

# Strain Gauge Measurement

# WPMZ-3

- Strain Gauge input
- Wave compare, Multi hold function
- High-speed sampling rate (1ch : 4000 times/sec, 2ch : 2000 times/sec)

[WPMZ-3] is for measuring strain gauge, and it has wave compare and multi hold function.

It is suitable for Process control, Quality control and traceability etc. at the manufacturing site where mass production is carried out with constant cycle.



## Application examples

### Wave compare mode

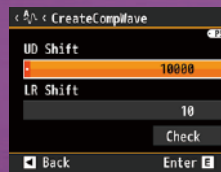
Alarm output and waveform log function by comparing measurement waveform and comparison waveform

### Multi hold mode

Outputs each compare result for each hold value of each section and the comparison judgement setting value.

### Judgement waveform creation

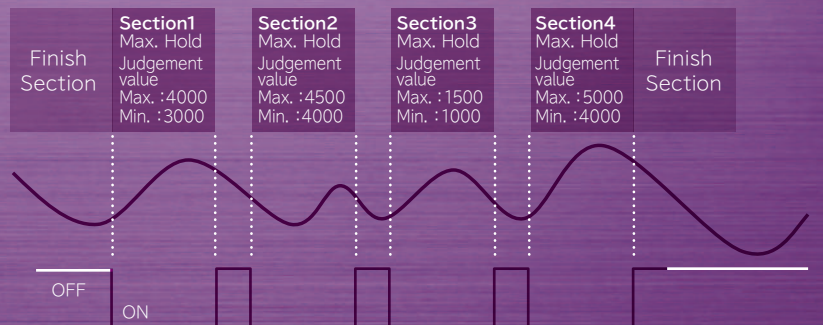
Function to create judgement waveform necessary for comparison



NG judgement

### Alarm output

Output alarm as 'NG' judgement if there is more than 1 measured point which is out of judgement waveform



### Display Example

Displays the hold value in each section with the current measurement value. Icons will appear according to the hold detail section switching method.



Multi hold measurement display



Multi hold graph display

## Main Specifications

### Power supply

- 100~240VAC  $\pm 10\%$
- 12VDC  $\pm 10\%$
- 24~48VDC  $\pm 10\%$

### Input : Ach/Bch

- Strain gauge input
- DC Voltage / Current input (Process input)

### Option output

- Analog output
- BCD output (Open collector NPN / PNP)
- RS-232C
- RS-485 (Modbus RTU)

### Comparator output (AL1~AL4)

- Open collector output (NPN / PNP)
- Relay output (Normally open)



## Features

- Easy to read by 2.4 inch TFT Full color LCD display
- High-speed sampling rate  
(1ch : Max. 4000 times/sec, 2ch : Max. 2000 times/sec)
- Alarm log function up to 8 alarm trend data
- Wave compare function in 48 x 96mm size (1/8 DIN size)
- 8 types of hold method and 4 section Multi hold function
- [Value], [Bar graph] and [Trend graph] Display can be selected according to the measurement
- Standard 1ch input type, and also 2ch input type which can use for special measurement

## Model

WPMZ-3-①②③-④⑤-⑥⑦

| Series | ① Power supply | ② Input Ach | ③ Input Bch | ④ Option output | ⑤ Comparator output | ⑥ Test report | ⑦ Suffix code | Description                                |
|--------|----------------|-------------|-------------|-----------------|---------------------|---------------|---------------|--------------------------------------------|
| WPMZ-3 |                |             |             |                 |                     |               |               | Strain gauge measurement                   |
|        | 1              |             |             |                 |                     |               |               | Power supply : 100 to 240VAC ±10%          |
|        | 3              |             |             |                 |                     |               |               | Power supply : 12VDC ±10%                  |
|        | 4              |             |             |                 |                     |               |               | Power supply : 24 to 48VDC ±10%            |
|        | S              |             |             |                 |                     |               |               | Strain gauge input                         |
|        | B              |             |             |                 |                     |               |               | DC Voltage / Current input (Process input) |
|        |                | X           |             |                 |                     |               |               | None                                       |
|        |                | S           |             |                 |                     |               |               | Strain gauge input                         |
|        |                | B           |             |                 |                     |               |               | DC Voltage / Current input (Process input) |
|        |                |             | X           |                 |                     |               |               | Display only (External control)            |
|        |                |             | 1           |                 |                     |               |               | Analog output                              |
|        |                |             | 2           |                 |                     |               |               | BCD output (Open collector NPN)            |
|        |                |             | 3           |                 |                     |               |               | BCD output (Open collector PNP)            |
|        |                |             | 4           |                 |                     |               |               | RS-232C output                             |
|        |                |             | 5           |                 |                     |               |               | RS-485 output (Modbus RTU)                 |
|        |                |             |             | E               |                     |               |               | Open collector output (NPN) (AL1~AL4)      |
|        |                |             |             | F               |                     |               |               | Open collector output (PNP) (AL1~AL4)      |
|        |                |             |             | R               |                     |               |               | Relay output (Normally open) (AL1~AL4)     |
|        |                |             |             |                 | X                   |               |               | Without Test report                        |
|        |                |             |             |                 | T                   |               |               | With Test report                           |
|        |                |             |             |                 |                     | 00            |               | Japanese default setting                   |
|        |                |             |             |                 |                     | E0            |               | English default setting                    |

