GRAPHIC MULTI-METER
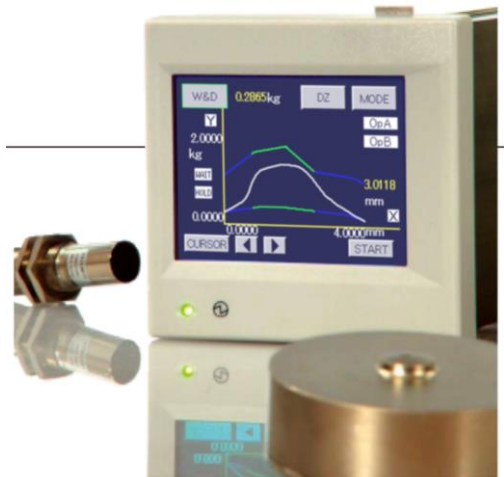
MODEL : G1000 SERIES

SIMPLIFIED INSTRUCTION MANUAL

（STRAIN GAUGE / PULSE）
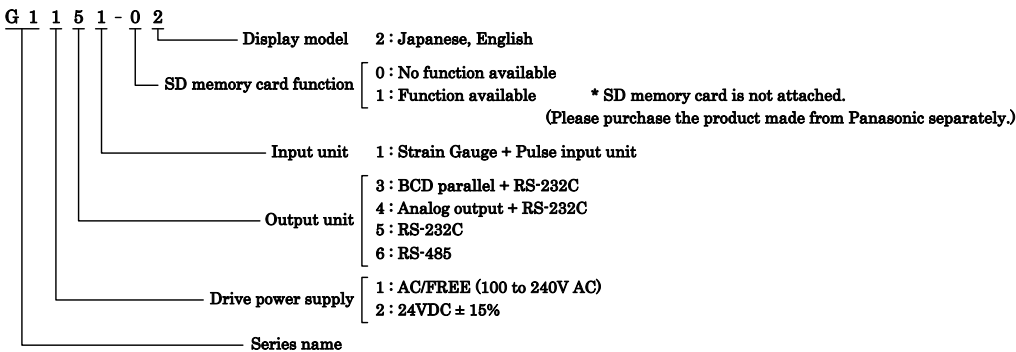
■ Contents

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.
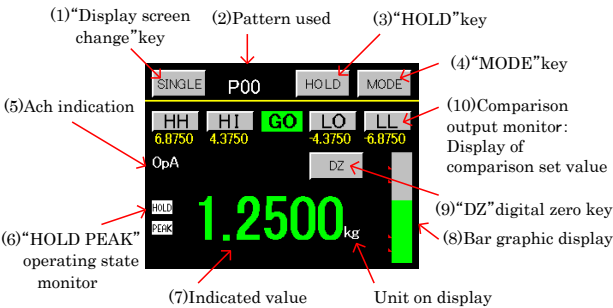
G 1 1 5 1 - 0 2

- Display model   2 : Japanese, English
- SD memory card function
  - 0 : No function available
  - 1 : Function available   * SD memory card is not attached.
    (Please purchase the product made from Panasonic separately.)
- Input unit   1 : Strain Gauge + Pulse input unit
- Output unit
  - 3 : BCD parallel + RS-232C
  - 4 : Analog output + RS-232C
  - 5 : RS-232C
  - 6 : RS-485
- Drive power supply
  - 1 : AC/FREE (100 to 240V AC)
  - 2 : 24VDC ± 15%
- Series name

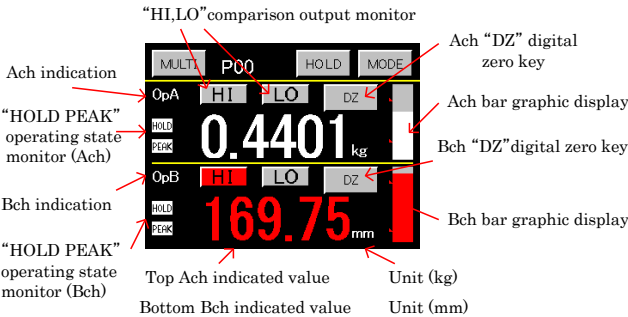* Standard equipment of the comparison output (Photocoupler output) is carried out.

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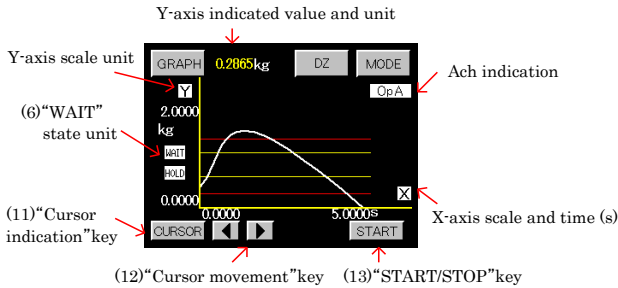
2-1. Name and Function of Display Screen

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

(1)"Display screen change"key
(2)Pattern used
(3)"HOLD"key
(4)"MODE"key
(5)Ach indication
(10)Comparison output monitor : Display of comparison set value
(6)"HOLD PEAK" operating state monitor
(9)"DZ"digital zero key
(8)Bar graphic display
(7)Indicated value
Unit on display

SINGLE P00 HOLD MODE
HH HI GO LO LL
6.8750 4.3750   -4.3750 -6.8750
OpA   DZ
HOLD
PEAK 1.2500 kg

2) Multi Display Screen (2ch meter)

"HI,LO"comparison output monitor
Ach "DZ" digital zero key
Ach indication
Ach bar graphic display
"HOLD PEAK" operating state monitor (Ach)
Bch "DZ"digital zero key
Bch indication
Bch bar graphic display
"HOLD PEAK" operating state monitor (Bch)
Top Ach indicated value
Unit (kg)
Bottom Bch indicated value
Unit (mm)

MULTI P00 HOLD MODE
OpA HI LO DZ
HOLD
PEAK 0.4401 kg
OpB HI LO DZ
HOLD
PEAK 169.75 mm

3) Graphic Display Screen

Y-axis indicated value and unit

Y-axis scale unit

(6)"WAIT"
    state unit

(11)"Cursor
indication"key

Ach indication

X-axis scale and time (s)

(12)"Cursor movement"key   (13)"START/STOP"key

4) Waveform Comparison Display Screen (Ach, Bch)

Y-axis indicated value and unit

Y-axis scale unit

HI limit waveform
 set value

LO limit waveform
set value

X-axis scale and time (s)
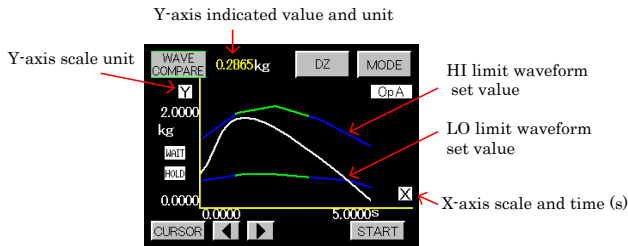
5) Waveform & Displacement Comparison Display Screen

(14) Y-axis indicated value and unit

Y-axis scale unit

(15)X-axis Indicted
    value and unit

X-axis scale and
displacement (unit)
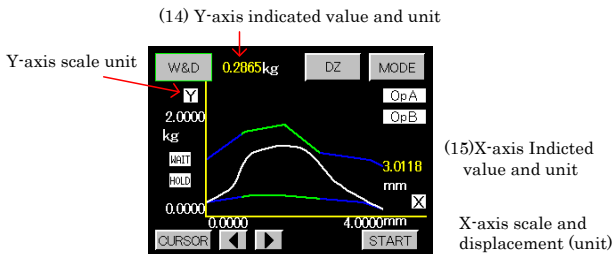
・"MODE" Key
   Various settings can be performed with the measurement operation stopped and each output turned off.
   When the caution screen for start settings appears and "YES" is selected on it, the main setting screen is
   displayed, making it possible to perform setting.
・Comparison output monitors   "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.
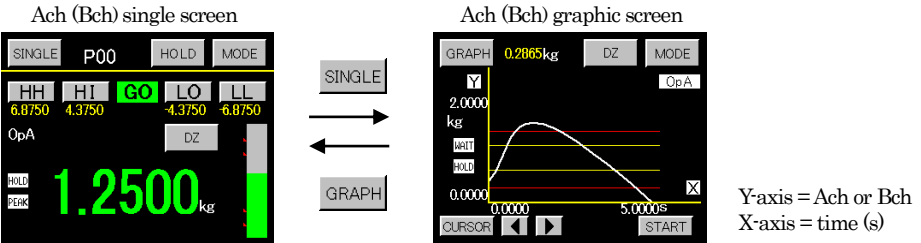
2-2. Functional Description

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.
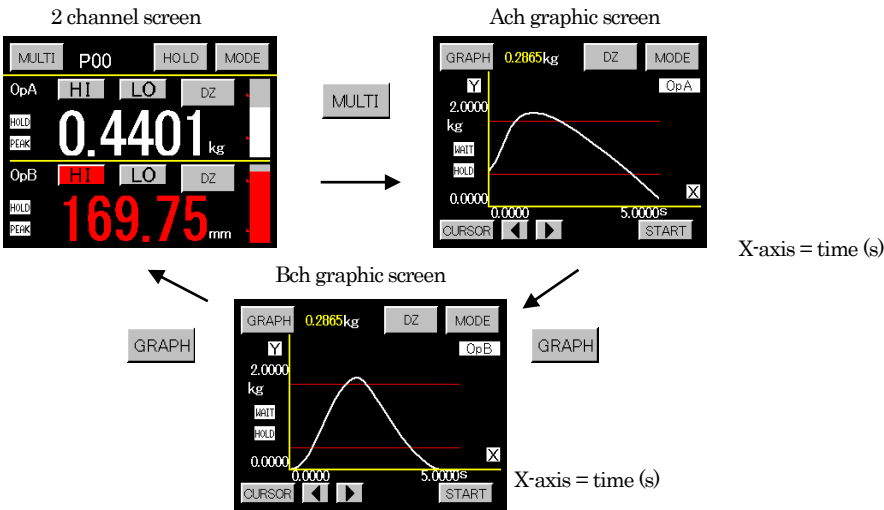
It changes according to 1) Meter Setup of"4. Basic Function Setting (Setup)".
Display screen of three kinds are available. The state when each of MULTI GRAPH SINGLE be pressed is shown according to each meter setting.

