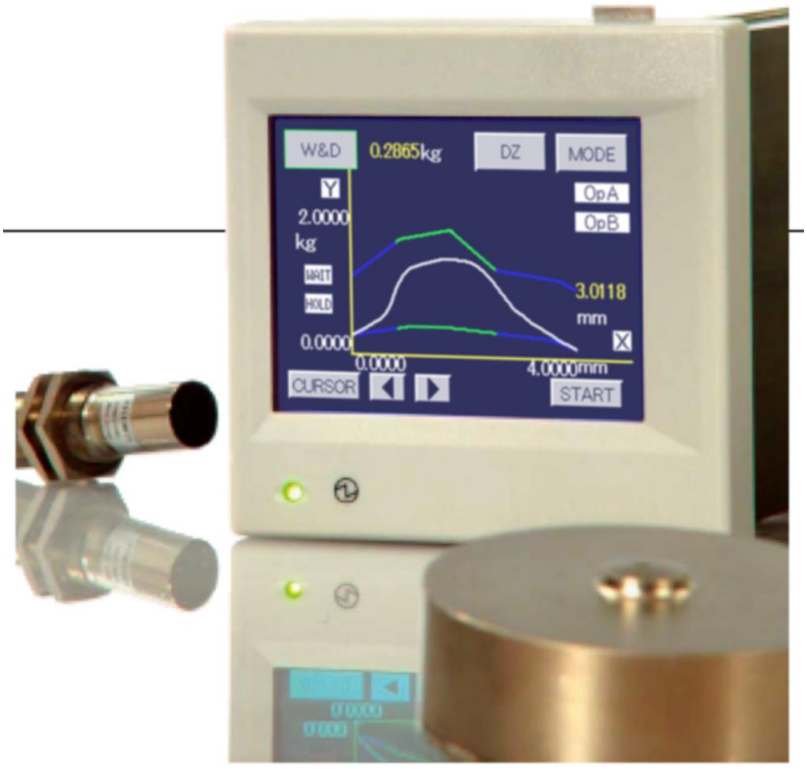
INSTRUCTION MANUAL

GRAPHIC MULTI-METER

MODEL G1000 Series

(Strain Gauge / Process Input)



Introduction

Thank you for purchasing G1000 Graphic Multi-meter.

Check for any breakdown during transit and discrepancy of the specification. Always keep this manual at hand.

Cautions for safety

Cautions

(1)Applying voltage and current exceeding the maximum permissible value results in the breakdown of the meter.

(2)Use supply voltage within the specified limit. Using the meter outside the specified limit causes fire, electric shocks and other troubles.

(3)The contents of this manual are subject to change without notice for further improvement.

(4)This manual has been carefully prepared. However, if you find any questionable matter, error, omission, etc., please contact the dealer from which you bought the meter or directly our company.

(5)After reading this manual, keep it in an easily accessible place.

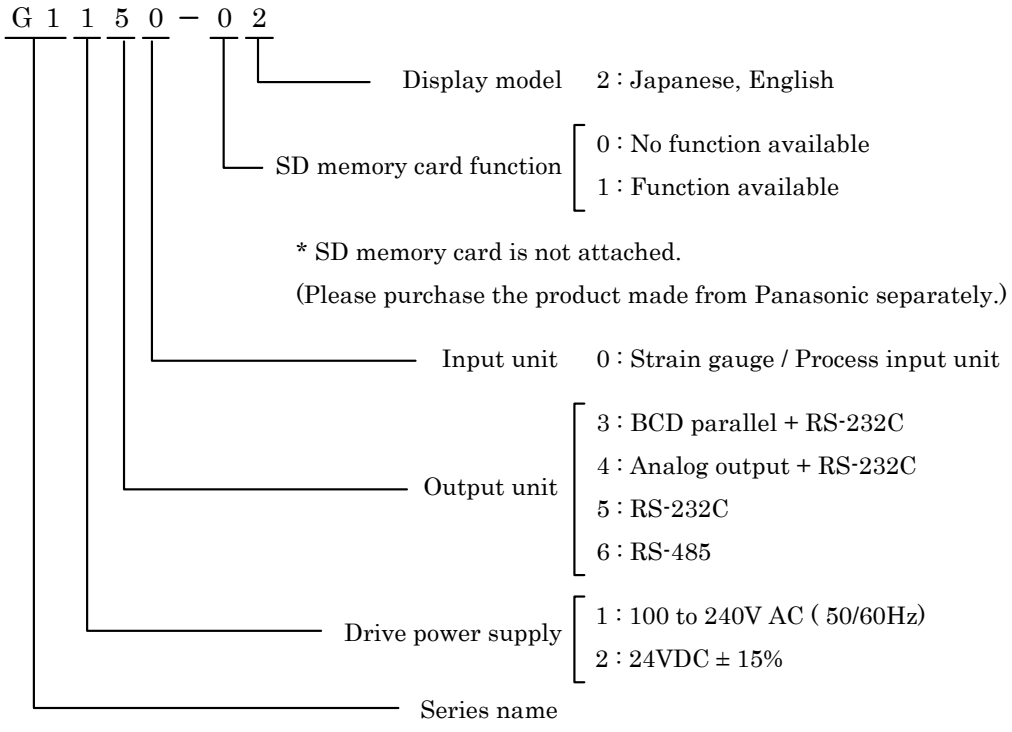
Before use

In order to obtain the highest performance of your G1000, thoroughly read this manual before use.

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.



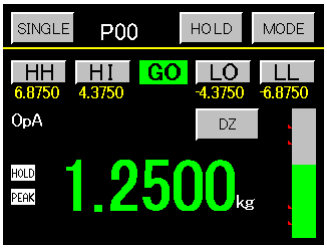
* Standard equipment of the comparison output (Open collector output) is carried out.

Contents

1. G1000 Operation Outline

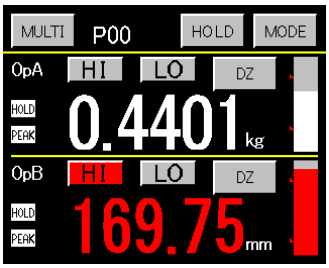
1-1. Display Screen

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



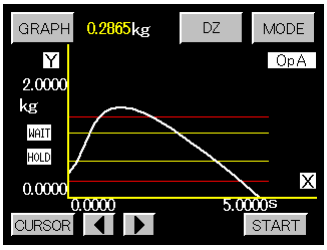
- Run as meter of 4-segment setting.
- The analog input Ach and Bch can be chosen.
- Various hold functions can be performed for each of Ach and Bch individually.
- The peak value, valley value, peak-valley value, maximal value, minimal value, inflection point is detected out, and comparison result is output simultaneously.

2) Multi Display Screen (2 channel)



- Run as meter of 2-segment setting for each of Ach and Bch.
- Various hold functions can be performed for each of Ach and Bch individually.
- The peak value, valley value, peak-valley value, maximal value, minimal value, inflection point is detected out, and comparison result is output simultaneously.