## Input Specifications

Ach input (1ch) / Bch input (2ch)

■ Strain gauge input Input code **S**

| Bridge power supply | Adjustment range of gain | Measurement range | Calibration accuracy (at 23±5°C 35~85%RH) | Nonlinearity (at 23±5°C 35~85%RH) |
|---------------------|--------------------------|-------------------|-------------------------------------------|-----------------------------------|
| 5V                  | 1mV/V~                   | ~3.5mV/V~         | ±(0.1% of FS + 1digit)                    | ±(0.02% of FS + 1digit)           |
| 10V                 | 3.5mV/V                  | 3.5mV/V           |                                           |                                   |
| 2.5V                |                          |                   |                                           |                                   |

A/D conversion

Bridge voltage

ΔΣ conversion

DC5V ±10% 60mA

\*Up to four 350Ω load cells can be connected

DC10V ±10% 30mA

DC2.5V ±10% 30mA

\*1.2W max. in the case of combination with DC voltage / current input (Process input)

100ppm/°C

Temperature characteristic

Applicable sensor

Sampling rate

350Ω Strain gage type sensors

1ch input model : Max. 4000 times/sec

2ch input model : Max. 2000 times/sec

■ DC Voltage/Current input(Process input) Input code **B**

| Measurement range | Input resistance | Max. allowable input | Accuracy (at 23±5°C 35~85%RH) |
|-------------------|------------------|----------------------|-------------------------------|
| ±5V               | Approx. 1MΩ      | ±100V                | ±(0.05% of FS + 1digit)       |
| 0~5V              |                  |                      |                               |
| 1~5V              |                  |                      |                               |
| ±10V              |                  |                      |                               |
| 0~10V             |                  |                      |                               |
| ±20mA             | Approx. 10Ω      | ±50mA                |                               |
| 0~20mA            |                  |                      |                               |
| 4~20mA            |                  |                      |                               |

A/D conversion

Input Configuration

Sampling rate

ΔΣ conversion

Single ended

1ch input model : Max. 4000 times/sec

2ch input model : Max. 2000 times/sec

Sensor power supply

12VDC ±10% 100mA max. / 24VDC ±10% 50mA max.

\*When 2channel input, allowable current of Ach and Bch together will be above current.

\*1.2W max. when the combination of 12VDC and 24VDC

\*1.2W max. when the combination of Strain gauge input

## Common Specifications

Measurement channel

Display

1ch or 2channels

2.4 inch TFT LCD

1ch input : Measurement results of Ach input

2ch input : Either measurement results of Ach input,

measurement results of Bch input, or

calculation results

Measurement results of Ach and Bch input

Measurement results and calculation

results of Ach or Bch input

Display range

−99999 to 99999

Zero display

Leading zero suppression

Decimal point

Arbitrary setting possible

Over range warning

OVER or −OVER when input range or display range is exceeded

Operating temp & humidity range

−5 to 50 °C, 35 to 85% RH (No condensation)

Storage temp & humidity range

−10 to 70 °C, 60% RH or less

Power supply

100 to 240VAC ±10% 50/60 Hz

12VDC ±10%

24 to 48 VDC ±10%

Power consumption

11VA max. (100VAC), 15VA max. (240VAC),

6.5W (12VDC), 6.5W (24VDC), 7W (48VDC)

Dimensions

96mm(W) x 48mm(H) x 145mm(D), 1/8 DIN size

Weight

Approx. 350g

Withstand voltage

AC power supply :

