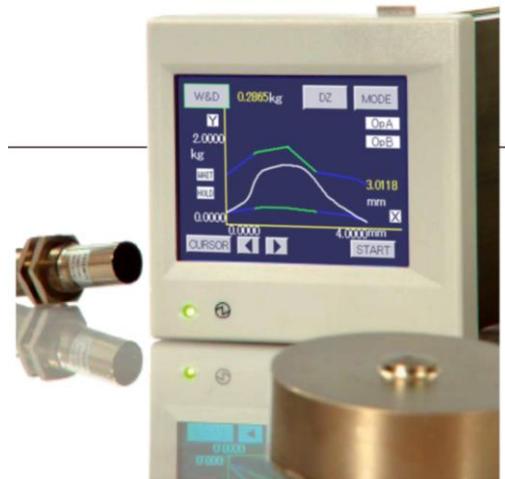


# GRAPHIC MULTI-METER

MODEL : G1000 SERIES

SIMPLIFIED INSTRUCTION MANUAL

( STRAIN GAUGE / PROCESS )



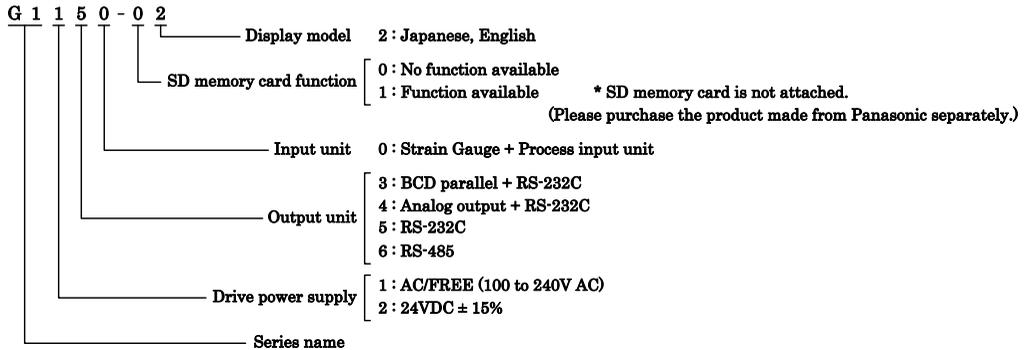
## ■ Contents

<b>1. Configurations of model</b> .....	<b>3</b>
<b>2. Screen Configurations</b> .....	<b>3</b>
2-1. NAME AND FUNCTION OF DISPLAY SCREEN.....	3
2-2. FUNCTIONAL DESCRIPTION.....	5
<b>3. Setting</b> .....	<b>6</b>
3-1. WAVEFORM COMPARISON / WAVEFORM & DISPLACEMENT COMPARISON (EXAMPLE) .....	6
3-2. SET-VALUE INPUT SCREEN.....	7
3-3. DATA SETTING LIST.....	8
<b>4. Basic Function Setting (Setup)</b> .....	<b>13</b>
<b>5. Input Setting</b> .....	<b>17</b>
5-1. STRAIN GAUGE .....	17
5-2. ANALOG INPUT SETTING (ACH).....	17
5-3. PROCESS INPUT (BCH) .....	21
<b>6. Comparison Set Value (Comparator) (A/Bch)</b> .....	<b>25</b>
<b>7. Hold Function (Hold)</b> .....	<b>28</b>
7-1. HOLD FUNCTION SETTING .....	28
<b>8. Waveform Comparison / Waveform &amp; Displacement Comparison (Waveform)</b> .....	<b>31</b>
8-1. VARIOUS SETTING AND CORRECTION METHODS .....	31
<b>9. Graphic Display Setting (Graph Disp)</b> .....	<b>35</b>
<b>10. Linearization</b> .....	<b>38</b>
<b>11. Basic Function Setting 2 (System)</b> .....	<b>39</b>
11-1. PROTECT.....	39
11-2. INITIALIZATION .....	39
11-3. FUNCTION CHECK.....	39
<b>12. Output</b> .....	<b>41</b>
12-1. ANALOG OUTPUT SETTING.....	41
12-2. BCD OUTPUT SETTING.....	41
<b>13. About Error Messages</b> .....	<b>42</b>
<b>14. Accessories</b> .....	<b>43</b>

## 1. Configurations of model

The G1000 Series are configured as follows :

Check that there is no discrepancy between the model and its specifications you have chosen when ordering and the model and its specifications under your hand.

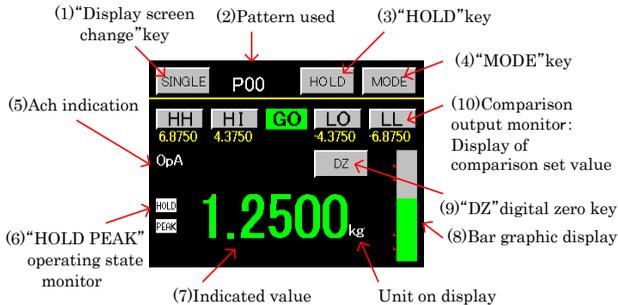


\* Standard equipment of the comparison output (Photocoupler output) is carried out.

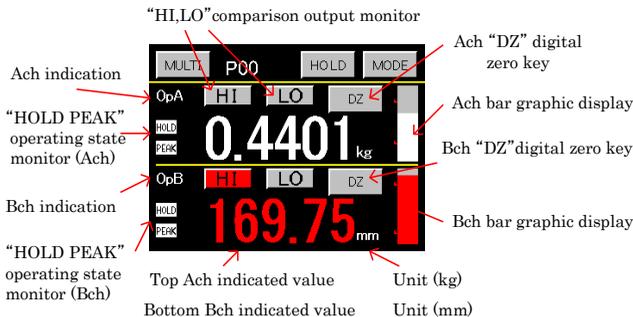
## 2. Screen Configurations

### 2-1. Name and Function of Display Screen

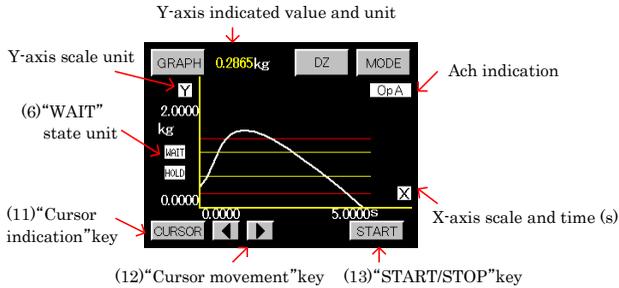
#### 1) Single Display Screen (A channel, B channel)



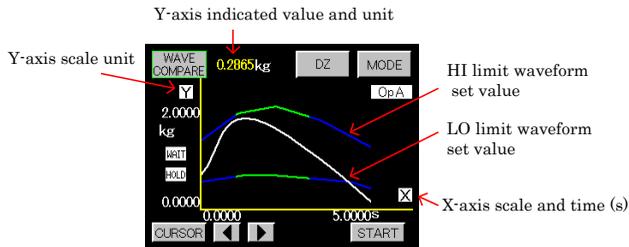
#### 2) Multi Display Screen (2ch meter)



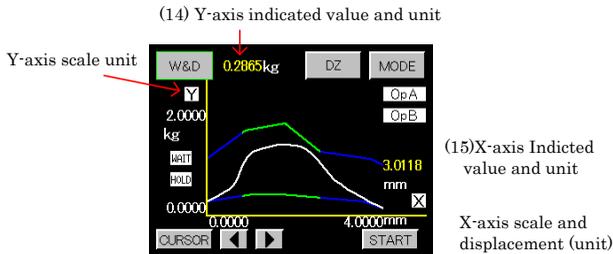
## 3) Graphic Display Screen



## 4) Waveform Comparison Display Screen (Ach,Bch)



## 5) Waveform &amp; Displacement Comparison Display Screen



## • "MODE" Key

Various settings can be performed with the measurement operation stopped and each output turned off. When the caution screen for start settings appears and "YES" is selected on it, the main setting screen is displayed, making it possible to perform setting.

## • Comparison output monitors "HH", "HI", "GO", "LO", "LL"

When the comparison output ON/OFF state is displayed on the single screen, a comparison set value is also displayed. In case of the multi-display screen (2 channel), each of Ach and Bch is independently displayed. "HH", "HI", "LO", "LL" are used as setting keys. Pressing it displays a 10-key pad on the screen, allowing data setting. (It can be set during measurement operation)

## • Others

I perform control of this product by a screen key and external control. (External control connector)

In external control, control is possible independently by digital zero, hold of Ach and Bch. In addition, as for the pattern change of setting, a change is possible from external control (P0 to P3) and RS communication.

## 2-2. Functional Description

The touch panel is used for setting and operation on the screen. If 2 or more points are pressed simultaneously or quickly pressed continuously, the point so pressed may be detected incorrectly. Be sure to press only one point at intervals.

It changes according to 1) Meter Setup of "4. Basic Function Setting (Setup)".

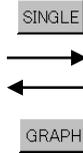
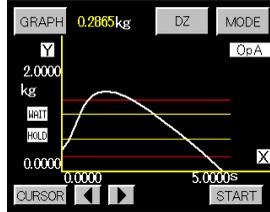
Display screen of three kinds are available. The state when each of **MULTI** **GRAPH** **SINGLE** be pressed is shown according to each meter setting.