3) Graphic Display Screen (Hold function)

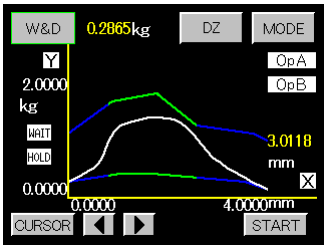


- The indicated value and graph can be displayed.
- Various hold functions can be performed for each of Ach and Bch individually.
- The peak value, valley value, peak-valley value, maximal value, minimal value, inflection point is detected out, and comparison result is output simultaneously.

4) Waveform Comparison Screen

- Waveform comparison
  The A/D conversion of the analog input waveform which changes with time is performed, the converted value (indicated value) is compared with HI/LO limits waveform set-values, and the result is output.
- Waveform comparison for each of Ach and Bch can be performed individually.
  (for Bch, waveform comparison of voltage input or current input is performed)

5) Waveform & Displacement Comparison Screen



- Waveform & Displacement comparison (W&D)
  (Ach)
  The A/D conversion of the analog input waveform which changes with displacement is performed, the converted value (indicated value) is compared with HI/LO limits waveform set-values, and the result is output.

  (Bch)
  The A/D conversion of the analog input is performed, the value (indicated value) is displayed and compared with displacement's HI/LO limit set-values, the result is output.

1-2. Display Procedure of A channel, B channel and 2 channel

G1000 performs the A/D conversion of analog input signal from strain gauge sensor and displacement sensor, then does calibration and scaling, after that, displays the result as indicated value, finally compare with comparison set-values and outputs the results.

In addition, for calibration, scaling, comparison set-values etc., it can be saved up to 16 patterns, and can be switched by pattern select signal or RS- easily.

1) Connect lines

Connect the sensor, I/O signal, RS-232C, RS-485, analog output, BCD output, etc.

・please refer to「3. Terminal Connections and Description」.

2) Do basic function setting

・please refer to「6. Basic Function Setting (Setup)」.

3) Do calibration. (Do each of Ach and Bch individually.)

・please refer to「7. Strain Gauge 」.

4) Set and finalize each itemized setting.

・please refer to「5-4. Data Setting Tree」

5) Check if item is displayed as set-value.

1-3. Procedure of Waveform Display and Hold Function

Using set-values in graph display, to detect some parts of the analog input waveform (e.g. the peak, the valley, the maximal, the minimal, inflection point), perform the comparison and output the result.

For hold type setting in hold function, comparison set-values, graph display setting, it can be saved up to 16 patterns, and can be switched by pattern select signal or RS- easily.

1) The procedure from line connection to calibration is the same as above-mentioned.

2) Perform each operation and setting.

・Please refer to「8. Operation of Waveform Display」.

・Please refer to「11. Hold Function (Hold)」,「13. Graphic Display Setting (Graph Disp)」.

3) Operate the input signals STA, STB, START, RESET, STOP and confirm the display and action.

1-4. Procedure of Waveform Comparison / Waveform & Displacement Comparison

Waveform comparison is, perform the A/D conversion of the analog input waveform which changes with time or displacement, compare the converted value (indicated value) with HI/LO limit waveform set-values, then output the result.

For HI/LO limit waveform set-values, comparison range, HI/LO limit displacement set-values, it can be saved up to 8 patterns, and can be switched by pattern select signal or RS- easily.

1) Perform each operation and setting.

・please refer to「12. Waveform Comparison / Waveform & Displacement Comparison (Waveform)」.

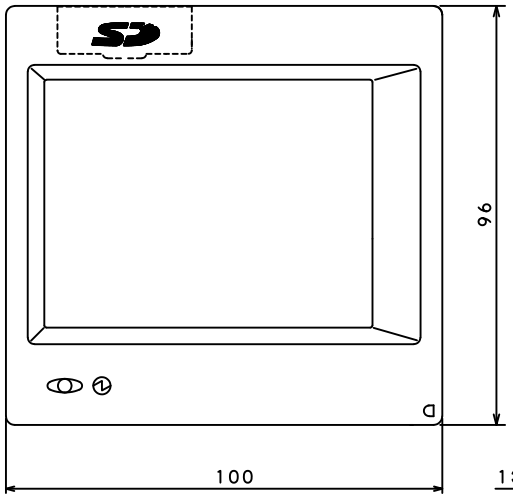
・please refer to「11. Hold Function (Hold)」,「13. Graphic Display Setting (Graph Disp)」.

・please refer to「8. Operation of Waveform Display」.

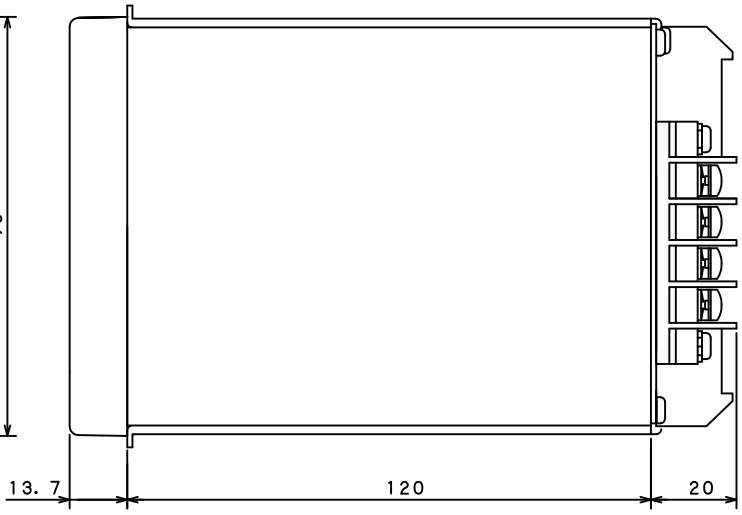
2) Operate the input signals START, STOP and confirm the display and action.

2. Outside Dimensions and Mounting Method

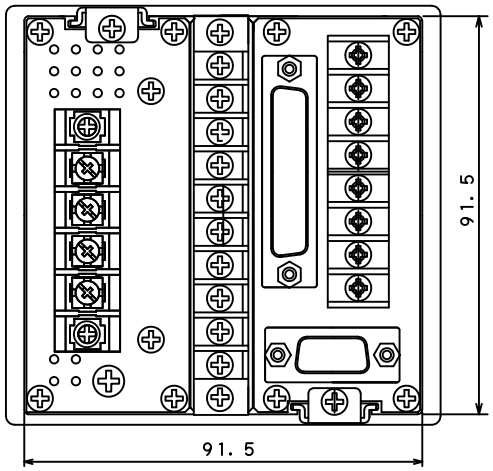
1) Outside dimensions



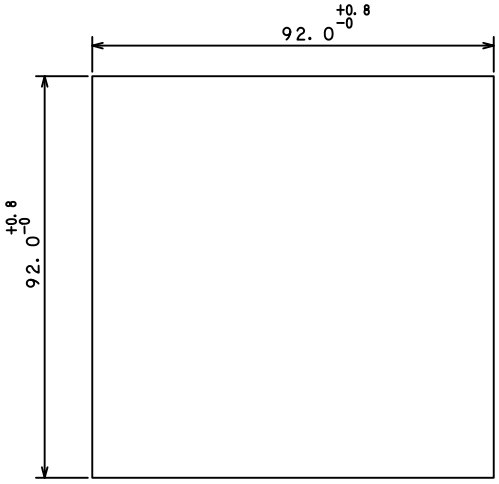
[Front]



