within 3 sec) in succession sets the controller to the fixed set-point control mode and simultaneously lights the lamp.

29. **Manual key and lamp (MAN)**
    Pressing this key twice (within 3 sec) in succession sets the controller to the manual control mode and simultaneously lights the lamp.

30. **Set key and lamp (SET)**
    Pressing this key sets and also confirms various parameters. The lamp lights under the settable status and is extinguished under the setting locked status.

### Others

31. **Pattern card**
    Enter the pattern stored in the unit (for 1 pattern) into this card.

32. **Input range indication**
    Input type and range are indicated.
3. FUNDAMENTALS OF DATA SETTING

The following shows basic data setting examples. Because parameter data is set and changed in accordance with this procedure, first carry out operations as shown in the examples to master data setting. Also, the measured-value (PV) display unit always displays a measured-value regardless of the setting. As an example, change the level set-value in the segment setting group from 0°C to 200°C.

First, in order to set the controller to the setting enable state, confirm that the LED in the SET key section lights. If it is not lit, light it up by referring to Item “Set data locking function” on page 12. Simultaneously, confirm that the controller is not in the computer mode. Press the key a few times to display the level set-value.

Setting using the character display unit and the \(x\) and \(x\) keys.

Change the level set-value
The lower 4 digits from the least significant digit (LED) on the set-value (SV) character display unit are also used as key switches. By pressing any digit section desired to be changed, it lights up brightly. The digit lit brightly can be changed. When changing 0°C to 200°C, press the key switch corresponding to the third digit from the least significant digit.

Change the level set-value
Pressing the key once lights only the least significant digit (LED) brightly on the character display unit. The digit lit brightly is settable. When changing 0°C to 200°C, press the key 3 times.

Set the digit lit brightly using the \(x\) and \(x\) keys. Display 200 by pressing the \(x\) key twice.

After the numeric value is set, press the key to have finished the setting. Confirm that all of the digits corresponding to the set value light brightly and then press the key again. Thus the display unit shows the segment time setting characters. Therefore conduct the setting in the same way as level setting.

Thus, the setting has been finished. If key operation is not performed for more than 30 sec., the current display returns to the monitoring display. In this case repeat the setting procedure from 1. If no more set-value change is required, lock the data by referring to Item “Set data locking function” on page 12.

Notes
Use care of the following for data setting.

1. This controller uses the parameter in any digit at the time it was changed.
2. This controller can shift the digit up and down when each parameter is changed. For example, if "199°C" is necessary to be changed to "200°C", first shift the digit lit brightly to the least significant digit, then press the key to increase the set value from "199°" to "200°", thereby obtaining 200°C. This procedure is also applied to shift the digit down.
3. Set a minus sign (-) in accordance with the following procedure.
   (Example)
   In order to change 200 to -100, shift the digit lit brightly to the hundreds digit, and then press the key to decrease numeric values in order of 1 -> 0 -> -1.
4. The number of digits to be lit brightly or dimly varies with the parameter type. This means that the effective setting digit corresponding to that parameter lights brightly or dimly. However, when the effective setting digit corresponds to the units digit, the tens digit lights dimly for convenience.

(Example 1) For PID memory No. setting

Since the effective setting digit corresponds to the units digit, the tens digit lights dimly for convenience, but the digit lit brightly cannot be shifted.

(Example 2) For time signal output No. setting

Since the 3rd and 4th digits from the LED are not effective setting digits, they cannot be lit brightly.

(Example 3) For segment time setting

For this setting, digits up to the 6th digit are effective.

5. When the set-value (SV) character display unit displays other than the current operation mode monitoring display, the present display returns to the monitoring display if key operation is not performed for more than 30 sec. However, this does not apply when the display unit displays a parameter in the "Common setting group".

6. Always operate the keys with fingers.

The sections enclosed with on the set-value (SV) character display unit in the above Fig., indicate that they light up dimly.
4. OPERATION MODE STATUS TRANSITION

- Operation mode status transition diagram

This controller roughly has 4 modes as shown in the following Fig., and it enables you to confirm and set a parameter in each setting group even if it is in any operation mode.

- RESET
  - (The reset lamp lights.)
- RUN
  - (The RUN lamp lights.)
- FIX
  - (The FIX lamp lights.)
- MAN
  - (The manual lamp lights.)

- Key operation
  - \( \times 2 \) Press the RESET key twice in succession.
  - \( \times 2 \) Press the RUN key twice in succession.
  - \( \times 2 \) Press the MAN key twice in succession.
  - \( \times 2 \) Press the FIX key twice in succession.

- Always operate the keys with fingers.

4.1 Setting in RUN program operation mode.

a) Program setting group
- When the lamp in the SET key section lights, this setting is available. (1-7) (The setting can be confirmed even when the lamp is extinguished.)