◎The display screen changes as follows, when Ach and Bch are selected by meter setting :

Ach (Bch) single screen



Ach (Bch) graphic screen



Y-axis = Ach or Bch  
X-axis = time (s)

◎Display screen change when 2 channel meter is selected by meter setting

2 channel screen

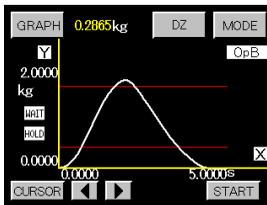


Ach graphic screen



X-axis = time (s)

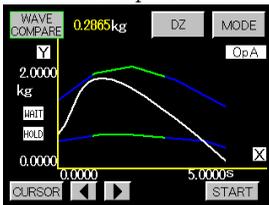
Bch graphic screen



X-axis = time (s)

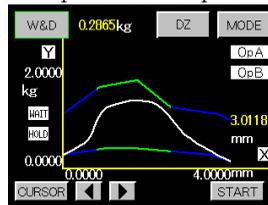
◎When Waveform Comparison Ach/Bch or Waveform & Displacement Comparison are selected, no screen will change

Waveform comparison screen



Y-axis = Ach or Bch  
X-axis = time (s)

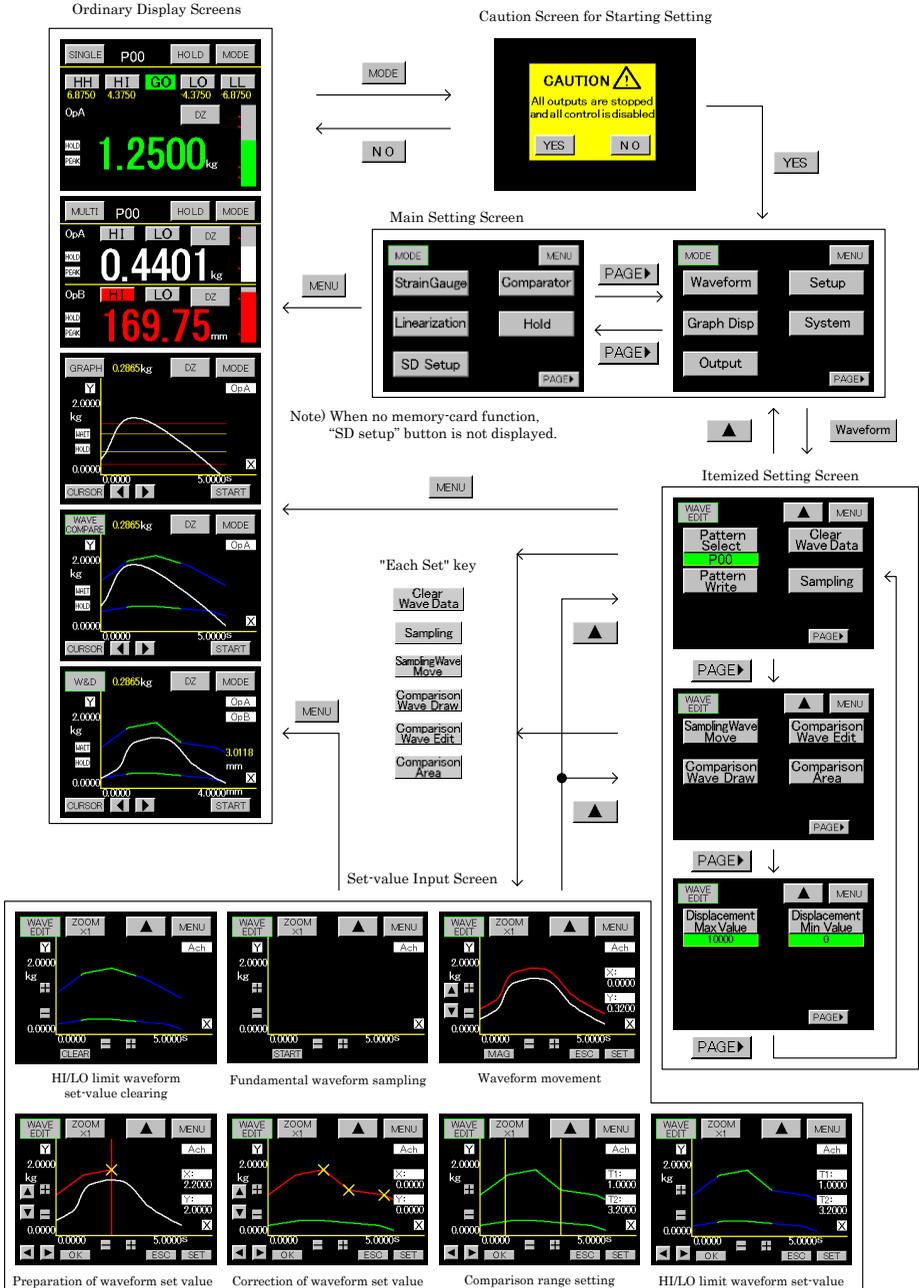
Waveform & Displacement Comparison screen



Y-axis = Ach  
X-axis = Bch

### 3. Setting

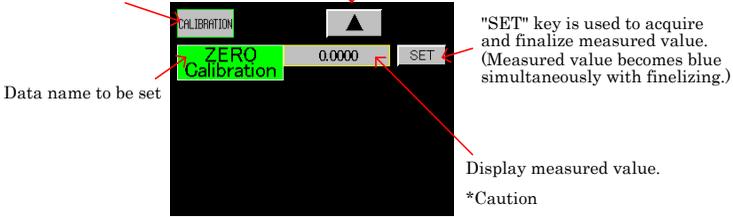
#### 3-1. Waveform Comparison / Waveform & Displacement Comparison (Example)



### 3-2. Set-Value Input Screen

#### 1) Measured-value acquisition screen

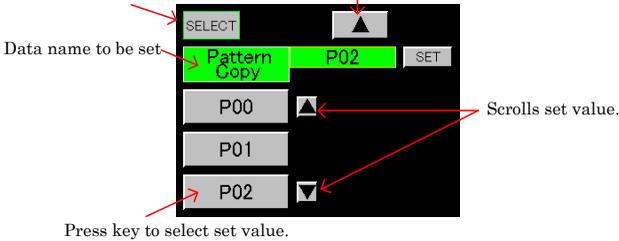
"CALIBRATION": Displays contents to be set with indicator. Returns to itemized setting screen.



※ When "4. Basic Function Setting (Setup) 4) Motion Detect" is active, measured value becomes red while analog output is not stable. Setting is possible even during unstable state.

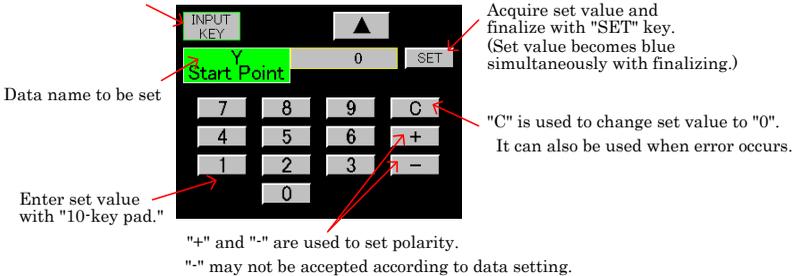
#### 2) Set-value select screen

"SELECT" is used to select data to be set with indicator. Displays the selected value.



#### 3) 10-key input screen

"INPUT KEY": Used to set data to be set with indicator.



### 3-3. Data Setting List

#### Setup

#### Basic Function Setting (Setup)

Setting item	Default value	Setting range
Meter Setup	A channel	A channel, B channel, 2 channel, Wave Ach, Wave Bch, W&D
Display Cycle	2.5 CPS	12.5, 6.25, 2.5, 1.0, 0.5 CPS
Sampling Cycle	500 CPS	4000, 2000, 1000, 500, 200, 100, 50, 20, 10 CPS
MD Time	0.0	Time 0.0 to 9.9 (second.)
MD Width	1	Comparison width 01 to 99 (digit)
ZT Time	0.0	Correction time 0.0 to 9.9 (second)
ZT Width	0	Correction width 0 to 99 (digit)
Input ON Delay	0.000	0.000 to 4.999 (sec.)
Output Delay	0.000	0.000 to 4.999 (sec.)
Power ON Delay	0	0 to 30 (sec.)
Back Light Time	0	0 to 99 (min)
Contrast	-----	0 to 255
Cross Talk	33	0 to 63
Digital ZERO Backup	OFF	OFF, ON
Language	Japanese	Japanese, English
BPS	9600	38400, 19200, 9600, 4800, 2400 BPS
Data Length	7	7, 8
Parity	Even	Even, Odd, None
Stop Bit	2	2, 1
Delimiter	CR+LF	CR+LF, CR, LF
Address (RS-485 ID)	0	00 to 99

#### StrainGauge

#### Strain Gauge Input Setting (Ach) (P00 to P15)

Setting item	Default value	Setting range
Pattern Select	-----	P00 to 15
Pattern Copy	-----	P00 to 15
Sensor Power	2.5V	2.5V, 5V, 10V
ZERO Calibration	0	0.0000
Equivalent Calibration	2.0000	SPIN value (rated-output value) (0.1 to 3.000mV/V)
Actual Load	10000	Span set value (100 to 99999)
Decimal Point	0	0.0000, 0.000, 0.00, 0.0, 0
Digital Shift	0	±99999
Unit	None	Select from among 79 different units.
Moving Average	OFF	OFF, 2, 4, 8, 16, 32, 64, 128, 256, 512, 1024 (times)
Analog Filter	600	10, 30, 300, 600 (Hz)
Digital Limiter HI	99999	-99998 to 99999
Digital Limiter LO	-99999	-99999 to 99998
Step	1	1, 2, 5, 10

## Process Input Setting

(Bch) (P00 to P15)

Setting item	Default value	Setting range
Pattern Select	----	P00 to 15
Pattern Copy	----	P00 to 15
Input Range	±0 to 10V	0 to 10, ±0 to 20mA, 4 to 20mA
Full Scale	10000	0 to 99999
Off set Scale	0	0 to 99999
Full Scale Input	10.000	-10.000 to 10.000, -20.000 to 20.000
Offset Scale input	0	-10.000 to 10.000, -20.000 to 20.000
Decimal Point	0	0.0000, 00.000, 000.00, 0000.0, 0
Digital Shift	0	±99999
Unit	None	Select from among 79 different units.
Moving Average	OFF	OFF, 2, 4, 8, 16, 32, 64, 128, 256, 512, 1024 (times)
Analog filter	600	10, 30, 300, 600 (Hz)
Digital Limiter HI	99999	-99998 to 99999
Digital Limiter LO	-99999	-99999 to 99998
Step	1	1, 2, 5, 10

## Comparator

Comparison Set Value Setting (Comparator)

(Ach/Bch) (P00 to P15)/(P00 to P15)

Setting item	Default value	Setting range
Pattern Select	---	P00 to 15
Pattern Copy	---	P00 to 15
HH Limit	1000	-99999 to 99999
HI Limit	500	-99999 to 99999
LO Limit	100	-99999 to 99999
LL Limit	50	-99999 to 99999
HH Hysteresis	1	-9999 to 9999
HI Hysteresis	1	-9999 to 9999
LO Hysteresis	-1	-9999 to 9999
LL Hysteresis	-1	-9999 to 9999
Type	Normal	Normal, Area, Rank
Zero Band	0	0 to 99999
Start Condition	Always	Always, Zero Band, Motion, Z + M

**Hold**

Hold Function (Hold)  
(P00 to P15)