3000VAC for 1 minute: Between the power supply terminal -

input / external control / comparator output / option output

DC power supply :

1500VAC for 1 minute: Between the power supply terminal -

input / external control / comparator output / option output

AC/DC power supply :

1500VAC for 1 minute: Between the input terminal - external

control / comparator output / option output

Between Case - each terminals : 3000VAC for 1 minute

100MΩ (500VDC) or more between the above terminals

Insulation resistance

IP66 (Front bezel)

Protection

2000m or less

Rated altitude

Contamination level

2

Applicable EN standard

EN61326-1 (EMS : Industrial installations; EMI : Class A)

\*Applies to wire length of 30m or less

EN61010-1

EN IEC 63000

Case material / color

Polycarbonate, Black UL94V-0

## External control

\*Execute by COM terminal short circuit

|                       |                                                                                             |
|-----------------------|---------------------------------------------------------------------------------------------|
| <b>Compare reset</b>  | Turns OFF comparator output monitor and comparator output                                   |
| <b>Display hold</b>   | Holds the display value                                                                     |
| <b>Peak hold</b>      | Holds the max. value                                                                        |
| <b>Bottom hold</b>    | Holds the min. value                                                                        |
| <b>Amplitude Hold</b> | Holds the difference between max. and min. value                                            |
| <b>Deviation hold</b> | Holds the display value that has the max. absolute value of difference from reference value |
| <b>Average hold</b>   | Stabilize display by additional moving average for the set number of times                  |
| <b>Hold reset</b>     | Reset hold state of display value                                                           |
| <b>Digital zero</b>   | Set the display value to zero value                                                         |
| <b>Display change</b> | Changes the measurement display                                                             |
| <b>Trend log</b>      | Acquire alarm log                                                                           |
| <b>Pattern select</b> | Changes the setting patterns (Max. 8 pattern)                                               |

\*Each function can be assigned to control terminal 1 to 5.

## Option Specifications

### Comparator output

|                             |                                                                                                                                                              |
|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Output method</b>        | Open collector output or Relay output                                                                                                                        |
| ●Open collector output      | Rated output<br>NPN : Sink current Max. 50mA<br>PNP : Source current Max. 50mA<br>Applied voltage Max. 30V<br>Output saturation voltage 1.2V or less at 50mA |
| ●Relay output               | Contact rating : 250VAC 2A, 30VDC 2A<br>Mechanical life : 20,000,000 times<br>Electrical life : 100,000 times                                                |
| <b>Control method</b>       | Microcomputer operation method                                                                                                                               |
| <b>Setting range</b>        | –99999 to 99999                                                                                                                                              |
| <b>Hysteresis</b>           | 1 to 99999 digit for each setpoints                                                                                                                          |
| <b>Comparison condition</b> | Condition can be set to AL1 to AL4 independently                                                                                                             |
| ●Level judgement mode       | The alarm is ON when display value exceeds setpoint (Over alarm)<br>The alarm is ON when display value is under setpoint (Under alarm)                       |

#### Over alarm (Upper limit judgement)

| Comparison condition                | 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 (Lower limit judgement)

| Comparison condition                | 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 between upper and lower judgement values (Inside zone)  
The alarm is ON when out of upper and lower judgement values (Outside zone)

#### Inside zone alarm

| Comparison condition                      | Result |
|-------------------------------------------|--------|
| AL1 zone HI ≥ Display value ≥ AL1 zone LO | AL1    |
| AL1 zone HI ≥ Display value ≥ AL2 zone LO | AL2    |
| AL1 zone HI ≥ Display value ≥ AL3 zone LO | AL3    |
| AL1 zone HI ≥ Display value ≥ AL4 zone LO | AL4    |

#### Outside zone alarm

| Comparison condition                                       | Result |
|------------------------------------------------------------|--------|
| Display value > AL1 zone HI or AL1 zone LO > Display value | AL1    |
| Display value > AL2 zone HI or AL2 zone LO > Display value | AL2    |
| Display value > AL3 zone HI or AL3 zone LO > Display value | AL3    |
| Display value > AL4 zone HI or AL4 zone LO > Display value | AL4    |

●Difference judgement mode \*Alarm is ON when the (Max.-Min.) during the fixed time exceeds the change judgement value.