[Side]



[Rear]

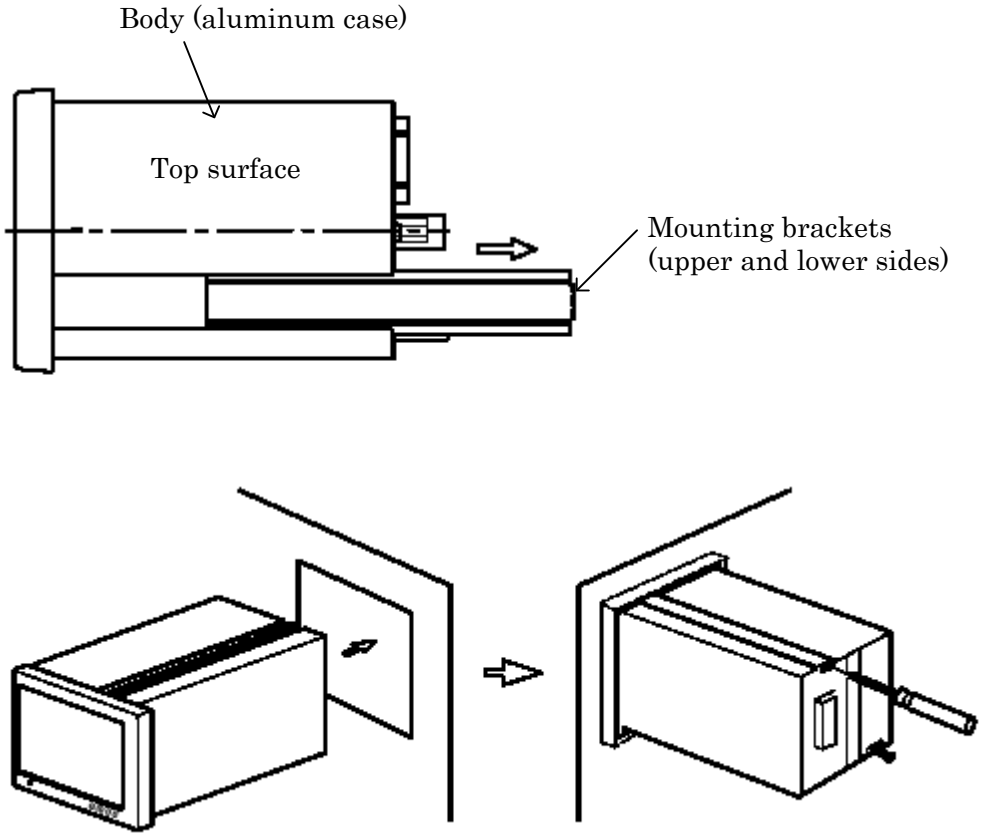


[Panel cutting hole]

*When you have no memory card function, there is no SD cover of the front upper part.

2) Mounting method

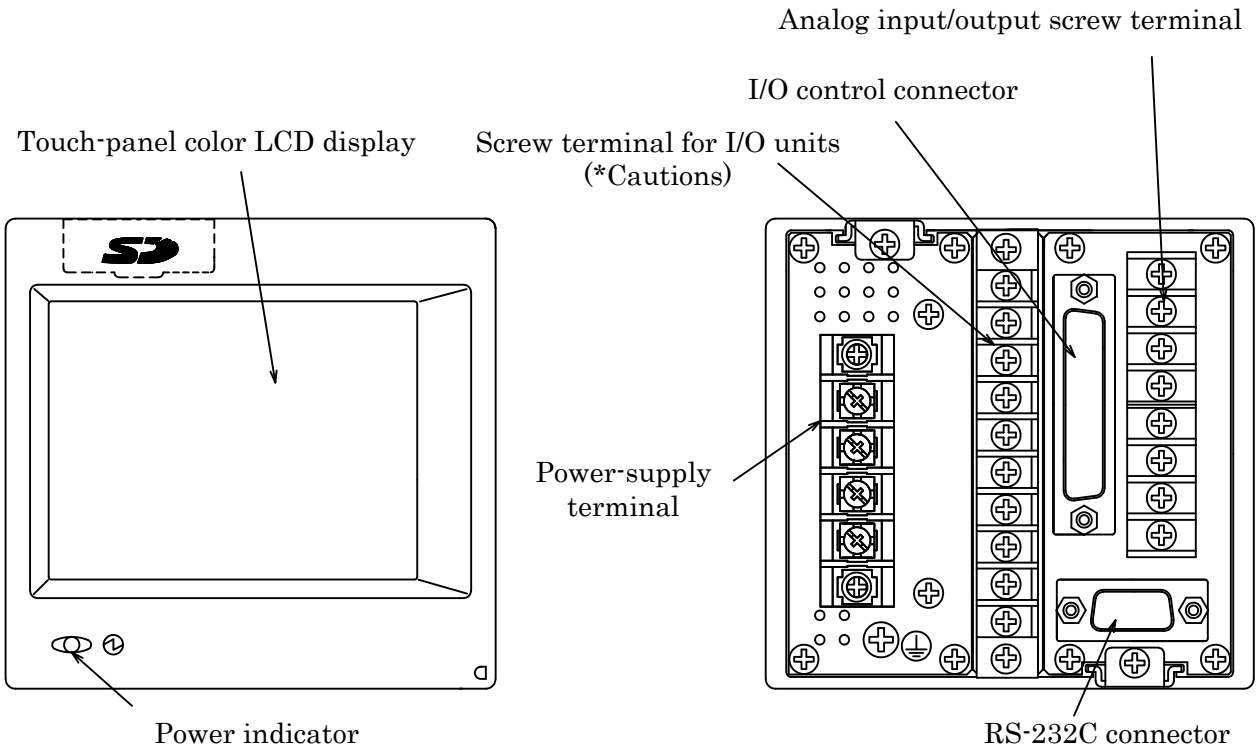
Make a mounting hole shown by the panel cutting hole and remove the mounting bracket from the rear side. Fit the body from the front side of the panel as shown in Fig. below, and tighten the mounting bracket from the rear side.



Cautions

(1)Panel board thickness is 1 to 5mm. Use tightening torque of about 0.39 N・m.
(2)Do not locate the Meter in a place where ambient temperature is outside the range of 0 to 40℃, humidity is outside the range of 35 to 85 % and humidity changes suddenly, causing dew condensation.
(3)Use the Meter in a place free from dust, dirt, chemicals and corrosive gases harmful to the electric parts.
(4)Protect the Meter from any vibration and shock.
(5)When locating the Meter in facilities, use care to radiate heat so that temperature inside the facilities may not exceed 40℃.