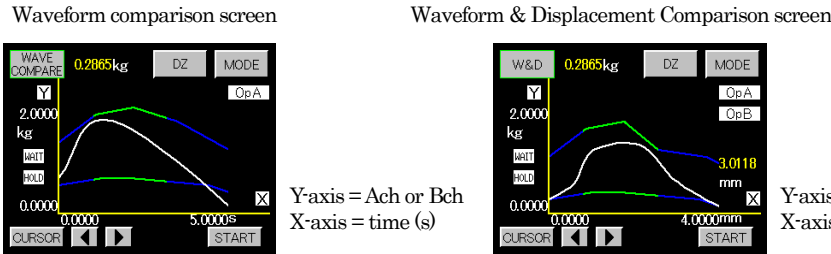◎The display screen changes as follows, when Ach and Bch are selected by meter setting :

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)
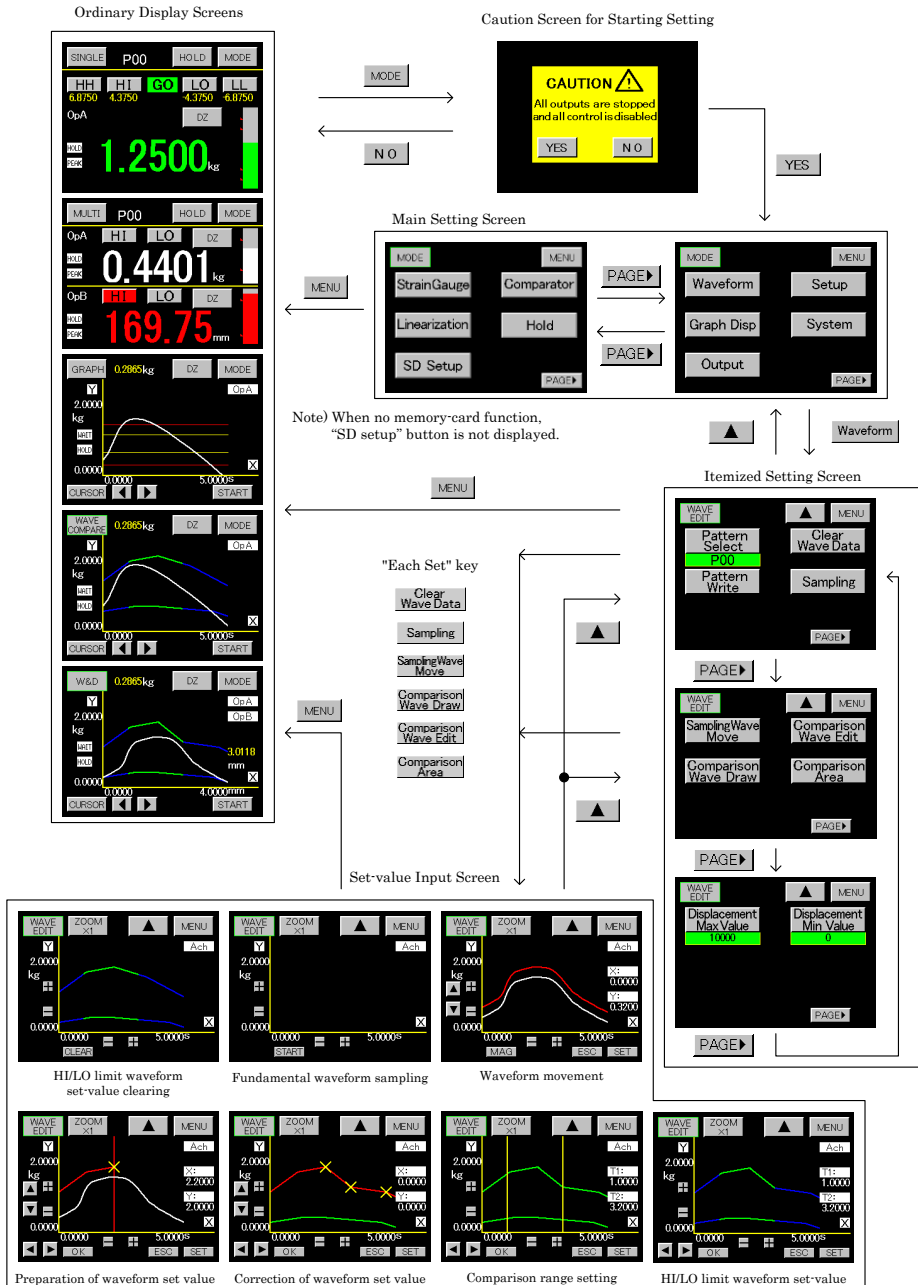
Bch graphic screen

X-axis = time (s)

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

Waveform comparison screen   Waveform & Displacement Comparison screen

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

Y-axis = Ach
X-axis = Bch

3. Setting

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

Ordinary Display Screens

Caution Screen for Starting Setting

Main Setting Screen

Note) When no memory-card function,
"SD setup" button is not displayed.

Itemized Setting Screen

Waveform

"Each Set" key

Set-value Input Screen

HI/LO limit waveform
set-value clearing

Fundamental waveform sampling

Waveform movement

Preparation of waveform set value

Correction of waveform set value

Comparison range setting

HI/LO limit waveform set-value

3-2. Set-Value Input Screen

1) Measured-value acquisition screen

"CALIBRATION" : Displays
contents to be set with indicator.

Returns to itemized setting screen.

"SET" key is used to acquire
and finalize measured value.
(Measured value becomes blue
simultaneously with finelizing.)

Data name to be set

Display measured value.

*Caution

※ 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.

Data name to be set

Scrolls set value.

Press key to select set value.

3) 10-key input screen

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

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

Data name to be set

"C" is used to change set value to "0".
It can also be used when error occurs.

Enter set value
with "10-key pad."

"+" and "-" are used to set polarity.
"-" may not be accepted according to data setting.

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

Input   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	-4.0mV/V to 3.0mV/V
Equivalent Calibration	2.0000	SPIN value (rated-output value) (0.1 to 3.000mV/V)
Actual Load	10000	Span set value (100 to 99999 digit)
Decimal Point	0	0, 0.0, 0.00, 0.000, 0.0000
Digital Shift	0	±99999 (digit)
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 (digit)
Digital Limiter LO	-99999	-99999 to 99998 (digit)
Step	1	1, 2, 5, 10 (digit)

Input

Pulse Input Setting
(Bch)   (P00 to P15)

Setting item	Default value	Setting range
Pattern Select	− − − −	P00 to 15
Pattern Copy	− − − −	P00 to 15
Input Phase & Multiply	2Phase 1x	2Phase 1x, 2Phase 2x, 2Phase 4x, 1Phase 1x, 1Phase 2x
Divider	OFF	OFF, 1/4, 1/16, 1/64
ZERO Calibration	0	0 to 14079999
Equivalent Calibration	1000	SPIN value: 1 to 14080000
Actual Load	1000	Span set value 1 to 99999 (digit)
Decimal Point	0	0, 0.0, 0.00, 0.000, 0.0000
Digital Shift	0	±99999 (digit)
Unit	None	Select from among 79 different units.
Moving Average	OFF	OFF, 2, 4, 8, 16, 32, 64, 128, 256, 512, 1024 (times)
Digital Limiter HI	99999	-99998 to 99999 (digit)
Digital Limiter LO	-99999	-99999 to 99998 (digit)
Step	1	1, 2, 5, 10 (digit)

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 (digit)
HI Limit	500	-99999 to 99999 (digit)
LO Limit	100	-99999 to 99999 (digit)
LL Limit	50	-99999 to 99999 (digit)
HH Hysteresis	1	-9999 to 9999 (digit)
HI Hysteresis	1	-9999 to 9999 (digit)
LO Hysteresis	-1	-9999 to 9999 (digit)
LL Hysteresis	-1	-9999 to 9999 (digit)
Type	Normal	Normal, Area, Rank
Zero Band	0	0 to 99999 (digit)
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 (digit)
Start Condition	Pass	Pass, Rising Edge, Trailing Edge, More, Less
Detection Time	1000	1 to 9999 (digit)
Minimal Value	50	1 to 9999 (digit)
Detection Level	×1/2	×1/4, ×1/2, ×3/4, ×1, ×1.25, ×1.5, ×2, ×3, ×4
Detection Count	1	1 to 9 (time)
Inflection Range	30	1 to 99999 (digit)
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 (digit)
Displacement Min Value	0	0 to 99999 (digit)

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 (digit)
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 (digit)
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)
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 (digit)
Point Out O=0 to 31	0	-99999 to 99999 (digit)

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 (digit)
Analog Output LO	0	-99999 to 99999 (digit)
Output Data	Display Data	Display Data, Measure Data

For model with BCD output

Pattern Select	―――	P00 to 15
Pattern Copy	―――	P00 to 15
Output Channel	A channel	A channel, B channel
Output Data	Display Data	Display Data, Measure Data

* 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
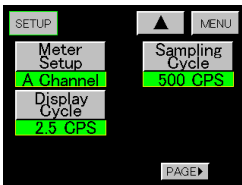
1) Meter Setup
　・Select meter operation.
　　(1) A channel
　　(2) B channel
　　(3) 2 channel
　　(4) Wave Ach
　　(5) Wave Bch
　　(6) W&D

2) Display Cycle
　・Select the period for updating the indicated value.
　・Choice items : 12.5, 6.25, 2.5, 1.0, 0.5 (times/second)
3) Sampling Cycle
　・Select the input signal acquisition speed.
　・Choice items : 4000, 2000, 1000, 500, 200, 100, 50, 20, 10 (times/sec)
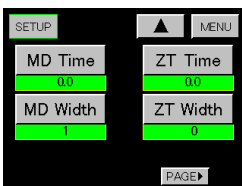
4) Motion Detect (MD = Motion Detect)
　・Set MD Time and MD Width.
　・MD Time : 0.0 to 9.9 (second)
　・MD Width : 1 to 99 (digit)
　*MD Time = 0.0, no function for moving average are available.