- Monitoring mode or Monitoring display
  - Changing this value can shift to another pattern No.
    - Setting range: 1 to 16
  - Segment No. setting
    - Changing this value can shift to another pattern No.
    - Setting range: 1 to 16
  - Level setting
    - Sets the desired temperature.
    - Setting range: Within input range
  - Segment time setting
    - Sets time/segment.
    - Setting range: 0 sec. to 99 hour, 99 min and 59 sec.
  - Segment end/continuation selection
    - Light End falsely for pattern setting end and \( \neq Y \) for pattern setting continuation.
    - \( \neq \) (16)
  - Segment No. setting
    - After displays each segment No. down to 16 in due order.
  - Link pattern No. setting
    - Set the pattern No. to be linked.
    - \( \neq \) (6-2) (13)
  - Pattern No. setting
    - Pattern No.
    - \( \neq \) (6-2) (13)

b) Monitoring mode
- This is a mode used for confirming the status in the program control mode. Each parameter is not suitable.

- Program control mode
  - (Excluding common setting group)
  - Set value under program progress
    - \( \neq \) (200)
  - Segment remaining time
    - \( \neq \) (0000)
    - Displays the remaining time in the segment under execution.
  - No. of program execution times
    - \( \neq \) (5)
    - Displays the number of program execution times.
  - Opening feedback input value
    - \( \neq \) (300)
    - Displayed only for the position proportioning type.
  - CT input value
    - \( \neq \) (30)
    - Displayed only for the controller with the heater break function.
  - Manipulated output value
    - \( \neq \) (50)
    - \( \neq \) (4)

Precautions

1. The numeric value corresponding to each parameter is one example.
2. If key operation is not performed for more than 30 sec, the current display returns to the monitoring display.
3. If the key switch corresponding to any of the upper 4 digits from the most significant digits (MSD) on the set-value (SV)/character display unit is pressed by mistake during setting, the display suddenly jumps to the "Memory setting group". In this case, call up the setting group already set again and continue the setting.
4. Always operate keys with fingers.
5. If the level and time of the segment under execution are changed, they are not captured, but captured from those under the next execution.
6. O and ( ) in the above Fig. show the reference pages.

* Items 2 and 3 above are excluded when each parameter in the "Common setting group" is displayed.
5. MEMORY SETTING GROUP/COMMON SETTING GROUP

5-1 PID memory No. setting group

- Eight settings of PID constants, etc. can be stored in memory.
- This setting is available while the LED in the SET key section lights. (17) (The setting can be confirmed even when the LED is extinguished.)

PID memory No. setting

Changing this value can shift to another PID memory No.

Setting range: 1 to 8

Proportional band (P) setting

Setting range: 0 to 200

Integral time (I) setting

Setting range: 0 to 3600 sec

Derivative time (D) setting

Setting range: 0 to 3600 sec

Neutral band setting

Displayed only for position proportioning type

ON-OFF section

down differential gap setting

ON-OFF action differential gap setting

Output limiter high-limited setting

Setting range: -5.0 to +105.0% of span

Output limiter low-limited setting

Setting range: 0.1 to 20.0% of P.B.

PID memory No. setting

Pressing the SET key hereafter displays PID memory No. down to 8 in due order.

- Where: Output limiter high-limited Output limiter low-limited

How to call up setting group

Pressing any of the upper 4 digits from MSD on the set-value (SV) character display unit again with any parameter in the PID memory No. setting group displayed changes the display as shown in this Fig.

5-2 Alarm memory No. setting group

(Not displayed for the controller without the alarm function)

- Eight alarm set-values can be stored in memory.
- This setting is available while the LED in the SET key section lights. (17) (The setting can be confirmed even when the LED is extinguished.)

Alarm memory No. setting

Changing this value can shift to another alarm memory No.

Setting range: 1 to 8
5-3 Common setting group

- Setting group related to all of the patterns and segments.
- This setting is available while the LED in the SET key section lights. (17) (The setting can be confirmed even when the LED is extinguished.)

Any display panel

Press any of the upper 4 digits from the MSD on the set-value (SV)/character display unit for about 5 sec.

PV bias setting

Auto-tuning learning

Setting range: 0 to 100% limit to output limit range

Alarm 1 hysteresis band setting

Setting range: 0 to 100% limit to output limit range

Alarm 2 hysteresis band setting

Setting range: 0 to 100% limit to output limit range

Proportioning cycle setting

Setting range: 0 to 100 sec. (No zero can be set.)

Digital filter setting

Setting range: 0 to 999 hour, 59 min., and 59 sec.

Pattern and output time setting

Setting range: 0 sec to 999-hour, 59-min., and 59 sec.

There are 3 MV setting methods. Use any of them according to the application.

1. Continuous changes using and keys (soft acceleration)

2. Changed in steps of 1 digit using , , and keys.

3. Changed in steps of 1 digit on character display unit using and keys.
6. SET DATA EXAMPLE

6-1 Program pattern setting method

Program setting example as shown in the above Fig.
(Example when the value set before shipment is changed.)