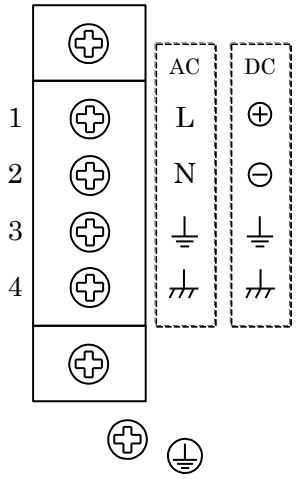
3. Terminal Connections and Description



*Cautions : Use the screw terminal for I/O units at the time of analog output or RS-485.
Use a connector of card edge type ribbon cable at the time of BCD output, instead of the Conforming cable : UL2651 AWG#28 flat cable (7 cables/0.127mm, cable shield diameter 0.8 to 1.0mm)
When you have no memory card function, there is no SD cover of the front upper part.

3-1. Connection of Power Supply

Power-supply input
screw terminal



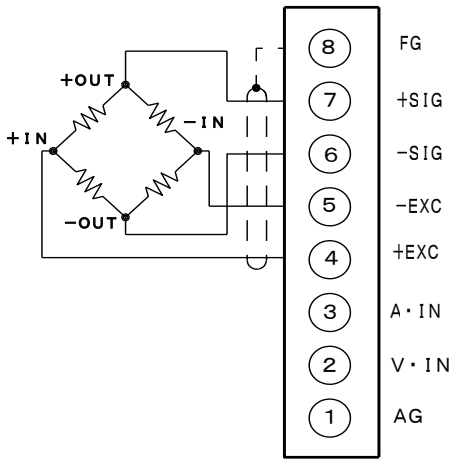
- AC input voltage is 100 to 240V AC ±10% (50/60Hz).
- DC input voltage is 24V DC ±15%.
- Connect power supply to terminals No.1 and terminal No.2 (N).
- Terminals No.3 ( )and terminal No.4 ( ) are connected with a short bar.
- Ground it to prevent an electric shock and a trouble of static electricity.
- As Terminal No.3 is charged at neutral point, use care to prevent it from contacting other terminals.
- Terminal No.4 is connected to the frame (case). It can be used for noise countermeasures and to prevent the trouble of static electricity in an environment where no grounding is available.
- terminal is a protective earth terminal. It has the same electric potential as No.4 ( ).

3-2. Connection of Strain Gauge Sensor

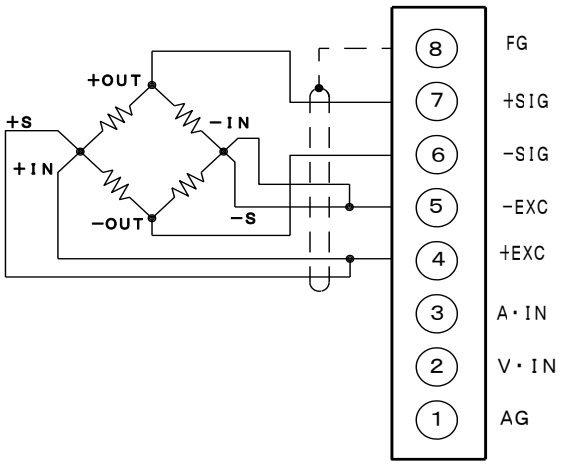
・Analog I/O screw terminal

Terminal No.	Signal name	Contents
8	FG	Frame ground
7	+SIG	＋input terminal (Ach)
6	-SIG	－input terminal (Ach)
5	-EXC	－Sensor power-supply output terminal (-side) (Ach)
4	+EXC	＋Sensor power-supply output terminal (+side) (Ach)
3	A・IN	＋Current input (Bch)
2	V・IN	＋Voltage input (Bch)
1	AG	－Analog ground (Bch)

・Four-wire type



・Six-wire type



・Before connecting the sensor, set power-supply voltage (Sensor power) to the sensor and turn off power to this Meter. (please refer to「7-1. 4) Sensor power」.)

・Terminals (4) to (7) are for input of Ach.

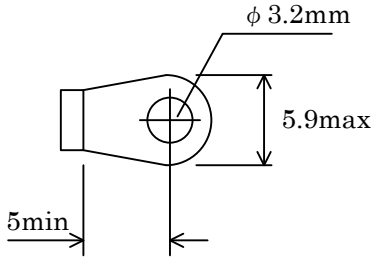
・Connect the shield (shielding wire) of the sensor to the frame ground.(FG)

・When connecting a six-wire type strain gauge sensor, short-circuit (+ EXC and +S) (-EXC and -S), respectively.
Other connections are the same as those for four-wire type.

Cautions !

Applied voltages to the strain gauge sensor are 2.5V, 5V, and 10V.
When any sensor rated below the applied voltage is connected, it may generate heat or be damaged.

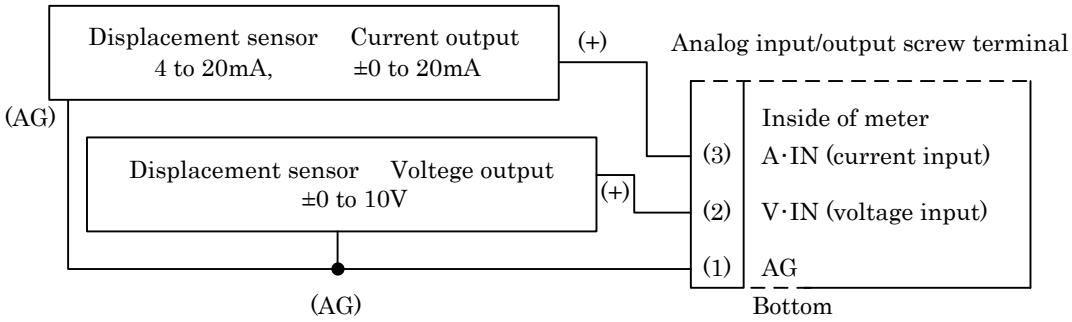
・Conforming crimp-type-terminal size



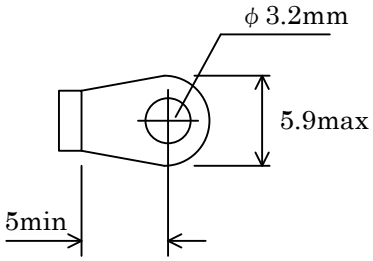
3-3. Connection of Displacement Sensor

・It is possible to connect various displacement sensors.
It is also possible to select voltage/current by setting an input range at「7-3. Analog Input Setting (Bch)」.

・Terminals (1) to (3) are for input of Bch.
(3) DC current input terminal.
(2) DC voltage input terminal.
(1) Analog ground terminal (Common input terminal for (2) and (3).)



