

Graphical Digital Panel Meter  
WPMZ-6-□□□-□□-□□□  
Quick instruction manual

Thank you for purchasing the WPMZ graphical digital panel meter. This manual is a quick instruction manual only for preparation, connection and basic condition settings of the WPMZ. For the all functions of the WPMZ, please refer to a detailed instruction manual which can be downloaded from our homepage.

For models with RS communication functions, please refer to "Modbus communication manual" or "RS-232C communication manual" which also can be downloaded from our homepage.

(<http://www.watanabe-electric.co.jp/en/>)

## Checks before supplying power, preparations, wiring

### 1. CHECKING THE PRODUCT

#### 1-1. MODEL CODES

Please check that the product has been delivered matches the model code ordered in reference to "17. SPECIFICATIONS".

## 2. PRECAUTIONS FOR USE

### 2-1. ENVIRONMENTS AND CONDITIONS OF USE

Please do not use the product under the following circumstances. It might cause malfunctions and shortening the life of the product.

- 1) Ambient temperature of out of -5 to 50°C
- 2) Ambient humidity of out of 35 to 85%, or freezing condensing
- 3) Excessive dust or metal particles  
(Storing in a dust-proof chassis and a countermeasure against heat dissipation are required.)
- 4) Environment of corrosive gas, salty air or oily smoke
- 5) Environment of much vibration or impact
- 6) Environment of rain or water drops (except the front panel)
- 7) Environment of strong electromagnetic field or much exogenous noises.

### 2-2. INSTALLATION AND CONNECTION

- 1) Please read this manual before the installation and the connection of wires. And they should be performed by a person having a specialized technique. In addition, the insulation class of the WPMZ is as shown by the figure below. Please confirm that the insulation class satisfies a use condition prior to the installation.

  Reinforced Insulation   
   Basic Insulation  
  Operational Insulation

|          |                                                                                  |                                           |
|----------|----------------------------------------------------------------------------------|-------------------------------------------|
| AC power | Comparative outputs, External control inputs, Analog output, BCD output, RS-232C | RS-485 Modbus RTU                         |
|          | Input Ach<br>Totalizer-synchronized pulse                                        | Input Bch<br>Totalizer-synchronized pulse |
| DC power | Comparative outputs, External control inputs, Analog output, BCD output, RS-232C | RS-485 Modbus RTU                         |
|          | Input Ach<br>Totalizer-synchronized pulse                                        | Input Bch<br>Totalizer-synchronized pulse |

- 2) Do not wire the power supply line, input signal lines and output signal lines near noise sources or relay drive lines.
- 3) Bundling or containing in a same duct with lines including noises might cause malfunctions.
- 4) The WPMZ becomes available functionally right after power activation, but requires 30 minutes' warming to satisfy all performance requirements.

Note: The inputs "A channel" and "B channel" may be abbreviated to "Ach" and "Bch" in this manual.

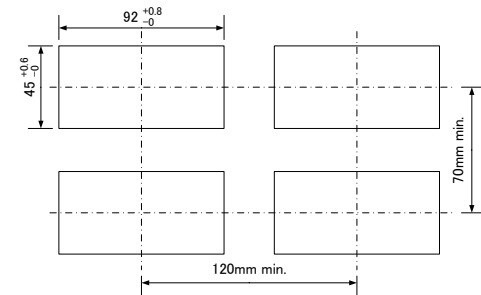
### 2-3. CHECKING BEFORE USE

Install the WPMZ under the environments and conditions of use which meet requirements.

If you find any damage to the product or any problem, please contact to your dealer or our company directly.

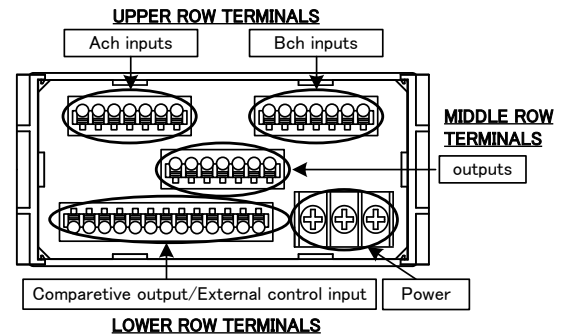
## 3. HOW TO INSTALL (PANEL CUT DIMENSIONS)

To install the WPMZ, panel cut dimensions are as shown by the figure below.

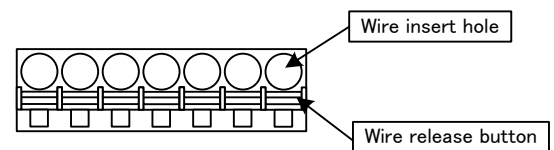


## 4. CONNECTING TERMINALS

### 4-1. BACK VIEW



### 4-2. WIRING TO SCREWLESS TERMINALS



Pushing the wire release button with a flat-blade screwdriver, insert the wire to the wire insert hole deeply and then release the button.

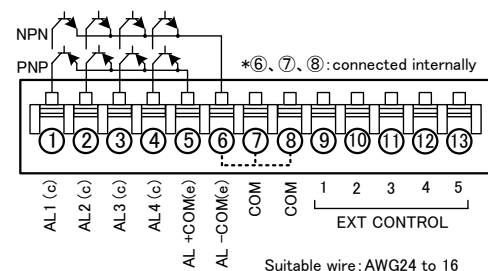
(Suitable tool for pushing buttons : flat-blade screwdriver blade width 2.5mm)

### 4-3. CONNECTOR FOR LOWER ROW TERMINALS (COMPARATIVE OUTPUT/EXTERNAL CONTROL INPUT, POWER)

#### 4-3-1. Comparative Output / External Control Input

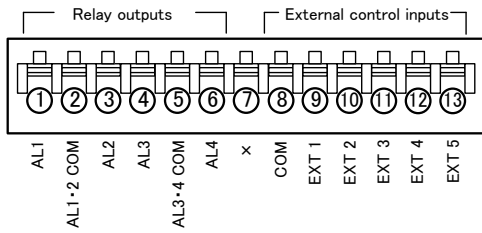
##### \*Screwless connector

[Open-collector output products]



| No. | Name     | Description                                                           |
|-----|----------|-----------------------------------------------------------------------|
| 1   | AL1 c    | AL1 open-collector output (collector)                                 |
| 2   | AL2 c    | AL2 open-collector output (collector)                                 |
| 3   | AL3 c    | AL3 open-collector output (collector)                                 |
| 4   | AL4 c    | AL4 open-collector output (collector)                                 |
| 5   | AL+COM e | Common terminal for PNP output (emitter) (NPN output : no connection) |
| 6   | AL-COM e | Common terminal for NPN output (emitter) (PNP output : GND for PNP)   |
| 7,8 | COM      | Common terminal for external control inputs                           |
| 9   | 1        | External control input No.1                                           |
| 10  | 2        | External control input No.2                                           |
| 11  | 3        | External control input No.3                                           |
| 12  | 4        | External control input No.4                                           |
| 13  | 5        | External control input No.5                                           |

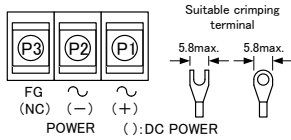
## 【Relay output products】



Suitable wire: AWG 24 to 16

| No. | Name      | Description                                      |
|-----|-----------|--------------------------------------------------|
| 1   | AL1       | AL1 relay output                                 |
| 2   | AL1.2 COM | Common terminal for relay outputs of AL1 and AL2 |
| 3   | AL2       | AL2 relay output                                 |
| 4   | AL3       | AL3 relay output                                 |
| 5   | AL3.4 COM | Common terminal for relay outputs of AL3 and AL4 |
| 6   | AL4       | AL4 relay output                                 |
| 7   | x         | No connection                                    |
| 8   | COM       | Common terminal for external control inputs      |
| 9   | EXT 1     | External control input No.1                      |
| 10  | EXT 2     | External control input No.2                      |
| 11  | EXT 3     | External control input No.3                      |
| 12  | EXT 4     | External control input No.4                      |
| 13  | EXT 5     | External control input No.5                      |

## 4-3-2. Supply Power

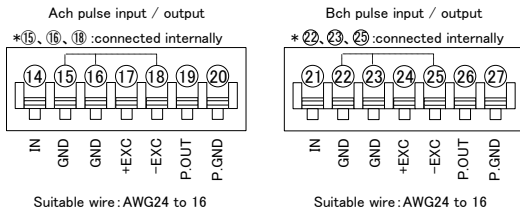


| Terminal | Name      | Description                                                                    |
|----------|-----------|--------------------------------------------------------------------------------|
| P1       | POWER (+) | Power source terminal (In case of DC power, +V)                                |
| P2       | POWER (-) | Power source terminal (In case of DC Power, 0V)                                |
| P3       | FG (NC)   | FG terminal (DC power option: no connection (Non-usable for a relay terminal)) |

## 4-4. CONNECTION FOR UPPER ROW TERMINALS

## 4-4-1. Pulse Inputs / Output

## \*Screwless connector



## ●A channel. pulse input

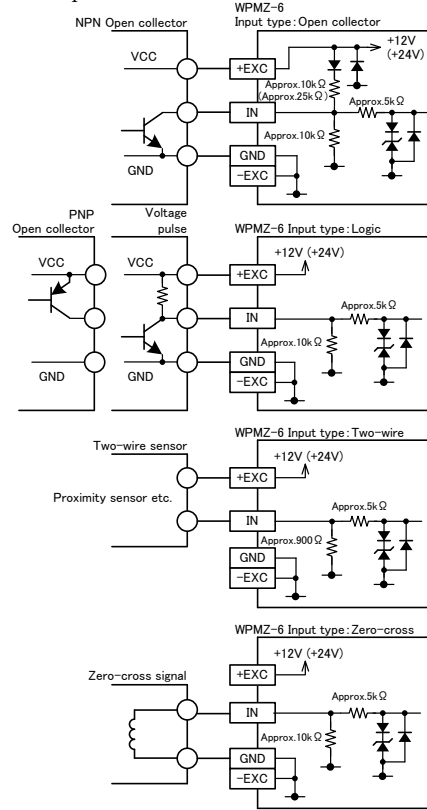
| Terminal | Name  | Description                                         |
|----------|-------|-----------------------------------------------------|
| 14       | IN    | Ach pulse input terminal                            |
| 15,16    | GND   | Ach input ground terminal                           |
| 17       | +EXC  | Ach sensor power output terminal (+)                |
| 18       | -EXC  | Ach sensor power output terminal (-)                |
| 19       | P.OUT | Ach totalizer-synchronous pulse output terminal (+) |
| 20       | P.GND | Ach totalizer-synchronous pulse output terminal (-) |

## ●B channel. pulse input

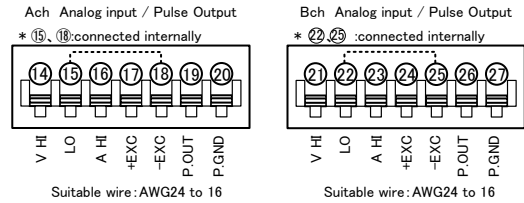
| Terminal | Name  | Description                                         |
|----------|-------|-----------------------------------------------------|
| 21       | IN    | Bch pulse input terminal                            |
| 22,23    | GND   | Bch input ground terminal                           |
| 24       | +EXC  | Bch sensor power output terminal (+)                |
| 25       | -EXC  | Bch sensor power output terminal (-)                |
| 26       | P.OUT | Bch totalizer-synchronous pulse output terminal (+) |
| 27       | P.GND | Bch totalizer-synchronous pulse output terminal (-) |

\*Using as a 2-phase pulse input, connect the GND of A channel to the GND of B channel.