・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.
5) Zero Tracking (ZT = Zero Tracking)
　・This function is provided to correct automatically the slow change of the zero point due to a change in the environment etc.
　　　performed at every ZT cycle.
　　　Set ZT time and ZT width.
　　　ZT Time : 0.0 to 9.9 (second)
　　　ZT Width : 0 to 99 (digit)
　・When the indicated value is below the ZT Width, the indicated value is set to "0" and internal correction is
　・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.
　* Ach, Bch is common and works.

Example of ZT display

ZT	Yes	Yes	No	No	Yes	Yes
Display	Zero display	Zero display	Normal display	Normal display	Normal display	Zero display

+

Indicated value 0

−

| ZT Width |

| ZT Width | *1

ZT cycle

*1 Indicated value = "0" in this range.

Indicated value "0"   Normal display xx   Indicated value "0"
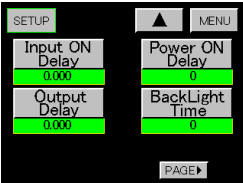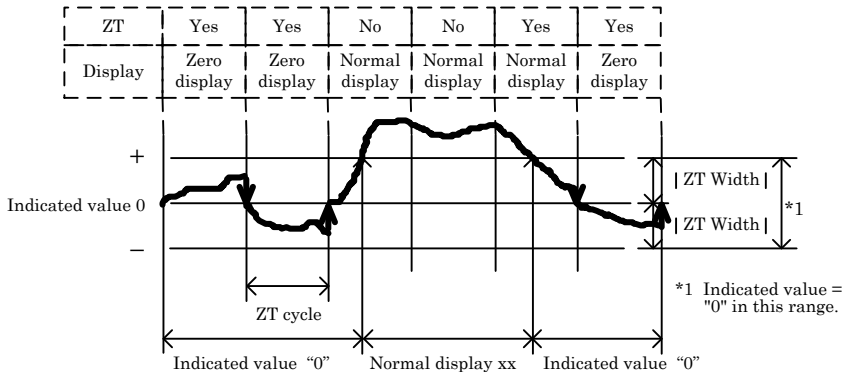
6) Input ON Delay
・Set time.
    Time-setting range : 0 to 4.999 (second)
・This function is provided to adjust the duration from the time when the external control input (STA, STB) and「HOLD」key are activated to the time when operation is actually started.

STA, STB   OFF ("1")
                   ON ("0")

"hold"key   OFF ("1")
                   ON ("0")

Internal   OFF ("1")
operation   ON ("0")
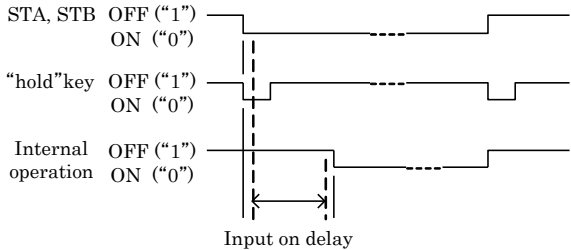
Input on delay

・Synchronize Input on delay for the above-mentioned external control input (STA, STB) and「HOLD」key.
・STA (Ach), STB (Bch) of external 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 / Waveform & Displacement Comparison)

   Time-setting range : 0 to 4.999 (second)

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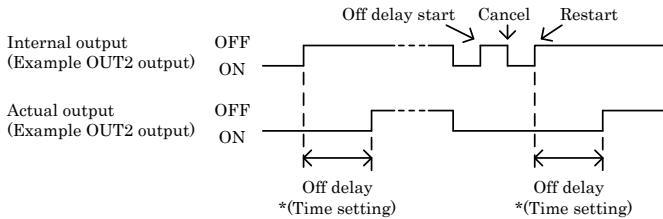
   * For time setting, priority is given to Td and other settings than Td are considered as same setting.

     Td=1/sampling speed. (Same as above-mentioned 6) Input on delay)

     For example, sampling of 10 times/second means Td = 100ms.

     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.

   ・Time-setting range : 0 to 30 (second)

   ・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.

   ・Time-setting range : 0 to 99 (minute)

   ・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.
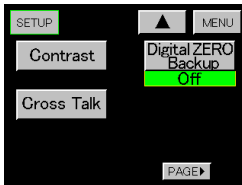
10) Contrast
・Control "brightness" on the contrast screen.
・Each time「＋」key on the control screen is pressed, screen brightness
　increases.
11) Cross Talk
・When display screen flickers, adjust it.
・Each time「＋」or「‐」key on the control screen is pressed, screen flicker is
　adjusted.

Contrast adjustment screen
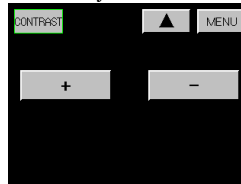
12) Digital ZERO Backup
　・ON/OFF change can be performed by pressing the「Digital ZERO Backup」key one at a time.
　・When backup is set to ON, Digital ZERO continues even when power is turned OFF/ON.
　(A built-in battery during availability)
13) Change of an indication form (Language)
　・It is possible to change the language displayed by each key and screen.
　・Choice items : Japanese, English
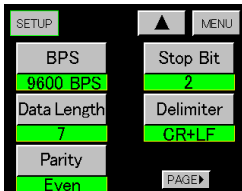
14) Communication and Related Items
　・BPS : 2400, 4800, 9600, 19200, 38400 (bps)
　・Data Length : 7, 8
　・Parity : Even, Odd, None
　・Stop Bit : 1, 2
　・Delimiter : CR＋LF, CR, LF
　＊Caution
　　After a return, change from a point in time returned to normal
　　operation.
15) Address (RS-485 ID)
　・Set address of RS-485.
　・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.
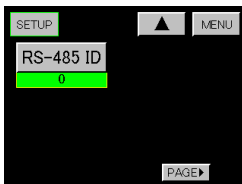
5. Input Setting

Setting procedure：「MODE」key → Caution Screen for Starting Setting → Main setting screen →
「Input」key
　・Before calibration
　　*When doing a calibration of input, use the following setting contents. Please confirm it before calibration
　　　by all means.
　　1) Protect Input：There is it in「Basic Function Setting 2 (System)」. Please turn it off.
　　　Do a push and hold (about 3 seconds) of「Protect Input」key and turn off protection.
　　2) Sensor Power Supply (only Ach)：There is it in「input」「Ach」.
　　　Please set the sensor voltage in confirming the rating voltage of a used sensor.
　　　For security, make a power supply of this meter a state of OFF once and reboot a sensor after
　　　connection.
　・About Equivalent Calibration and Actual Load
　　1) Zero Calibration：At the time of Equivalent Calibration and Actual Load, use it for being common to.
　　　Set the zero point of display value with no load applied to the sensor.
　　2) Equivalent Calibration：「Equivalent proofreading」sets indication value in the rating output of a sensor.
　　　Please set rating value (SPIN value) of a sensor and indication value at that time (a span set point).
　　3) Actual Load：Actual Load is performed by applying actual load to the connected sensor, and by setting
　　　the indicated value (SPAN set value) at the time.
　　　(Accurate calibration with least error occurrence can be attained.)
　　4) Turning ON Protect Setting：After finalizing the setting, push and hold "Protect Input" key in the Basic
　　　Function Setting 2 (System) to turn Protect ON. When turn on protection, 「input」key is shaded, and
　　　「input」becomes in condition not to have setting it.
　・Others
　　　When setting of「decimal point」is considered to be it, a decimal point is displayed when set「span set
　　　point」 at the time of above proofreading and「digital shift」,「digital limiter」.

5-1. Strain Gauge 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.
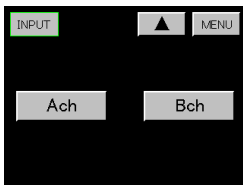
1) Setting Channel
　・Select Ach.
　・When Bch is selected,「5-2. Pulse Input Setting (Bch)」is performed.
2) Pattern Select
　・Select a pattern to be set.
　・Choice items：P00 to 15
　　* Select a Pattern Select before changing the set value.
3) Pattern Copy
　・Select the pattern of the copy destination on the set-value select screen.
　・Choice items：P00 to P15
4) Sensor Power
　・Select voltage applied to the strain gauge sensor to be used.
　・Choice items：10V, 5V, 2.5V
　　　Set it before connecting the strain gauge sensor.
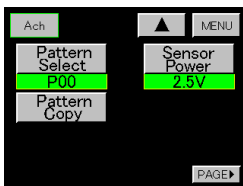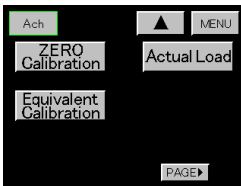
5) Zero Calibration
・The point at which the indicated value becomes "0" with no load applied
 to the strain gauge sensor is acquired.
・The acquisition range of zero value : -4.0 to 3.0mV/V
・It is performed on the measured-value acquisition screen.
・It is used in case of Equivalent Calibration and Actual Load.