Key operation

<table>
<thead>
<tr>
<th>Character display</th>
<th>Pattern 1 setting</th>
<th>Segment 1 setting</th>
<th>Segment 2 setting</th>
<th>Setting after segment 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display other than each setting group</td>
<td>SEG 1</td>
<td>LEYL 0</td>
<td>LEYL0030</td>
<td>End nEYr</td>
</tr>
<tr>
<td></td>
<td>× 2</td>
<td>LEYL0000</td>
<td>F 000000</td>
<td>F 0010.00</td>
</tr>
<tr>
<td></td>
<td>× 3</td>
<td>LEYL0000</td>
<td>F 000000</td>
<td>F 0010.00</td>
</tr>
<tr>
<td></td>
<td>× 4</td>
<td>LEYL0000</td>
<td>F 000000</td>
<td>F 0010.00</td>
</tr>
<tr>
<td></td>
<td>× 2</td>
<td>LEYL0000</td>
<td>F 000000</td>
<td>F 0010.00</td>
</tr>
</tbody>
</table>

Hereafter, also perform setting down to the segment to be executed using the  ,  ,  , and  keys.

6-2 Pattern linking method

For linking from pattern 2 to pattern 5.
(Example when the value set before shipment is changed.)

From pattern 2 and segment 1

<table>
<thead>
<tr>
<th>Pattern 2</th>
<th>Pattern 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEG 1</td>
<td>SEG 1</td>
</tr>
<tr>
<td>End nEYr</td>
<td>LEYL 3</td>
</tr>
<tr>
<td></td>
<td>LEYL 0.3</td>
</tr>
<tr>
<td></td>
<td>LEYL 0.5</td>
</tr>
<tr>
<td></td>
<td>LEYL 5</td>
</tr>
<tr>
<td></td>
<td>Pn 5</td>
</tr>
</tbody>
</table>

Setting after pattern 5

Hereafter, perform setting by referring to "Program pattern setting method".

6-3 Fixed set-point control setting method

For setting SV value 0°C to 50°C
(PID No. 2, and ALM No. 1)

Display other than common setting group

<table>
<thead>
<tr>
<th>PID 1</th>
<th>PID 01</th>
<th>PID 02</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLY</td>
<td>SU 0</td>
<td>SU 0000</td>
</tr>
<tr>
<td>× 2</td>
<td>× 5</td>
<td>× 2</td>
</tr>
<tr>
<td>SU 0050</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pid</td>
<td>Pid</td>
<td>Pid</td>
</tr>
<tr>
<td>× 2</td>
<td>× 2</td>
<td>× 2</td>
</tr>
<tr>
<td>ALNS 0</td>
<td>ALNS 00</td>
<td>ALNS 01</td>
</tr>
</tbody>
</table>

* Sections enclosed with on the set-value (SV)/character display unit in the above Fig. indicate those lit dimly.
7. PRIOR TO OPERATION

7-1 Setting in the user initial setting mode

Prior to starting operations, carry out setting in the user's initial setting mode.

(a) Preparation

As shown in Fig. 1, pull out the internal chassis from the housing while pushing up the stopper at the bottom of the instrument with fingers. Thus, it can be withdrawn from the housing. Next, as shown in Fig. 2, turn ON the internal switch A at the top of the instrument, then push the internal chassis into the housing. Thus the instrument is set to the user initial setting mode.

In order to exit from the user initial setting mode, turn OFF the internal switch shown in Fig. 2.

(b) Parameter descriptions

Entering the user initial setting mode causes the measured-value (PV) display unit and the set-value (SV)/character display unit to show "b P S". Then, pressing the [Esc] key changes the setting item as follows. (When one cycle is complete, it returns to the first item, "b P S").

<table>
<thead>
<tr>
<th>Measured-value (PV) display unit</th>
<th>Name</th>
<th>Description</th>
<th>Initial value at shipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>b P S</td>
<td>Communication rate setting</td>
<td>No display is made if this controller is not provided with the communication function. For these settings, refer to &quot;Communication Instruction Manual&quot; separately prepared.</td>
<td>4800</td>
</tr>
<tr>
<td>b 1 F</td>
<td>Data forms setting</td>
<td></td>
<td>012</td>
</tr>
<tr>
<td>R d d</td>
<td>Device address setting</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>l n f</td>
<td>Interval time setting</td>
<td></td>
<td>120</td>
</tr>
</tbody>
</table>

* Pd  Start mode selection

This parameter sets the initial instrument status at recovery from power failure or power ON.

<table>
<thead>
<tr>
<th>Set value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Cool start in the reset mode (All outputs are OFF)</td>
</tr>
<tr>
<td>1</td>
<td>Cool start in the manual mode (Output is the output limit (LOW/LIMIT) value)</td>
</tr>
<tr>
<td>2</td>
<td>Hot start (Status before power is turned OFF)</td>
</tr>
</tbody>
</table>

For an instantaneous power failure of less than 4 seconds, the instrument performs a hot start regardless of the setting.

* S y S 5 Selection at start

This sets the level at which the set-value (SV) starts when program control is executed.

<table>
<thead>
<tr>
<th>Set value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Starts set-value (SV) from level 0</td>
</tr>
<tr>
<td>1</td>
<td>Starts set-value (SV) from measured value (PV)</td>
</tr>
</tbody>
</table>

* C l r  Data all clear setting

Setting "9999" cancels all data excluding the user initial setting and causes the initial value to appear. Conduct setting according to character display and setting using the [Esc] and [Esc] keys in "3. FUNDAMENTALS OF DATA SETTING" on page 3. Setting other than "0" or "9999" cannot be achieved.

* Setting can be done only with the [Esc] key.