## •Examples for Input connections



## 4-4-2. Analog Inputs / Pulse Output \*Screwless connector



## ●A channel. analog input

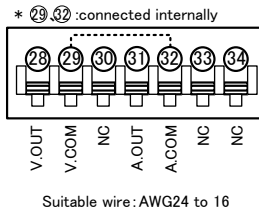
| Terminal | Name  | Description                                         |
|----------|-------|-----------------------------------------------------|
| 14       | V HI  | Ach voltage range input terminal (+)                |
| 15       | LO    | Ach input common terminal (-)                       |
| 16       | A HI  | Ach current range input terminal (+)                |
| 17       | +EXC  | Ach sensor power output terminal (+)                |
| 18       | -EXC  | Ach sensor power output terminal (-)                |
| 19       | P.OUT | Ach totalizer-synchronous pulse output terminal (+) |
| 20       | P.GND | Ach totalizer-synchronous pulse output terminal (-) |

## ●B channel. analog input

| Terminal | Name  | Description                                         |
|----------|-------|-----------------------------------------------------|
| 21       | V HI  | Bch voltage range input terminal (+)                |
| 22       | LO    | Bch input common terminal (-)                       |
| 23       | A HI  | Bch current range input terminal (+)                |
| 24       | +EXC  | Bch sensor power output terminal (+)                |
| 25       | -EXC  | Bch sensor power output terminal (-)                |
| 26       | P.OUT | Bch totalizer-synchronous pulse output terminal (+) |
| 27       | P.GND | Bch totalizer-synchronous pulse output terminal (-) |

## 4-5. CONNECTION FOR MIDDLE ROW TERMINALS

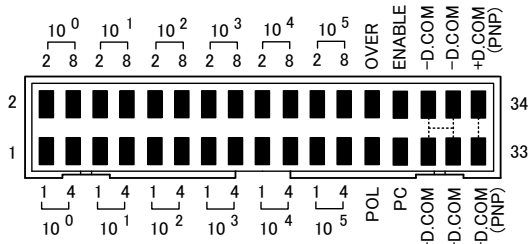
## 4-5-1. Analog Output \*Screwless connector



## ●WPMZ-6-□□□-1□-□□□

| Terminal | Name  | Description                                      |
|----------|-------|--------------------------------------------------|
| 28       | V.OUT | Analog voltage output terminal (+)               |
| 29       | V.COM | Analog voltage output terminal (-)               |
| 30       | NC    | No connection. (Non-usable for a relay terminal) |
| 31       | A.OUT | Analog current output terminal (+)               |
| 32       | A.COM | Analog current output terminal (-)               |
| 33,34    | NC    | No connection. (Non-usable for a relay terminal) |

## 4-5-2. BCD Output \*MIL connector

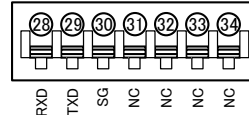


Suitable wire: AWG#28 flat cable(7/0.127mm)

## ●WPMZ-6-□□□-2or3□-□□□

| Terminal | Name                 | Description                                                                                                                        |
|----------|----------------------|------------------------------------------------------------------------------------------------------------------------------------|
| 1 to 4   | 10 <sup>0</sup> -1-8 | Bit 1-8 of BCD 10 <sup>0</sup> digit output terminals                                                                              |
| 5 to 8   | 10 <sup>1</sup> -1-8 | Bit 1-8 of BCD 10 <sup>1</sup> digit output terminals                                                                              |
| 9 to 12  | 10 <sup>2</sup> -1-8 | Bit 1-8 of BCD 10 <sup>2</sup> digit output terminals                                                                              |
| 13 to 16 | 10 <sup>3</sup> -1-8 | Bit 1-8 of BCD 10 <sup>3</sup> digit output terminals                                                                              |
| 17 to 20 | 10 <sup>4</sup> -1-8 | Bit 1-8 of BCD 10 <sup>4</sup> digit output terminals                                                                              |
| 21 to 24 | 10 <sup>5</sup> -1-8 | Bit 1-8 of BCD 10 <sup>5</sup> digit output terminals                                                                              |
| 25       | POL                  | BCD polarity output terminal                                                                                                       |
| 26       | OVER                 | BCD over output terminal                                                                                                           |
| 27       | PC                   | BCD synchronous signal output terminal                                                                                             |
| 28       | ENABLE               | BCD enable terminal<br>By bringing to same voltage level of -D.COM or connecting to -D.COM, transistors of BCD outputs become OFF. |
| 29 to 32 | -D.COM               | Common terminal for BCD open collector NPN                                                                                         |
| 33,34    | +D.COM               | External power terminal for BCD open collector PNP                                                                                 |

## 4-5-3. RS-232C \*Screwless connector



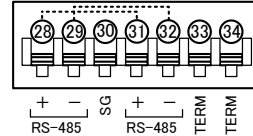
Suitable wire: AWG24 to 16

## ●WPMZ-6-□□□-4□-□□□

| Terminal | Name | Description                                       |
|----------|------|---------------------------------------------------|
| 28       | RXD  | receive data terminal                             |
| 29       | TXD  | transmit data terminal                            |
| 30       | SG   | common terminal for communication function        |
| 31 to 34 | NC   | no connection<br>*Non-usable for a relay terminal |

## 4-5-4. RS-485 Modbus RTU \*Screwless connector

\* 28, 29 &amp; 30, 31: connected internally



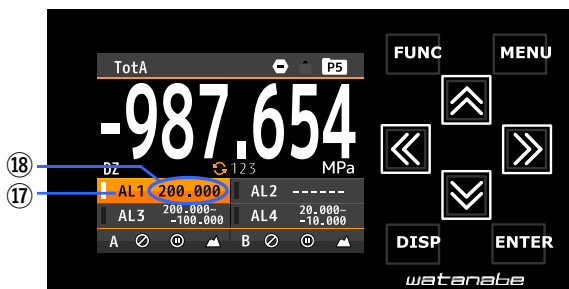
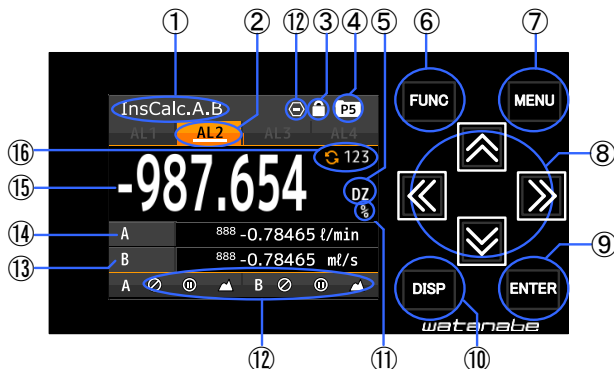
Suitable wire: AWG24 to 16

## ●WPMZ-6-□□□-5□-□□□

| Terminal | Name | Description                                                                            |
|----------|------|----------------------------------------------------------------------------------------|
| 28       | +    | Non-inverting signal                                                                   |
| 29       | -    | Inverting signal                                                                       |
| 30       | SG   | Signal ground                                                                          |
| 31       | +    | Non-inverting signal                                                                   |
| 32       | -    | Inverting signal                                                                       |
| 33,34    | TERM | Terminal resistance (120Ω) terminals<br>* Short 33 and 34 to be enable the resistance. |

## 5. NAMES OF EACH PAR

## 5-1. NAMES OF EACH PART



| No. | Name              | Function                                                                 |
|-----|-------------------|--------------------------------------------------------------------------|
| ①   | Display title     | Indicates contents of display                                            |
| ②   | Comparison result | Lights when the result of comparative output is ON.                      |
| ③   | Key lock          | Lights when the key lock is effective.                                   |
| ④   | Pattern           | Indicates pattern No. in use.                                            |
| ⑤   | DZ icon           | Indicates the operation status of the "Digital zero" function            |
| ⑥   | FUNC key          | Used for registering external control shortcut function.                 |
| ⑦   | MENU key          | Used for moving to setting display and returning to measurement display. |

|   |                   |                                                                                                                                                                                                    |
|---|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ⑧ | Arrow keys        | Used to move the cursor and to move to other displays while setting mode.<br>*When the shortcut function is registered, the assigned function will be valid by holding down the key over 1 second. |
| ⑨ | ENTER key         | Used to validate setting value.                                                                                                                                                                    |
| ⑩ | DISP key          | Used to switch measurement displays.                                                                                                                                                               |
| ⑪ | Display unit      | Unit for 1st item display                                                                                                                                                                          |
| ⑫ | External control  | Lights when any of external control functions are valid                                                                                                                                            |
| ⑬ | 3rd item display  | Displays measured value of 3rd item                                                                                                                                                                |
| ⑭ | 2nd item display  | Displays measured value of 2nd item                                                                                                                                                                |
| ⑮ | 1st item display  | Displays measured value of 1st item                                                                                                                                                                |
| ⑯ | Overflow counter  | In case that 1st display item is totalized value, indicates overrun count.<br>* If the setting for the overflow count is NONE, this item is not shown.                                             |
| ⑰ | Comparison result | Lights when the result of comparative output is ON.                                                                                                                                                |
| ⑱ | Judgement value   | Shows value or area of comparison judgement                                                                                                                                                        |

## 5-2. EXPLANATION OF ICONS

## 5-2-1. Display Icons on The Measurement Display

These icons are displayed on the top or the bottom of the measurement

| Icon | Meaning                                                                                             |
|------|-----------------------------------------------------------------------------------------------------|
| P5   | Indicates pattern No. in use.                                                                       |
| 🔒    | Indicates key lock function is effective.                                                           |
| 🔄    | Indicates comparative output reset function(an external control function) is effective.             |
| 🚫    | Indicates measurement inhibit function(an external control function) is effective.                  |
| ⏸    | Indicates display hold function(an external control function) is effective.                         |
| 📈📉   | Indicates maximum value or minimum value hold function (an external control function) is effective. |

### 5-2-2. Key Operation Icons on The Setting Display

Key operation icons which are displayed on setting displays are shown below.

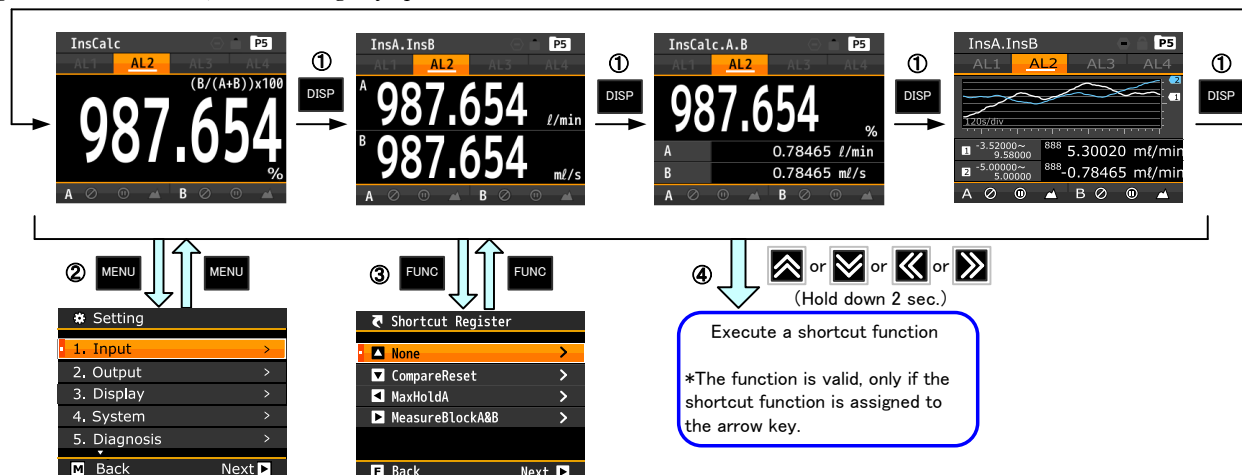
| icon | Meaning  | icon | meaning           |
|------|----------|------|-------------------|
|      | MENU key |      | ARROW key (LEFT)  |
|      | FUNC key |      | ARROW key (RIGHT) |

|  |                  |  |                           |
|--|------------------|--|---------------------------|
|  | ENTER key        |  | ARROW key (UP&DOWN)       |
|  | DISP key         |  | ARROW key (LEFT&RIGHT)    |
|  | ARROW key (UP)   |  | ARROW key (ALL)           |
|  | ARROW key (DOWN) |  | Pattern No. under setting |

## BASIC OPERATIONS, SETTINGS

### 6. BASIC OPERATIONS OF MEASUREMENT DISPLAY

During measurement mode, the following key operations can be done.