Setting item	Default value	Setting range
Pattern Select	----	P00 to 15
Pattern Copy	----	P00 to 15
Hold	Normal	(1)Normal (2)Sample (3)Peak (4)Valley (5)Peak valley (6)Area Peak (7)Area Valley (8)Area Peak Valley (9)Time Peak (10)Time Valley (11)Time Peak Valley (12)Level + Time P (13)Level + Time V (14)Level +Time P-V (15)Maximum Value + Level(16)Minimum Value + Level (17)Inflection Point + Level *Level = Start level
Start Level	100	±99999
Start Condition	Pass	Pass, Rising Edge, Trailing Edge, More, Less
Detection Time	1000	1 to 9999
Minimum Value	50	1 to 9999
Detection Level	×1/2	×1/4, ×1/2, ×3/4, ×1, ×1.25, ×1.5, ×2, ×3, ×4
Detection Count	1	1 to 9
Inflection Range	30	1 to 99999
Detection Before	20	1 to 999
Detection After	20	1 to 999

**Waveform**

Waveform Comparison / Waveform & Displacement Comparison (Waveform)  
(P00 to P07)

Setting item	Default value	Setting range
Pattern Select	----	P00 to 07
Pattern Write	----	P00 to 07
Clear Wave Data	----	
Sampling	----	
Sampling Wave Move	----	
Comparison Wave Draw	----	
Comparison Wave Edit	----	
Comparison Area	----	
Displacement Max Value	10000	0 to 99999
Displacement Min Value	0	0 to 99999

## Graph Disp

Graphic Display Setting (Graph Disp)  
(P00 to P15)

Setting item	Default value	Setting range
Pattern Select	---	P00 to 15
Pattern Copy	---	P00 to 15
Y Start Point	0	-99999 to 99999
Y Scale	1/100	(1/1, 1/2, 1/5, 1/10, 1/20, 1/50, 1/100, 1/200, 1/500, 1/1000, 1/2000)
X Start Point	0	0 to 99999
X Scale	1/5	(1/1, 1/2, 1/5, 1/10)
Interval Time	1.0	0.0 to 99.9 (sec.)
Start Type	Ext signal	(1)Free Run (2)Ext. Signal (3)Wave Start Level (4)E.S. + W.S.
Wave Data Read	---	
Rejection Data Read	ON	(1)1 Times Before (2)2 Times Before (3)3 Times Before (4)4 Times Before (5)Rejection Data Store (On/Off) (Default value ON)
Rejection Data Clear	---	

## Linearization

Linearize Setting (Linearization)  
(Ach/Bch) (P00 to P15) / (P00 to P15)

Setting item	Default value	Setting range
Pattern Select	---	P00 to 15
Pattern Copy	---	P00 to 15
Set Number	2	2 to 32
Linearization	Clear	ON, OFF, Clear (zero clear)
Point In I = 0 to 31	0	-99999 to 99999
Point Out O = 0 to 31	0	-99999 to 99999

## System

## Basic Function Setting 2 (System)

Setting item	Default value	Setting range
Protect DZ	OFF	ON, OFF
Protect Strain Gauge	OFF	ON, OFF (Ach/Bch)
Protect Others	OFF	ON, OFF (1)Comparator (2)Hold (3)Linearization (4)Waveform (5)Graph Disp (6)Setup (7)Output
(1) Initialize Strain Gauge	----	P00 to 15 are selected and initialized (For Ach/Bch)
(2) Initialize Comparator	----	P00 to 15 are selected and initialized (For Ach/Bch)
(3) Initialize Linearization	----	P00 to 15 are selected and initialized (For Ach/Bch)
(4) Initialize Graph Disp	----	P00 to 15 are selected and initialized
(5) Initialize Hold	----	P00 to 15 are selected and initialized
(6) Initialize Waveform	----	P00 to 07 are selected and initialized
(7) Initialize Output	----	P00 to 15 are selected and initialized
(8) Initialize Setup	----	
Initialize All	----	All items (1) to (8) are initialized.

Self Check Display	----	Color, Back Light , Line
Self Check Touch Panel	----	
Self Check I/O	----	
Self Check Sensor	----	
Self Check Output	----	Analog or BCD (As per specification)

## Output

## Output

## For model with analog output

Setting item	Default value	Setting range
Pattern Select	----	P00 to 15
Pattern Copy	----	P00 to 15
Output Channel	A channel	A channel, B channel
Output Type	±10V	±10V, 4 to 20mA
Analog Output HI	10000	-99999 to 99999
Analog Output LO	0	-99999 to 99999

## For model with BCD output

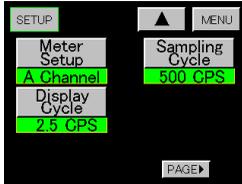
Pattern Select	----	P00 to 15
Pattern Copy	----	P00 to 15
Output Channel	A channel	A channel, B channel

\* When output unit is not mounted, button operation is not available.

(Button display is shaded.)

## 4. Basic Function Setting (Setup)

•Setting procedure → "MODE" key → Caution Screen for Starting Setting → Main setting screen → "PAGE" key → "SETUP" key



### 1) Meter Setup

- Set meter operation on the set-value select screen.
  - (1) A channel
  - (2) B channel
  - (3) 2 channel
  - (4) Wave Ach
  - (5) Wave Bch
  - (6) W&D

### 2) Display Cycle

- Set the period for updating the indicated value on the set-value select screen.
- Setting items : 12.5, 6.25, 2.5, 1.0, 0.5 times/second

### 3) Sampling Cycle

- Set the analog input signal acquisition speed on the set-value select screen.
- Setting items : 4000, 2000, 1000, 500, 200, 100, 50, 20, 10 times/second

### 4) MD = Motion Detect

- Set time and MD Width on the 10-key input screen.
- MD Time : 0.0 to 9.9 seconds
- MD Width : 1 to 99 digits
- Stable state

When the difference of the last measured value (at 1/sampling speed) and the present measured value is within the MD width and when this state continues beyond the time setting, the Meter considers this state to be stable. Then, moving average internally starts automatically.

When the value measured after the moving average and the present measured value come within the MD width by 32 times continuously, such a condition is judged a stable state.

#### •Unstable state

When the present measured value becomes larger than the MD width for the value after moving average, the moving average will be canceled and it is considered as an unstable state.

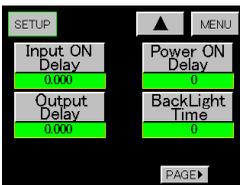
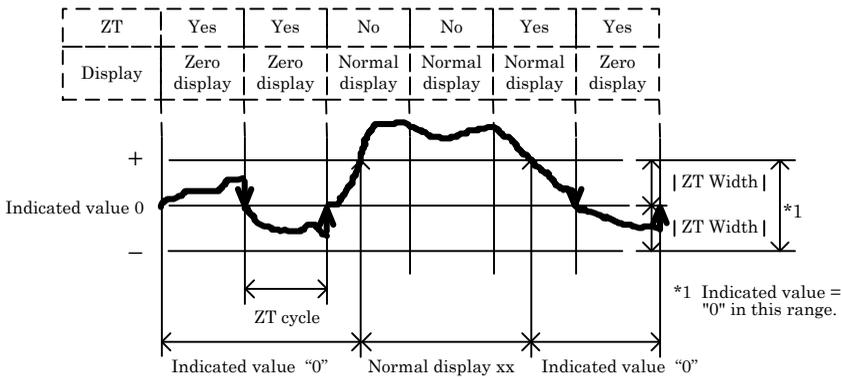
- MD Time = 0.0, no function for moving average are available.

## 5) ZT = Zero Tracking

- Set ZT time and ZT width on the 10-key input screen.
- ZT Time : 0.0 to 9.9 seconds
- ZT Width : 0 to 99 digits
- ZT Time = 0.0 correction is continuously performed. When it is within the ZT Width, the indicated value is set to "0."
- ZT Width = 0.0 no function is available.
- This function is provided to correct automatically the slow change of the zero point due to a change in the environment etc.

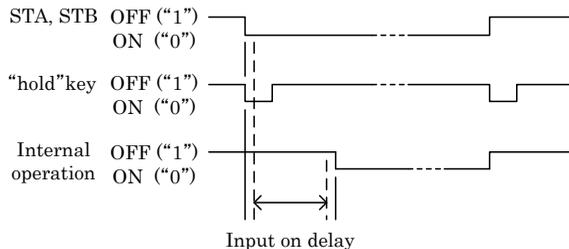
When the indicated value is below the ZT Width, the indicated value is set to "0" and internal correction is performed at every ZT cycle.

## Example of ZT display



## 6) Input ON Delay

- Set time on the 10-key input screen.
- Time-setting range (Input on delay) : 0 to 4.999 seconds
- This function is provided to adjust the duration from the time when the control input and "HOLD" key are activated to the time when operation is actually started.

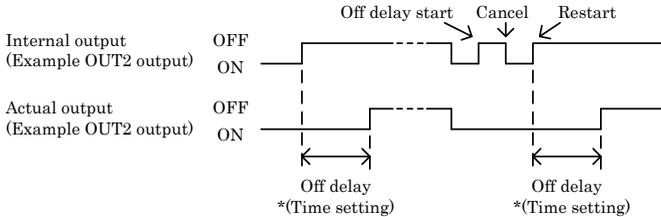


- Use Input on delay for the above-mentioned control terminal and "HOLD" key.
- STA (Ach) / STB (Bch) control terminals can be used separately for each channel.
- "HOLD" key : Operates at Ach and Bch simultaneously.
- Time setting is commonly used for Ach/Bch.

## 7) Output OFF Delay (Output Delay)

(Not used for Waveform Comparison and Waveform & Displacement Comparison)

- Set time on the 10-key input screen.  
Delay range : 0 to 4.999 seconds
- Used for comparison output (OUT1 to OUT5) and synchronizing signal output (SYNC).
- Set the time required from turning OFF of comparison output and synchronizing signal to actual turning OFF.
- When comparison output is turned ON and OFF during output off delay time, operation is repeated from the start of time setting.



\* For time setting, priority is given to Td and other settings than Td are considered as same setting.

$T_d = 1/\text{sampling speed}$ . (Same as above-mentioned 6) Input on delay)

For example, sampling of 10 times/second means  $T_d = 100\text{ms}$ .

For time-setting = 0.001 to 0.100, operation is done as time setting = 0.100.

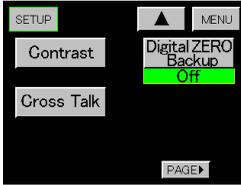
For time-setting = 0.501 to 0.600, operation is done as time setting = 0.600.

## 8) Power ON Delay

- Set time on the 10-key input screen.
- Delay range : 0 to 30 seconds
- Each output does not change during the time setting immediately after turning on power.  
Comparison output (OUT1 to OUT5) = OFF  
BCD output (open collector output) = OFF  
Analog output (voltage output = 0V, current output = 0mA)
- Power on delay = 0 no power on delay functions.

## 9) Back Light Time

- Set time on the 10-key input screen.
- Delay range : 0 to 99 minutes
- When the touch panel is never touched during the preset time (minute), the back light of LCD is turned off.  
Touching the touch panel while light is off turns on the back light of LCD.
- Back light time = 0 it lights up continuously.