7-2 Opening adjustment

(For the position proportioning type)

This instrument has already been adjusted at shipment to the resistance value corresponding to opening feedback input. However, if fine adjustment needs to be made, do it in the following way. In this case, check connections and make sure that loads such as the control motor operate.

(a) Wiring procedure

(b) Adjustment procedure

Pull the internal chassis from the housing as shown in Fig. 1, turn the internal switch B on the top of the instrument to ON as shown in Fig. 3, then return the internal chassis to the housing. Turning the power supply ON causes the display units to display parameter as shown in (1) below. Pressing the [Esc] key starts adjustment, and the display automatically changes in the order of (1) → (2) → (3) → (4) shown below.

Adjustment is complete when display (4) appears. Then, turn the internal switch B shown in Fig. 3 to OFF to return to the normal status.

Caution

Pay much attention that load such as control motor operates during adjustment.

7-3 How to use pattern cards

This instrument is capable of programming 16 control patterns in program control. Therefore, the control processes are on pattern cards which are mounted on the instrument's front panel to allow you to check the control pattern at a glance. (Ten pattern cards for 20 patterns are attached.)

(Example)

(1) The vertical line shows levels in which one scale division is 20°C, while the horizontal line shows segments in which each scale division represents one segment.

(2) The lines at the upper section of the graph show segments where the time signal is turned ON. As there are 4 time signal outputs, each scale division from the top is regarded at TS1, TS2, TS3, and TS4 respectively.

* If instruments are mounted just along the sides of the controller, no pattern card can be inserted into the controller. Therefore in this case, slightly pull out the internal chassis of the controller as shown in Fig. 1 and then insert the card into the controller.
8. HOW TO START PROGRAM OPERATION

Example: When starting program operation from pattern No. 3

(a) Set the pattern No. from which program operation needs to be started.

(b) If the set data lock function is activated, only the pattern setting group is confirmed.

(c) Program operation is started and the set value is displayed.

9. DESCRIPTION OF MAIN FUNCTIONS

(1) Program progress accelerating/reversing function

Program progress speed can be accelerated only when the \( \text{RESET} \) key is pressed during program operation. Speed will continue to increase as this key is being pressed. Further pressing of the key advances the program to execute the linked pattern or program operation using the repeat number. Program progress can also be reversed while the \( \text{EXEC} \) key is being pressed. This reverse speed further increases as this key continues to be pressed. Continued pressing of the key returns the segment, then the linked pattern to the previous pattern, and all the way back to pattern start: segment 1. However, for the repeat set pattern, the number of setting times returns only to the segment 1 pattern during operation. This operation is the same as normal operation during activation of this function. Also time and control output change as time progresses and time signal is also turned ON/OFF. Neither accelerating nor reversing is activated in the set lock/END status.

(2) Self-diagnostic function

<table>
<thead>
<tr>
<th>Check item</th>
<th>Display during trouble occurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set data check</td>
<td>Displays &quot;Errr&quot; or error code No. on the measured value (PV) display unit.</td>
</tr>
<tr>
<td>Input data check (measured-value input/current transformer input)</td>
<td></td>
</tr>
<tr>
<td>RAM check</td>
<td></td>
</tr>
<tr>
<td>CPU power monitoring</td>
<td>FAIL indicating lamp lights up. All other displays light out.</td>
</tr>
<tr>
<td>Watch dog timer</td>
<td></td>
</tr>
</tbody>
</table>

(a) Error codes

1. Error 1 (Errr) • CPU error
   - [Cause]: Influence by noise, etc.
   - [Remedy]: Turn the power OFF once, then turn ON again. However, if the error still occurs contact our service department.

2. Error 2 (Errr) • RAM error
   - [Cause]: Backup battery is dead and/or RAM is faulty.
   - [Remedy]: Contact our service department.

(b) Error 3 (Errr) • Data error
   - [Cause]: Electrical noise, incorrect setting, etc.
   - [Remedy]: Check each setting item, again. Especially, time signal and linked pattern No. settings! However, if the error still occurs, contact our service agency.

(c) Error 4 (Errr) • A/D conversion error
   - [Cause]: A/D converter trouble, etc.
   - [Remedy]: Contact our service agency.

(c) Output status during trouble occurrence

- Control output (relay contact, voltage pulse, Triac drive timer) and alarm output
- Control output (current, continuous voltage) and analog output
- FAIL output (Contacts keep being closed during error code display)

(d) Alarm (ALM) function

Up to 2 alarm output points are available. When alarm 1 is activated, the set-value (SV)/character display unit flashes "AL in". (For alarm 2, "AL in") When both the alarms are activated, the display unit flashes "AL in" and "AL in" alternately. The action of each alarm is as shown in the following.