### 7. SETTING LAYER OVERVIEW

The setting menus of the WPMZ which are represented by key words and have layers, therefore desired setting menu can be selected accurately. The layers consist of 1st layer to 4th layer (Only custom unit setting has the 5th layer.) Please refer to “8. BASIC OPERATION OF SETTING DISPLAY” about how to set up.

| 1st Layer<br>Large<br>Categories | 2nd Layer<br>Small<br>Categories | 3rd Layer (Setting Variables)                 |                                                       | 4th Layer (Setting Values)         |                                                                                                               | Remarks                                                                                                                  |
|----------------------------------|----------------------------------|-----------------------------------------------|-------------------------------------------------------|------------------------------------|---------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
|                                  |                                  | Names of Variables                            | Character Strings<br>On Display<br>(Abbreviated Form) | Initial Values                     | Settable Values                                                                                               |                                                                                                                          |
| 1.Input                          | Pulse input A<br>Pulse input B   | Pattern select                                | PatternSelect                                         | Pattern1(or pattern No.<br>in use) | Pattern1/ Pattern 2/ Pattern 3/ Pattern 4/ Pattern<br>5/ Pattern 6/ Pattern 7/ Pattern 8                      | Select pattern No. to set.                                                                                               |
|                                  |                                  | Input type                                    | InputType                                             | OpenCollector                      | OpenCollector/Logic/ZeroCross/2Wire/<br>2PhaseOpenCol/2PhaseLogic/2Phase2wire                                 | Select input signal type                                                                                                 |
|                                  |                                  | Input filter                                  | InputFilter                                           | None                               | None/30Hz/1.5kHz/15kHz                                                                                        | Select analog input filters                                                                                              |
|                                  |                                  | Sensor power                                  | SensorPower                                           | 12V                                | 12V/24V                                                                                                       | Switch Sensor power voltage                                                                                              |
|                                  |                                  | Instantaneous value<br>display coefficient    | InsDispCoef                                           | 1.00000×10 <sup>0</sup>            | 0.00000 to 9.99999×10 <sup>-9</sup>                                                                           | For scaling setting of instantaneous value display,<br>multiply frequency by instantaneous coefficient and<br>unit time. |
|                                  |                                  | Instantaneous Unit<br>Time                    | InsUnitTime                                           | Sec                                | Sec/Min/Hour                                                                                                  |                                                                                                                          |
|                                  |                                  | Instantaneous value<br>decimal point position | InsDecPoint                                           | #####<br>(No decimal point)        | #####/#####/#####/#####/#####                                                                                 | Set number of digits after decimal point                                                                                 |
|                                  |                                  | Instantaneous value<br>display unit           | InsDispUnit                                           | None                               | None/select from 62 units (See 6-2)/custom unit                                                               | Refer to detailed instruction manual about custom<br>unit                                                                |
|                                  |                                  | Instantaneous value<br>auto zero              | InsAutoZero                                           | 0.00                               | 0.00 to 99.99sec                                                                                              | Displays 0 if no pulse input over more than setting<br>time                                                              |
|                                  |                                  | Instantaneous value<br>moving average         | InsMoveAve                                            | None                               | None/2times/3times /4times /5times /6times<br>/7times /8times / 9times                                        | Set number of moving average.                                                                                            |
|                                  |                                  | Instantaneous<br>value simple average         | InsSimpleAve                                          | None                               | None/2 times /4 times /8 times /16 times /32 times<br>/64 times /128 times /256 times                         | Set number of simple average for internal sampling<br>(10ms)                                                             |
|                                  |                                  | Instantaneous value<br>display step           | InsDispStep                                           | None                               | None/5steps/10steps                                                                                           | Setting of steps of display (If set to 5steps, displayed<br>only 0 or 5 on LSB)                                          |
|                                  |                                  | Totalized value display<br>coefficient        | TotDispCoef                                           | 1.00000×10 <sup>0</sup>            | 0.00000 to 9.99999×10 <sup>-9</sup>                                                                           | Scaling setting for totalized value display.                                                                             |
|                                  |                                  | Totalized value<br>default value              | TotDefaults                                           | 0.00000×10 <sup>0</sup>            | ± 9.99999×10 <sup>-9</sup>                                                                                    | Setting of Initial value of totalized value                                                                              |
|                                  |                                  | Total calculation<br>direction                | TotDirection                                          | AddToDefault                       | AddToDefault/SubFromDefault                                                                                   | Set addition or subtraction for totalized value                                                                          |
|                                  |                                  | Totalized value<br>decimal point position     | TotDecPoint                                           | #####<br>(No decimal point)        | #####/#####/#####/#####/#####                                                                                 | Set number of digits after decimal point                                                                                 |
|                                  |                                  | Totalized value display<br>unit               | TotDispUnit                                           | None                               | None/select from 62 units (See 6-2)/custom unit                                                               | Refer to detailed instruction manual about custom<br>unit                                                                |
|                                  |                                  | Totalized value<br>overrun count              | TotOverCount                                          | None                               | None/999times/Endless                                                                                         | Setting for overrun count                                                                                                |
|                                  | Analog Input A<br>Analog Input B | Pattern select                                | PatternSelect                                         | Pattern1(or pattern No.<br>in use) | Pattern1/ Pattern 2/ Pattern 3/ Pattern 4/ Pattern<br>5/ Pattern 6/ Pattern 7/ Pattern 8                      | Select pattern No. to set.                                                                                               |
|                                  |                                  | Input Type                                    | InputRange                                            | 4 to 20mA                          | 0 to 5V/1 to 5V/0 to 10V/4 to 20mA/0 to 20mA                                                                  | Select input signal type                                                                                                 |
|                                  |                                  | Sensor Power                                  | SensorPower                                           | 12V                                | 12V/24V                                                                                                       | Select sensor power voltage                                                                                              |
|                                  |                                  | Shut Down                                     | InputLowCut                                           | 00.500                             | 0.00 to 100.00%                                                                                               | Cutting off low level input signal                                                                                       |
|                                  |                                  | Linearize Function                            | InputCorrect                                          | Disable                            | Disable/Enable                                                                                                | Switch ON/OFF of linearize function.                                                                                     |
|                                  |                                  | Linearize Point                               | Linearize Point                                       | 0.00 to 100.0<br>0.00 to 100.0     | Input value (1st to 21st point) :<br>0.00 to 100.00%<br>Output value (1st to 21st point) :<br>0.00 to 100.00% | On after 2nd point, if both of input value and output<br>value are 0.00, the following points become invalid.            |
|                                  |                                  | Instantaneous value<br>display Coefficient    | InsDispCoef                                           | 1.00000×10 <sup>4</sup>            | 0.00000 to 9.99999×10 <sup>-5</sup>                                                                           | Scaling setting of instantaneous value display.                                                                          |