* Caution
    When「4. Basic Function Setting (Setup) 4) Motion Detect」is active, measured value becomes red while
    analog input is not stable. Setting is possible even during unstable state.
 ・Finalize ZERO value with「SET」key. (Value becomes blue simultaneously with finalizing.)
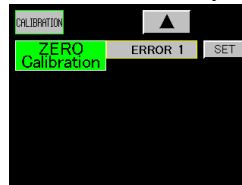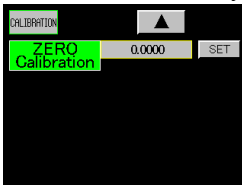
・When the acquired ZERO value falls under the following case, it is judged an Error and resetting is
  performed.
        Error 1: ZERO value ＜ -4.0mV/V.
        Error 2: ZERO value ＞ -3.0mV/V.
 ・Perform resetting by pressing the「▲」key and then pressing the「ZERO Calibration」key.

6) Equivalent Calibration
 ・Set the rated output value (SPAN value : mV/V value) for the strain gauge sensor and the indicated value
  at the time.
 ・The setting rage of SPIN value : 0.1 to 3.0mV/V.
 ・The setting range of SPAN set value (indicated value) : 100 to 99999 (digit).
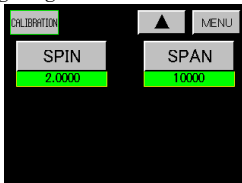
・Select the set value (SPIN, SPAN).

a) SPIN value
 ・Finalize set value with「SET」key. (Value becomes blue simultaneously with finalizing.)
        SPIN value (Finalized output value)   In case of error
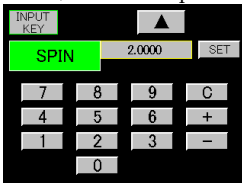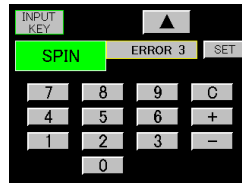
・When falls under the following case, it is judged an error and resetting is performed.
        Error 3 : SPIN value ＜ 0.1mV/V
        Error 4 : SPIN value ＞ 3.0mV/V
 ・To reset, press「C」to set the set value to "0", or press「▲」to return to the set-value select screen of the
  above-mentioned 6) and then press「SPIN」key.

b) SPAN set value
　・Set the indicated value when the SPIN value (Finalized output value) is input.
　・Finalize indicated value with「SET」key.
　(Value becomes blue simultaneously with finalizing.)

SPAN set value   In case of error
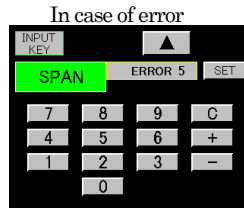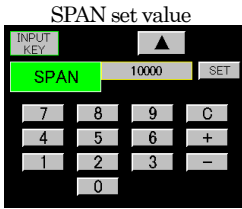

　・The acquired SPAN set value (indicated value) is checked.
　　Resolution in this Meter is 10000 at the time of a 1.000mV/V value.
　　Error 5 is displayed at SPAN set value ÷ (SPIN value × 10000) > 1.
　・When no problem occurs at Error 5, which can be directly used.
　　When a problem occurs, press「C」to set 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.
　　* Caution
　　　Because this Meter uses sensor of 4-wire type, if the length of cable is too long, resistance of the cable
　　　will cause an error in equivalent calibration.
7) Actual Load
　・Take in the input value that increased actual load to strain gauge sensor and set a SPAN set value
　　(indicated value) at that time.
　・Acquisition range : -3.0 to 4.0mV/V
　・Setting range of SPAN set value (indicated value) : 100 to 99999 (digit).
　　* Caution
　　　When「4. Basic Function Setting (Setup) 4) Motion Detect」is active, measured value becomes red while
　　　output is not stable. Setting is possible even during unstable state.
　・Acquire both input value of actual load and SPAN set value and finalize with「SET」key.
　(Value becomes blue simultaneously with finalizing.)

When input value of actual value is error
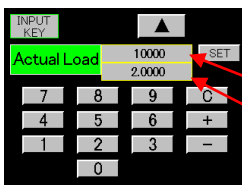
SPAN set value
Input value of actual load
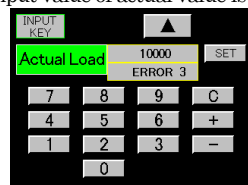
　・When falls under the following case, it is judged an error and resetting is performed.
　　　Error 3 : Input value of actual load < 0.1mV/V
　　　Error 4 : Input value of actual load   > 3.0mV/V
　・Perform resetting by pressing the「▲」key and then pressing the「Actual Load」key on the above-mentioned
　　itemized setting screen. Check the condition with actual load applied and then press the「SET」key.
　・When SPAN set value is Error 5
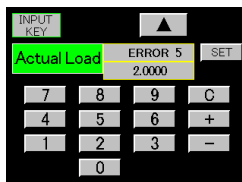
・Resolution in this Meter is 10000 at the time of a 1.0000mV/V value.
   Error 5 is displayed at SPAN set value ÷ (SPIN value×10000) > 1.
・When no problem occurs at Error 5, which can be directly used.
 When a problem occurs, press「C」to set the set value to "0", or press「▲」and press「Actual Load」key on the
 above-mentioned itemized setting screen for resetting. If Error 5 still occurs, it is necessary to press the
 「▲」key to perform resetting from 5) Zero Calibration.
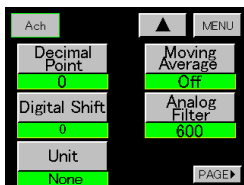
8) Decimal Point
 ・Set the decimal point position displayed.
 ・Choice items : 0, 0.0, 0.00, 0.000, 0.0000
9) Digital Shift
 ・Function provided to simply shift the indicated value.
  Indicated value = (Internal indicated value) + (±digital shift value)
 ・Set it on the 10-key input screen.
 ・Setting range : ±99999 (digit)

10) Unit
 ・Select the unit corresponding to the indicated value.
 ・Choice items : 79 different setting items (including those without display).
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.
 ・Choice 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.
 ・Choice items : 10, 30, 300, 600 (Hz)
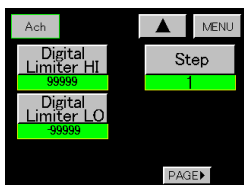
13) Digital Limiter (HI/LO)
 ・Specify the display range of indicated values. When it is outside the
  display range, a digital limiter value is displayed.
 ・Setting conditions
  Digital Limiter HI > Digital Limiter LO
 ・Setting range
  Digital Limiter HI -99998 to 99999 (digit)
  Digital Limiter LO -99999 to 99998 (digit)

14) Step
 ・Set the minimum updating width of indicated values.
 ・Choice items : 1, 2, 5, 10 (digit)

⚠ Caution

 ・An applied voltage of strain gauge sensor is 2.5V, 5V, 10V.
 ・When the voltage more than rating is impressed on a sensor, there can be fever or a damaged
  thing.
 ・I set the voltage of a sensor power supply by all means before connecting a sensor, Please be
  connected after switching off the meter.
 ・Please connect a mantle (a shield line) of a sensor to frame ground (FG).

5-2. Pulse Input Setting (Bch)

・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.

・ORIGIN input

If ORIGIN signal is inputted, the inner counter will be reset to "0".
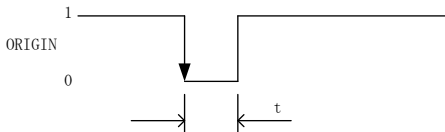
After ORIGIN signal changes from "1" → "0", the inner counter is reset to "0".

<div style="padding-left:2em">

In case of open collector input :   "1" level (open) : approx. 3.5 to 5V

"0" level (short) : approx. 0 to1.5V

Input current (i) : below -15mA

In case of line driver input :   "1" level : 2V to power supply voltage of a rotary encoder

"0" level : GND of rotary encoder to 0.8V

t : above 5µs
</div>

* Note

・When 「+LOAD」or「-LOAD」 is displayed on screen, though inputting ORIGIN will release this state.

In this case please "t" should be above 20ms.

・Because ORIGIN is an one-shot action, even holding it on "0" level, the inner count operation will go on.
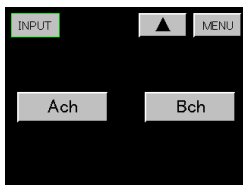
1) Setting Channel

・Select Bch

2) Pattern Select

・Select a pattern.

・Choice items : P00 to P15

* Select a Pattern Select before changing the set value.

3) Pattern Copy

・Select the pattern of the copy destination on the set-value select screen.

・Choice items : P00 to P15
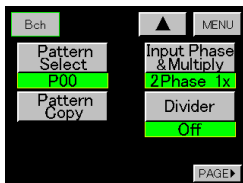
4) Input Phase & Multiply

・Set the shape of pulse input.

・Choice items : 2Phase 1x, 2Phase 2x, 2Phase 4x, 1Phase 1x, 1Phase 2x

5) Divider

・Select the divide rate of input pulse.

