

# 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

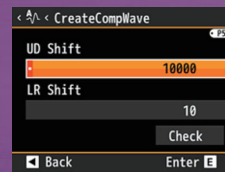
Alarm output and waveform log function by comparing measurement waveform and comparison waveform

### Multi hold mode

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

### Judgement waveform creation

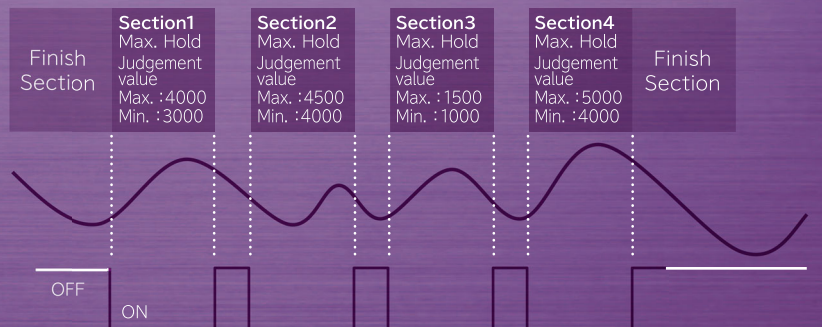
Function to create judgement waveform necessary for comparison



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 ±10%
- 12VDC ±10%
- 24~48VDC ±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	-3.5mV/V~ 3.5mV/V	±(0.1% of FS + 1digit)	±(0.02% of FS + 1digit)
10V				
2.5V				

A/D conversion  $\Delta \Sigma$  conversion  
 Bridge voltage 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 350Ω Strain gage type sensors  
 Sampling rate 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  $\Delta \Sigma$  conversion  
 Input Configuration Single ended  
 Sampling rate 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 1ch or 2channels  
 Display 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

Insulation resistance 100MΩ (500VDC) or more between the above terminals  
 Protection IP66 (Front bezel)  
 Rated altitude 2000m or less  
 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
● <b>Open collector output</b>	Rated output NPN : Sink current Max. 50mA PNP : Source current Max. 50mA Applied voltage Max. 30V Output saturation voltage 1.2V or less at 50mA
● <b>Relay output</b>	Contact rating : 250VAC 2A, 30VDC 2A Mechanical life : 20,000,000 times 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
● <b>Level judgement mode</b>	The alarm is ON when display value exceeds setpoint (Over alarm) 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 $\geq$ Display value $\geq$ AL1 zone LO	AL1
AL1 zone HI $\geq$ Display value $\geq$ AL2 zone LO	AL2
AL1 zone HI $\geq$ Display value $\geq$ AL3 zone LO	AL3
AL1 zone HI $\geq$ Display value $\geq$ 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 $\geq$ AL1 judgement value	AL1
(Max.-Min.) during the fixed time $\geq$ AL2 judgement value	AL2
(Max.-Min.) during the fixed time $\geq$ AL3 judgement value	AL3
(Max.-Min.) during the fixed time $\geq$ 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 300 $\mu$ s (0 $\rightarrow$ 90% response)
<b>Specifications for each output</b>	Refer to the following chart.

Output type	Load resistance	Accuracy	Ripple
0~10V	$\geq 2k\Omega$	$\pm 0.1\%$ FS	$\pm 50mV_{p-p}$
-10~10V			
1~5V			
0~20mA	$\leq 500\Omega$		$\pm 25mV_{p-p}$
4~20mA			

\*Ripple for current output is at load resistance 250 $\Omega$  (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. Output saturation voltage $\leq 1.2V$ at 10mA
<b>Enable</b>	Output transistor turns OFF when the enable terminal is short with D.COM

## RS-232C communication

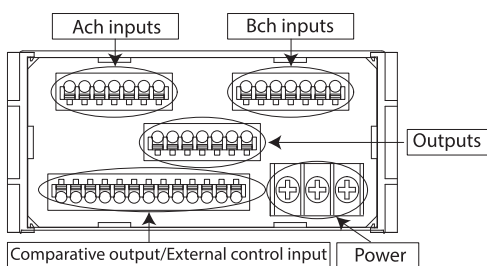
<b>Communication protocol</b>	Modbus RTU*, Original command, Original output
<b>Synchronous system</b>	Asynchronous mode
<b>Communication method</b>	Full duplex
<b>Communication speed</b>	9600bps, 19200bps, 38400bps
<b>Data length</b>	7bit, 8bit
<b>Stop bit</b>	1bit, 2bit
<b>Parity bit</b>	None, Odd, 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