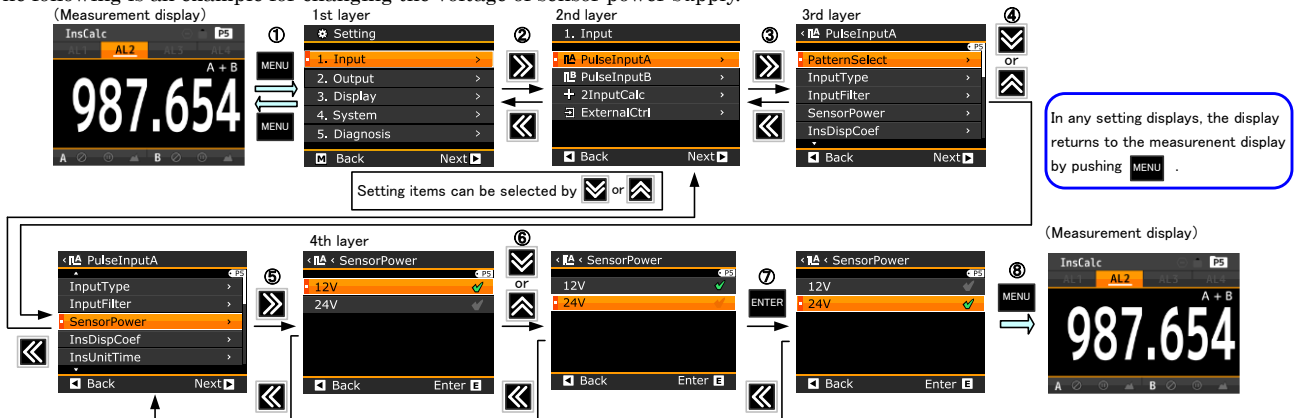
| 1st LayerLarge Categories | 2nd LayerSmall Categories                                                                            | 3rd Layer (Setting Variables)                |                                                                             | 4th Layer (Setting Values)                                   |                                                                                                                                                                                                                                                                                                                                  | Remarks                                                                                                   |
|---------------------------|------------------------------------------------------------------------------------------------------|----------------------------------------------|-----------------------------------------------------------------------------|--------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|
|                           |                                                                                                      | Names of Variables                           | Character Strings On Display (Abbreviated Form)                             | Initial Values                                               | Settable Values                                                                                                                                                                                                                                                                                                                  |                                                                                                           |
| 1.Input                   | Analog Input A<br>Analog Input B                                                                     | Instantaneous value decimal point position   | InsDecPoint                                                                 | #####<br>(No decimal point)                                  | #####/####. #####. ###/###. ####/#. #####                                                                                                                                                                                                                                                                                        | Set number of digits after decimal point                                                                  |
|                           |                                                                                                      | Instantaneous value display unit             | InsDispUnit                                                                 | None                                                         | None/select from 62 units (See 6-2)/custom unit                                                                                                                                                                                                                                                                                  | Refer to detailed instruction manual about custom unit                                                    |
|                           |                                                                                                      | Instantaneous value moving average           | MoveAve                                                                     | None                                                         | None/2times/3times /4times /5times /6times /7times /8times /9times                                                                                                                                                                                                                                                               | Set number of moving average for analog inputs                                                            |
|                           |                                                                                                      | Instantaneous value simple average           | SimpleAve                                                                   | None                                                         | None/2 times /4 times /8 times /16 times /32 times /64 times /128 times /256 times                                                                                                                                                                                                                                               | Set number of simple average                                                                              |
|                           |                                                                                                      | Instantaneous value display step             | InsDispStep                                                                 | None                                                         | None/5steps/10steps                                                                                                                                                                                                                                                                                                              | Setting of steps of display (If set to 5steps, displayed only 0 or 5 on LSB)                              |
|                           |                                                                                                      | Totalized unit time                          | TotUnitTime                                                                 | Hour                                                         | Sec/Min/Hour                                                                                                                                                                                                                                                                                                                     | Set unit time                                                                                             |
|                           |                                                                                                      | Totalized value display Coefficient          | TotDispCoef                                                                 | 1.00000×10 <sup>5</sup>                                      | 0.00000 to 9.99999×10 <sup>-9</sup>                                                                                                                                                                                                                                                                                              | Scaling setting for totalized value display.                                                              |
|                           |                                                                                                      | Totalized value default value                | TotDefaults                                                                 | 0.00000×10 <sup>0</sup>                                      | ± 9.99999×10 <sup>-9</sup>                                                                                                                                                                                                                                                                                                       | Setting of Initial value of totalized value                                                               |
|                           |                                                                                                      | Total calculation direction                  | TotDirection                                                                | AddToDefault                                                 | AddToDefault/SubFromDefault                                                                                                                                                                                                                                                                                                      | Set addition or subtraction for totalized value                                                           |
|                           |                                                                                                      | Totalized value decimal point position       | TotDecPoint                                                                 | #####<br>(No decimal point)                                  | #####/####. #####. ###/###. ####/#. #####                                                                                                                                                                                                                                                                                        | Set number of digits after decimal point.                                                                 |
|                           | 2 input calculation                                                                                  | Totalized value display unit                 | TotDispUnit                                                                 | None                                                         | None/select from 62 units (See 6-2)/custom unit                                                                                                                                                                                                                                                                                  | Refer to detailed instruction manual about custom unit                                                    |
|                           |                                                                                                      | Totalized value overrun count                | TotOverCount                                                                | None                                                         | None/999times/Endless                                                                                                                                                                                                                                                                                                            | Setting for overrun count                                                                                 |
|                           |                                                                                                      | Pattern select                               | PatternSelect                                                               | Pattern1(or pattern No. in use)                              | Pattern1/ Pattern 2/ Pattern 3/ Pattern 4/ Pattern 5/ Pattern 6/ Pattern 7/ Pattern 8                                                                                                                                                                                                                                            | Select pattern No. to set.                                                                                |
|                           |                                                                                                      | Expression for instantaneous value           | InsExpression                                                               | None                                                         | None/ (B/A)*100 / (B/A-1)*100 /B-A / (B(A+B))*100 / A+B                                                                                                                                                                                                                                                                          | Select expression for calculation of instantaneous value.                                                 |
|                           |                                                                                                      | Instantaneous value decimal point position   | InsDecPoint                                                                 | #####<br>(No decimal point)                                  | #####/####. #####. ###/###. ####/#. #####                                                                                                                                                                                                                                                                                        | Set number of digits after decimal point                                                                  |
|                           |                                                                                                      | Instantaneous value display unit             | InsDispUnit                                                                 | None                                                         | None/select from 62 units (See 6-2)/custom unit                                                                                                                                                                                                                                                                                  | Refer to detailed instruction manual about custom unit                                                    |
|                           |                                                                                                      | Instantaneous value display step             | InsDispStep                                                                 | None                                                         | None/5steps/10steps                                                                                                                                                                                                                                                                                                              | Setting of steps of display (If set to 5steps, displayed only 0 or 5 on LSB)                              |
|                           |                                                                                                      | Expression for totalized value               | TotExpression                                                               | None                                                         | None/A+B / B-A                                                                                                                                                                                                                                                                                                                   | Select expression for calculation of totalized value.                                                     |
|                           |                                                                                                      | Totalized value decimal point position       | TotDecPoint                                                                 | #####<br>(No decimal point)                                  | #####/####. #####. ###/###. ####/#. #####                                                                                                                                                                                                                                                                                        | Set number of digits after decimal point.                                                                 |
|                           |                                                                                                      | Totalized value display unit                 | TotDispUnit                                                                 | None                                                         | None/select from 62 units (See 6-2)/custom unit                                                                                                                                                                                                                                                                                  | Refer to detailed instruction manual about custom unit                                                    |
|                           |                                                                                                      | Totalized value overrun count                | TotOverCount                                                                | None                                                         | None/999times/Endless                                                                                                                                                                                                                                                                                                            | Setting for overrun count                                                                                 |
|                           | External Control                                                                                     | Function of external control terminal 1 to 5 | ExtCtrl1Func<br>ExtCtrl2Func<br>ExtCtrl3Func<br>ExtCtrl4Func<br>ExtCtrl5unc | None                                                         | None/ CompareReset/ TotalResetA/ TotalResetB/ TotalResetA&B/ MeasureBlockA/ MeasureBlockB/ MeasureBlockA&B/ DispHoldA/ DispHoldB/ DispHoldA&B/ MaxHoldA/ MaxHoldB/ MaxHoldA&B/ MinHoldA/ MinHoldB/ MinHoldA&B/DigitalZeroA/DigitalZeroB/ DigitalZeroA&B/PatternChange1/ PatternChange2/ PatternChange3/ MonitorChange/ TrendHold | Select functions assigned to external control terminals.                                                  |
| 2.Output                  | CompareList                                                                                          | ---                                          | ---                                                                         | ---                                                          | Go to screen of CompareList                                                                                                                                                                                                                                                                                                      |                                                                                                           |
|                           | Comparative Output AL1<br>Comparative Output AL2<br>Comparative Output AL3<br>Comparative Output AL4 | Pattern select                               | PatternSelect                                                               | Pattern1(or pattern No. in use)                              | Pattern1/ Pattern 2/ Pattern 3/ Pattern 4/ Pattern 5/ Pattern 6/ Pattern 7/ Pattern 8                                                                                                                                                                                                                                            | Select pattern No. to set.                                                                                |
|                           |                                                                                                      | Source output display value                  | OutputDispValue                                                             | None                                                         | None/InsA/InsB/InsCalc/TotA/TotB/TotCalc                                                                                                                                                                                                                                                                                         | Select source output display value to compare.                                                            |
|                           |                                                                                                      | Compare mode                                 | CompareMode                                                                 | LevelJudge                                                   | LevelJudge/ ZoneJudge                                                                                                                                                                                                                                                                                                            | Select compare mode                                                                                       |
|                           |                                                                                                      | Condition of ON                              | OnConditions                                                                | Excess<br>InTheZone                                          | Excess/LessThan<br>InTheZone/OutsideTheZone                                                                                                                                                                                                                                                                                      | In level judge mode<br>In Zone judge mode                                                                 |
|                           |                                                                                                      | Comparison judgement value                   | Threshold                                                                   | 10000<br>0                                                   | Threshold :±999999<br>Hysteresis: 0 to 999999                                                                                                                                                                                                                                                                                    | In level judge mode                                                                                       |
|                           |                                                                                                      | Comparison ON delay                          | OnDelay                                                                     | None                                                         | Zone lower limit :±999999<br>Zone upper limit :±999999<br>Hysteresis: 0 to 999999                                                                                                                                                                                                                                                | In Zone judge mode                                                                                        |
|                           |                                                                                                      | Comparison OFF delay                         | OffDelay                                                                    | None                                                         | None/20ms/50ms/100ms/200ms/500ms<br>1s/5s/10s/20s                                                                                                                                                                                                                                                                                | Comparative output turns ON, if ON condition continues over set delay time.                               |
|                           |                                                                                                      | Output mode                                  | OutputMode                                                                  | Normal                                                       | Normal/Latch/OneShot5ms/ OneShot 10ms/ OneShot 20ms/ OneShot 50ms/ OneShot 0.1s/ OneShot 0.2s/ OneShot 0.5s/ OneShot 1s/ OneShot 2s                                                                                                                                                                                              | Select output mode of comparison                                                                          |
|                           | Pulse Output A<br>Pulse Output B                                                                     | Output logic                                 | OutputLogic                                                                 | Negative(NO)                                                 | Positive(NC)/Negative(NO)                                                                                                                                                                                                                                                                                                        | NC/NO are for relay output product.                                                                       |
|                           |                                                                                                      | Background Color at ON                       | OnBgColors                                                                  | Black                                                        | Black/Red/Yellow/Green                                                                                                                                                                                                                                                                                                           | Background color priority<br>AL1>AL2>AL3>AL4                                                              |
|                           |                                                                                                      | Pattern select                               | PatternSelect                                                               | Pattern1(or pattern No. in use)                              | Pattern1/ Pattern 2/ Pattern 3/ Pattern 4/ Pattern 5/ Pattern 6/ Pattern 7/ Pattern 8                                                                                                                                                                                                                                            | Select pattern No. to set.                                                                                |
|                           |                                                                                                      | Source output display value                  | OutputDispValue                                                             | None                                                         | None/TotA/TotB/TotCalc                                                                                                                                                                                                                                                                                                           | Select source output display value to output as totalizer-synchronous pulse                               |
|                           |                                                                                                      | Output synchronous digit                     | OutputSyncDigit                                                             | 1stDigit                                                     | 1stDigit/2ndDigit/3rdDigit/4thDigit/5thDigit /6thDigit                                                                                                                                                                                                                                                                           | Select display digit with which totalizer-synchronous pulse synchronized.                                 |
|                           |                                                                                                      | Output pulse width                           | OutputPulseWidth                                                            | 5ms                                                          | 5ms/10ms/20ms/50ms/100ms/500ms/1s/2s                                                                                                                                                                                                                                                                                             | Select width of totalizer-synchronous pulse.                                                              |
|                           |                                                                                                      | Output logic                                 | OutputLogic                                                                 | Negative                                                     | Positive/Negative                                                                                                                                                                                                                                                                                                                | Select logic of totalizer-synchronous pulse.                                                              |
|                           |                                                                                                      | Pattern select                               | PatternSelect                                                               | Pattern1(or pattern No. in use)                              | Pattern1/ Pattern 2/ Pattern 3/ Pattern 4/ Pattern 5/ Pattern 6/ Pattern 7/ Pattern 8                                                                                                                                                                                                                                            | Select pattern No. to set.                                                                                |
|                           | Analog Output                                                                                        | Output range                                 | OutputRange                                                                 | 0-10V                                                        | 0-10V/±10V/1-5V/0-20mA/4-20mA                                                                                                                                                                                                                                                                                                    | Select output range (type).                                                                               |
|                           |                                                                                                      | Source output display value                  | OutputDispValue                                                             | None                                                         | None/InsA/InsB/InsCalc/TotA/TotB/TotCalc                                                                                                                                                                                                                                                                                         | Select a displayable item for analog output                                                               |
|                           |                                                                                                      | Output scale                                 | OutputScale                                                                 | 0<br>10000                                                   | 0% display value :±999999(±99999)<br>100% display value :±999999(±99999)                                                                                                                                                                                                                                                         | Set scaling for analog output.<br>Set expected display values at 0% and 100% output.                      |
|                           |                                                                                                      | Pattern select                               | PatternSelect                                                               | Pattern1(or pattern No. in use)                              | Pattern1/ Pattern 2/ Pattern 3/ Pattern 4/ Pattern 5/ Pattern 6/ Pattern 7/ Pattern 8                                                                                                                                                                                                                                            | Select pattern No. to set.                                                                                |
|                           | BCD Output                                                                                           | Source output display value                  | OutputDispValue                                                             | None                                                         | None/InsA/InsB/InsCalc/TotA/TotB/TotCalc                                                                                                                                                                                                                                                                                         | Select a displayable item for BCD output                                                                  |
|                           |                                                                                                      | Data signal logic                            | DataSignalLogic                                                             | Negative                                                     | Positive /Negative                                                                                                                                                                                                                                                                                                               | Select logic of data signal output.                                                                       |
|                           |                                                                                                      | Synchronous signal logic                     | SyncSignalLogic                                                             | Negative                                                     | Positive /Negative                                                                                                                                                                                                                                                                                                               | Select logic of synchronous signal (PC) output.                                                           |
|                           |                                                                                                      | Pattern select                               | PatternSelect                                                               | Pattern1(or pattern No. in use)                              | Pattern1/ Pattern 2/ Pattern 3/ Pattern 4/ Pattern 5/ Pattern 6/ Pattern 7/ Pattern 8                                                                                                                                                                                                                                            | Select pattern No. to set.                                                                                |
|                           | RS-485 Modbus communication                                                                          | Slave Address                                | SlaveAddress                                                                | 1                                                            | 1/2/3/4/ ..... /30/31                                                                                                                                                                                                                                                                                                            | Set ID number.                                                                                            |
|                           |                                                                                                      | Baud rate                                    | Baudrate                                                                    | 19200bps                                                     | 9600bps/19200bps/38400bps                                                                                                                                                                                                                                                                                                        | Set baud rate.                                                                                            |
|                           |                                                                                                      | Parity                                       | Parity                                                                      | Even                                                         | None/Even/Odd                                                                                                                                                                                                                                                                                                                    | Set parity bit.                                                                                           |
|                           |                                                                                                      | Protocol                                     | Protocol                                                                    | Modbus-RTU                                                   | Modbus-RTU/OriginalCommand/OriginalOutput                                                                                                                                                                                                                                                                                        | Set protocol                                                                                              |
|                           | RS-232C communication                                                                                | Baud rate                                    | Baudrate                                                                    | 19200bps                                                     | 9600bps/19200bps/38400bps                                                                                                                                                                                                                                                                                                        | Set baud rate.                                                                                            |
|                           |                                                                                                      | Data length                                  | DataLength                                                                  | 8bit                                                         | 7bit/8bit                                                                                                                                                                                                                                                                                                                        | Set data character length                                                                                 |
|                           |                                                                                                      | Parity                                       | Parity                                                                      | None                                                         | None/Even/Odd                                                                                                                                                                                                                                                                                                                    | Set parity bit.                                                                                           |
|                           |                                                                                                      | Stop bit                                     | Stopbit                                                                     | 1bit                                                         | 1bit/2bit                                                                                                                                                                                                                                                                                                                        | Set stop bit length.                                                                                      |
|                           |                                                                                                      | Delimiter                                    | Delimiter                                                                   | CR                                                           | CR/CR LF                                                                                                                                                                                                                                                                                                                         | Set delimiter type.                                                                                       |
| 3.Display                 | Display Select                                                                                       | Measure select                               | MeasureSelect                                                               | 1input:<br>InsA+ TotA<br>2inputs:<br>InsA+ TotA / InsB+ TotB | InsA/InsB/InsCalc/ InsA+InsB / InsCalc+A+B/ TotA/TotB/TotCalc / TotA+TotB/TotCalc+A+B/ InsA+ TotA / InsB+ TotB/ InsCalc+ TotCalc/ InsA+Comp/InsB+Comp/InsCalc+Comp/ TotA+Comp/TotB+Comp/ TotCalc+Comp                                                                                                                            | Select displayable items can be switched by DISP key or external control (multiple selects are available) |
|                           |                                                                                                      | Level select                                 | LevelSelect                                                                 |                                                              | InsA/InsB/InsCalc/ InsA+InsB / TotA/TotB/TotCalc / TotA+TotB / InsB+ TotB/ InsCalc+ TotCalc                                                                                                                                                                                                                                      | Select an item displayed on level display                                                                 |
|                           |                                                                                                      | Trend select                                 | TrendSelect                                                                 |                                                              |                                                                                                                                                                                                                                                                                                                                  | Select an item displayed on trend display.                                                                |