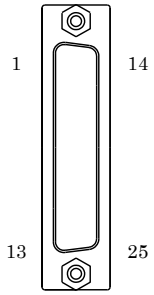
・Conforming crimp-type-terminal size



3-4. Connection of I/O Signals

1) I/O control connector arrangement

I/O connectors



Terminal No.	Signal name	contents	Terminal No.	Signal name	contents
1 (O)	OUT1	Comparison output	14 (O)	AOUTA	Analog output (Ach)
2 (O)	OUT2	Comparison output	15 (O)	AOUTB	Analog output (Bch)
3 (O)	OUT3	Comparison output	16	AG	Analog ground
4 (O)	OUT4	Comparison output	17 (O)	BUSY	Busy output *
5 (O)	OUT5	Comparison output	18 (I)	P0	Pattern selection
6 (O)	Error	Error signal	19 (I)	P1	Pattern selection
7 (O)	SYNC	Synchronizing signal output	20 (I)	P2	Pattern selection
8	E.COM	Photo-coupler output common	21 (I)	P3	Pattern selection
9 (I)	STA	Start / Peak hold (Ach)	22 (I)	START	Graphic start
10 (I)	STB	Start / Peak hold (Bch)	23 (I)	STOP	Graphic stop
11 (I)	DZA	Digital zero (Ach)	24 (I)	RESET	Reset
12 (I)	DZB	Digital zero (Bch)	25	DG	Digital ground
13	DG	Digital ground			

・"(O), (I)" in the above table show the direction of a signal. (O) = output and (I) = input.

・*BUSY output is used when SD memory card function is available.

・Specified connector (When a connectors other than specified is used, the Meter cannot be used.)
Type with solder : E25-403N-150 (with case) (made by Chuomusen Co.,Ltd.)

2) I/O signal function

・Terminal No.1 to 5：Comparison output (OUT1 to 5)

(Output terminal)　Output signal changes by selections of each function.

Function \ Comparison output	OUT1 (No.1)	OUT2 (No.2)	OUT3 (No.3)	OUT4 (No.4)	OUT5 (No.5)
A channel	HH	HI	GO	LO	LL
B channel	HH	HI	GO	LO	LL
2 channel	HI (Ach)	LO (Ach)	GO (*1)	HI (Bch)	LO (Bch)
Waveform Compare Ach	HI (Ach)	LO (Ach)	GO (Ach)	———	———
Waveform Compare Bch	———	———	GO (Bch)	HI (Bch)	LO (Bch)
Waveform & Displacement comparison	HI (Ach)	LO (Ach)	GO (Ach)	HI (Bch)	LO (Bch)

*1　It turns ON only when all of HI and LO of both channels are OFF.

・Terminal No.6　: Error signal　(Error)
(Output terminal)　In Waveform & Displacement Comparison, when displacement (indicated value) changes suddenly, or displacement (indicated value) has not been updated for some time, turn the ERROR signal ON.
For details, refer to「12-3. Waveform & Displacement Comparison」.

・Terminal No.7　: Synchronizing signal output　(SYNC)
(Output terminal)　Be ON when the indicated value and comparison result have been finalized. Please use it when reading the output signal.（Details according to each timing chart)

・Terminal No.8　: Photo-coupler output common　(E.COM)
(Common terminal)　The common output terminal of terminal No.1 to 7 (OUT1 to 5, Error, SYNC).
For details, refer to「3-4. 4) Each output equivalent circuits」

・Terminal No.9　: Start / Peak hold Ach　(STA)
(Input terminal)　Control terminal of Start / Peak hold action of Ach. (ON ("0") trailing edge is active)
For details, refer to「11. Hold Function (Hold)」.

・Terminal No.10　: Start / Peak hold Bch　(STB)
(Input terminal)　Control terminal of Start / Peak hold action of Bch. (ON ("0") trailing edge is active)
For details, refer to「11. Hold Function (Hold)」.

・TerminalNo.11　: Digital Zero Ach　(DZA)
(Input terminal)　The terminal of turning the indicated value to 0 for Ach. (ON ("0") trailing edge is active)
For details, refer to「4-6. Functional Description (9)」and「12-3. Waveform & Displacement Comparison」.

・Terminal No.12　: Digital Zero Bch　(DZB)
(Input terminal)　The terminal of turning the indicated value to 0 for Bch. (ON ("0") trailing edge is active)
However, if Waveform & Displacement Comparison is chosen by meter setup in the basic function setting, it is denied.
For details, refer to「4-6. Functional Description (9)」and「12-3. Waveform & Displacement Comparison」.

・Terminal No.13　: Digital ground (DG), is connected with terminal No.25 (DG) inside.
(Common terminal)　The common input terminal of terminal No.9 to 12 (STA, STB, DZA, DZB).
For details, refer to「3-4. 6) Each input equivalent circuits」.)

・Terminal No.14 : Analog output Ach (AOUTA)
(Output terminal) Analog output for monitors.
For details, refer to「3-4. 3) Analog output」.)
・Terminal No.15 : Analog output Bch (AOUTB)
(Output terminal) Analog output for monitors.
For details, refer to「3-4. 3) Analog output」.)
・Terminal No.16 : Analog ground (AG)
(Common terminal) The common terminal of analog output (Ach) (terminal NO.14), analog output (Bch) (terminalNO.15).
・Terminal No.17 : BUSY output (Used when SD memory card function is available.)
・Terminal No.18 to 21 : Pattern selection (P0, P1 ,P2 ,P3)
(Input terminal) The terminal is for changing the used pattern in strain gauge (analog input setting), linearization setting, comparison setting, display setting, hold function, waveform comparison/waveform & displacement comparison, analog output and BCD output.
For details, refer to「3-4. 5) Pattern select and 6) Each input equivalent circuits」.)
・Terminal No.22 : Graphic start (START)
(Input terminal) Start the reading of analog input waveform (indicated value). (ON ("0") trailing edge is active.)
For details, refer to「4-6. Functional Description (13)」and「8. Operation of Waveform Display」.
・Terminal No.23 : Graphic stop (STOP)
(Input terminal) Stop the reading of analog input waveform (indicated value). (ON ("0") trailing edge is active.)
For details, refer to「4-6, Functional Description(13)」 and「8, Operation of Waveform Display」.
・Terminal No.24 : Reset (RESET)
(Input terminal) Release the hold function (use only in hold function.)
Release each peak hold with condition. (ON ("0") trailing edge is active.)
For details, refer to「11-6. to 11-9,」.
・Terminal No.25 : Digital ground (DG), Connected with No.13 (DG) inside.
(Common terminal) Common input terminal of terminal No.18 to 24 (P0 to P3), START, STOP, RESET.
For details, refer to「3-4. 6) Each input equivalent circuits」.)

3) Analog output

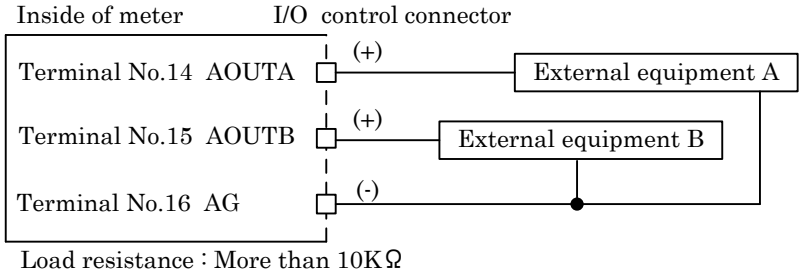
・Outputs analog voltage for monitors proportional to input of each channel.
The indicated value does not agree with the analog voltage output.