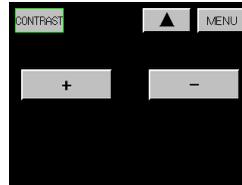
## 10) Contrast

- Control brightness on the contrast screen.
- Each time "+" key on the control screen is pressed, screen brightness increases.

## 11) Cross Talk

- Control "flicker" on the display screen.
- Each time "+" or "-" key on the control screen is pressed, screen flicker is adjusted.

## Contrast adjustment screen

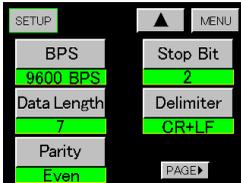


## 12) Digital ZERO Backup

- ON/OFF setting can be performed by pressing the "Digital ZERO Backup" key one at a time.
- When backup is set to ON, Digital ZERO continues even when power is turned OFF/ON.
- It is possible to backup for each channel.

## 13) Language

- It is possible to change the language displayed by each key and monitor. Choose between Japanese and English.
- Press "Language" key to choice between Japanese and English.



## 14) Communication and Related Items

- The following setting can be performed on the set-value select screen.
- BPS : 2400, 4800, 9600, 19200, 38400
- Data Length : 7, 8
- Parity : Even, Odd, None
- Stop Bit : 1, 2
- Delimiter : CR+LF, CR, LF

## \* Caution

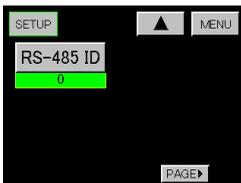
When baud rate is changed, it will change after returning to normal operation once.

## 15) Address (RS-485 ID)

- Set it on the 10-key input screen.
- Setting range : 0 to 99
- When the output unit is RS-485, the setting screen appears.

## \* Caution

Even if address is changed while the line is occupied, it will not be adopted but will be adopted when the line is released.



## 5. Input Setting

Procedure for equivalent calibration and actual load (Ach)

- When doing a calibration, first set items other than Zero calibration, Equivalent calibration, and Actual load calibration mentioned in 5-2. Sampling speed is fixed at 50 times/second.
  - 1) Turning OFF Protect Setting :  
Press "Protect strain gauge" key on the Basic function setting 2 screen to turn off protect.
  - 2) Check Sensor Power Supply :  
Check the contents of settings on the setting screen, return to the ordinary display screen, turn off power to the Meter and then connect the strain gauge sensor.
  - 3) Zero Calibration :  
Common settings to those of equivalent calibration and actual load. Set the zero point with no load applied to the strain gauge sensor. After completing the zero calibration, select either equivalent calibration or actual load according to the circumstances, and then perform calibration.
  - 4) Equivalent Calibration :  
Set the rated value (SPIN value) for the strain gauge sensor and the indicated value (span set value) at the time. Equivalent calibration can be performed only by setting the rated output (mV/V) of the strain gauge sensor and the indicated value at the time, without actual load.
  - 5) Actual Load :  
Actual load is performed by applying actual load to the connected strain gauge sensor, and by setting the indicated value (span set value) at the time.  
(Accurate calibration with least error occurrence can be attained.)
  - 6) Turning ON Protect Setting :  
After finalizing the setting, return to the ordinary screen, press "Protect Strain Gauge" key on the Basic function setting 2 (System) to turn Protect ON.

### 5-1. Strain Gauge

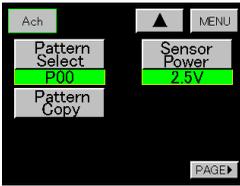
- Setting procedure → "MODE" key → Caution Screen for Starting Setting → Main setting screen → "Strain gauge" key
- Two calibrations are available : Actual load that is performed by inputting the intended actual loads to this Meter, and equivalent calibration that is performed by setting the data of the strain gauge sensor directly without using actual load.
- Protect Strain Gauge function on the Basic function setting 2 (System) is set to "ON", no setting can be performed. Perform setting by turning it "OFF".
- When setting a span set value, a digital shift value, and a digital limit value at Ach, no decimal point is set. However, when the decimal point position is already set, it is displayed.

### 5-2. Analog Input Setting (Ach)

All the items to be set at the time of calibration are shown. It is necessary to set or check items other than "Zero Calibration, Equivalent Calibration and Actual Load" before doing calibration.



- 1) Setting Channel
  - Select Ach.
  - When Bch is selected, "5-3. Analog Input (Bch) " is performed.
- 2) Pattern Select
  - Set a pattern to be set on the set-value select screen.
  - Setting range : 0 to 15
  - \* Select a setting pattern before changing the set value.



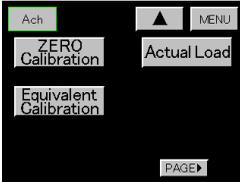
## 3) Pattern Copy

- Set the pattern of the copy destination on the set-value select screen.
- Setting range : 0 to 15

## 4) Sensor Power

- Set voltage applied to the strain gauge sensor to be used.
- Set it on the set-value select screen.
- Setting voltage : 10V, 5V, 2.5V

Set it before connecting the strain gauge sensor.



## 5) Zero Calibration

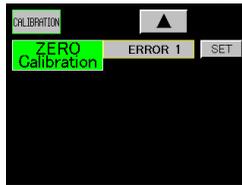
- The point at which the indicated value becomes "0" with no load applied to the strain gauge sensor is acquired.
- The acquisition range of zero value is -4.0 to 3.0mV/V
- It is performed on the measured-value acquisition screen.
- It is used in case of Equivalent Calibration and Actual Load.

## \* Caution

When 4) Motion Detect function of "4. Basic Function Setting (Setup)" is active, measured value becomes red while analog input is not stable. Setting is possible even during unstable state.

- Acquire measured value and finalize with "SET" key.

(Measured value becomes blue simultaneously with finalizing.)



- When the acquired ZERO value falls under the following case, it is judged an error and resetting is performed.

Error 1 : When the acquired ZERO value is smaller than -4.0mV/V.

Error 2 : When the acquired ZERO value is larger than -3.0mV/V.

- Perform resetting by pressing the "▲" key and then pressing the "ZERO Calibration" key.

## 6) Equivalent Calibration

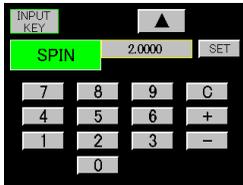
- Set the rated output value (mV/V value) for the strain gauge sensor and the indicated value at the time.
- The setting range of the rated output value (SPIN value) for the strain gauge sensor is 0.1 to 3.0mV/V.
- The setting range of SPAN set value (indicated value) is 100 to 99999.
- Select a set value on the set-value select screen and then set in on the 10-key input screen.



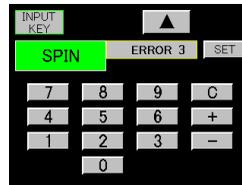
- Set-value select screen
- Select the set value (SPIN, SPAN).

- Acquire set value and finalize with "SET" key.  
(Set value becomes blue simultaneously with finalizing.)

SPIN value (Finalized output value)



SPAN value error



- When the acquired SPIN value (finalized output value) falls under the following case, it is judged an error and resetting is performed.

Error 3 : When it is smaller than 0.1mV/V value

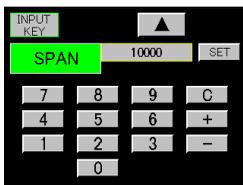
Error 4 : When it is larger than 3.0mV/V value

- To reset, press "C" to set the set value to "0", or press "▲" to return to the set-value select screen of the above-mentioned 6) and then press "SPIN" key.

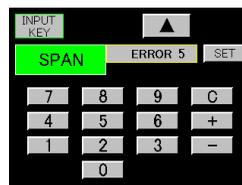
#### b) SPAN set value

- Set the indicated value when the SPAN value (rated-output value) is acquired and finalized.
- Acquire set value and finalize with "SET" key.  
(Set value becomes blue simultaneously with finalizing.)

SPAN set value



In case of SPAN set value error



- The acquired SPAN set value is checked.  
Resolution in this Meter is 10000 at the time of a 1.000mV/V value.  
 $k1 = \text{SPAN set value} / (\text{SPIN value} \times 10000)$

Error 5 is displayed at the time of  $k1 > 1$ .

- When no problem occurs at Error 5, press "SET" key to acquire the set value, which can be directly used. When a problem occurs, press "C" to set the set value to "0", or press "▲" to return to the set-value select screen of the above-mentioned 6) and then press "SPAN" key for resetting. If Error 5 still occurs, it is necessary to press the "▲" key twice and to perform resetting from 5) Zero calibration.

#### 7) Actual Load

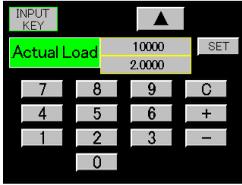
- The measured value (SPAN) when actual load is applied to the strain gauge sensor and the SPAN set value (indicated value) at the time are acquired.
- Acquisition range of measured value (SPAN value) -3.0 to 4.0mV/V.
- Setting range of SPAN set value (indicated value) 100 to 99999.
- Set it on the measured-value acquisition + 10-key input screen.

#### \* Caution

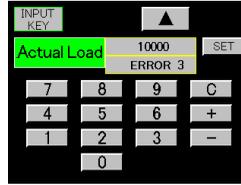
When 4) Motion detect function of "4. Basic function setting (Setup)" is active, measured value becomes red while analog output is not stable. Setting is possible even during unstable state.

- Acquire both SPAN set value and measured value (SPAN value) and finalize with "SET" key.  
(Set value becomes blue simultaneously with finalizing.)

SPAN set value



When SPAN value is error



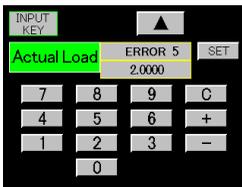
• A value obtained by subtracting ZERO value from the acquired measured value (SPAN value) is converted into SPIN value (mV/V value) and it is checked. In the following cases, it is judged an error and resetting is performed.

Error 3 : When it is smaller than 0.1mV/V value

Error 4 : When it is larger than 3.0mV/V value

• Perform resetting by pressing the "▲" key and then pressing the "Actual Load" key on the above-mentioned itemized setting screen. Check the condition with actual load applied and then press the "SET" key.

• When SPAN set value is Error 5

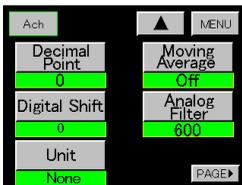


• Resolution in this Meter is 10000 at the time of a 1.0000mV/V value.

$$k1 = \text{SPAN set value} / (\text{SPIN value} \times 10000)$$

Error 5 is displayed at the time of  $k1 > 1$ .