| Comparison condition                                    | Result |
|---------------------------------------------------------|--------|
| (Max.-Min.) during the fixed time ≥ AL1 judgement value | AL1    |
| (Max.-Min.) during the fixed time ≥ AL2 judgement value | AL2    |
| (Max.-Min.) during the fixed time ≥ AL3 judgement value | AL3    |
| (Max.-Min.) during the fixed time ≥ AL4 judgement value | AL4    |

## Analog output

\*Select either Ach, Bch or calculation results to be output.

|                                       |                               |
|---------------------------------------|-------------------------------|
| <b>Conversion method</b>              | D/A conversion method         |
| <b>Resolution capability</b>          | Equivalent of 13bit           |
| <b>Scaling</b>                        | Digital scaling               |
| <b>Response speed</b>                 | Up to 300μs (0→90% response)  |
| <b>Specifications for each output</b> | Refer to the following chart. |

| Output type | Load resistance | Accuracy | Ripple   |
|-------------|-----------------|----------|----------|
| 0~10V       | ≥2kΩ            | ±0.1% FS | ±50mVp-p |
| –10~10V     |                 |          |          |
| 1~5V        |                 |          |          |
| 0~20mA      | ≤500Ω           |          | ±25mVp-p |
| 4~20mA      |                 |          |          |

\*Ripple for current output is at load resistance 250Ω (20mA output)

## BCD Output

\*Select either Ach, Bch or calculation results to be output.

|                             |                                                                                |
|-----------------------------|--------------------------------------------------------------------------------|
| <b>Output type</b>          | Open collector output, NPN/PNP type                                            |
| <b>Measurement data</b>     | Negative logic. Transistor ON when logic is "1"                                |
| <b>Polarity signal</b>      | Negative logic. Transistor ON when negative display                            |
| <b>Over signal</b>          | Negative logic. Transistor ON when over display                                |
| <b>Print command signal</b> | Transistor ON for fixed period when data conversion                            |
| <b>Transistor capacity</b>  | Voltage 30V max., Current 10mA max.<br>Output saturation voltage ≤1.2V at 10mA |
| <b>Enable</b>               | Output transistor turns OFF when the enable terminal is short with D.COM       |

## RS-232C communication

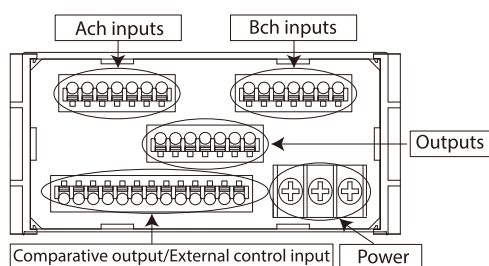
|                                       |                                                |
|---------------------------------------|------------------------------------------------|
| <b>Communication protocol</b>         | Modbus RTU*, Original command, Original output |
| <b>Synchronous system</b>             | Asynchronous mode                              |
| <b>Communication method</b>           | Full duplex                                    |
| <b>Communication speed</b>            | 9600bps, 19200bps, 38400bps                    |
| <b>Data length</b>                    | 7bit, 8bit                                     |
| <b>Stop bit</b>                       | 1bit, 2bit                                     |
| <b>Parity bit</b>                     | None, Odd, Even                                |
| <b>Delimiter</b>                      | CR, CR+LF                                      |
| <b>Character code</b>                 | ASCII                                          |
| <b>Transmission control procedure</b> | Non-procedure                                  |
| <b>Signal name</b>                    | TXD, RXD, SG                                   |
| <b>No. of connectable units</b>       | 1 unit                                         |
| <b>Line length</b>                    | 15m                                            |

\*No data length / stop bit / delimiter settings when Modbus RTU protocol

## RS-485 communication

|                                 |                                  |
|---------------------------------|----------------------------------|
| <b>Communication protocol</b>   | Modbus RTU                       |
| <b>Synchronous system</b>       | Asynchronous mode                |
| <b>Communication method</b>     | 2-wire half duplex               |
| <b>Communication speed</b>      | 9600bps, 19200bps, 38400bps      |
| <b>Data length</b>              | 8bit                             |
| <b>Stop bit</b>                 | 1bit, 2bit                       |
| <b>Parity bit</b>               | N/A, odd number, even number     |
| <b>Signal name</b>              | Non-inverting (+), inverting (-) |
| <b>No. of connectable units</b> | 31 units                         |
| <b>Line length</b>              | 1.2km max (Total)                |