・The analog ground of sensor input and the analog ground of sensor output have the same electric potential. (Non-isolation)

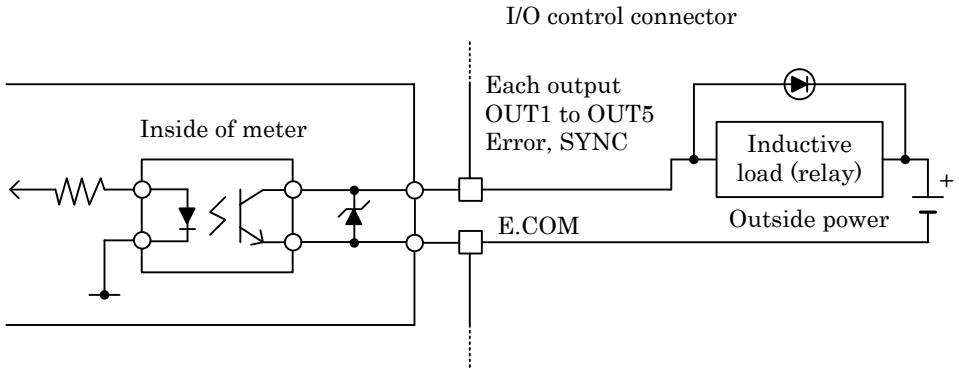
・Input and output voltage.

.

Channel (ch)	Input	Output voltage (V)
Ach	Strain gauge sensor ±4.0mV/V	Approx. ±6V
Bch	Voltage input ±0 to 10V	Approx. ±5V
Bch	Current input ±0 to 20mA (4 to 20mA)	Approx. ±5V



4) Each output equivalent circuits



・Photo-coupler output (NPN open collector output)
Output capacitance : voltage MAX.30V current MAX.30mA
Output saturation voltage is below 1.2V at the time of 30mA

Caution : Don't apply the inverse voltage. Use it within the output capacitance.

5) Pattern select (P0, P1, P2, P3)

・The terminal for changing used pattern in Strain gauge (analog input setting), Linearization setting, Comparison setting, Display setting, Hold function, Waveform Comparison / Waveform & Displacement Comparison, and output (analog output / BCD output).

*Caution : When changing the setting in display screen or RS-232C, RS-485, don't change the pattern. It may result in the wrong setting.

・"1"and "0" in the table below is shown as follows :
P0 to P3 terminal and DG terminal's short-circuited = ON or "0" level
P0 to P3 terminal and DG terminal's open-circuited = OFF or "1" level

Terminal / Pattern	P3	P2	P1	P0
P00	1	1	1	1
P01	1	1	1	0
P02	1	1	0	1
P03	1	1	0	0
P04	1	0	1	1
P05	1	0	1	0
P06	1	0	0	1
P07	1	0	0	0
P08	0	1	1	1
P09	0	1	1	0
P10	0	1	0	1
P11	0	1	0	0
P12	0	0	1	1
P13	0	0	1	0
P14	0	0	0	1
P15	0	0	0	0

Caution : When performing the Waveform Comparison or Waveform & Displacement Comparison, P00 to P07 can be used. (Don't use P3.)

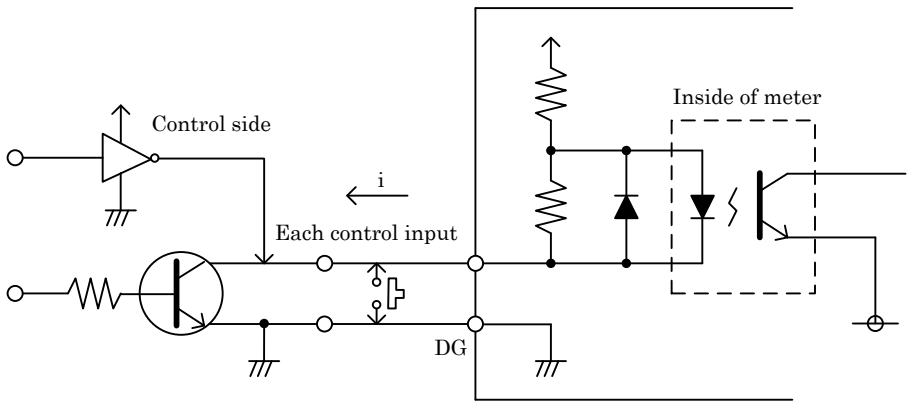
6) Each input equivalent circuits

・For input of the input control signal, use the transistor (open collector output), IC (buffer etc.), contact point that has no voltage. (It is performed by ON/OFF control between the control input and DG.)

・The rated-input value of input terminal is :

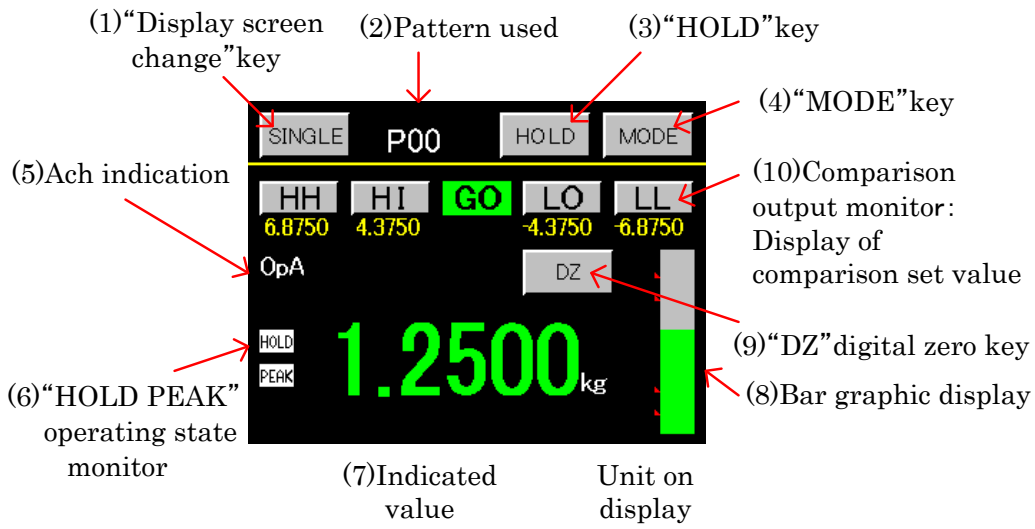
OFF "1" level (open circuit) : approx. 3.5 to 5V
ON "0" level (short circuit) : approx. 0 to 1.5V