• When no problem occurs at Error 5, press "SET" key to acquire the set value, which can be directly used. When a problem occurs, press "C" to set the set value to "0", or press "▲" and press "Actual Load" key on the above-mentioned itemized setting screen for resetting. If Error 5 still occurs, it is necessary to press the "▲" key twice and to perform resetting from 5) Zero calibration.



#### 8) Decimal Point

• Set the decimal point position displayed on the set-value select screen.

• Setting items : 0, 0.0, 0.00, 0.000, 0.0000

#### 9) Digital Shift

• Function provided to simply shift the indicated value.

Indicated value = (Internal indicated value) + (±digital shift value)

• Set it on the 10-key input screen.

• Setting range : ±99999

## 10) Unit

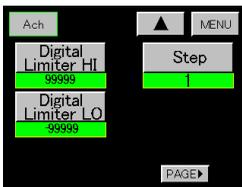
- Set the unit corresponding to the indicated value.
- Set it on the set-value select screen.

## 11) Moving Average

- This function is provided for the moving average of data after A/D conversion so as to reduce the fluctuation of the indicated values. As the number of times of moving average is increased, the indicated value is stabilized. However response becomes slow.
- Set it on the set-value select screen.
- Setting items : OFF, 2, 4, 8, 16, 32, 64, 128, 256, 512, 1024 times

## 12) Analog Filter

- Low pass filter provided to remove unnecessary noise components from analog input signal. As the cut-off frequency becomes large, response becomes quick. However, noise component may be contained.
- Set it on the set-value select screen.
- Setting items : 10, 30, 300, 600



## 13) Digital Limiter (HI/LO)

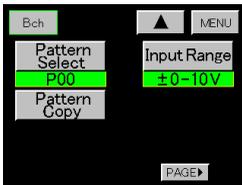
- Specify the display range of indicated values. When it is outside the display range, a digital limiter value is displayed.
- Set it on the 10-key input screen.
- Setting conditions  
Digital Limiter HI > Digital Limiter LO
- Setting range  
Digital Limiter HI -99998 to 99999  
Digital Limiter LO -99999 to 99998

## 14) Step

- Set the minimum updating width of indicated values.
- Set it on the set-value select screen.
- Setup items : 1, 2, 5, 10

## 5-3. Process Input (Bch)

- When setting a scaling (full scale, offset scale), a digital shift value, and a digital limit value at Bch, no decimal point is set. However, when 5) Decimal point position is already set, it is displayed.



## 1) Pattern select

- Determine a pattern to be set on the set-value select screen.
- Setting ranges : 0 to 15
- \* Select a pattern select before changing the set value.

## 2) Pattern copy

- Determine the pattern of the copy destination on the set-value select screen.
- Setting ranges : 0 to 15

## 3) Input range

- Set the input range on the set-value select screen.
- Setting items : 0 to 10V, ±0 to 20mA, 4 to 20mA

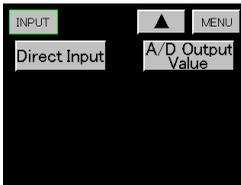


## 4) Scaling

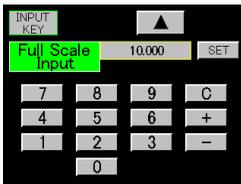
- Data setting
  - a) Full scale
  - b) Offset scale
  - c) Full scale input
  - d) Offset scale input
- Set each set value on the 10-key input screen.
- Setting conditions : Full scale > Offset scale
- Setting range :

	Voltage input	Current
Full Scale	0 to 99999	
Offset Scale	0 to 99999	
Full Scale Input	±10.000V	±20.000
Offset Scale Input	±10.000V	±20.000

- Full scale : Set the indicated value when a full scale input value is entered.
- Offset : Set the indicated value when an offset scale input value is entered.
- Full scale input and Offset scale input : Set it Directly input on the 10-key input screen or use the indicated value (A/D output value) according to circumstances.



- When the "Full Scale Input" key or "Offset Scale Input" key is pressed, choose between setting on the 10-key input screen (Direct Input) and using the measured value (A/D Output Value).



- When the "Direct Input" key is pressed, set it on the 10-key setting screen.
- Acquire set value and finalize with "SET" key. (Set value becomes blue simultaneously with finalizing.)
- To reset, press "C."



- When the "A/D Output Value" key is pressed, perform on the measured-value acquisition screen. Acquire set value and finalize with "SET" key. (Measured value becomes blue simultaneously with finalizing.) To reset, press "▲" to return to the above-mentioned select screen, and press the "A/D Output Value" key again.

There are 4 different data to be set.

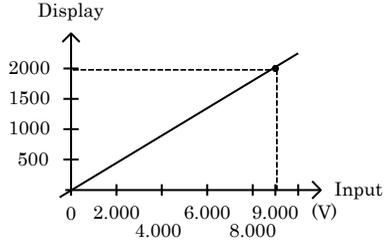
- Example of scaling setting

Full scale input = 9.000V

Full scale (indicated value) = 2000

Offset scale input = 0.000V

Offset scale (indicated value) = 0



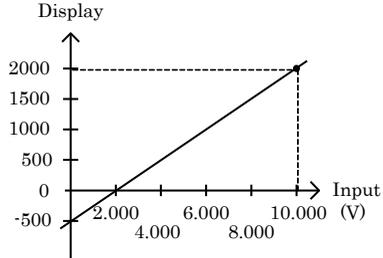
- Example of scaling setting

Full scale input = 10.000V

Full scale (indicated value) = 2000

Offset scale input = 2.000V

Offset scale (indicated value) = 0



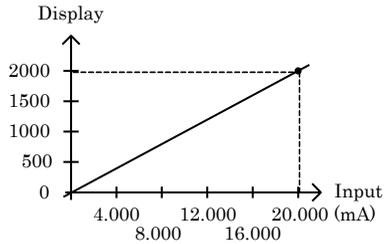
- Example of scaling setting

Full scale input = 20.000mA

Full scale (indicated value) = 2000

Offset scale input = 0mA

Offset scale (indicated value) = 0



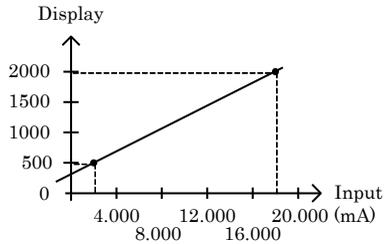
- Example of scaling setting

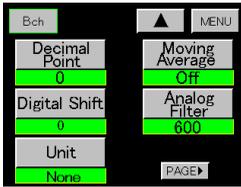
Full scale input = 18.000mA

Full scale (indicated value) = 2000

Offset scale input = 2.000mA

Offset scale (indicated value) = 500





## 5) Decimal point

- Set a decimal point position to be displayed on the set-value select screen.
- Setting items : 0, 0.0, 0.00, 0.000, 0.0000

## 6) Digital shift

- Function provided to simply shift the indicated value.
- Indicated value = (Internal indicated value) + ( $\pm$ digital shift value)
- Set it on the 10-key input screen.
- Setting range :  $\pm 99999$

## 7) Unit

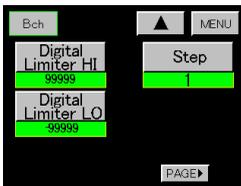
- Set the unit corresponding to the indicated value.
- Set it on the set-value select screen.

## 8) Moving average

- This function is provided for the moving average of data after A/D conversion so as to reduce the fluctuation of the indicated values. As the number of times of moving average is increased, the indicated value is stabilized. However response becomes slow.
- Set it on the set-value select screen.
- Setting items : OFF, 2, 4, 8, 16, 32, 64, 128, 256, 512, 1024 times

## 9) Analog filter

- Low pass filter provided to remove unnecessary noise components from analog input signal. As the cut-off frequency becomes large, response becomes quick. However, noise component may be contained.
- Set it on the set-value select screen.
- Setting items : 10, 30, 300, 600



## 10) Digital limiter (HI/LO)

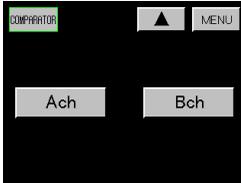
- Specify the display range of indicated values. When it is outside the display range, a digital limiter value is displayed.
- Set it on the 10-key input screen.
- Setting conditions :  
Digital limiter HI > Digital limiter LO
- Setting range :  
Digital limiter HI    -99998 to 99999  
Digital limiter LO    -99999 to 99998

## 11) Step wide (Step)

- Set the minimum updating width of indicated values.
- Set it on the set-value select screen.
- Setup items : 1, 2, 5, 10

## 6. Comparison Set Value (Comparator) (A/Bch)

- Setting procedure → "MODE" key → Caution Screen for Starting Setting → Main setting screen → "COMPARATOR" key
- When using the comparison set value, set as follows on 1) Meter Setup of "4. Basic Function Setting (Setup)".
  - (1) A channel
  - (2) B channel
  - (3) 2 channel
 Selection of meters
- Set each set value on each of Ach and Bch.



### 1) Setting Channel

- Select Ach.
- When Bch is selected, perform setting of Bch

The setting procedure is omitted. However, the same procedure as Ach is used.

### 2) Pattern Select

- Set a pattern to be set on the set-value select screen.

• Setting range : 0 to 15

\* Select a setting pattern before changing the set value.

### 3) Pattern Copy

- Set the pattern of the copy destination on the set-value select screen.
- Setting range : 0 to 15

### 4) Comparison set value

- Set the comparison set value to be used at A channel, B channel and 2 channel.

• Set it on the 10-key input screen.

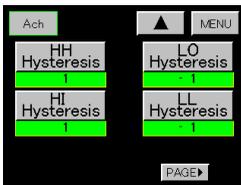
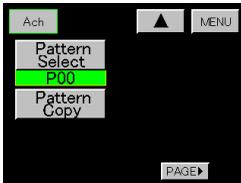
• For 2 channel, use the HI limit set value and LO limit set value.

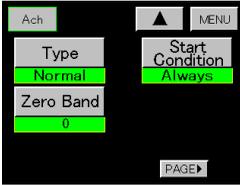
When "Area" and "Rank" are selected as "Comparison output type (Type)" on 6), some setting conditions are provided.

\* When "Comparison output type (Type)" setting is "Normal" and the "Comparison output type" is changed into "Rank", without fulfilling the setting conditions, the 10-key input value of comparison set value may not be reflected. In such a case, return the "Comparison output type" to "Normal" once, and change the "Comparison output type" into "Area" or "Rank" after entering the set value that satisfies the setting conditions.