<table>
<thead>
<tr>
<th>Deviation alarm</th>
<th>High alarm</th>
<th>Low alarm</th>
</tr>
</thead>
<tbody>
<tr>
<td>High alarm</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>High alarm</td>
<td>ON</td>
<td>ON</td>
</tr>
<tr>
<td>Low alarm</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>Low alarm</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>High/low alarm</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>Band alarm</td>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>Process alarm</td>
<td>ON</td>
<td>ON</td>
</tr>
<tr>
<td>High alarm</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Low alarm</td>
<td>ON</td>
<td>High</td>
</tr>
<tr>
<td>Low alarm</td>
<td>OFF</td>
<td>High</td>
</tr>
</tbody>
</table>

(a) Set-value (SV) A: Alarm setting

1. ... Alarm status where the alarm set-value is set to plus (+).
2. ... Alarm status where the alarm set-value is set to minus (-).
3. ... Status where an alarm is converted into 2 equal deviation points from the set value (SV) with alarm set-value (absolute deviation) is set.

(4) Heater break alarm (HBA) function

1. When the heater break alarm is activated, the set-value (SV)/character display unit flashes "HB in".

2. It is desirable that basically the heater break alarm be set to about 85% of a current transformer input value, "0/25%. However, when power supply variations are large, set the alarm to a slightly smaller value.

\[ \text{Caution: For current control output or continuous voltage control output, no heater break alarm can be used.} \]
(5) Auto-tuning (AT) function

The auto-tuning function measures, calculates and sets the optimum PID constants automatically. It is used in the program control or fixed set-point control mode.

1. Pressing the $\text{AT}$ key twice starts auto-tuning. The set-value (SV)/character display unit flashes " $\text{AT}$ " while the auto-tuning function is activated.

2. When the function ends its activation, " $\text{AT}$ " stops flashing. The PID constants thus computed are automatically written into the PID memory No. already selected at the time of auto-tuning start, and as a result the PID constants stored before this time are erased.

3. If it needs to confirm the auto-tuned constants, call up the PID memory No., setting group (page 6). Also, change the auto-tuned constants in accordance with "3. FUNDAMENTALS OF DATA SETTING" (page 3).

4. When suspending the auto-tuning function halfway, press the $\text{AT}$ key twice. (In this case, no PID constants are changed. (The values before auto-tuning start))

5. Auto-tuning execution in a soak level (fixed set-point control sections in program control) during program control can obtain a good controlled result. Also, program progress is automatically held during auto-tuning execution and the program automatically restarts after the auto-tuning function is finished.

6. Auto-tuning function progress is suspended when:
   - the operation mode is changed.
   - the PV bias value is changed.
   - the set-value (SV) is changed during fixed set-point control.
   - an error occurs.
   - an input wire is disconnected.
   - the auto-tuning function does not end after the lapse of about 9 hours from its start.
   - However, when power failure occurs (including instantaneous power failure within about 4 sec.) and then recovers during auto-tuning execution, the auto-tuning function is not canceled but is started from the beginning. (Only when start is selected in the user initial set mode)

(6) Auto-tuning learning function (ATT)

The PID constants vary with the level to be set even at the same load. For this reason, the auto-tuning function must be executed for each segment in program control. However, if the auto-tuning function is learned, each program soak level (fixed set-point control section in program control) is automatically detected for executing the auto-tuning function, and up to 8 PID constants are stored in a PID memory No. setting group from PID memory No. 1 in executing order.

After confirming whether or not the values thus stored are appropriate, set up a program to be executed. The auto-tuning learning function can be used only in the reset mode. This setting is made in accordance with "Common setting group". (Refer to page 7.)

(7) External contact input

Pattern No., reset mode and program control mode settings, and step and hold functions can be performed by not only front keys but also contact input from the rear terminals.

(1) Pattern No. setting

A pattern No. is selected according to the open/close status of rear terminal Nos. from 20 to 24. If rear terminals, Nos. 20 and 25 (P.SET) are closed, the selected data is captured. This is effective only in the reset mode.

Pattern No. selection according to terminal status

<table>
<thead>
<tr>
<th>Terminal No.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
<th>16</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 20 - 21</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
</tr>
<tr>
<td>No. 20 - 22</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
</tr>
<tr>
<td>No. 20 - 23</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
</tr>
<tr>
<td>No. 20 - 24</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
</tr>
</tbody>
</table>

1. X: Open O: Close (No.20 : Common)

(2) Reset mode setting

If rear terminals, Nos. 20 and 26 (RESET) are closed, the operation mode is set to the reset mode.

(3) Program control mode setting

If rear terminals, Nos. 20 and 27 (RUN) are closed, the operation mode is set to the program control mode.

(4) Step function

If rear terminals, Nos. 20 and 28 (STEP) are closed, the step function is activated. However, this is effective only in the program control mode.

(5) Hold function

If rear terminals, Nos. 20 and 29 (HOLD) are closed, the hold function is activated. However, this is effective only in the program control mode.

Cautions

1. Reset mode and program control mode setting keep their statuses even if the relevant terminals are opened after being closed once.
2. When the relevant terminals are closed by external contact input in order to set the controller to the reset or program control mode, no operation mode change by the front key can be made.
3. The hold function is activated only when the relevant terminals are closed.
4. Priority is given in the order of $\text{①, ②, ③, ④, ⑤}$ described above.
5. If the terminals in higher priority are closed, those in lower priority become invalid.

(8) Overscale/underscale

1. If a measured-value goes increasing and exceeds the high limit of the setting range due to input disconnection (or shorting), the measured-value display starts flashing. Further if it exceeds the input display range, the measured-value (PV) display unit flashes " $\circ \circ \circ \circ \circ$ " (overscale display).