・Choice items : off, 1/4, 1/16, 1/64

* Caution

After changing the multiply/divider, please always input the ORIGIN and redo the zero calibration.
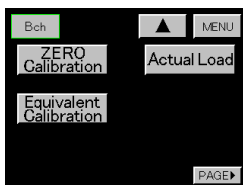
6) Zero Calibration

・The count value where the indicated value becomes "0" is acquired as zero value.

・The acquisition range : 0 to 14079999.

(When divider is off)

・「ZERO value」is the value that, the inner count value be processed by setting of divider.

・It is used in case of Equivalent Calibration and Actual Load.

* Caution

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

・Finalize with「SET」key. (Value becomes blue simultaneously with finalizing.)
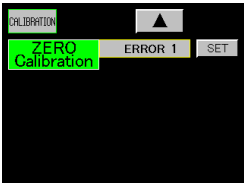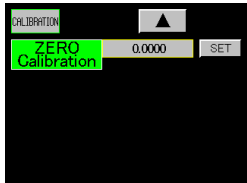
・When the acquired ZERO value falls under the following case, it is judged an Error and resetting is performed.
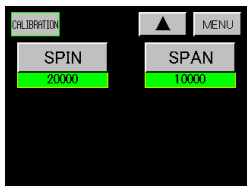
Error 1 : ZERO value ＜ 0

Error 2 : ZERO value ＞ 14079999

The value is processed toward the inner count value.

The inner count value is the value when divider is set to off.

・Perform resetting by pressing the「▲」key and then pressing the「ZERO Calibration」key.

7) Equivalent Calibration

・Set the count value of pulse input and the SPAN set value (indicated value) at the time.

・The setting rage of SPIN value : 1 to 14080000

・The setting range of SPAN set value (indicated value) : 1 to 99999 (digit)

・The SPIN value is the value that, the inner count value be processed by setting of divider.

Select the set value (SPIN, SPAN).

a) SPIN value

・Finalize with「SET」key.

(Value becomes blue simultaneously with finalizing.)
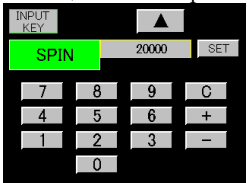
SPIN value (Finalized output value)   In case of error
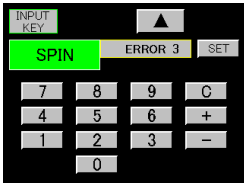
・When the acquired SPIN value (finalized output value) falls under the following case, it is judged an error and resetting is performed.

Error 3 : ZERO value + SPIN value ＜ 0

Error 4 : Zero value + SPIN value ＞ 14080000

The value is processed toward the inner count value.

The inner count value is the value when divider is set to off.

・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 SPIN value (finalized output value) is acquired and finalized.
・Finalize with「SET」key.
 (Value becomes blue simultaneously with finalizing.)

SPAN set value	In case of error
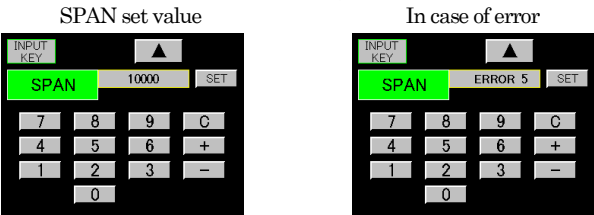
・The acquired SPAN set value is checked.
 Resolution in this Meter is 10000 at the time of 10000.
・Error 5 is displayed at SPIN set-value ÷ SPIN value ＞ 1.
・When no problem occurs at Error 5, which can be directly used.
 When a problem occurs, press「C」to set the set value to "0", or press「▲」to return 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 to perform resetting from 6) Zero Calibration.
 * Reference
   The Zero value, SPIN value, SPAN set value of Equivalent Calibration have the following relationship.

SPIN value

ORIGIN input   Zero value   SPAN set value
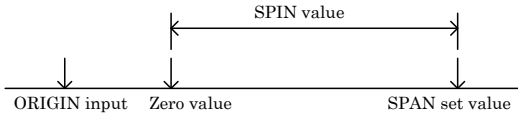
8) Actual Load
 ・Acquire the count value (SPAN value) when added pulse input and the SPAN set value (indicated value)
  at the time.
 ・Acquisition range of SPAN value：1 to 14080000
 ・The setting range of SPAN set value (indicated value)：1 to 99999 (digit)
 ・The SPAN value is the value that, the inner count value be processed by divider setting.
  * Caution
    When「4. Basic Function Setting (Setup) 4) Motion Detect」is active, measured value becomes red while
    pulse input is not stable. Setting is possible even during unstable state.
 ・Acquire both SPAN value and measured value and finalize with「SET」key.
  (Value becomes blue simultaneously with finalizing.)
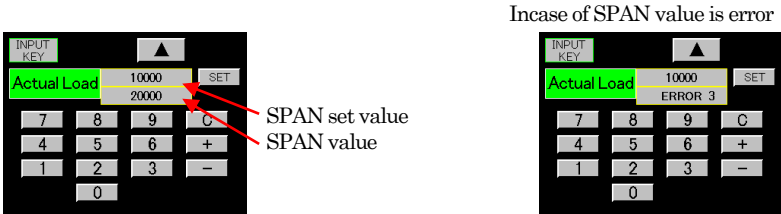
Incase of SPAN value is error

SPAN set value
SPAN value

・When falls under the following case, it is judged an error and resetting is performed.
    Error 3：SPAN value ＜ 1
    Error 4：SPAN value ＞ 14080000
  The value is processed toward the inner count value.
  The inner count value is the value when divider is set to off.

・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.

・In case of SPAN set value is error 5
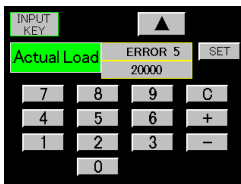
・Error 5 is displayed at SPAN set value ÷ SPIN value ＞ 1.

・When no problem occurs at Error 5, 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.

* Reference

The Zero value, SPAN value, SPAN set value of Actual Load have the following relationship.

ORIGIN input   Zero value   SPAN set value
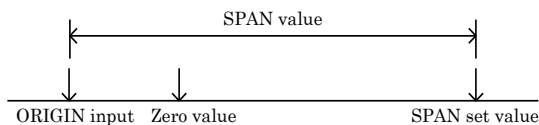
* Caution

The value displayed in Zero Calibration and Actual Load, is processed by multiply and divider.
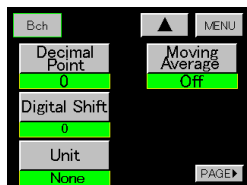
9) Decimal Point

・Select the decimal point position displayed.

・Choice items : 0, 0.0, 0.00, 0.000, 0.0000

10) Digital Shift

・Function provided to simply shift the indicated value.

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

・Setting range： ±99999 (digit)

11) Unit

・Select the unit corresponding to the indicated value.

・Choice items : 79 different setting items (including those without display).

12) Moving Average

・This function is provided for the moving average of data after data 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.

・Choice items : OFF, 2, 4, 8, 16, 32, 64, 128, 256, 512, 1024 (times)

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.

・Setting conditions

Digital Limiter HI > Digital Limiter LO

・Setting range

Digital Limiter HI -99998 to 99999 (digit)

Digital Limiter LO -99999 to 99998 (digit)

14) Step

・Set the minimum updating width of indicated values.

・Choice items : 1, 2, 5, 10 (digit)

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

・Setting procedure：「MODE」key → Caution Screen for Starting Setting → Main setting screen →
  「COMPARATOR」key
・The comparison set value is used when the following setting has been set on「4. Basic Function Setting
  (Setup) 1) Meter Setup」.
  (1) A channel
  (2) B channel   Selection of meters
  (3) 2 channel
・Set each set value on each of Ach and Bch.
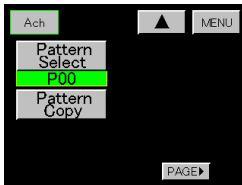
1) Setting Channel
  ・Select Ach.
  ・When Bch is selected, perform setting of Bch
    Setting procedure is the same as Ach, omitted here.
2) Pattern Select
  ・Select a pattern to be set.
  ・Choice items：P00 to P15
    * Select a Pattern Select before changing the set value.
3) Pattern Copy
  ・Select the pattern of the copy destination.
  ・Choice items：P00 to P15
4) Comparison set value
  ・Set the comparison set value to be used at A channel, B channel and 2
    channel.
  ・For 2 channel, use the HI Limit set value and LO Limit set value for each
    channel.
    When「Area」or「Rank」are selected as Comparison output type (Type) on
    6), some setting conditions are provided.
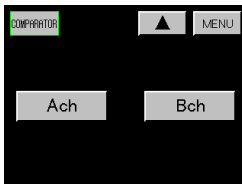
 * When Comparison output type (Type) setting is「Normal」and the Comparison output type (Type) is
   changed into「Area」or「Rank」, without fulfilling the setting conditions, the comparison set value may not
   be reflected. In such a case, return the Comparison output type (Type) to「Normal」once, and change the
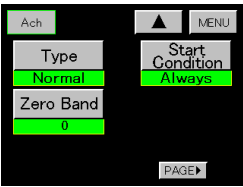   Comparison output type (Type) into「Area」or「Rank」after entering the set value that satisfies the setting
   conditions.
・Setting range： ±99999 (digit)
    HH set value (HH Limit)
    HI set value (HI Limit)
    LO set value (LO Limit)
    LL set value (LL Limit)
 * When 2 channel is selected, HH and LL of each set value are not used even if they have been set.
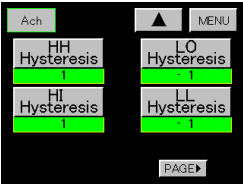
5) Hysteresis
・Set hysteresis to be used at A channel, B channel and 2 channel.
・For 2 channel, use the HI Hysteresis set value and LO Hysteresis set value for each channel.
　When「Area」or「Rank」are selected as Comparison output type (Type) on 6), some setting conditions are provided.