- Setting range : ±99999

HH limit  
 HI limit  
 LO limit  
 LL limit





### 5) Hysteresis

- Set hysteresis to be used at A channel, B channel and 2 channel.
- Set it on the 10-key input screen.
- For 2 channel, use the HI hysteresis set value and LO hysteresis set value for each channel.
- When "Area" and "Rank" are selected as Comparison output type (Type) on 6), some setting conditions are provided

\* When Comparison output type setting is "Normal" and the Comparison output type is changed into "Area" or "Rank", without fulfilling the setting conditions, the 10-key input value of hysteresis may not be reflected. In such a case, return the Comparison output type to "Normal" once, and change the Comparison output type into "Area" or "Rank" after entering the set value that satisfies the setting conditions.

- Setting range :  $\pm 9999$ 
  - HH hysteresis
  - HI hysteresis
  - LO hysteresis
  - LL hysteresis

### 6) Comparison output type (Type)

- Set a "Type of comparison output (Type)" on the set-value select screen.
- Setting items :
  - For contents of operation, refer to "Type of Comparison Output".
  - (1) Normal (2) Area (3) Rank

### 7) Zero Band

- Zero Band on the 10-key input screen.
- Setting range : 0 to 99999

The indicated value and Zero band set value are checked during operation.

At the | indicated value | > the Zero band set value, it is judged as the outside of the Zero band range.

The result of check is used on the Comparison output start conditions given in the next paragraph.

### 8) Comparison output start conditions (Start Conditions)

- Set the output start conditions to be output on the set-value select screen.
- Setting items :

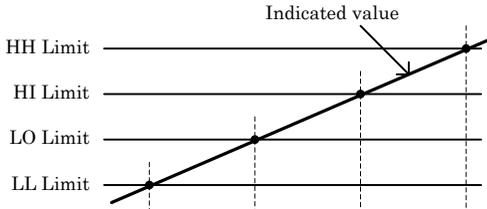
(1) Always	Always output.
(2) Zero Band	Outputs at outside of zero band range.
(3) Motion	Outputs, when motion is stable on display.
(4) (2) + (3) (Z + M)	Outputs, when indicated value is stable and outside Zero band ange.

(For description of motion, refer to 4) of "4. Basic Function Setting (Setup)")

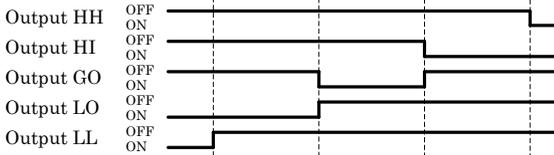
\* When 2 channel is selected, HH and LL of each set value are not used even if they have been set.

•Type of Comparison Output

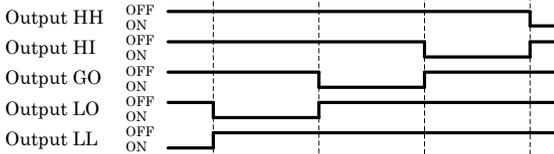
A Comparison output type can be selected from among 3 types.  
 (It corresponds to A channel, B channel, and 2 channel.)



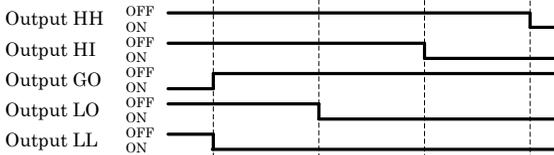
(1) In case of Normal operation type



(2) In case of Area type



(3) In case of Rank type

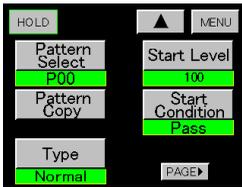


## 7. Hold Function (Hold)

- This function is provided to detect one sample with a peak, a valley, a peak valley, a maximum and the minimum, and point of inflection, holds the indicated value, performs HI/LO limit comparison simultaneously, and outputs the result.
- When ⑥ Input on delay of "4. Basic function setting (Setup)" is set, it is adopted. (Input on-delay is used for STA/STB signal and "HOLD" key.)
- \* Caution
  - When STA/STB signal it turned on and STA/STB signal is turned off during input on-delay, input on-delay operation is stopped. (When "HOLD" key is turned on during on-delay, "HOLD" is also stopped.)
  - "HOLD" key is active in the A channel, B channel, and 2 channel to be set on "4. Basic function setting (Setup)". In case of the multi-display screen, it is active in both Ach and Bch.
  - "HOLD" key can be used in A channel, B channel (single display screen), and 2 channel (multi-display screen).
    - When "HOLD" key is turned on in 2 channel (multi-display screen), Ach and Bch operate simultaneously. Turning on "HOLD" key with both STA/STB signals turned on will not be accepted. Priority is given to STA/STB signal.

### 7-1. Hold Function Setting

- Setting procedure → "MODE" key → Caution Screen for Starting Setting → Main setting screen → "HOLD"



#### 1) Pattern Select

- Set a pattern to be set on the set-value select screen.
- Setting range : 0 to 15
- \* Select a setting pattern before changing the set value.

#### 2) Pattern Copy

- Set the pattern of the copy destination on the set-value select screen.
- Setting range : 0 to 15

#### 3) Hold type (Type)

- Set a hold type among 17 different types on the set-value select screen.
  - (1) Normal (2) Sample (3) Peak (4) Valley (5) Peak valley (6) Area peak (7) Area valley (8) Area peak valley (9) Time peak (10) Time valley (11) Time peak valley (12) Level + time P (13) Level + time V (14) Level + time P-V (15) Maximal value + Level (16) Minimal value + Level (17) Inflection point + Level
  - a) When (1) Normal is selected, "STA" and "STB" signal input or "HOLD" key are inactive.
  - b) In case of single or multi display screen, the indicated value of the point appropriate for the type of hold for output.
  - c) In case of graphic display screen, the indicated value of the point appropriate for the type of hold, "." is displayed for the waveform for output.
  - d) The Y-axis of the graphic display screen serves as an analog input (Indicated value), and the X-axis serves as time.

#### 4) Waveform start level (Start Level)

- Set the point at which to start detection or acquisition and plotting of an analog input waveform. Set it on the 10-key input screen.
- Setting range : ±99999

- In case of Hold Function or waveform comparison.

The waveform start level is used for (12) "Level + time P" of the above-mentioned 3) to (17) "Level + Inflection point", and waveform comparison.

It is also used when (3) Wave start level or (4) "E.S. + W.S." is selected at 8) Start type of "11. Graphic display setting (Graph disp).

- In case of waveform & displacement comparison

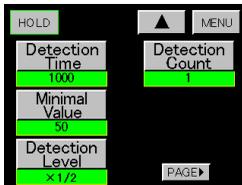
- Set the start level at -99999 and execute starting. When the displacement indicated value of X-axis becomes "0" (or over "0"), acquisition of analog waveform (Ach) is started.
- Execute starting with the waveform start level set at a value other than -99999. When the indicated value satisfies (Start level + Start condition), digital zeroing is automatically performed internally for the displacement indicated value of X-axis. Acquisition of analog input waveform (Ach) is started from the displacement indicated value "0" point.

#### 5) Waveform start conditions (Start Condition)

- Set conditions for Start Level on the set-value select screen.

It is available when Start Level + Start Conditions are satisfied.

- Setting items : (1) Pass (2) Rising edge (3) Trailing edge (4) More (5) Less



#### 6) Detection Time

- When time designation ((9) to (11)) and Level + Time ((12) to (14)) are selected as Hold type (Type), set the detection period.

Set it on the 10-key input screen.

- Setting ranges : 1 to 9999

Detection time is ( $T_d \times$  set value). ( $T_d = 1/\text{sampling speed}$ )

#### 7) Maximum value and Minimum value hold

- Use it, when maximum value and minimum value hold ((15), (16)) are selected as a Hold Function. Set minimal value, detection level, and detection frequency.

##### a) Detection minimum (Minimal Value)

Set it on the 10-key input screen.

Setting ranges : 1 to 9999

##### b) Detection level

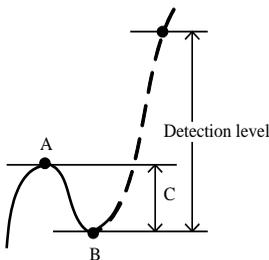
Set it on the set-value select screen.

Setting items : 1/4, 1/2, 3/4, 1, 1.25, 1.5, 2, 3, 4 times

##### c) Detection frequency (Detection Count)

Set it on the 10-key input screen.

Setting ranges : 1 to 9.



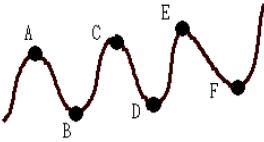
- Detection of maximum value and minimum value

When "value A - value B = value C" is over the Minimal Value, value A becomes maximum value and value B becomes minimum value.

- Hold of maximum value and minimum value

In case of maximum value hold, when value  $C \times$  "Detection Level" is exceeded after detecting the maximum value and minimum value, value A is indicated and held.

In case of minimum value hold, value B is displayed and held.



- In case of a waveform of which maximum value and minimum value repeat, the maximum value and minimum value of which number of times is set as a Detection Count is hold.

**Caution**

When the indicated value contains much noise, the maximum value and minimum value of noise may be sometimes detected. Check the indicated value on the screen and set the proper minimal value.

For example, at the setting of Detection Count = 3, E is held as maximum value and F as minimum value

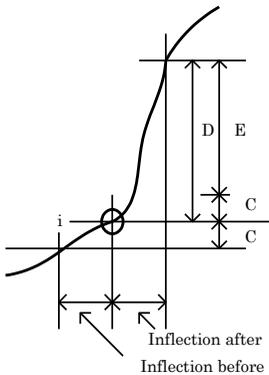


8) Point of inflection hold

- Use it when point of inflection during period ((17)) is selected by the Hold function. Set the detected Inflection range, inflection before and inflection after.

- Detected point of inflection value (Inflection Range)  
Set it on the 10-key input screen.  
Setting ranges : 1 to 99999
- Detection time A (Inflection Before)  
Detection time is  $(1/\text{sampling speed} \times \text{set value})$ .  
Set it on the 10-key input screen.  
Setting range : 1 to 999
- Detection time B (Inflection After)  
Detection time is  $(1/\text{sampling speed} \times \text{set value})$ .  
Set it on the 10-key input screen.  
Setting ranges : 1 to 999

Method of detecting point-of-inflection



(Usually, Inflection before = after)

• Hold of point of inflection

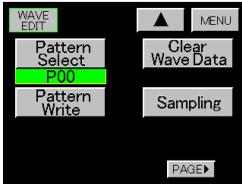
Where the value obtained by subtracting the indicated value of variable C during "Inflection before" from the indicated value of variable D during "Inflection after" is E, point "i" is held as a point of inflection when the value of variable E exceeds the detected point-of-inflection value

## 8. Waveform Comparison / Waveform & Displacement Comparison (Waveform)

- Waveform performs the A/D conversion of the analog input waveform which changes with time or displacement, compares the converted value (indicated value) with HI/LO limit waveform set-values and then outputs the result.
- The operating state can be easily checked and quality judgment can be performed.