2. If a measured-value goes decreasing and falls below the low limit of the setting range due to input disconnection (or shorting), the measured-value display starts flashing. Further, if it falls below the input display range, the measured value (PV) display unit flashes " $\circ \circ \circ \circ \circ$ " (underscale display).

For overscale and underscale display ranges, refer to "11. SPECIFICATIONS" (page 14).

When an opening feedback input wire is disconnected for the position proportioning type.

<table>
<thead>
<tr>
<th>Disconnected position</th>
<th>Display</th>
<th>Control output</th>
<th>Alarm output</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>$O \ O \ O \ O$ (Overscale)</td>
<td>Open side (OUT(11))</td>
<td>Alarm 1 (AL1)</td>
</tr>
<tr>
<td>W</td>
<td>$U \ U \ U \ U$ (Underscale)</td>
<td>Close side (OUT(21))</td>
<td>Alarm 2 (AL2)</td>
</tr>
<tr>
<td>O</td>
<td>$O \ O \ O \ O \ O$</td>
<td>Both are OFF</td>
<td>Both are ON</td>
</tr>
</tbody>
</table>

1. For disconnected positions, refer to item 10-1 (page 13).
2. Overscale or underscale is displayed on the set-value (SV)/character display unit only when an opening feedback input value ($P \ O \ S$) is being displayed as described.
(9) PV start

When a measured-value (PV) already reaches to a certain level just at program control start, control is performed just after the start by setting the program start level to the current measured-value (PV). The PV start setting is made in the user initial set mode (page 9). (Zero start selection is also possible.)

(10) Step function

If it needs to perform program control by skipping the current segment to the next segment, press the STEP key twice. Thus, the segment now in program control is skipped to perform the control from the next segment.

(11) Hold function

If it needs to suspend temporarily program progress in program control, press the HOLD key twice. Thus, the set-value (SV)/character display unit flashes “HOLD” (Hold), and as a result the control stops at the level set to the HOLD status. This status is not released even if the controller is set to any other operation mode (fixed set-point control or manual control mode). For releasing the hold status, press the HOLD key twice again.

(12) Wait function

If a measured-value (PV) cannot follow program progress in program control, this function stops program movement to the next segment. When the measured-value (PV) enters within the specified value by setting a wait zone (setting of absolute deviation value with respect to level) the program moves to the next segment. The wait zone is set in accordance with “Pattern setting group”. (Refer to page 5).

(13) Pattern link (connection) function

One pattern of this controller consists of up to 16 segments and up to 16 patterns (256 segments) can be stored. However, when one pattern consisting of 16 segments is not sufficient, a successive program with more than 16 segments can be set up by connecting more than one pattern. Pattern link setting is in accordance with “Program setting group”. (Refer to page 4.)

However, when “Segment end” (segment setting group) is set in the pattern segment to be connected or setting corresponding to 16 segments is not made to the pattern to be connected, no pattern link is performed. In addition, pattern connection order can be freely set, but the same pattern cannot be connected two or more times.

(14) PV bias

If a PV bias is set for the following cases, a value obtained by adding the PV bias to a measured-value (PV) becomes an indicated value, and computation is performed using that value. A PV bias is set in accordance with “Common setting group”. (Refer to page 7.)

- For thermocouple or RTD input
  
  When an indicated value needs to be corrected because of the difference between the above indicated value and measured-value (PV) of other instruments being used simultaneously resulting from the characteristic dispersion and location of each sensor.

- For voltage or current input
  
  When input value needs to be corrected.

(15) Digital filter

In order to reduce noise contained in a measured-value (PV), a low pass filter can be inserted. Thus, control eliminating input noise influence becomes possible by setting appropriately this filter time constant according to measured-object characteristics and noise level. This digital filter is set in accordance with “Common setting group”. (Refer to page 7.)

(16) Pattern end output function

If one program ends, the set-value (SV)/character display unit flashes ”END” (End). At this time, a pattern end signal is also output. Pattern end output time is set in accordance with “Common setting group”. (Refer to page 7.)

Also, even if the pattern end output ends, ”END” (End) goes flashing. ”END” (End) disappears when the controller is set to the reset mode by pressing the RESET key twice.

The pattern end output enables the execution of the next process at the program end during the preset time or external counting of the number of program execution times. (The pattern end signal is output for 0.5 sec. when the program is repeated.)

(17) Set data lock function

The set data lock function makes each set data change impossible. In order to set the controller to the set data lock state, press the character display section (any one digit in the upper 4 digits) on the set-value (SV)/character display unit while pressing the SET key, again. Thus, the set-value (SV)/character display unit flashes ”L.CK” (Lock SET) for about 2 to 3 sec. to inform the operator of the locked state.

In order to release data locking, press the character display section (any one digit in the upper 4 digits) on the set-value (SV)/character display unit while pressing the SET key, again. (When the controller is set to the computer mode even with the set data unlocked, each set-value cannot be changed using the front key, and also the step cannot be hold during operation mode selection auto-tuning and program control (RUN)).

(18) Communication function

The built-in RS-422A or RS-232C interface enables data communication with a host computer. For details, refer to Instruction Manual “REX-P250 Communication”.