* When Comparison output type (Type) setting is「Normal」and the Comparison output type (Type) is changed into「Area」or「Rank」, without fulfilling the setting conditions, the value of hysteresis may not be reflected. In such a case, return the Comparison output type (Type) to「Normal」once, and change the Comparison output type (Type) into 「Area」or「Rank」after entering the set value.

・Setting range： ±9999 (digit)
　HH hysteresis set value (HH Hysteresis)
　HI hysteresis set value (HI Hysteresis)
　LO hysteresis set value (LO Hysteresis)
　LL hysteresis set value (LL Hysteresis)

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

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
・Set Zero Band set value.
・Setting range : 0 to 99999 (digit)
　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 (Start Condition) given in the next paragraph.

8) Comparison output start conditions (Start Condition)
・Set the output start conditions to be output.
・Choice items：

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

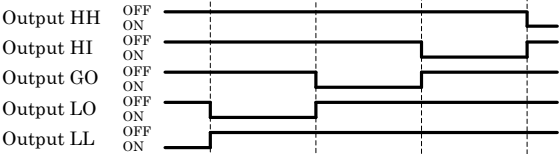(For description of motion, refer to 4) of "4. Basic Function Setting (Setup)")

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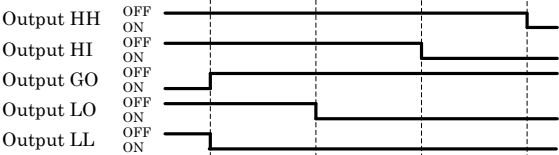(It corresponds to A channel, B channel, and 2 channel.)

Indicated value

HH Limit

HI Limit

LO Limit

LL Limit
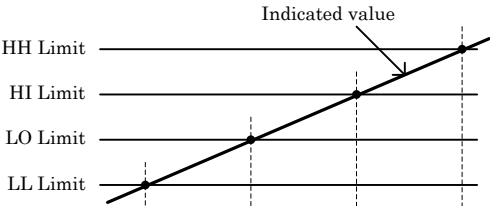
(1) In case of Normal operation type

Output HH   OFF ON
Output HI   OFF ON
Output GO   OFF ON
Output LO   OFF ON
Output LL   OFF ON

(2) In case of Area type

Output HH   OFF ON
Output HI   OFF ON
Output GO   OFF ON
Output LO   OFF ON
Output LL   OFF ON

(3) In case of Rank type

Output HH   OFF ON
Output HI   OFF ON
Output GO   OFF ON
Output LO   OFF ON
Output LL   OFF ON
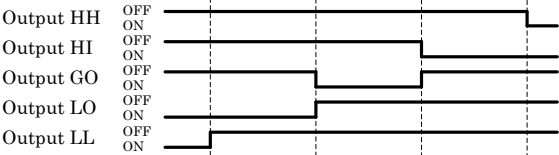
7. Hold Function (Hold)

・This function is provided to detect one sample with a peak, a valley, a peak valley, a maximal/ minimal, and an inflection point, holds the indicated value, performs HI/LO limit comparison simultaneously, and outputs the result.

* Caution

　When STA (hold of Ach) / STB (hold of Bch) of external control input be turned ON and STA/STB signal is turned OFF during Input ON Delay, Input ON Delay operation is stopped. (A hold key is similar, too)

・In addition,「HOLD」key of screen is active in the A channel, B channel, and 2 channel to be set on「5. Basic Function Setting (Setup)」. And in case of 2 channel, hold is control in both Ach and Bch.

・As for control of hold with external control input (STA/STB) and「hold」key, external control input is given priority to.

7-1. Hold Function Setting

・Setting procedure :「MODE」key → Caution Screen for Starting Setting → Main setting screen→「HOLD」key
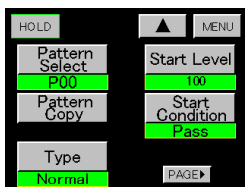
1) Pattern Select
　・Select a pattern to be set.
　・Choice items : P00 to P15
　　* Select a Pattern Select before changing the set value.
2) Pattern Copy
　・Select the pattern of the copy destination.
　・Choice items : P00 to P15

3) 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, STB signal of external control input or「HOLD」key are inactive.
　　　b) In case of single or multi display screen, the indicated value is held for output.
　　　c) In case of graphic display screen, the indicated value is held for output, "." is displayed for the waveform.
4) Waveform start level (Start Level)
　・Setting range : ±99999 (digit)
　・In case of Hold Function (Hold)
　　Used for (12)「Level + Time P」to (17)「Inflection Point」of the above-mentioned 3)Hold type (Type), and waveform comparison.

・In case of Graphic display
   Use it as a trigger level to start drawing.
   * Caution of in case of Waveform & Displacement Comparison (W&D)
 a) After execute GSTART (START key) at a set value other than -99999, digital zero is automatically
   performed internally with Bch indicated value of X-axis. Acquisition of waveform is started from ZERO
   point of X-axis.
 b) Set the set value at -99999. When Bch indicated value of X-axis becomes more than "0", acquisition of
   waveform is started.
5) Waveform start conditions (Start Condition)
   ・Set trigger conditions for Start Level.
   Input data is start when「Start Level」+「Start Conditions」are satisfied.
   ・Choice items : (1) Pass   (2) Rising edge   (3) Trailing edge   (4) More   (5) Less
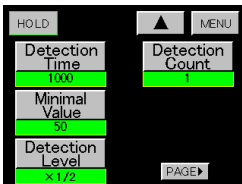
6) Detection Time
   ・When time designation ((9) to (11)) and Level + Time ((12) to (14)) are
     selected as 3)Hold type (Type), set the detection period.
   ・Setting ranges : 1 to 9999
     Detection time is (Detection Time × Td).   (Td = (1/sampling speed))
7) Maximal value and Minimal value hold
   ・Setting items of follow a) to c) : Use it, when maximal value or minimal
     value Inflection point ((15) to (17)) is selected as a Hold Function (Hold).
   a) Detection minimal value (Minimal Value)
       Setting ranges : 1 to 9999 (digit)
   b) Detection level (Detection Level)
       Choice items : 1/4, 1/2, 3/4, 1, 1.25, 1.5, 2, 3, 4 (time)
   c) Detection count (Detection Count)
       Choice ranges : 1 to 9 (time)
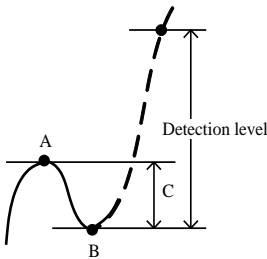
・Detection of maximal value and minimal value
   When value A- value B = value C is over the Minimal Value, value A
   becomes maximal value and value B becomes minimal value.
   (Value C $\geqq$ Detection minimal value)
・Hold of maximal value and minimal value
   In case of maximal value hold, when value C × 「Detection Level」is
   exceeded after detecting the maximal value and minimal value, value A is
   indicated and held. In case of minimal value hold, value B is displayed
   and held.
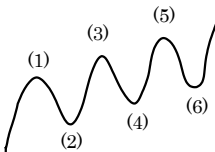
・In case of a waveform of which maximal value and minimal value repeat
   like an upper figure, the maximal value and minimal value of which
   number of times is set as a Detection Count is hold.
   * For example, at the setting of Detection Count = 3, (5) is held as
   maximal value and (6) as minimal value.

⚠ 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.

Method of detecting point-of-inflection

Inflection after

Inflection before

8) Inflection point hold

・Use it when inflection point hold ((17)) is selected by 3)Hold type (Type).

a) Detected point of inflection value (Inflection Range)

    Setting ranges : 1 to 99999 (digit)

b) Detection time A (Inflection Before)

    Detection time is (1/sampling speed ×Detection time A).

    Setting range : 1 to 999

c) Detection time B (Inflection After)

    Detection time is (1/sampling speed ×Detection time B).

    Setting ranges : 1 to 999

・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-infection value」.

    (Usually, Inflection before = after)

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

・Waveform Comparison / Waveform & Displacement Comparison (Waveform) is, compare the Input waveform and HI/LO limit waveform set-values which changes with time or displacement, then output the Comparison result.

8-1. Various Setting and Correction Methods

・Setting procedure :「MODE」key → Caution Screen for Starting Setting → Main setting screen → 「PAGE」 key → 「WAVEFORM」key
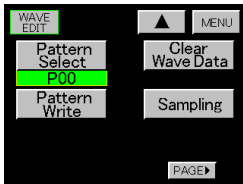
1) Pattern Select
・Call the waveform of the pattern stored in inside memory.
(The called waveform is used for Comparison Wave Edit and Comparison Area.)
・Choice items : P00 to P07
*Select a Pattern Select before changing the set value.

2) Comparison waveform writing (Pattern Write)
・Select a pattern in which to write the comparison waveform. The HI/LO limit comparison waveform values for which waveform edit has been completed are stored.
・Choice items : P00 to P07
*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.

　　　　Caution screen

・"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.
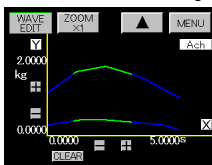
・Erase with「CLEAR」key.
* The following key is commonly used at step 3) to step 8).

MENU	Returns to the normal display screen.
▲	Displays the itemized setting screen.
ZOOM ×1	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 GSTART signal of external control input = ON, after pressing「START」key.
・Waveform sampling is started from the time of satisfying「Start Level + Start Conditions」.