### 8-1. Various Setting and Correction Methods

- Setting procedure → "MODE" key → Caution Screen for Starting Setting → Main setting screen → "PAGE" key → "WAVEFORM" key



#### 1) Pattern Select

- Call the waveform of the pattern stored in Flash Rom on the set-value select screen. (The called waveform is used for Comparison Wave Edit and Comparison Area.)
- Setting range : 0 to 7
- \* Select a setting pattern before changing the set value.

#### 2) Comparison waveform writing (Pattern Write)

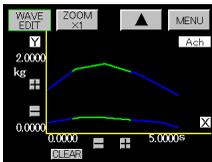
- Set a pattern in which to write the comparison waveform on the set-value select screen. The HI/LO limit comparison waveform values for which waveform edit has been completed are stored in memory.
- Setting range : 0 to 7
- \* When returning to the main setting screen or normal display screen without writing in the HI/LO limit waveform set values, a caution screen is displayed.



- "YES" key: Exits the edit of comparison waveforms without saving.
- \* The waveforms being edited are cleared.
- "NO" key: Returns to the itemized setting screen
- \* The waveforms being edited are not cleared.

#### 3) Comparison waveform clearing (Clear Wave Data)

- Erase the HI/LO limit comparison waveform and sampling waveform in the buffer.



- Press "CLEAR" key.

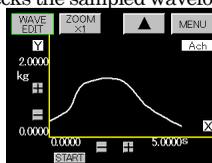
- \* The following key is commonly used at step 3) to step 8).

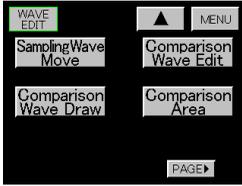
MENU	Returns to the normal display screen.
▲	Displays the itemized setting screen.
ZOOM x1	Enlarges the screen.
— +	Moves the screen.

#### 4) Waveform sampling (Sampling)

- Samples a waveform to be used as reference when making a comparison waveform.
- Sampling is started by pressing "START" key to turn on the start signal.
- Waveform sampling is started from the time of satisfying "Waveform Start Level + Waveform Start Conditions".

- Checks the sampled waveform.

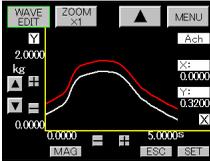




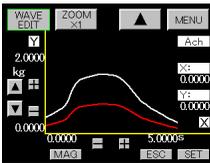
### 5) Sampling waveform movement (Sampling Wave Move)

- Moves, enlarges and reduces the sampled waveform to prepare a comparison waveform.

- \* HI limit comparison waveform is first prepared, and then LO limit comparison waveform is prepared.

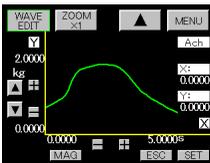


- Used to move the waveform up and down.



- Enlarge or reduce the waveform vertically with the "MAG" key. Enter at a scaling of 1 to 250% on the 10-key input screen.

- "ESC" key is used to return to the waveform used before scaling.



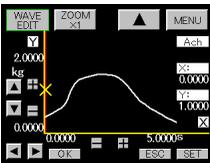
- When waveform preparation is completed, press "SET" key to save the comparison waveform in the buffer temporarily.

- (The prepared waveform turns into green.)

### 6) Comparison waveform drawing (Comparison Wave Draw)

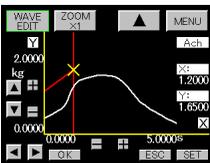
- Move the cursor on the screen to determine a point and prepare a comparison waveform by connecting between points with a straight line.

- \* HI limit comparison waveform is first prepared, and then LO limit comparison waveform is prepared.



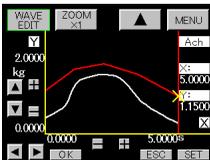
- Move the cursor with the key, determine a drawing starting point, and press "OK" key to set it.

- Pressing "ESC" key after completion of setting will reset the drawing starting point.

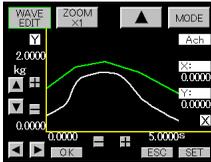


- When the cursor is moved furthermore to determine the next drawing point and press "OK" key, so that the last determined points are connected with a straight line.

- Pressing "ESC" key after completion of setting will reset the determined point.



- Draw a waveform by repeating the above-mentioned procedure.



- When drawing is completed, press "SET" key to save the comparison waveform in the buffer temporarily.  
(The prepared waveform turns into green.)

## 7) Comparison waveform edit (Comparison Wave Edit)

- Correct the prepared comparison waveform.



- Select a waveform (HI Limit waveform or LO Limit waveform) to be edited with "Up/down cursor" key.



- Move the cursor, determine an edit starting point, and press "OK" key. Pressing "ESC" key after completion of setting will reset the edit starting point.



- Move the cursor, determine an edit end point, and press "OK" key. Pressing "ESC" key after completion of setting will reset the edit ending.



- Move the cursor, determine an edit pass point, and press "OK" key.



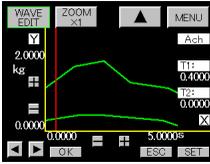
- A straight line connecting the edit starting point-Pass point and edit end point is prepared. Pressing "ESC" key will reset the edit pass point.



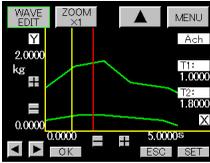
- When editing is completed, press "SET" key to save the comparison waveform in the buffer temporarily.

## 8) Comparison area setting (Comparison Area)

- Determine the starting point/end point of the comparison range, and set the waveform portion for comparison.

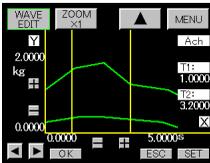


- Move the cursor with key, determine a comparison range starting point and comparison range end point, and press "OK" key to set it. (Cursor turns into yellow.)



- Pressing "ESC" key after completion of setting will reset the comparison area starting point.

- Move the cursor furthermore and determine the end point of the comparison area.

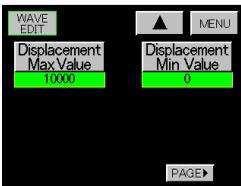


- Determine the end point of the comparison area with "OK" key. Pressing "ESC" key after completion of setting will reset the comparison area end point.



- When the range has been set, press "SET" key to save the comparison area in the buffer temporarily.

## 9) Displacement Max/Min Value



- Displacement Max Value
- Displacement Min Value
- Set it on the 10-key input screen.
- Setting ranges : 0 to 99999

\* Displacement max/min value is available only when W&D comparison is selected by meter setting of the setup.

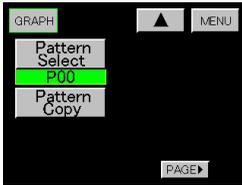
\* When HI/LO limit waveform setting is completed, write it in for memory.

For details, refer to the above-mentioned 2) Pattern Write.

## 9. Graphic Display Setting (Graph Disp)

Set the function necessary for waveform display.

•Setting procedure → "MODE" key → Caution Screen for Starting Setting → Main setting screen → "PAGE" key → "Graph Disp" key



### 1) Pattern Select

- Set a pattern to be set on the set-value select screen.
- Setting range : 0 to 15
- \* Select a pattern before changing the set value.

### 2) Pattern Copy

- St the pattern of the copy destination on the set-value select screen.
- Setting range : 0 to 15

### 3) Y Start Point

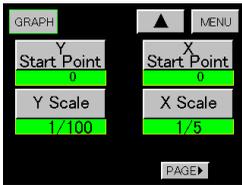
- Set in on the 10-key input screen.
- Setting range : ±99999

### 4) Y-axis magnification (Y Scale)

- Select a magnification by which the input waveform is displayed on the display range of the screen.

Set a magnification on the set-value selectscreen.

- Setting magnification: 1/1, 1/2, 1/5, 1/10, 1/20, 1/50, 1/100, 1/200, 1/500, 1/1000, 1/2000 (11 kinds)



### 5) X Start Point

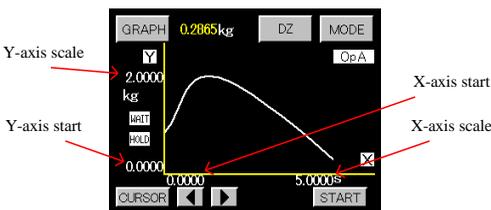
- The setting range is set by the sampling speed and full-scale value (Bch).
- Set it on the 10-key input screen.

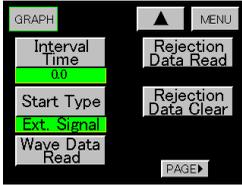
Each hold / Waveform Comparison	
Sampling	Range
4000 times/second	0 to 500
2000	0 to 1000
1000	0 to 2000
500	0 to 4000
200	0 to 10000
100	0 to 20000
50	0 to 40000
20	0 to 100000
10	0 to 200000

Waveform & Displacement Comparison	
Full-scale value	Range (Each unit)
1 to 2047	0 to 2000
2048 to 4095	0 to 4000
4096 to 8191	0 to 8000
8192 to 16384	0 to 16000
16385 to 32768	0 to 32000
32769 to 65536	0 to 65000
65537 to 99999	0 to 130000

### 6) X-axis magnification (X Scale)

- Select a magnification by which the input waveform is displayed on the display range of the screen.Set a magnification on the set-value select screen.
- Setting magnifications : 1/1, 1/2, 1/5, 1/10 (4 kinds)





### 7) Interval Time

- It is available when the free run is set in accordance with the next paragraph.  
Pressing "START" key or turning on the start signal starts drawing.  
When one screen is finished, the period drawing screen at the interval time is held.
- Set it on the 10-key input screen.
- Setting range : 0.0 to 99.9 (s)

### 8) Start Type

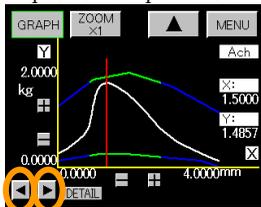
- Set a type when starting waveform drawing and waveform acquisition.
- Set a type on the set-value select screen.
- Setup items :
  - (1) Free Run
  - (2) Ext. Signal
  - (3) Wave Start Level
  - (4) E.S. + W.S.

\* Caution : External signal input means "START" key or "START signal".

### 9) Wave Data Read

- Each point value of the waveform of which acquisition has been completed.
- When moving to the point to be read using the "cursor" key and pressing "DETAIL" key, the following screen appears, indicating the HI/LO limit set value of each point, HI/LO limit waveform set value, displacement max/min value, and the indicated value.