--- 12 ---
10. WIRING

10-1 Rear terminals

**Cautions**

1. Each unused terminal (which varies with instrument Model) is fitted with a blind patch.
2. For thermocouple input, the temperature compensation element in the internal assembly is projected through a gap between terminal Nos. 17 and 18. Do not damage the above temperature compensation element when the internal assembly is removed from the case.
3. For input terminals with terminal Nos. 17, 18, and 19, use solderless terminals of 8.1mm or less wide and for the terminals with terminal Nos. other than the above, use solderless terminals 6.2mm or less wide.

**NO**: Normally Open  **NC**: Normally Closed  **COM**: Common

10-2 Wiring example

- **Standard type**  
  (REX-P250SC-M×B-21N)

- **Position proportioning type**  
  (REX-P250YDC-M×B-N1-N)

* For Models, refer to page 1.

10-3 Cautions for wiring

1. Conduct input signal wiring away from instrument, electric equipment power, and load lines as much as possible to avoid noise induction.
2. Conduct instrument power wiring so as not to be influenced by noise from the electric equipment power. If it is assumed that a noise generation source is located near the controller and the controller is influenced by noise, use a noise filter (select the filter by checking instrument power supply voltage).
   - Sufficient effect may not be expected depending on the filter. Therefore, select the filter by referring to its frequency characteristic, etc.
3. For instrument power wiring, if it is assumed that noise exerts a bad influence upon the controller, shorten the distance between twisted power supply wire pitches. (The shorter the distance between the pitches, the more effective for noise reduction.)
4. Install the noise filter on the panel which is always grounded and minimize the wiring distance between the noise filter output side and the controller power terminals. Otherwise, the longer the distance between output side and instrument power terminals, the less effective for noise.
5. Do not install fuses and/or switches on the filter output signal since this may lessen filter effect.
11. SPECIFICATIONS

(1) Input

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input impedance</td>
<td>Metro-couple input: Approx. 1MΩ</td>
</tr>
<tr>
<td></td>
<td>Voltage input: 250kΩ or more</td>
</tr>
<tr>
<td></td>
<td>Current input: 250mA</td>
</tr>
<tr>
<td>Influence of external resistance</td>
<td>Approx. 0.35μV/Ω (For thermocouple input)</td>
</tr>
<tr>
<td>Influence of input lead resistance</td>
<td>Approx. 0.0075%/Ω of reading (For RTD input)</td>
</tr>
</tbody>
</table>

(2) Output

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control output</td>
<td>250V, 3A (Resistive load)</td>
</tr>
<tr>
<td></td>
<td>10V contact</td>
</tr>
<tr>
<td></td>
<td>Electrical life: 0.3 million times or more, Rated load</td>
</tr>
</tbody>
</table>

(3) Setting

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Program storage patterns</td>
<td>Up to 16 patterns (Up to 16 segments/Packet)</td>
</tr>
<tr>
<td>No. of Segments</td>
<td>Up to 256 segments (16 patterns x 16 segments)</td>
</tr>
<tr>
<td>No. of connectable patterns</td>
<td>Up to 16 patterns</td>
</tr>
<tr>
<td>Time signal</td>
<td>No. of program storage patterns: 16 patterns</td>
</tr>
<tr>
<td></td>
<td>No. of storage times: 16/packet</td>
</tr>
<tr>
<td>No. of storage PID constants</td>
<td>8 memory (Selected for each segment)</td>
</tr>
<tr>
<td>No. of storage alarm settings</td>
<td>4 memory (Selected for each segment)</td>
</tr>
</tbody>
</table>

(4) Input scale range

<table>
<thead>
<tr>
<th>Type</th>
<th>Range</th>
<th>Resolution</th>
<th>Underscale</th>
<th>Overscale</th>
</tr>
</thead>
<tbody>
<tr>
<td>K</td>
<td>0 to 1370°C</td>
<td>1°C</td>
<td>Less than 30°C</td>
<td>1370°C or more</td>
</tr>
<tr>
<td>J</td>
<td>0 to 260°C</td>
<td>0.1°C</td>
<td>Less than 30°C</td>
<td>260°C or more</td>
</tr>
<tr>
<td>R</td>
<td>0 to 1210°C</td>
<td>1°C</td>
<td>Less than 30°C</td>
<td>1210°C or more</td>
</tr>
<tr>
<td>T</td>
<td>0 to 900°C</td>
<td>1°C</td>
<td>Less than 30°C</td>
<td>900°C or more</td>
</tr>
<tr>
<td>U</td>
<td>0 to 100°C</td>
<td>0.1°C</td>
<td>Less than 10°C</td>
<td>100°C or more</td>
</tr>
</tbody>
</table>

(5) Accuracy in the range of 0 to 399.9°C (0 to 750°F):
   Accuracy in the range of 0 to 399.9°C (0 to 750°F):
   Not guaranteed

* Conforming to JIS/IEC
* Conforming to JIS

IEC (International Electrotechnical Commission) is equivalent to JIS, DIN and ANSI.
(4) Performance