| 1st Layer<br>Large<br>Categories | 2nd Layer<br>Small<br>Categories | 3rd Layer (Setting Items)          |                                                       | 3rd Layer (Setting Items)                                   |                                                                                          | Remarks                                                                                                                  |
|----------------------------------|----------------------------------|------------------------------------|-------------------------------------------------------|-------------------------------------------------------------|------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
|                                  |                                  | Name Of Item                       | Character Strings<br>On Display<br>(Abbreviated Form) | Initial Values                                              | Settable Variables                                                                       |                                                                                                                          |
| 3.Display                        | Level Display                    | Pattern select                     | PatternSelect                                         | Pattern1(or pattern No.<br>in use)                          | Pattern1/ Pattern 2/ Pattern 3/ Pattern 4/ Pattern<br>5/ Pattern 6/ Pattern 7/ Pattern 8 | Select pattern No. to set.                                                                                               |
|                                  |                                  | Instantaneous value A<br>scale     | InsA Scale                                            | 0<br>10000                                                  | Lower limit :±999999<br>Upper limit :±999999                                             | Set display scale of level display.<br>Left edge of display is lower limit and right edge of<br>display is higher limit  |
|                                  |                                  | Instantaneous value B<br>scale     | InsB Scale                                            |                                                             |                                                                                          |                                                                                                                          |
|                                  |                                  | Instantaneous<br>calculation scale | InsCalcScale                                          |                                                             |                                                                                          |                                                                                                                          |
|                                  |                                  | Totalized value A Scale            | TotA Scale                                            |                                                             |                                                                                          |                                                                                                                          |
|                                  |                                  | Totalized value B<br>Scale         | TotB Scale                                            |                                                             |                                                                                          |                                                                                                                          |
|                                  |                                  | Totalized calculation<br>scale     | TotCalcScale                                          |                                                             |                                                                                          |                                                                                                                          |
|                                  | Trend Display                    | Pattern select                     | PatternSelect                                         | Pattern1(or pattern No.<br>in use)                          | Pattern1/ Pattern 2/ Pattern 3/ Pattern 4/ Pattern<br>5/ Pattern 6/ Pattern 7/ Pattern 8 | Select pattern No. to set.                                                                                               |
|                                  |                                  | Instantaneous value A<br>scale     | InsA Scale                                            | 0<br>10000                                                  | Lower limit :±999999(±99999)<br>Upper limit :±999999(±99999)                             | Set display scale of trend display.<br>Bottom edge of display is lower limit and top edge of<br>display is higher limit. |
|                                  |                                  | Instantaneous value B<br>scale     | InsB Scale                                            |                                                             |                                                                                          |                                                                                                                          |
|                                  |                                  | Instantaneous<br>calculation scale | InsCalcScale                                          |                                                             |                                                                                          |                                                                                                                          |
|                                  |                                  | Totalized value A scale            | TotA Scale                                            | 0<br>10000                                                  | Lower limit :±999999(±99999)<br>Upper limit :±999999(±99999)                             | Set display scale of trend display.<br>Bottom edge of display is lower limit and top edge of<br>display is higher limit. |
|                                  |                                  | Totalized value B scale            | TotB Scale                                            |                                                             |                                                                                          |                                                                                                                          |
|                                  |                                  | Totalized calculation<br>scale     | TotCalcScale                                          |                                                             |                                                                                          |                                                                                                                          |
| 4.System                         | General                          | Time axis                          | TimeAxis                                              | 1s/div                                                      | 1s/div,2s/div,5s/div,10s/div,30s/div,60s/div<br>120s/div                                 | Select time for 1 division of time axis.                                                                                 |
|                                  |                                  | Brightness                         | Brightness                                            | 5 Bright                                                    | 5 Bright/4/3/2/1 Dark/0 Off                                                              | Select brightness of display<br>**"0 Off" is set, whole display is black out                                             |
|                                  |                                  | Power on delay                     | PowerOnDelay                                          | None                                                        | None/2Sec/5Sec/10Sec/20Sec/30Sec/60Sec                                                   | Select time from power on to starting measurement                                                                        |
|                                  |                                  | Power saving time                  | PowerSavingTime                                       | None                                                        | None/1min/2 min/5 min/10 min/30 min/60 min                                               | In power saving state, brightness becomes "1 Dark"<br>level.                                                             |
|                                  |                                  | Totalized value<br>Memory          | TotMemory                                             | Enable                                                      | Enable/Disable                                                                           | Select saving totalized value or not.                                                                                    |
|                                  |                                  | Digital zero retention             | D-ZeroRetention                                       | Disable                                                     | Enable/Disable                                                                           | Select retent digital zero execution state and value<br>or not.                                                          |
|                                  |                                  | Language                           | Language                                              | 日本語                                                         | 日本語 /English                                                                             | Select language                                                                                                          |
|                                  |                                  | Direction of display               | DisplayDirection                                      | Horizontal                                                  | Horizontal/Vertical                                                                      | Select direction of display                                                                                              |
|                                  |                                  | Setting protect                    | SettingProtect                                        | Disable                                                     | Disable/Enable                                                                           | If Enable, changing settings are disabled.                                                                               |
|                                  | Initialize                       | Pattern Copy                       | PatternCopy                                           | Pattern5(source)<br>PatternAll(destination)<br>Excuse       | Pattern 1/2/3/4/5/6/7/8<br>Pattern 1/2/3/4/5/6/7/8/PatternAll<br>Operationselect Excuse  | Function of copying settings for each pattern.                                                                           |
|                                  |                                  | Save user defaults                 | UserDefaultSave                                       | Message "Save current settings as user initial values?"     |                                                                                          |                                                                                                                          |
|                                  |                                  | Initialize to user<br>defaults     | UserDefaultLoad                                       | Message "Initialize setting values to user initial values?" |                                                                                          |                                                                                                                          |
|                                  |                                  | Initialize to factory<br>default   | FactoryDefaultLoad                                    | Message "Initialize setting values to factory default?"     |                                                                                          |                                                                                                                          |
|                                  |                                  |                                    |                                                       |                                                             |                                                                                          |                                                                                                                          |
| 5.Diagnosis                      | Input Diagnosis                  | Pulse input A Pulse<br>input B     | PulseInputA<br>PulseInputB                            | —                                                           | —                                                                                        | Check for input signal existence.<br>(Displays pulse counts)                                                             |
|                                  |                                  | Analog input A Analog<br>input B   | AnalogInputA<br>AnalogInputB                          | —                                                           | —                                                                                        | Check for input signal existence.<br>(Displays level in percentage of rating.)                                           |
|                                  |                                  | External control<br>inputs         | ExternalCtrl                                          | —                                                           | —                                                                                        | Check for ON/OFF state of terminals                                                                                      |
|                                  |                                  |                                    |                                                       |                                                             |                                                                                          |                                                                                                                          |
|                                  | Output Test                      | Comparative output<br>AL1 to AL4   | CompareAL1<br>CompareAL2<br>CompareAL3<br>CompareAL4  | —                                                           | —                                                                                        | Outputs ON level or OFF level                                                                                            |
|                                  |                                  | Pulse output A Pulse<br>output B   | PulseOutputA<br>PulseOutputB                          | —                                                           | —                                                                                        | Outputs ON level or OFF level                                                                                            |
|                                  |                                  | Analog output                      | AnalogOutput                                          | —                                                           | —                                                                                        | Outputs level of 10% steps of rating.                                                                                    |
|                                  |                                  | BCD Output(Data)<br>BCD Output(PC) | BCD Output(Data)<br>BCD Output(PC)                    | —                                                           | —                                                                                        | Outputs ON level or OFF level for each bit                                                                               |
|                                  |                                  | Modbus<br>Communication            | ModbusCom                                             | —                                                           | —                                                                                        | Displays receive data and transmit data                                                                                  |
|                                  |                                  | RS-485<br>RS-232C                  | RS-232C Com                                           | —                                                           | —                                                                                        | Displays receive data and transmit data                                                                                  |

## 8. BASIC OPERATIONS FOR SETTING DISPLAYS

Basic operations for setting displays are shown as below.

The following is an example for changing the voltage of sensor power supply.



- By pushing the "MENU" key in the measurement mode, the display moves to the setting display and displays the **1st layer (major categories)**.  
By moving the cursor with "arrow key (UP/DOWN)", the selection of major categories to set can be changed.  
\* On the 1st layer, by pushing the "MENU" key, the display returns to the measurement display.
- Pointing the cursor to a major category to set and pushing "arrow key (RIGHT)", the display moves to the **2nd layer (small categories)**.  
By moving the cursor with "arrow key (UP/DOWN)", the selection of small categories of the setting can be changed.  
If the "arrow key (LEFT)" is pushed, the display returns to the 1st layer.  
\* On the 2nd layer, by pushing the "MENU" key, the display returns to the measurement display.
- Pointing the cursor to a small category to set and pushing "arrow key (RIGHT)", the display moves to the **3rd layer (setting items)**.  
If the "arrow key (LEFT)" is pushed, the display returns to the 2nd layer.  
\* On the 3rd layer, by pushing the "MENU" key, the display returns to the measurement display.
- By moving the cursor with "arrow key (UP/DOWN)", select a setting item.  
If the "arrow key (LEFT)" is pushed, the display returns to the 2nd layer.
- At the selected setting item, by pushing "arrow key (RIGHT)", the display moves to the 4th layer (setting contents) and a current



selected content has a check mark. If the “arrow key (LEFT)” is pushed, the display returns to the 3rd layer.

- ⑥ By moving the cursor with “arrow key (UP/DOWN)”, select a content.  
If the “arrow key (LEFT)” is pushed, the display returns to the 3rd layer.
- ⑦ By pushing the “ENTER” key, the selected content is confirmed and a check mark accompanies.  
If the “arrow key (LEFT)” is pushed, the display returns to the 3rd layer.
- ⑧ By pushing the “MENU” key, the selected content is stored and returns the measurement display.  
\* If the power is shut down before being pushed the “MENU” key, the selected content is not stored.

## 9. SETTING EXAMPLES

The followings are some examples for some necessary setting point and operation methods to perform flow measurements.

### 9-1. EXSAMPLES FOR PULSE INPUTS

#### 9-1-1. Setting Example 1

When maximum flow rate is approx. 40[l/min], using a sensor of rating 7.5[mℓ/Pulse] (open collector type), instantaneous flow rate will be displayed in [l/min] and total flow volume will be displayed in [kℓ].

- ① Input type setting  
The sensor is an open collector output type, therefore select “opencollector” as input type.
- ② Setting for instantaneous flow rate display  
Set flowrate per 1 pulse as instantaneous display coefficient  
Although instantaneous flow rate will be displayed in [l/min], the rating of the sensor is 7.5[mℓ/Pulse], it should be converted to  $7.5 \times 10^{-3}$ [l/Pulse].  
•Set the “Instantaneous display factor” as “ $7.50000 \times 10^{-3}$ ”  
•Displayed unit is [l/min], therefore select “minute” as the instantaneous unit time.  
By “instantaneous decimal point position”, set the number of digits after the decimal point
- ③ Setting for totalize flow rate display  
Set flowrate per 1 pulse as totalize display coefficient  
•Although totalize flow rate will be displayed in [kℓ], the rating of the sensor is 7.5[mℓ/Pulse], it should be converted to  $7.5 \times 10^{-6}$ [kℓ/Pulse].  
•Set the “Totalize display factor” as “ $7.50000 \times 10^{-6}$ ”  
•By “totalize decimal point position”, set the number of digits after the decimal point
- ④ Setup steps  
Although setup steps are basically same as “8.BASIC OPERATION OF SETTING DISPLAY”, setting of instantaneous display factor is needed, an example is shown below.

#### 9-1-2. Setting Example 2

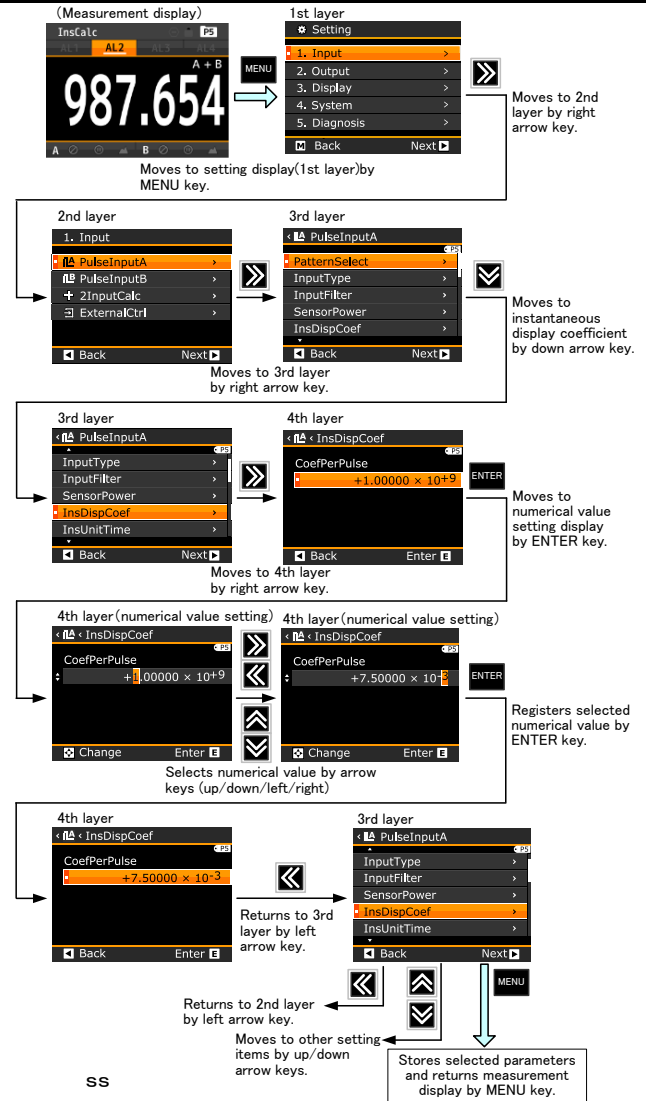
Using a sensor (Voltage output type) which outputs 15 [Hz] for 90[l/min], instantaneous flow rate will be displayed in [l/sec] and total flow volume will be displayed in [kℓ].