Acquisition completion screen



cursor key

Each point display screen



- The displacement set value of X-axis is not available at the time of hold and waveform comparison.

### 10) Outlying waveform reading (Rejection Data Read)

- When analog input value is outside the HI/LO limit set value or HI/LO limit waveform set value, such waveform is read.
- Select a waveform to be read.

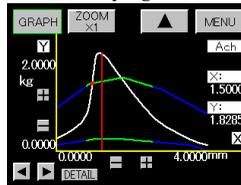
Up to 4 waveforms can be stored in memory by automatic updating. (No backup is available.)

- Meter setting of "4. Basic Function Setting (Setup)" is changed or the pattern is changed at the pattern select terminal, RS-232C or RS-485, All the memorized waveforms outside the range are cleared.

- (1) 1 Times Before
- (2) 2 Times Before
- (3) 3 Times Before
- (4) 4 Times Before
- (5) Rejection Data Store

- Rejection Data Store is usually turned on for automatic updating. Each time it is pressed, "ON/OFF" is alternately switched. (No backup is available.)
- When there is a waveform to be kept during automatic updating, turn it off.
- When (1) "1 Times Before" key is pressed, the last outlying waveform is displayed.

Last outlying screen



- When reading on the cursor point, reading in accordance with the same procedure as the above-mentioned "9) Wave Data Read" is possible.

#### 11) Outlying waveform clearing (Rejection Data Clear)

- Each time "Rejection Data Clear" key is pressed, the outlying waveform is cleared in chronological order.



## 11. Basic Function Setting 2 (System)

·Setting procedure → "MODE" key → Caution Screen for Starting Setting → Main setting screen → "PAGE" key → "SYSTEM" key

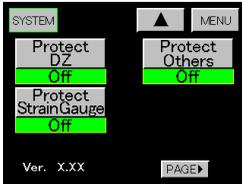
By basic function 2 (System), perform protection of each key, initialization and function check.

### 11-1. Protect

The key operation the state that do not have by protecting a key

Switch ON/OFF when each Protect key is push and hold (about 3 seconds).

When protect is ON, key is shaded.



·Digital Zero key protect (Protect DZ)

Used for denying "DZ" key in screen.

·Input setting protect (Protect Input)

Protect set of "Strain Gauge"

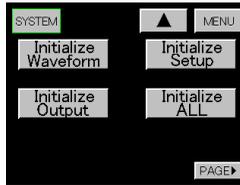
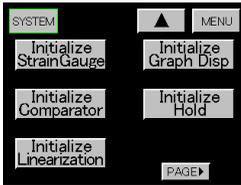
·Setting value protect (Protect Others)

Protect various setting except "Strain Gauge" and "Basic Function Setting 2 (System)"

### 11-2. Initialization

Initialize various set value.

Individual appointment is necessary whether setting except「Basic Function Setting (Setup)」, 「Basic Function Setting 2 (System)」initializes a pattern of which channel.



#### \* Caution

**It takes about 2 minutes to execute「Initialization All」.**

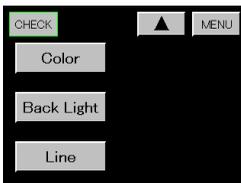
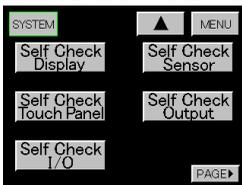
**Please don't shut down the power while doing initialization.**

**If the power is shut down while doing initialization, system can't operate normally at next power-on.**

About error indication, please refer to "About Error Messages"

### 11-3. Function Check

Check whether basic movement of each function acts normally.



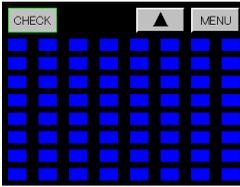
Display check

There are three ways of follows on display check

a) Color : Confirm that a color is displayed normally.

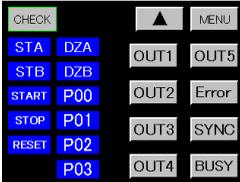
b) Back light : Check that ON/OFF control of backlight is normal.

c) Line: Check if each line is connected on screen.



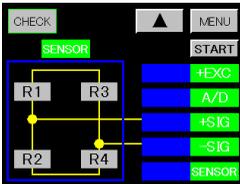
### Check Touch Panel

- touch a part of blue and check that a detection point is normal.  
Please confirm that the point that I touched reacts normally.



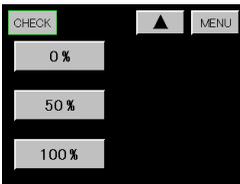
### Check I/O

- Check that wiring of external control I/O is normal.  
Control input : ON = yellow, OFF = blue  
Control output : Pressing key turns ON/OFF control output alternately.  
Note) START : GSTART of external control input  
STOP : GSTOP of external control input



### Self Check Sensor

- The check result is displayed on the blue portion.  
「+EXC」displays the output level of the sensor power supply of this equipment numerically.  
「A/D」checks whether A/D in this Meter is normal or not.  
「+SIG」checks whether the connection is made or not.  
「-SIG」checks whether the connection is made or not.  
「SENSOR」checks the connected sensor for any trouble.  
•Pressing "START" key starts the self-check.

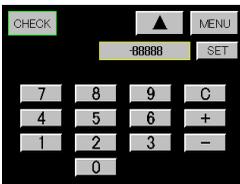


### Check output (Analog output)

- Only available when analog output unit output unit is mounted.
- Pressing「0%」,「50%」, or「100%」key outputs voltage or current from the terminal of the selected type.

Key	±10V type	4 to 20mA type
0%	-10V	4mA
50%	0V	12mA
100%	10V	20mA

- Pressing「MENU」key returns to the normal display screen.  
Analog output returns to normal movement.



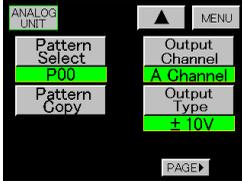
### Check output (BCD Output)

- Only available when BCD output unit is mounted.
- Enter a numerical value to be output to the BCD output terminal with a numerical value and "Polarity" key. Press「SET」key, and the set numeric data (BCD code) is output to the BCD output terminal. Up to 5 digit-figures can be set. When no digit is set, "0" is output for that digit.
- Pressing「MENU」key returns to the measurement screen.  
BCD output returns to normal movement.
- An input of 99999 or -99999 will output and over signal.

## 12. Output

### 12-1. Analog Output Setting

- When analog output unit is mounted, it can be performed.
- Setting procedure : "MODE" key → Caution Screen for Starting Setting → Main setting screen → "PAGE" key → "Output" key



#### 1) Pattern Select

- Select a pattern to be set.
- Choice items : P00 to P15
- \* Select a Pattern Select before changing the set value.

#### 2) Pattern Copy

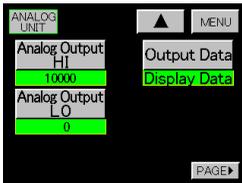
- Select the pattern of the copy destination.
- Choice items : P00 to P15

#### 3) Output Channel

- Select which channel.
- Select items : Ach, Bch

#### 4) Output Type

- Select voltage output of  $\pm 10V$  and current output of 4 to 20mA.
- Select items :  $\pm 10V$ , 4 to 20mA



#### 5) Analog Output HI

- Set an indicated value when analog output is 10V or 20mA.
- Setting range :  $\pm 99999$  (digit)

#### 6) Analog Output LO

- Set an indicated value when analog output is 0V or 4mA.
- Setting range :  $\pm 99999$  (digit)

#### 7) Output data

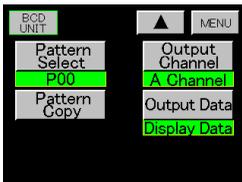
- Select items : indicated value, measured value

Indicated value : When hold is ON, screen display value is hold. And analog output is hold, too.

Measured value : link and output, in defiance of hold, always for a change of the input.

### 12-2. BCD Output Setting

- When BCD output is mounted, it can be performed.
- Setting procedure : "MODE" key → Caution Screen for Starting Setting → Main setting screen → "PAGE" key → "Output" key.



#### 1) Pattern Select

- Select a pattern to be set.
- Choice items : P00 to P15
- \* Select a Pattern Select before changing the set value.

#### 2) Pattern Copy

- Select the pattern of the copy destination.
- Choice items : P00 to P15

#### 3) Output Channel

- Select which channel.
- Choice items : Ach, Bch

#### 4) Output data

- Select items : indicated value, measured value

Indicated value : When hold is ON, screen display value is hold. And BCD output is hold, too.

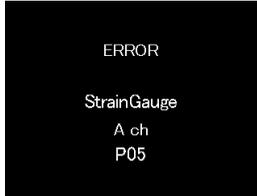
Measured value : link and output, in defiance of hold, always for a change of the input.

### 13. About Error Messages

- 1) When power is turned on, or each set value is changed, or the pattern used is changed, each set value is checked. If the contents at the time of setting differ from the contents at the time of reading, the following response is given :

Example of response : Strain gauge input setting (Ach) "P05" (pattern 5) is different.

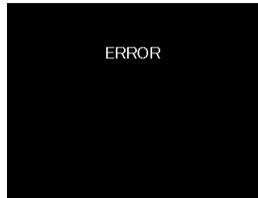
Error screen



- ← The setting item of Error
- ← The channel of Error
- ← The setting pattern of Error

- 2) Error is displayed on the screen and each output is turned off.  
As the set value of Error item is initialized (default value), be sure to turn on power again and then reset the Error item.  
Normal operation is performed after all Error(s) are corrected.
- 3) In case of RS-232C, the Meter responds at the occurrence of Error when the command is executed.  
As the set value of Error item is initialized (default value), be sure to turn on power again and then reset the ERROR item.  
Normal operation is performed after all Error(s) are corrected.
- 4) In case of RS-485, the Meter responds at the occurrence of Error when the command is executed after line is established. The subsequent operation is the same as that of RS-232C.
- 5) When only "ERROR" appears on the screen or "DATA LOST MEMORY" is responded during communication of RS-232C or RS-485, there is the possibility that a problem has occurred in the memory device itself. In this case, contact the dealer or our company directly (to send the memory device).

Screen where "DATA LOST MEMORY" is displayed.



## 14. Accessories

This book

Hardware Setup Manual

Utility CD

Card edge connector (Option : BCD unit)

Instruction Manual for SD Memory Function (Option : SD Memory Function)

*watanabe*

WATANABE ELECTRIC INDUSTRY CO., LTD.

6-16-19, Jingumae, Shibuya-ku, Tokyo 150-0001, Japan

Phone: (81)3-3400-6141

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

\* The specifications, design and other contents of this manual are subject to change without notice for further improvement.