<table>
<thead>
<tr>
<th>Setting accuracy</th>
<th>Level</th>
</tr>
</thead>
</table>
| ±(0.01% of set-value) or ±50m sec. (Within value whichever the greater) | Thermocouple input
- ±0.3% of set-value + 1 digit or ±2°C(±4°F)
  (Within value whichever the greater)
- For thermocouple input of R, S, or B
  - R.S... In the range of 0 to 399°C (0 to 750°F):  
    - Within ±6°C(±12°F)
  - B... In the range of 0 to 399°C(0 to 750°F):
    - Not guaranteed
- RTO input
  - ±0.3% of set-value + 1 digit or ±0.6°C(±1.1°F)
    (Within value whichever the greater)
- Voltage/current input
  - Within ±0.2% of setting limiter span + 1 digit
    - Same for set-value (SV) in fixed set-point control and wait zone

<table>
<thead>
<tr>
<th>Analog output</th>
<th>Input</th>
<th>Current transformer output</th>
</tr>
</thead>
</table>
| 0 to 10mV | ±5% of set-value or ±2A
(Whichever the greater) |
| 0 to 100mV | Relay contact output: 250V AC, 1A
(Resistive load) |
| 0 to 5V | 1"a" contact |
| 0 to 5V | Electrical life: 50,000 times or more |
| 1 to 5V | (Rated load) |

<table>
<thead>
<tr>
<th>Other specifications</th>
<th>Power supply voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>90 to 264V AC</td>
<td>950 to 60Hz common use</td>
</tr>
<tr>
<td>(Including power supply voltage variation)</td>
<td>Power consumption</td>
</tr>
<tr>
<td>15VA or less</td>
<td>(Rating: 100 to 240V AC)</td>
</tr>
<tr>
<td>(However, 9VA or less at 100V)</td>
<td>Setting condition</td>
</tr>
<tr>
<td>Do not install the controller at a location where the operator needs a safeguard and/or corrosive gases exist.</td>
<td></td>
</tr>
<tr>
<td>Allowable ambient temperature</td>
<td>0 to 50°C(32 to 122°F)</td>
</tr>
<tr>
<td>Allowable humidity</td>
<td>45 to 85% RH</td>
</tr>
<tr>
<td>Weight</td>
<td>750g (1.65lb)</td>
</tr>
</tbody>
</table>

12. DIMENSIONS

- Dimensions in inches are shown for reference.
## 13. DATA ENTRY FORMAT

### Format 1 [Prepare the formats corresponding to the number of patterns (16 patterns or less)] Copy this format for its use.

<table>
<thead>
<tr>
<th>Format No.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
<th>16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time signal</td>
<td>TS1</td>
<td>TS2</td>
<td>TS3</td>
<td>TS4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Segment time</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PID memory No.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alarm memory No.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time signal No.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td>16</td>
</tr>
<tr>
<td>Output No.</td>
<td>TS</td>
<td>TS</td>
<td>TS</td>
<td>TS</td>
<td>TS</td>
<td>TS</td>
<td>TS</td>
<td>TS</td>
<td>TS</td>
<td>TS</td>
<td>TS</td>
<td>TS</td>
<td>TS</td>
<td>TS</td>
<td>TS</td>
<td>TS</td>
</tr>
<tr>
<td>Start segment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>End segment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start time</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>End time</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Format 2 [prepare only one of this format.]

**PID memory No. setting group**

<table>
<thead>
<tr>
<th>Memory No.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportional band</td>
<td>$P$ (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Integral time</td>
<td>$I$ (Sec.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Derivative time</td>
<td>$d$ (Sec.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neutral zone</td>
<td>$d_b$ (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ON-OFF action</td>
<td>$a_H$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hysteresis band</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output limiter</td>
<td>$\bar{H}$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High limit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output limiter</td>
<td>$\bar{L}$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low limit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Common setting group**

<table>
<thead>
<tr>
<th></th>
<th>PV bias</th>
<th>$P_b$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alarm 1</td>
<td>hysteresis band</td>
<td>$R_H$</td>
</tr>
<tr>
<td>Alarm 2</td>
<td>hysteresis band</td>
<td>$R_H$</td>
</tr>
<tr>
<td>Proportional cycle</td>
<td>$C_Y C$ (Sec.)</td>
<td></td>
</tr>
<tr>
<td>Digital filter</td>
<td>$d_F$ (Sec.)</td>
<td></td>
</tr>
<tr>
<td>Pattern and output time</td>
<td>$E_T$</td>
<td></td>
</tr>
</tbody>
</table>

**Fixed set-point control setting group**

<table>
<thead>
<tr>
<th></th>
<th>Set-value (SVI)</th>
<th>$S_V$</th>
</tr>
</thead>
<tbody>
<tr>
<td>PID memory No.</td>
<td>$P_I d$</td>
<td></td>
</tr>
<tr>
<td>Alarm memory No.</td>
<td>$R_L \bar{n} S$</td>
<td></td>
</tr>
</tbody>
</table>

**Manual control setting group**

<table>
<thead>
<tr>
<th></th>
<th>PID memory No.</th>
<th>$P_I d$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alarm memory No.</td>
<td>$R_L \bar{n} S$</td>
<td></td>
</tr>
</tbody>
</table>