Input current (i) : below -2mA



4. Name and Function of Display Screen

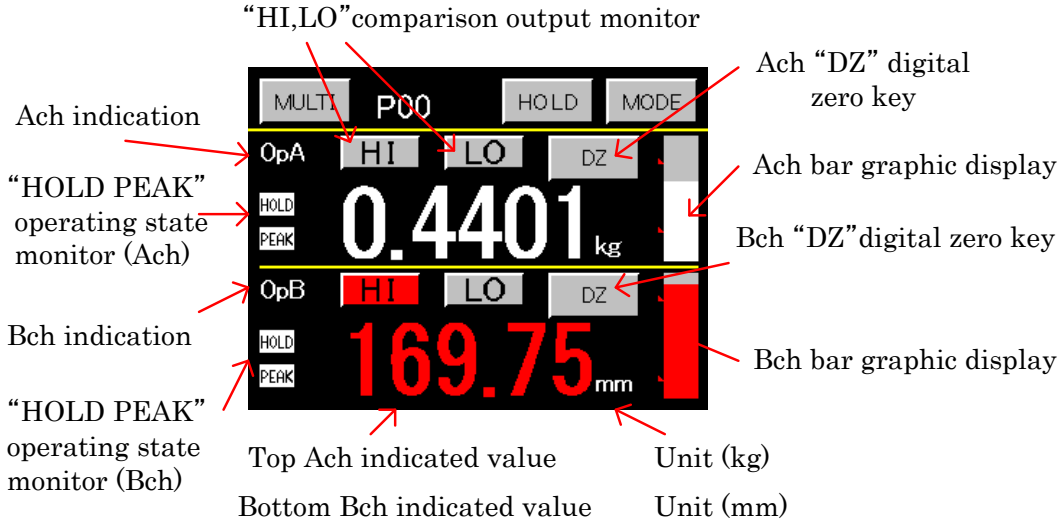
4-1. Single Display Screen (A channel, B channel)



・ About the color of comparison output, indicated value and comparison output monitors.

Comparison output	Color of indicated value and bar graph	Comparison output monitors
HH, LL	Red	
HI, LO	Yellow	
GO	Green	
None	White	No monitor

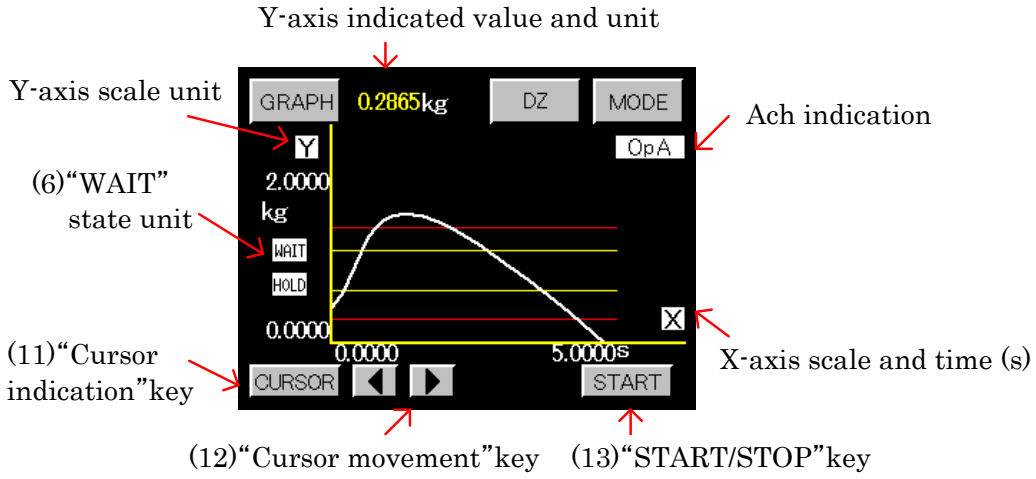
4-2. Multi Display Screen (2 channel)



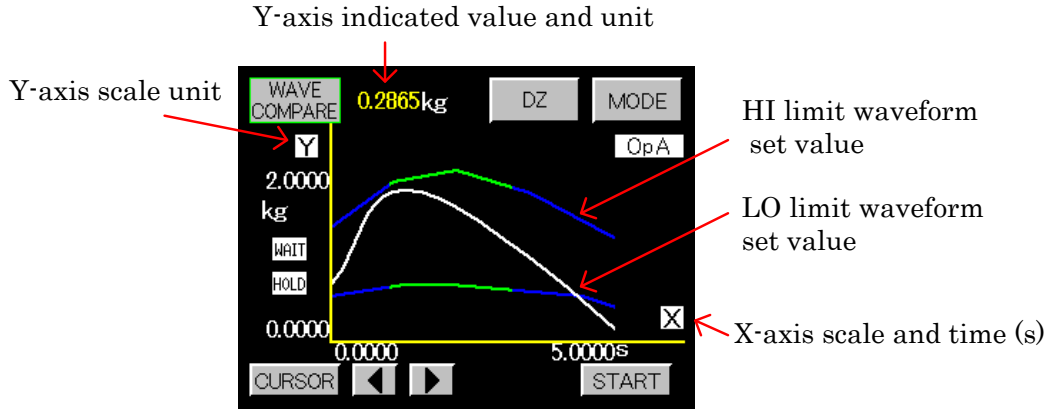
・ About the color of comparison output, indicated value and comparison output monitors.

Comparison output	Color of indicated value and bar graph	Comparison output monitors
HI, LO	Red	
GO	Green	No monitor
None	White	No monitor

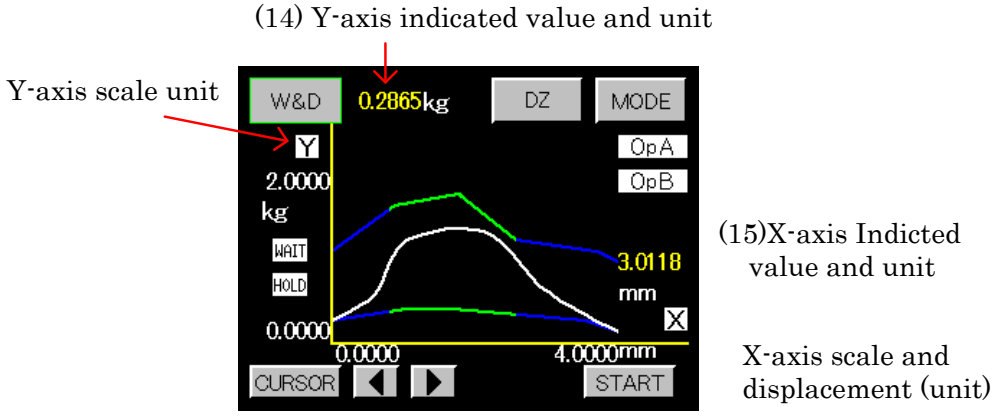
4-3. Graphic Display Screen (Each Hold, Free Run)



4-4. Waveform Comparison Display Screen (Ach, Bch)



4-5. Waveform & Displacement Comparison Display Screen



4-6. 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.