・Checks the sampled waveform.
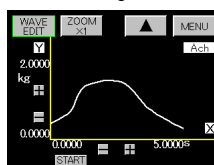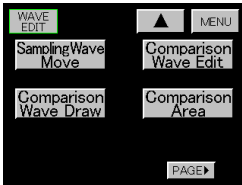
5) Sampling waveform movement (Sampling Wave Move)
　・Moves, enlarges and reduces the Waveform sampling (Sampling) to
　　prepare a comparison waveform.
　　*HI limit comparison waveform is first prepared, and then LO limit
　　　comparison waveform is prepared.
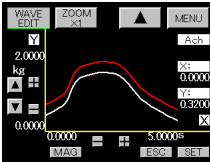
・ Used to move the waveform up and down.
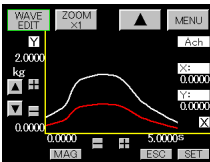
・Enlarge or reduce the waveform vertically with the「MAG」key.
　Set at a scaling of 1 to 250% with the「MAG」key.
　「ESC」key is used to return to the waveform used before scaling.
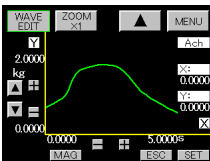
・When waveform preparation is completed, press「SET」key to save the
　HI comparison waveform in the buffer temporarily.
　(The prepared waveform turns into green.)

　・Next use 　　 key to move the waveform and create the LO limit comparison waveform in same procedure.
　・When waveform preparation is completed, press「SET」key to save the LO comparison waveform in the
　　buffer temporarily.
　・Use「▲」key to return to itemized setting screen, push「Pattern Write」key to save the edited waveform.
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.
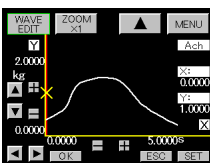
・ Move the cursor with the key, determine a drawing starting
　point, and press「OK」key to set it.
　Pressing「ESC」key after completion of setting will reset the drawing
　starting point.
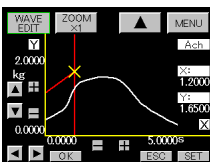
・When the cursor is moved furthermore to determine the next drawing
　point and press「OK」key, so that the last determined points are
　connected with a straight line.
　Pressing「ESC」key after completion of setting will reset the
　determined point.
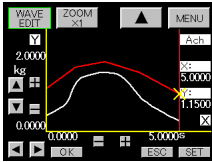
・Draw a waveform by repeating the above-mentioned procedure.
・When the drawing of HI limit comparison waveform is completed, press 「SET」key will move the cursor to left-down, and start to the drawing of LO limit comparison waveform.
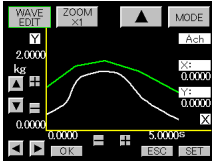
・When LO limit comparison waveform preparation is completed, press 「SET」key to save the comparison waveform in the buffer temporarily. (The prepared waveform turns into green.)
・Use「▲」key to return to itemized setting screen, push「Pattern Write」key to save the edited waveform.

7) Comparison waveform edit (Comparison Wave Edit)
  ・Push the「Comparison Wave Edit」key.
  ・Correct the prepared comparison waveform.
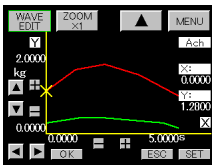
・Select a waveform (HI Limit waveform or LO Limit waveform) to be edited with "Up/down cursor" key.

・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.
 Then the cursor moves on line of waveform.
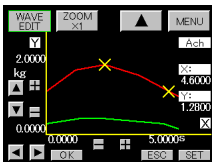
・Move the cursor, determine an edit end point, and press「OK」key. Pressing「ESC」key after completion of setting will reset the edit ending point.
 Then the cursor moves on line of waveform.
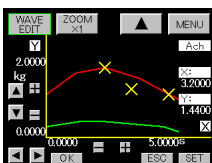
・Move the cursor, determine an edit pass point, and press「OK」key. Then the cursor moves between the edit starting point and the edit ending point.
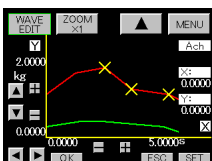
・A straight line connecting the edit starting point-Pass point and edit end point is prepared.
 Pressing「ESC」key will reset the edit pass point.
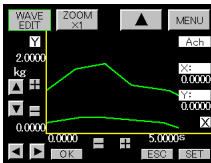
・When editing is completed, press「SET」key to save the comparison
waveform in the buffer temporarily.
・Use「▲」key to return to itemized setting screen, push「Pattern Write」
key to save the edited waveform.

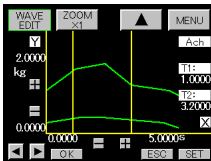8) Comparison area setting (Comparison Area)
　・Determine the starting point/end point of the comparison range, and set the waveform portion for
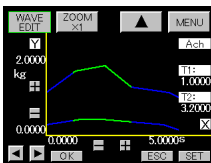　comparison.
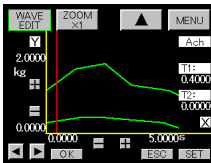
・◀ ▶ Move the cursor with key, determine a comparison range
starting point and comparison range end point, and press「OK」key to
set it.
(Cursor turns into yellow.)
Pressing「ESC」key after completion of setting will reset the
comparison area starting point.
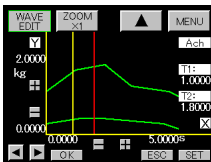
・Move the cursor furthermore and determine the end point of the
comparison area.

・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.
・Use「▲」key to return to itemized setting screen, push「Pattern Write」
key to save the edited waveform.
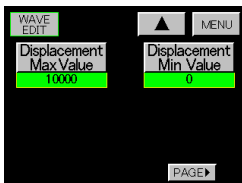
9) Displacement Max/Min Value
　・Displacement Max Value
　・Displacement Min Value
　Setting ranges : 0 to 99999 (digit)

　*Displacement max/min value is available only when (6) W&D is selected
　by「4. Basic Function Setting (Setup) 1)Meter Setting」.
　*When HI/LO limit waveform setting is completed, write it in for
　memory.
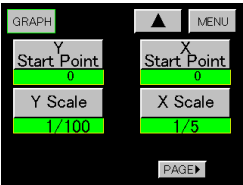　For details, refer to the above-mentioned 2) Pattern Write.

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
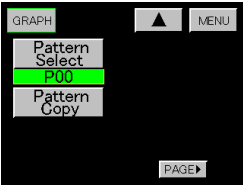
1) Pattern Select
 ・Select a pattern to be set.
 ・Choice items : P00 to P15
  * Select a Pattern Select before changing the set value.
2) Pattern Copy
 ・Select the pattern of the copy destination.
 ・Choice items : P00 to P15
3) Y Start Point
 ・Setting range : ±99999 (digit)
4) Y-axis magnification (Y Scale)
 ・Select a magnification by which the input waveform is displayed on the
  display range of the screen.
 ・Choice items : 1/1, 1/2, 1/5, 1/10, 1/20, 1/50, 1/100, 1/200, 1/500,
          1/1000, 1/2000

5) X Start Point
 ・The setting range is decided by the sampling speed and SPAN set value (Bch).

Each hold / Waveform Comparison			Waveform & Displacement Comparison	
Sampling	Range		Bch SPAN Set value	Range (Each unit)
4000 times/sec	0 to 500		1 to 2047	0 to 2000
2000	0 to 1000		2048 to 4095	0 to 4000
1000	0 to 2000		4096 to 8191	0 to 8000
500	0 to 4000		8192 to 16384	0 to 16000
200	0 to 10000		16385 to 32768	0 to 32000
100	0 to 20000		32769 to 65536	0 to 65000
50	0 to 40000		65537 to 99999	0 to 130000
20	0 to 100000			
10	0 to 200000			

6) X-axis magnification (X Scale)
 ・Select a magnification by which the input waveform is displayed on the display range of the screen.
  Choice items : 1/1, 1/2, 1/5, 1/10
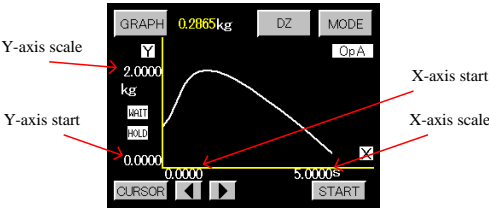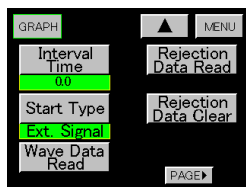
7) Interval Time
  ・It is available when the Free Run is set in accordance with the next
    paragraph.
    Starts drawing with GSTART signal of external control input /ON
    (or START key). When one screen is finished, the period drawing screen
    at the interval time is held.
    Acquisition time of a waveform
    Setting range : 0.0 to 99.9 (second)

8) Start Type
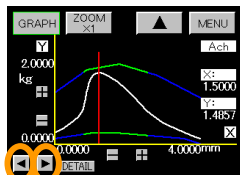 ・Select a type when starting acquisition drawing.
  ・Choice items :
    (1) Free Run   *Cannot use it with Waveform comparison (Ach, Bch) and Waveform & Displacement
                         comparison mode
    (2) Ext. Signal   *External control input   GSTART = ON, or START key
    (3) Wave Start Level   *Become「Wave Start Level」+「Start Condition」precisely.
    (4) E.S. + W.S.
    * 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 X-axis and Y-axis, and the indicated value.
  ・The displacement set value of X-axis is not available at the time of hold and waveform comparison.