## Terminal Connections



## Lower terminal

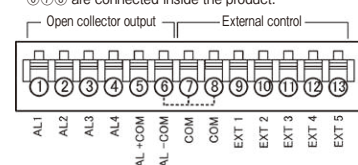
(External control / comparator output / power supply)

- Comparator output / External control

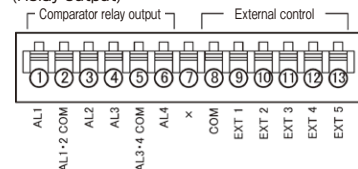
Compatible wire : AWG24 to 16

(Open collector output)

\*⑥⑦⑧ are connected inside the product.



(Relay output)



- Power supply



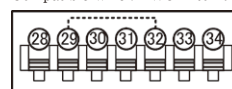
FG (NC) (-) (+)  
( ) : DC POWER



## Middle terminal (Option output)

- Analog output

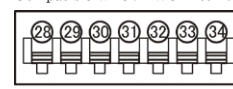
Compatible wire : AWG24 to 16



\*②③ are connected internally

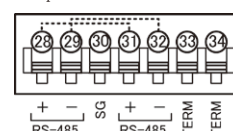
- RS-232C

Compatible wire : AWG24 to 16



- RS-485

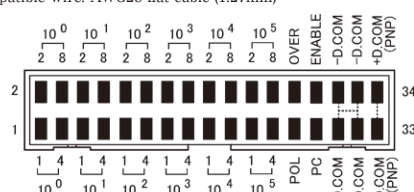
Compatible wire : AWG24 to 16



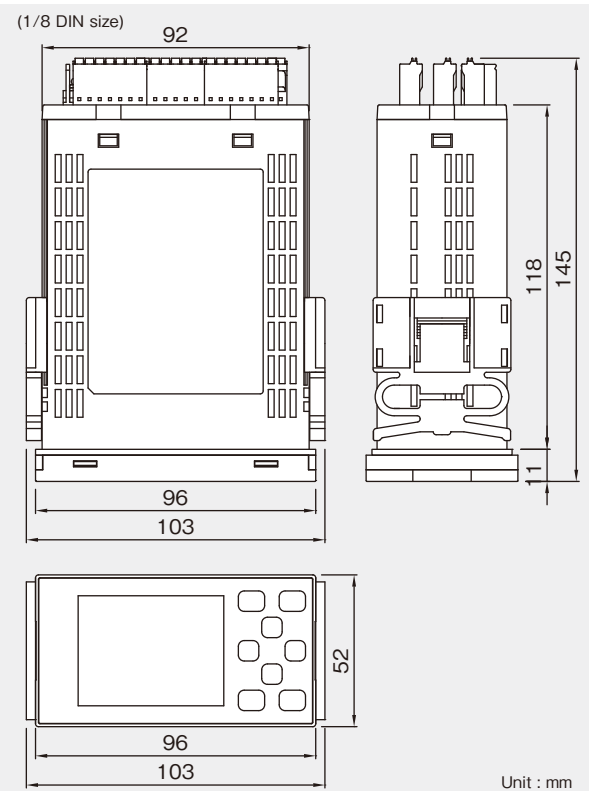
\*②③ are connected internally

- BCD

Compatible wire : AWG28 flat cable (1.27mm)



## Dimensions



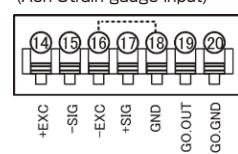
## Upper terminal

(Input / GO output / sensor power supply)

- Strain gauge input

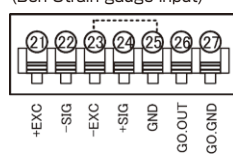
Compatible wire : AWG24 to 16

(Ach Strain gauge input)



\*⑮⑯ are connected internally

(Bch Strain gauge input)

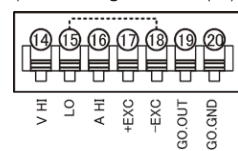


\*⑲⑳ are connected internally

- DC voltage / current input (Process input)

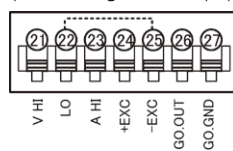
Compatible wire : AWG24 to 16

(Ach DC voltage / current input)



\*⑮⑯ are connected internally

(Bch DC voltage / current input)



\*⑲⑳ are connected internally

## Panel cutout