- ① Input type setting  
The sensor is Voltage output type, therefore select “LOGIC” for “input type”.
- ② Setting for instantaneous flow rate display  
Set flowrate per 1 pulse as “instantaneous display coefficient”.  
•Calculate number of pulses per 1 [ℓ].  
The sensor outputs pulses of 15[Hz] at 90[l/min], therefore,  $(15 \times 60) / 90 = 10$ [Pulse/ℓ].  
•Calculate flowrate per 1 pulse.  
Number of pulses per 1 liter is 10[Pulse/ℓ], therefore,  $1/10 = 1 \times 10^{-1}$ [ℓ/Pulse].  
•Set “ $1.00000 \times 10^{-1}$ ” for the “instantaneous value display coefficient”.  
\* Any settings of “ $1.00000 \times 10^{-1}$ ”, “ $0.10000 \times 10^0$ ” and “ $0.01000 \times 10^1$ ” for the “instantaneous value display coefficient” bring same results.  
•Unit to display is [l/sec], therefore, select “Sec” for the “instantaneous unit time”.  
•By “instantaneous decimal point position”, set the number of digits after the decimal point.
- ③ Setting for the totalized value display  
As setting of the totalized value display coefficient, set flow volume per 1 pulse.  
•The totalized value is displayed in [kℓ], therefore convert  $1 \times 10^{-1}$  [ℓ/Pulse] to  $1 \times 10^{-4}$ [kℓ/Pulse].  
•Set “ $1.00000 \times 10^{-4}$ ” for the totalized value display coefficient  
•By “totalize decimal point position”, set the number of digits after the decimal point

#### 9-1-3. Setting Example 3

Detecting pulses from a gear wheel which generates 5 pulses per 1 round by proximity switch (open collector output) and displays the revolving speed in [rpm].

- ① Input type setting  
The sensor is an open collector type, therefore “open collector” should be selected as the input type.



- ② Setting for Instantaneous flow rate display  
For setting of Instantaneous display coefficient, Number of rotation per 1 pulse is needed.  
•Calculate the number of rotation per 1 pulse.  
Because of 5 [Pulse] per 1 round, therefore,  $1/5 = 2 \times 10^{-1}$ [round]  
•Set “ $2.00000 \times 10^{-1}$ ” as the Instantaneous display coefficient  
•Unit to display is [rpm], therefore, select “Min” for the instantaneous unit time.  
•By “instantaneous decimal point position”, set the number of digits after the decimal point.
- ③ Setting for totalized flow rate display  
The totalize function is not used, therefore, the setting is not needed.

#### 9-1-4. Setting Example 4

Using a gearbox of 805[rpm] with an open collector output, displaying the circumferential speed of the roll diameter 350[mm] in [m/min]  
(conditions)

- rotation speed 805[rpm] (output pulse 60[P/R] built-in)
- reduction ratio 1/90
- roll diameter 350[mm]

- ① Input type setting  
The sensor is an open selector type, therefore “open collector” should be selected as the input type.
- ② Setting for instantaneous flow rate display  
For setting of Instantaneous display coefficient, travel distance of rotation per 1 pulse is needed.  
•calculation of circumferential speed  
 $805[\text{rpm}] \times 1/90 \times (0.35[\text{m}] \times 3.14) = 9.82994[\text{m/min}]$   
•Cumulate travel distance per 1 pulse  
 $1/60[\text{P/R}] \times 1/90 \times (0.35[\text{m}] \times 3.14) = 2.03518 \times 10^{-4}[\text{m/Pulse}]$   
•Set “ $2.03518 \times 10^{-4}$ ” as the Instantaneous display

coefficient

- Display is in [min], therefore, “Min” is selected for the instantaneous unit time.
- By “instantaneous decimal point position”, set the number of digits after the decimal point.

- ③ Setting for totalized flow rate display  
The totalize function is not used, therefore, the setting is not needed.

## 9-2. EXAMPLES FOR ANALOG INPUT SETTING

### 9-2-1. Setting Example 1

For flowrate of 0-90[l/min], using a sensor outputs 4-20 [mA], display instantaneous flow rate in [l/min] and totalized value in [kl].

- ① Input type setting  
The sensor outputs 4 to 20 [mA], therefore select “4 to 20mA” for input type.
- ② Setting for instantaneous flow rate display  
As setting of instantaneous display coefficient, set flow rate at 20 [mA] output.  
• The sensor outputs 20 [mA] at 90 [l/min], therefore set  $9.00000 \times 10^1$  as instantaneous display coefficient.  
• By “instantaneous decimal point position”, set the number of digits after the decimal point.
- ③ Setting for totalized value display  
As setting of totalized value display coefficient, set flow volume for 1 hour of 20 [mA] input.  
• The sensor outputs 20 [mA] at 90 [l/min], therefore the flow volume after 1 hour work is  $90 \times 60 = 5400$  [l].  
The unit to display is [kl], therefore the setting value is  $5.4 [kl]$ .  
• Set “ $5.40000 \times 10^0$ ” for the totalized value display coefficient.  
• By “totalize decimal point position”, set the number of digits after the decimal point.

## 10. SETTING OF UNITS

Units are selectable and can be displayed optionally.

If units should be used is not available, custom units up to 6 characters are can be made.

\*For custom units, please refer to the detailed manual which can be downloaded from our home page.

### 10-1. LOCATIONS OF PARAMETERS FOR UNIT SETTING

| 1st Layer        | 2nd Layer                       | 3rd Layer                  |
|------------------|---------------------------------|----------------------------|
| 1. Input setting | pulse input A (pulse input B)   | Instantaneous display unit |
|                  | analog input A (analog input B) | Instantaneous display unit |
|                  |                                 | Totalized display unit     |
|                  | 2 input calculation             | Instantaneous display unit |
|                  |                                 | Totalized display unit     |

### 10-2. AVAILABLE UNITS

The WPMZ has selectable 62 units.

| Units                                                                                                                                                                                                                                                                                                                     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>μA, mA, A, kA, μV, mV, V, kV, VA, W, kW, MW,<br/> μm, mm, cm, m, Ω, kΩ, MΩ, g, kg, N, kN, MN,<br/> Pa, kPa, MPa, hPa, J, kJ, MJ, Hz, kHz, MHz, m³,<br/> mm/s, mm/min, cm/min, m/s, m/min, m/h, m/s²,<br/> m³/s, m³/min, m³/h, kg/h, kg/m², kg/m³, N/m²,<br/> ℓ, ℓ/s, ℓ/min, ℓ/h, %, %RH, °C, pH, ppm, rpm, t, inch</p> |

### 10-3. SETTING OPERATION

Setting procedure is same as “8. BASIC OPERATIONS FOR SETTING DISPLAYS”. Operate in the track of SETTING DISPLAYS.

## 11. COMPARATIVE OUTPUT FUNCTION

Settings of comparative output functions needs 10 parameters to set for each output.

The following describe only main setting parameters and refer to detailed manual which can be downloaded from our homepage for other parameters.

### 11-1. LOCATIONS OF PARAMETERS FOR COMPARATIVE OUTPUT FUNCTION SETTING

| 1st Layer          | 2nd Layer                                                                                         | 3rd Layer                   |
|--------------------|---------------------------------------------------------------------------------------------------|-----------------------------|
| 4. Output settings | Comparative output AL1 (Comparative output AL2) (Comparative output AL3) (Comparative output AL4) | pattern select              |
|                    |                                                                                                   | output source display value |
|                    |                                                                                                   | comparison mode             |
|                    |                                                                                                   | compare ON condition        |
|                    |                                                                                                   | compare judgement value     |
|                    |                                                                                                   | compare ON delay            |
|                    |                                                                                                   | compare OFF delay           |
|                    |                                                                                                   | output mode                 |
|                    |                                                                                                   | output logic                |
|                    |                                                                                                   | compare ON background color |

\*Refer to “7. SETTING LAYER OVERVIEW”

### 11-2. SETTING OF OUTPUT SOURCE DISPLAY VALUE

Comparative outputs AL1-AL4 are settable independently and they have no magnitude relationship.

For example, instantaneous measured value of Ach is assigned to AL1, instantaneous measured value of Bch is assigned to AL2 and instantaneous calculate value is assigned to AL3, AL4 and so on. Every display item can be freely assigned to comparative outputs.

Setting procedure is same as “8. BASIC OPERATIONS FOR SETTING DISPLAYS”. Operate in the track of the procedure of SETTING DISPLAYS.

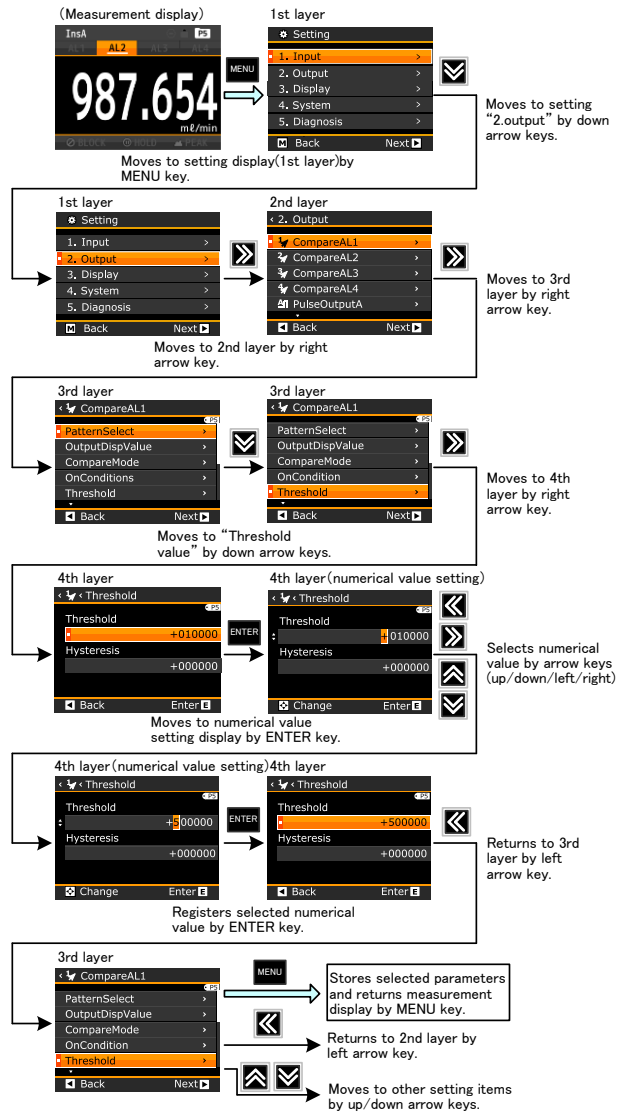
Caution: COM (emitter) terminal is common for AL1-AL4 in open-collector output products. Each AL1&2, AL3&4 have common terminal in relay output products.

### 11-3. COMPARISON JUDGEMENT VALUE

The comparison judgement value is a threshold value to judge.

Although, the setting procedure is same as “8. BASIC OPERATIONS FOR SETTING DISPLAYS”, comparison judgement values need the setting of numerical value. Therefore, its procedure is shown below.

\*The following is an explanation for the compare mode of “Level judgement”.

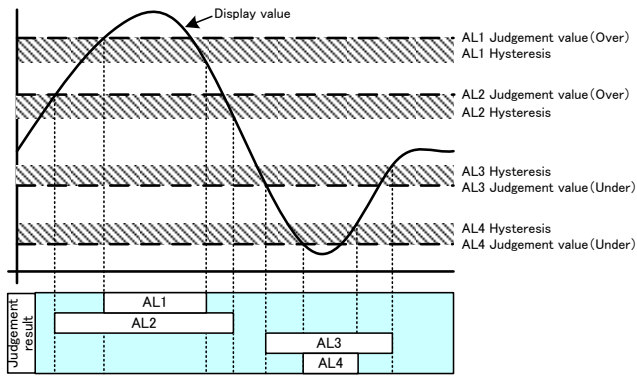


#### ● Level judgement action

| Comparative Output | Comparison type  | Comparison formula                  | judgement result |
|--------------------|------------------|-------------------------------------|------------------|
| AL1                | alarm when over  | display value > AL1 judgement value | AL1 ON           |
| AL2                | alarm when over  | display value > AL2 judgement value | AL2 ON           |
| AL3                | alarm when under | display value < AL3 judgement value | AL3 ON           |
| AL4                | alarm when under | display value < AL4 judgement value | AL4 ON           |

\*Refer to “16. SPECIFICATIONS –output specifications [comparative output]”





## 12. EXTERNAL CONTROL FUNCTION

As external control functions, the WPMZ has comparative output reset function, total reset function, measurement inhibit function, display hold function, maximum value hold function, minimum value hold function, digital zero function and pattern select function, each function can be executed by assigning to external control terminal 1 to 5.

\*External control functions are also assigned (entered) to 4 arrow keys as shortcut functions.

### 12-1. TERMINAL CONTROL

The control of assigned functions is performed by shorting each terminal to the com terminal or bringing to the "0" level

"0" level: 0 to 1.5V, "1" level: 3.5 to 5V, Input current: -1.2mA

\* The control terminals 1 to 5 are isolated from Power and input as DC signals.

### 12-2. COMPARATIVE OUTPUT RESET FUNCTION

Comparative output reset function makes all of comparative judgement results and their outputs OFF.