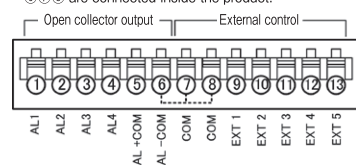
(External control / comparator output / power supply)

- Comparator output / External control

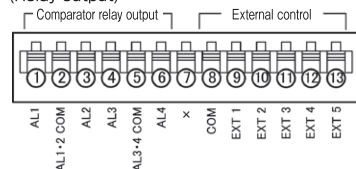
Compatible wire : AWG24 to 16

(Open collector output)

\*⑥⑦⑧ are connected inside the product.



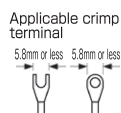
(Relay output)



- Power supply



(-) : DC POWER



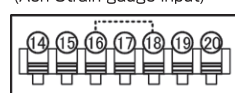
### Upper terminal

(Input / GO output / sensor power supply)

- Strain gauge input

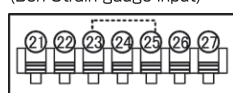
Compatible wire : AWG24 to 16

(Ach Strain gauge input)



\*⑮⑯ are connected internally

(Bch Strain gauge input)

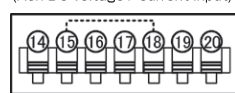


\*⑳㉑ are connected internally

- DC voltage / current input (Process input)

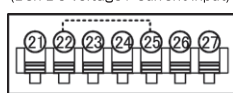
Compatible wire : AWG24 to 16

(Ach DC voltage / current input)



\*⑮⑯ are connected internally

(Bch DC voltage / current input)

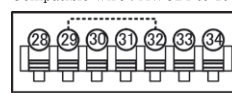


\*⑳㉑ are connected internally

### Middle terminal (Option output)

- Analog output

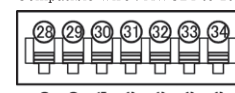
Compatible wire : AWG24 to 16



\*⑳㉑ are connected internally

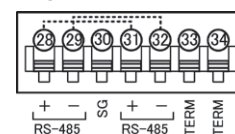
- RS-232C

Compatible wire : AWG24 to 16



- RS-485

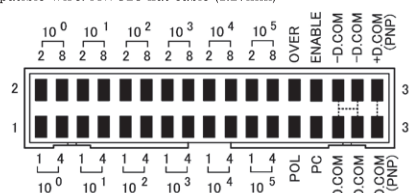
Compatible wire : AWG24 to 16



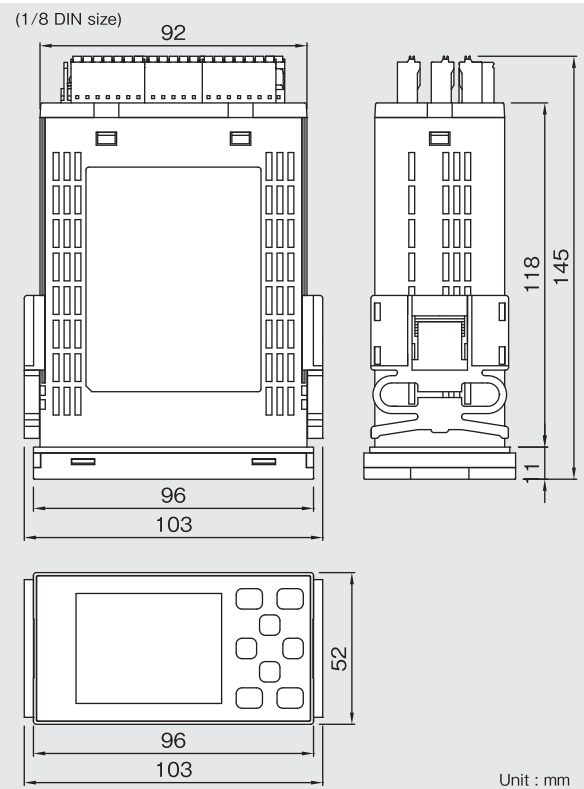
\*⑳㉑ are connected internally

- BCD

Compatible wire: AWG28 flat cable (1.27mm)



## Dimensions



## Panel cutout