       Acquisition completion screen   Each point display screen

      cursor key
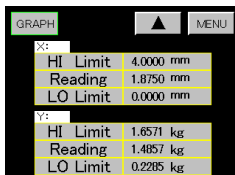
10) Outlying waveform reading (Rejection Data Read)
  ・When input waveform is outside the HI/LO limit set value or HI/LO limit waveform set value, such
   waveform is read.
  ・Select a waveform to be read.
    Up to 4 waveforms can be stored in memory by automatic updating. (No backup is available.)
  ・If「4. Basic Function Setting (Setup) 1) Meter Setting」is changed or the pattern is changed at P0 to P3 of
    external control input (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」key 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.

<div align="center">Last outlying screen</div>
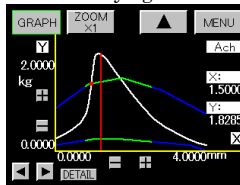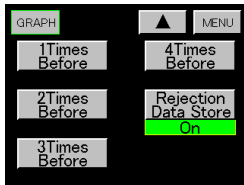
・When reading on the cursor point, reading in accordance with the same procedure as the above-mentioned
   「9) Wave Data Read」is possible.
11) Outlying waveform clearing (Rejection Data Clear)
・Each time「Rejection Data Clear」key is pressed, the old outlying waveform is cleared in chronological
   order.

10. Linearization

The function is for correcting the deflection of analog input signal. Number of break points becomes 32 points every channel at the maximum each.

・Setting procedure :「MODE」key → Caution Screen for Starting Setting → Main setting screen → 「LINEARIZE」key
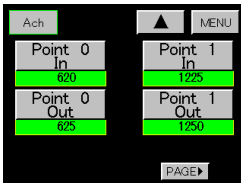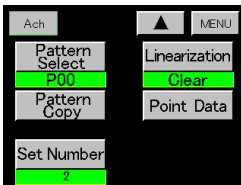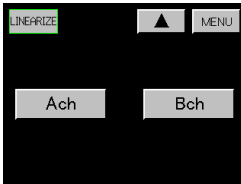
1) Setting channel
   ・Select a channel to be set.
2) Pattern Select
   ・Select a pattern to be set.
   ・Choice items : P00 to P15
     * Select a Pattern Select before changing the set value.
3) Pattern Copy
   ・Select the pattern of the copy destination.
   ・Choice items : P00 to P15
4) Set Number
   ・Set the number of break points in linearization.
   ・Setting range : 2 to 32
5) Linearization
   ・Set operation.
   ・Choice items :
       ON - Perform linearization.
       OFF - Don't perform linearization.
       CLEAR - Clear all the setting data of break point. (0 clear)
6) Data Setting (Point Data)
   ・Set input value and output value.
   ・Input data : 0 to 31 points / Setting range : -99999 to 99999 (digit)
   ・Output data : 0 to 31 points / Setting range : -99999 to 99999 (digit)
    * Input data and output data include the following condition each.
       「Data 0」＜「Data 1」＜ ....＜「Data 31」
   When the above condition isn't satisfied, measurement is not possible.

11. Basic Function Setting 2 (System)

By basic function 2 (System), perform protection of each key, initialization and function check.
・Setting procedure：→ 「MODE」key → Caution Screen for Starting Setting → Main setting screen →
「PAGE」key → 「SYSTEM」key

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.
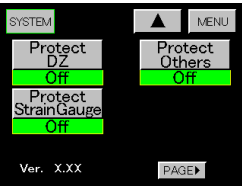
・Digital Zero key protect (Protect DZ)
Used for denying "DZ" key in screen.
・Input setting protect (Protect Input)
Protect set of "Strain Gauge"
・Setting value protect (Protect Others)
Protect various setting except "Strain Gauge" and "Basic Function Setting
2 (System)"

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.
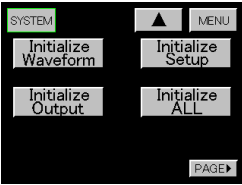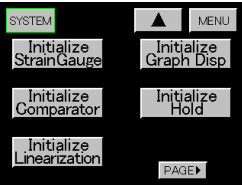
* Caution

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.
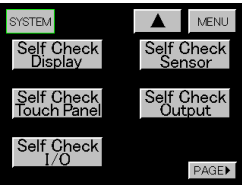
Display check
・There are three ways of follows on display check
a) Color：Confirm that a color is displayed normally.
b) Back light：Check that ON/OFF control of backlight is normal.
c) Line：Check if each line is connected on screen.
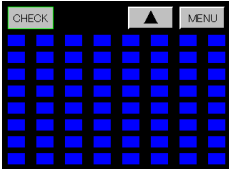
Check Touch Panel
  ・touch a part of blue and check that a detection point is normal.
   Please confirm that the point that I touched reacts normally.
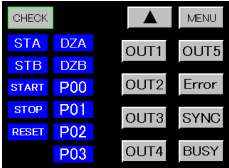
Check I/O
  ・Check that wiring of external control I/O is normal.
   Control input：ON = yellow, OFF = blue
   Control output：Pressing key turns ON/OFF control output alternately.
   Note)　START：GSTART of external control input
   STOP　：GSTOP of external control input
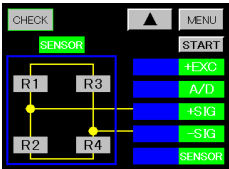
Self Check Sensor
  ・The check result is displayed on the blue portion.
   「+EXC」displays the output level of the sensor power supply of this
   equipment numerically.
   「A/D」checks whether A/D in this Meter is normal or not.
   「+SIG」checks whether the connection is made or not.
   「-SIG」checks whether the connection is made or not.
   「SENSOR」checks the connected sensor for any trouble.
 ・Pressing "START" key starts the self-check.
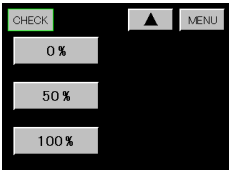
Check output (Analog output)
  ・Only available when analog output unit output unit is mounted.
  ・Pressing「0%」,「50%」, or「100%」key outputs voltage or current from the
   terminal of the selected type.

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.
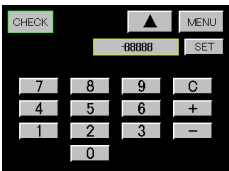
Check output (BCD Output)
  ・Only available when BCD output unit is mounted.
  ・Enter a numerical value to be output to the BCD output terminal with
   a numerical value and "Polarity" key. Press「SET」key, and the set
   numeric data (BCD code) is output to the BCD output terminal. Up to 5
   digit-figures 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.
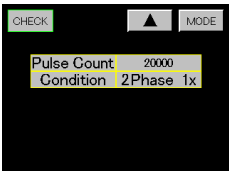
Check pulse input
  ・Check that a pulse is output definitely by a rotary encoder connected to
   Bch.
   「Pulse Count」displays an internal count value.
   Display setting as of a thing of Input phase & Multiply in「Condition」.

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
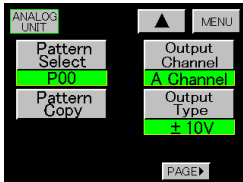
1) Pattern Select
  ・Select a pattern to be set.
  ・Choice items：P00 to P15
    *Select a Pattern Select before changing the set value.
2) Pattern Copy
  ・Select the pattern of the copy destination.
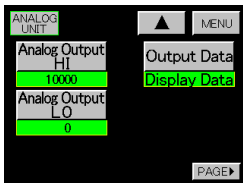 ・Choice items：P00 to P15

3) Output Channel
  ・Select which channel.
  ・Select items：Ach, Bch
4) Output Type
  ・Select voltage output of ±10V and current output of 4 to 20mA.
  ・Select items： ±10V, 4 to 20mA

5) Analog Output HI
  ・Set an indicated value when analog output is 10V or 20mA.
  ・Setting range： ±99999 (digit)
6) Analog Output LO
  ・Set an indicated value when analog output is 0V or 4mA.
  ・Setting range： ±99999 (digit)

7) Output data
  ・Select indicated value or measured value.
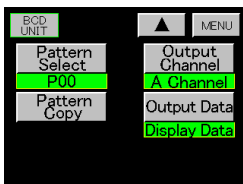 ・Select items：indicated value, measured value
   Indicated value：When hold is ON, screen display value is hold. And analog output is hold, too.
   Measured value：link and output, in defiance of hold, always for a change of the input.

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 indicated value or measured value.
  ・Select items：indicated value, measured value
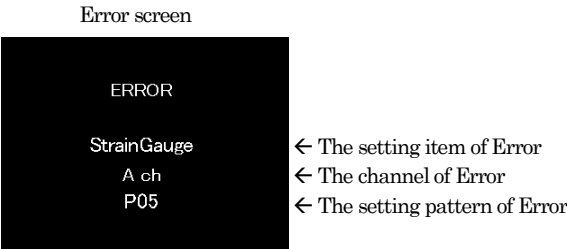   Indicated value：When hold is ON, screen display value is hold. And BCD output is hold, too.
   Measured value：link and output, in defiance of hold, always for a change of the input.

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

```
        ERROR

     StrainGauge      ← The setting item of Error
       A ch           ← The channel of Error
       P05            ← 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.

```
        ERROR
```
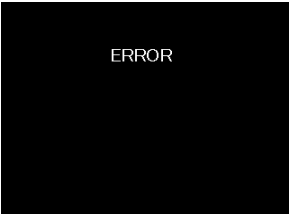
14. Accessories

This book
Hardware Setup Manual
Utility CD
26P half pitch connector
10P rectangular connector
Card edge connector (Option : BCD unit)
Instruction Manual for SD Memory Function (Option : SD Memory Function)

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

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