### 12-3. TOTAL RESET FUNCTION

The total reset function makes the totalized value clear and reset to the initial totalized value.

Total reset A: resets totalized value of Ach

Total reset B: resets totalized value of Bch

Total reset A&B: resets totalized values of both of Ach and Bch

### 12-4. MEASUREMENT INHIBIT FUNCTION

The measurement inhibit function ignores the input and the display value accompanies this.

Measurement inhibit A: inhibits the input of Ach

Measurement inhibit B: inhibits the input of Bch

Measurement inhibit A&B: inhibits the both inputs channel

### 12-5. DISPLAY HOLD FUNCTION

Display hold function holds display value. While this function is valid, measurement action is performed internally and the latest measurement value is displayed when the function become invalid.

Display hold A: holds the display of Ach

Display hold B: holds the display of Bch

Display hold A&B: holds the display of Ach and Bch

### 12-6. MAXIMUM VALUE HOLD FUNCTION

Maximum value hold function is the function which holds the maximum display value.

Maximum hold A: holds the maximum display value of Ach

Maximum hold B: holds the maximum display value of Bch

Maximum hold A&B: holds the maximum display value of Ach and Bch

Note: This function is valid for the instantaneous value only and invalid for the totalized value.

### 12-7. MINIMUM VALUE HOLD FUNCTION

Minimum value hold function is the function which holds the minimum display value.

\*When both of the maximum value hold and the minimum value hold are ON simultaneously, only the maximum value hold becomes valid.

Minimum hold A: holds the minimum display value of Ach

Minimum hold B: holds the minimum display value of Bch

Minimum hold A&B: holds the minimum display value of Ach and Bch

Note: This function is valid for the instantaneous value only and invalid for the totalized value.

### 12-8. DIGITAL ZERO FUNCTION

The digital zero function is a function to set the input value at the start of instruction to zero. During instruction, the range of fluctuation from the start of instruction is treated as input value.

Digital zero A: Execute digital zero for Ach input

Digital zero B: Execute digital zero for Bch input

Digital zero A&B: Execute digital zero for both input channel  
Note: This function is installed only for analog input products.

## 12-9. PATTERN SELECT FUNCTION

The pattern select function is the function which switches the pattern number to use for measurement. By using pattern select 1-3, Up to 8 patterns can be switched.

| Function Name   | Selected pattern No. (pattern No. in use) |       |       |       |       |       |       |       |
|-----------------|-------------------------------------------|-------|-------|-------|-------|-------|-------|-------|
| Pattern select1 | 1                                         | 2     | 3     | 4     | 5     | 6     | 7     | 8     |
| Pattern select1 | Open                                      | Short | Open  | Short | Open  | Short | Open  | Short |
| Pattern select2 | Open                                      | Open  | Short | Short | Open  | Open  | Short | Short |
| Pattern select3 | Open                                      | Open  | Open  | Open  | Short | Short | Short | Short |

Open: pattern select terminal is open or connected to "1" level.

Short: pattern select terminal is shorted to COM terminal or connected to "0" level.

## 12-10. MONITOR CHANGE FUNCTION

The monitor change function is the function which switches display and performs same action of DISP key.

## 12-11. TREND HOLD FUNCTION

The trend hold function is a function which holds the trend display.

## 13. SHORTCUT FUNCTION

External control functions and CompareList function are registered to arrow keys and are performed not by the terminal control but by the operation of the keys

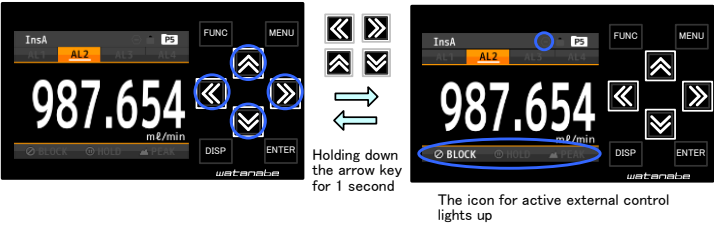
### 13-1. REGISTERING SHORTCUTS

External control functions which would be performed by shortcuts are assigned to arrow keys by the following steps.



13-2. PERFORMING SHORTCUTS

A shortcut function is performed by holding down the arrow key which an external control function is registered for 1 second. An active function becomes inactive by holding down the arrow key which the function is registered for 1 second.



\*If an external control function assigned to a key is valid by the terminal control, the short cut function is not acceptable.

14. INITIALIZE

Setting values can be initialized to factory default settings or user saved settings.

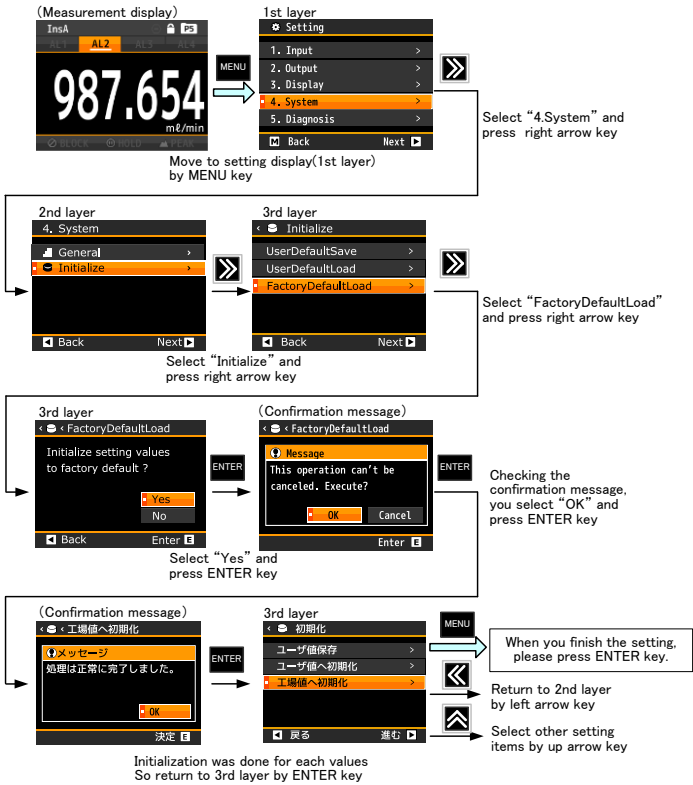
14-1. LOCATIONS OF PARAMETERS FOR INITIALIZE

| 1st Layer | 2nd Layer  | 3rd Layer          |
|-----------|------------|--------------------|
| 4.System  | Initialize | UserDefaultSave    |
|           |            | UserDefaultLoad    |
|           |            | FactoryDefaultLoad |

\*Refer to “7. SETTING LAYER OVERVIEW”.

14-2. INITIALIZE TO THE FACTORY DEFAULTS

By performing the following steps, setting values can be initialized to the factory defaults.



14-3. INITIALIZE TO USER DEFAULTS

Beside of initializing to factory defaults, current setting values can be saved as user default data and setting values will be initialized to the data.

14-3-1. Saving User Defaults

For initializing to user default values, entering setting values used as default values are required.

- ① Setting each values  
Set all setting values which are needed as user default values.
- ② Saving user initial values  
By executing to save user default values, current setting

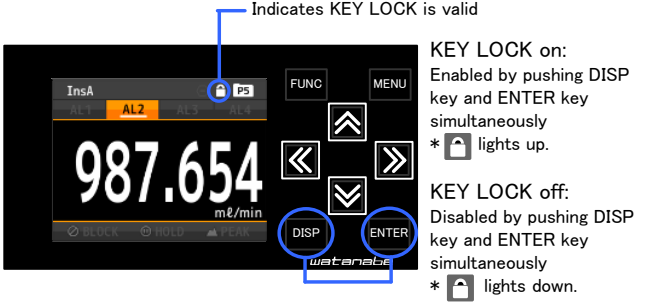
values are saved as user default values.  
Steps for the save operation are same as “14-2. Initializing to the factory defaults”. Operate the WPMZ according to the setting displays.  
\*Please refer to “14-1. Locations of parameters for initialize”.

14-3-2. Initializing To User Defaults

By executing to initialize to user defaults, current setting values are replaced by user defaults.  
Steps for the initialize operation are same as “14-2. Initializing to the factory defaults”. Operate the WPMZ according to the setting displays.  
\*Please refer to “14-1. Locations of parameters for initialize”.

15. KEY LOCK FUNCTION

To prevent unconsidered key operations, the WPMZ has the key lock function.



16. ERROR CODES

When some malfunctions occur, error codes are displayed according to the factor of the error.



| ERROR CODE             | ERROR MESSAGE                              | RECOVERY PROCEDURE                                                                                                                                                                                      |
|------------------------|--------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| E000                   | Program sum error                          | During the error mode, hold down the ENTER key for 1 seconds (long-press) to reset or power down and on.<br>*If the WPMZ does not recover by this procedure, please contact your dealer or our company. |
| E006                   | RAM error                                  |                                                                                                                                                                                                         |
| E100 to 102            | Errors associated with serial flash memory |                                                                                                                                                                                                         |
| E103 to 105            | Errors associated with FRAM                |                                                                                                                                                                                                         |
| E210 to 211            | Errors associated with calibration values  |                                                                                                                                                                                                         |
| E202 to 203            | Errors associated with sensor power short  |                                                                                                                                                                                                         |
| E110 to 111            | Errors associated with setting values      |                                                                                                                                                                                                         |
| E204 to 205            | Errors associated with initial values      |                                                                                                                                                                                                         |
| E206 to 209            | Other errors                               |                                                                                                                                                                                                         |
| Other than above codes | Other errors                               |                                                                                                                                                                                                         |

- If start-up delay is enabled, the WPMZ displays “-----” according to the delay time.
- If display value becomes out of displayable range, “OVER” is displayed in the display.

## 17. SPECIFICATION

## MODEL CODES

| WPMZ-6-□□□-□□-□□□ |       |           |           |        |                    |             |
|-------------------|-------|-----------|-----------|--------|--------------------|-------------|
| Series name       | Power | Input Ach | Input Bch | Output | Comparative output | Test report |
| WPMZ-6            |       |           |           |        |                    |             |
|                   | 1     |           |           |        |                    |             |
|                   | 3     |           |           |        |                    |             |
|                   | 4     |           |           |        |                    |             |
|                   | P     |           |           |        |                    |             |
|                   | A     |           |           |        |                    |             |
|                   | X     |           |           |        |                    |             |
|                   | P     |           |           |        |                    |             |
|                   | A     |           |           |        |                    |             |
|                   | X     |           |           |        |                    |             |
|                   | 1     |           |           |        |                    |             |
|                   | 2     |           |           |        |                    |             |
|                   | 3     |           |           |        |                    |             |
|                   | 4     |           |           |        |                    |             |
|                   | 5     |           |           |        |                    |             |
|                   | E     |           |           |        |                    |             |
|                   | F     |           |           |        |                    |             |
|                   | R     |           |           |        |                    |             |
|                   | X     |           |           |        |                    |             |
|                   | T     |           |           |        |                    |             |
|                   | 00    |           |           |        |                    |             |
|                   | E0    |           |           |        |                    |             |

(\*) Combination of 2 pulse inputs  
The combination of 2 pulse inputs (the A channel single phase input and the B channel single phase input) can be used for a 2-phase (90° phase) pulse input.

## BASIC SPECIFICATIONS

|                               |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------------------|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Number of measurement channel | : | 1 or 2 (according to model codes)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Display                       | : | 2.4 inch TFT liquid crystal display<br>Used in 1ch input : Ach measurement result<br>Used in 2ch inputs : Ach measurement result, Bch measurement result, calculation result, Ach and Bch measurement results, Ach or Bch measurement result and calculation result                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Over warning                  | : | By exceeding the range of display, displays OVER or -OVER                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| External controls             | : | 5 functions of the followings can be assigned to control terminals (user-configurable).<br>① Comparative output reset function<br>② Measurement inhibit function : Measurement inhibit A/B/A&B<br>③ Current value hold function : Current value hold A/B/A&B<br>④ Maximum value hold function : Maximum value hold A/B/A&B<br>⑤ Minimum value hold function : Minimum value hold A/B/A&B<br>⑥ Totalized value reset function : Totalized value reset A/B/A&B<br>⑦ Digital zero function : Digital zero A/B/A&B<br>⑧ Display select function<br>⑨ Pattern select function : Pattern select 1/2/3<br>⑩ Trend Hold function<br>As follows, only short cut setting<br>⑪ CompareList function |
| Ambient temperature range     | : | -5 to 50°C 35 to 85%RH (Non condensing)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Storage temperature range     | : | -10 to 70°C up to 60%RH                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Supply power                  | : | AC power (WPMZ-6-1□□-□□-□□□)<br>AC100 to 240V±10% 50/60Hz<br>DC power (WPMZ-6-3□□-□□-□□□)<br>DC12V±10%<br>DC power (WPMZ-6-4□□-□□-□□□)<br>DC24 to 48V±10%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Power consumption             | : | AC power (WPMZ-6-1□□-□□-□□□)<br>At AC100V: 10VA max At AC240V: 14VA max<br>DC power (WPMZ-6-3□□-□□-□□□)<br>At DC12V: 6W max,<br>DC power (WPMZ-6-4□□-□□-□□□)<br>At DC24V: 6W max, At DC48V: 6.5W max                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Sensor power                  | : | DC12V±10% 100mA max. DC24V±10% 50mA max.<br>*For 2ch inputs, allowable current of both Ach and Bch is same as above.<br>*Combine at DC12V, 24V: 1.2W max.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| External dimensions           | : | 96mm (W) × 52mm (H) × 145mm (D)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Weight                        | : | Approx. 350g                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Withstand voltage             | : | AC power (WPMZ-6-1□□-□□-□□□)<br>Between Power terminals and inputs/external controls/comparative outputs/other outputs<br>AC3000V for 1 minute                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

|                          |   |                                                                                                                                                     |
|--------------------------|---|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| Insulation resistance    | : | Between terminals mentioned above, at DC500V 100MΩ or higher                                                                                        |
| Vibration tolerance      | : | 10 to 55Hz half amplitude 0.15mm in X,Y,Z directions for 30 minutes                                                                                 |
| Protective structure     | : | IP66 (front)                                                                                                                                        |
| Installation environment | : | indoor use                                                                                                                                          |
| Rated altitude           | : | up to 2000m                                                                                                                                         |
| Transient overvoltage    | : | II                                                                                                                                                  |
| Pollution degree         | : | 2                                                                                                                                                   |
| Conformed EN standard    | : | EN61326-1 (EMS : industrial electromagnetic environment / EMI : Class A)<br>(Applicable to line length only under 30m)<br>EN61010-1<br>EN IEC 63000 |
| Material of enclosure    | : | polycarbonate (PC) black UL94V-0                                                                                                                    |

## INPUT SPECIFICATIONS

【Pulse input instantaneous and totalized measurement】

● Input specifications (common to Ach, Bch)

|                             |   |                                                                                                                                                                                                                                                                                                                                        |
|-----------------------------|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Frequency range             | : | 0.01Hz to 500kHz (*2ch input: 250kHz)                                                                                                                                                                                                                                                                                                  |
| Input signal                | : | Single ended<br>Open collector (NPN/PNP type), Voltage pulse, Totem pole, AC pulse, Proximity sensor                                                                                                                                                                                                                                   |
| Input method                | : | Single phase pulse<br>*In the 2ch input option, 2 phase pulse (90° phase) can be accept.                                                                                                                                                                                                                                               |
| Input level                 | : | Open collector<br>Pullup to 12V or 24V<br>Logic<br>L level: ≤ 1.0V<br>H level: 3.9 to 30V (max. allowable voltage ±50V)<br>Zero Cross<br>AC60mV to 40V (max. allowable voltage 70V)<br>*AC signal which gets across 0V.                                                                                                                |
| Input resistance            | : | Open collector<br>Pulled up to 12 V through approx. 10kΩ (in the case of sensor power 12V)<br>Pulled up to 24 V through approx. 25kΩ (in the case of sensor power 24V)<br>Pulled down to GND through approx. 10kΩ.<br>Logic/Zero Cross<br>Pulled down to GND through approx. 10kΩ<br>2 wire<br>Pulled down to GND through approx. 900Ω |
| Input pulse width           | : | ≥ 0.9μs (both of L level and H level)<br>(2 channel inputs: ≥ 1.8 μs)                                                                                                                                                                                                                                                                  |
| Measurement method          | : | Cyclic calculation method                                                                                                                                                                                                                                                                                                              |
| Sampling rate               | : | 10ms (calculation period)                                                                                                                                                                                                                                                                                                              |
| Display updating period     | : | 100ms                                                                                                                                                                                                                                                                                                                                  |
| (Instantaneous display)     | : | Display range : 0 to 999999<br>Zero display : Reading zero suppress<br>Decimal point : Settable freely<br>Display unit : Can be selected one of second, minute, hour time                                                                                                                                                              |
| Accuracy                    | : | ±(20ppm rdg + 1digit) @23±5°C<br>(Totalized display)                                                                                                                                                                                                                                                                                   |
| Display range               | : | -999999 to 999999                                                                                                                                                                                                                                                                                                                      |
| Zero display                | : | Reading zero suppress                                                                                                                                                                                                                                                                                                                  |
| Decimal point               | : | Settable freely                                                                                                                                                                                                                                                                                                                        |
| Totalized value reset       | : | Totalized value can be reset to total initial value by external control.                                                                                                                                                                                                                                                               |
| Totalizer-synchronous pulse | : | NPN open collector pulse output<br>DC30V 20mA max.                                                                                                                                                                                                                                                                                     |
| Accuracy                    | : | ±0 (at scaling "1")                                                                                                                                                                                                                                                                                                                    |

【Analog input instantaneous and totalized measurement】

● Input specifications (Common to Ach and Bch)

| Measurement range | Input resistance | Maximum allowable input | Accuracy                |
|-------------------|------------------|-------------------------|-------------------------|
| 0 to 5V           | Approx. 1MΩ      | ±100V                   | ±(0.05% of FS + 1digit) |
| 1 to 5V           |                  |                         |                         |
| 0 to 10V          |                  |                         |                         |
| 4 to 20mA         | Approx. 10Ω      | ±50mA                   |                         |
| 0 to 20mA         |                  |                         |                         |

\*Accuracy is applicable at 23±5°C 35 to 85%RH.

|                             |                                                                   |
|-----------------------------|-------------------------------------------------------------------|
| Conversion method           | : $\Delta\Sigma$ conversion method                                |
| Input signal                | : Single ended                                                    |
| Sampling rate               | : Max. 100times/sec.                                              |
| Display updating period     | : 100ms                                                           |
| Zero display                | : Reading zero suppress                                           |
| Decimal point               | : Settable freely                                                 |
| (Instantaneous display)     |                                                                   |
| Display range               | : 0 to 99999                                                      |
| (Totalized display)         |                                                                   |
| Display range               | : -999999 to 999999                                               |
| Totalized value             | : Totalized value can be reset to total initial value by reset    |
| Totalizer-synchronous pulse | : NPN open collector pulse output<br>DC30V 20mA max. (Max. 100Hz) |

**OUTPUT SPECIFICATIONS****【Comparative outputs】**

|                                |                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Open collector output          | : Output rating<br>NPN : sink current 50mA MAX.<br>PNP : source current 50mA MAX.<br>Applied voltage 30V MAX.<br>Output saturation voltage $\leq 1.2V$ at 50mA<br>Number of outputs 4 transistor outputs<br>Contact rating : AC250V 2A, DC30V 2A<br>Mechanical life : 20 million times<br>Electrical life : 100 thousand times or more<br>4 A contacts, AL1 and AL2, AL3 and AL4 share common |
| Relay output                   | : Microcomputer calculating method                                                                                                                                                                                                                                                                                                                                                            |
| Control method                 | : Pulse input : -999999 to 999999<br>Analog input : Instantaneous measurement -99999 to 99999<br>Totalized measurement -999999 to 999999                                                                                                                                                                                                                                                      |
| Judgement value settable range | : Settable within the range of 1-999999 digits for each judgement value independently.                                                                                                                                                                                                                                                                                                        |
| Hysteresis                     | : According to sampling rate (calculate period).                                                                                                                                                                                                                                                                                                                                              |
| Comparison action              | : Condition of comparison can be set to AL1 to AL4 independently.                                                                                                                                                                                                                                                                                                                             |
| Setting condition              | : •Level judgement mode<br>The alarm is ON when display value exceeds judgement value (over alarm)<br>The alarm is ON when display value underruns judgement value (under alarm)<br>Over alarm (upper limit judgement)                                                                                                                                                                        |

| Condition of comparison             | Judgement result |
|-------------------------------------|------------------|
| display value > AL1 judgement value | AL1              |
| display value > AL2 judgement value | AL2              |
| display value > AL3 judgement value | AL3              |
| display value > AL4 judgement value | AL4              |

**Under alarm (Under limit judgement)**

| Condition of comparison             | Judgement result |
|-------------------------------------|------------------|
| AL1 judgement value > display value | AL1              |
| AL2 judgement value > display value | AL2              |
| AL3 judgement value > display value | AL3              |
| AL4 judgement value > display value | AL4              |

**•Zone judgement mode**

The alarm is ON when display value between upper and lower judgement values (inside of zone alarm)  
The alarm is ON when display value out of upper and lower judgement values (outside of zone alarm)

**Inside of zone alarm**

| Condition of comparison                                               | Judgement result |
|-----------------------------------------------------------------------|------------------|
| AL1 zone upper limit $\geq$ display value $\geq$ AL1 zone lower limit | AL1              |
| AL2 zone upper limit $\geq$ display value $\geq$ AL2 zone lower limit | AL2              |
| AL3 zone upper limit $\geq$ display value $\geq$ AL3 zone lower limit | AL3              |
| AL4 zone upper limit $\geq$ display value $\geq$ AL4 zone lower limit | AL4              |

**Outside of zone alarm**

| Condition of comparison                                                      | Judgement result |
|------------------------------------------------------------------------------|------------------|
| display value > AL1 zone upper limit or AL1 zone lower limit > display value | AL1              |
| display value > AL2 zone upper limit or AL2 zone lower limit > display value | AL2              |
| display value > AL3 zone upper limit or AL3 zone lower limit > display value | AL3              |
| display value > AL4 zone upper limit or AL4 zone lower limit > display value | AL4              |

**【Analog output】**

|                                |                                                          |
|--------------------------------|----------------------------------------------------------|
| Conversion method              | : D/A conversion method                                  |
| Resolution capability          | : Equivalent of 13bit                                    |
| Scaling                        | : Digital scaling                                        |
| Output objective               | : An item can be selected from source displayable values |
| Response speed                 | : Up to 25ms (0→90% response)                            |
| Specifications for each output | : Refer to the following chart.                          |

| Output type | Load resistance  | Accuracy                   | Ripple        |
|-------------|------------------|----------------------------|---------------|
| 0 to 10V    | $\geq 2k\Omega$  | $\pm(0.1\% \text{ of FS})$ | $\pm 50mVp-p$ |
| $\pm 10V$   |                  |                            |               |
| 1 to 5V     |                  |                            |               |
| 0 to 20mA   | $\leq 550\Omega$ |                            | $\pm 25mVp-p$ |
| 4 to 20mA   |                  |                            |               |

\*Ripple for 4 to 20mA is at load resistance 250 $\Omega$ , 20mA output.

**【BCD output】**

|                              |                                                                                                                       |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| Output type                  | : Open collector output NPN/PNP type                                                                                  |
| Measurement data             | : Negative logic transistor is ON at logical "1"                                                                      |
| Polarity signal              | : Negative logic transistor is ON at minus display                                                                    |
| Over signal                  | : Negative logic transistor is ON at over display                                                                     |
| Synchronized signal (PC)     | : Transistor is ON for a fixed period every time data becomes valid.                                                  |
| Transistor output capability | : Voltage 30V max. Current 10mA max.<br>Output saturation voltage up to 1.2V at 10mA                                  |
| Enable                       | : By shorting the enable terminal to -D.COM or bringing to same voltage level, the BCD output transistors become OFF. |

**【RS-232C】**

|                                |                                             |
|--------------------------------|---------------------------------------------|
| Communication protocol         | : Modbus-RTU/OriginalCommand/OriginalOutput |
| Synchronization method         | : Asynchronous                              |
| Communication method           | : Full duplex                               |
| Baud rate                      | : 9600bps, 19200bps, 38400bps               |
| Data length                    | : 7bit, 8bit                                |
| Start bit                      | : 1bit                                      |
| Parity bit                     | : None, Odd, Even                           |
| Stop bit                       | : 1bit, 2bit                                |
| Delimiter                      | : CR LF, CR                                 |
| Character code                 | : ASCII                                     |
| Transmission control procedure | : No control sequence                       |
| Used signal names              | : TXD, RXD, SG                              |
| Number of connectable units    | : 1                                         |
| Cable length                   | : Max. 15m                                  |

**【RS-485】**

|                             |                                                         |
|-----------------------------|---------------------------------------------------------|
| Communication protocol      | : Modbus RTU                                            |
| Synchronization method      | : Asynchronous                                          |
| Communication method        | : 2-wire half-duplex                                    |
| Baud rate                   | : 9600bps, 19200bps, 38400bps                           |
| Data length                 | : 8bit                                                  |
| Start bit                   | : 1bit                                                  |
| Parity bit                  | : None, Odd, Even                                       |
| Stop bit                    | : 1bit                                                  |
| Used signal names           | : Non-inverting (+), Inverting (-)                      |
| Number of connectable units | : 31                                                    |
| Cable length                | : Max. 1.2km (total) ※Conforming CE mark, less than 30m |

The contents of this instruction manual are subject to change without prior notice.

**watanabe**

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