(1) "Display screen change" key

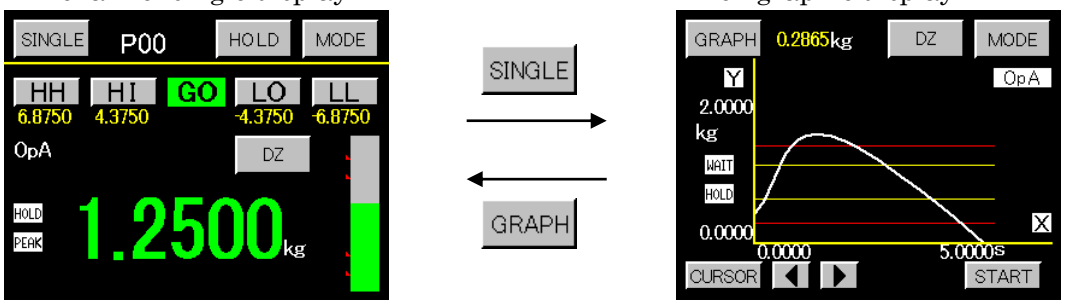
・It changes according to 1) Meter Setup of「6. Basic Function Setting (Setup)」.

・Three kinds of display change key are available. The state when each of SINGLE GRAPH MULTI be pressed is shown according to each meter setting.

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

・A channel single display and B channel single display

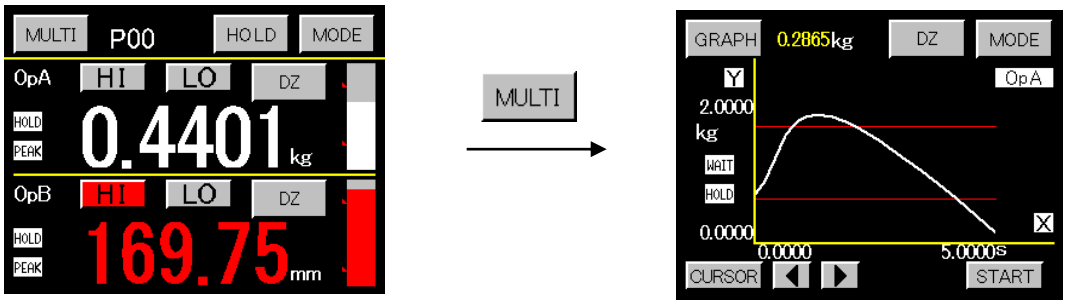
・Ach graphic display, and Bch graphic display



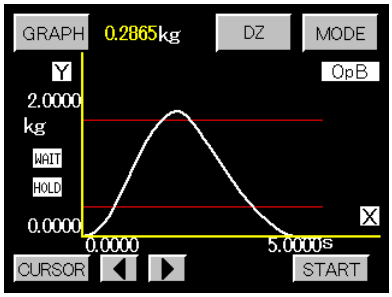
◎Display screen change when 2 channel meter is selected by meter setting

・2 channel display

・Ach graphic display



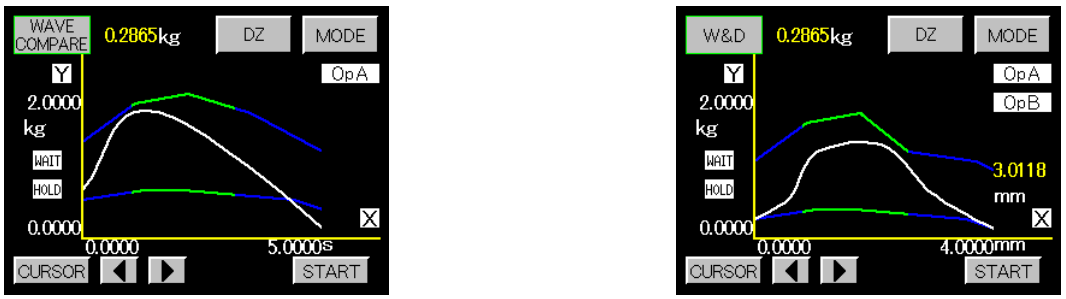
GRAPH ・Bch graphic display GRAPH



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

・Waveform comparison

・Waveform & Displacement Comparison



(2) Used pattern "P00 to P15"

・All setting values can be saved up to 16 patterns of "P00 to P15".
Display the used pattern.

・The set-values of Waveform Comparison and Waveform & Displacement Comparison can be saved up to 8 patterns of "P00 to P07".

(3) Hold key "HOLD"

・Perform ON, OFF and RESET for hold function of each sampling, Peak, valley, Peak-valley, Maximal value, Minimal value and Inflection point.
For details, refer to「11-2 to 11-9」.

(4) Set key "MODE"

・Used when performing each data setting.
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.
For details, refer to「5. Screen Configurations and Setting Procedures」.

(5) Display of used channel "OpA", "OpB"

・Display the analog input channel used in display of the indicated value and each output.

(6) State monitor of hold function "HOLD", "PEAK", "WAIT"

・"HOLD" operation state monitor: Turn red when "HOLD" key or signal STA/STB be "ON", or the indicated value is held.
・"PEAK" operation state monitor : Turn red during detecting/holding period.
・"WAIT" operation state monitor : Turn red when "START" key or signal START waiting to be ON.

(7) Display of the indicated value and unit
(Setting of unit is performed at「7-1,3. Analog Input Setting (Ach/Bch) 」) .

(8) Display of Bar graph

・Can be displayed for each of Ach and Bch individually.
・High limit of bar graph for Ach is + SPAN indicated value and low limit is - SPAN indicated value.
・High limit of bar graph for Bch is + full scale indicated value and low limit is - full scale indicated value.

(9) Digital Zero key "DZ"

・Set the indicated value to "0". Can be performed for each of Ach and Bch individually.
・"DZ" key can be set to "unacceptable" by「15. Basic Function Setting 2 (System)」.
・If Waveform＆Displacement Comparison is selected in「6. Basic Function Setting (Setup)」, only Ach (Y-axis) can be performed when "DZ" key is pressed.

(10) Comparison output monitors "HH", "HI", "GO", "LO", "LL"

・Show state of ON/OFF for comparison output, also show comparison set-values when in single display screen. When in multi-display screen (2 channel), show Ach and Bch individually.
・There are also "HH", "HI", "LO", "LL" key for setting. After pressing it, 10-key input screen is shown, and data setting is available. (Can be set during measurement operation.)

(11) Cursor key

・Switch to show or not to show the vertical line (red). When the cursor is enabled, getting waveform can't be performed.

(12) Cursor movement key

・Can move the indicated cursor to left or right, and the crossing point "x" with the waveform can be read out at the same time.

(13) Start key "START"

・Start or stop the getting of the analog input waveform in graph display screen, Waveform Comparison / Waveform & Displacement Comparison screen.

(14) Display indicated value of Y-axis.

・Display the indicated value and unit of Ach in Y-axis, when in the Waveform Comparison / Waveform & Displacement Comparison screen.

Unit setting is performed by「7-1,3. Analog Input Setting (Ach/Bch)」.

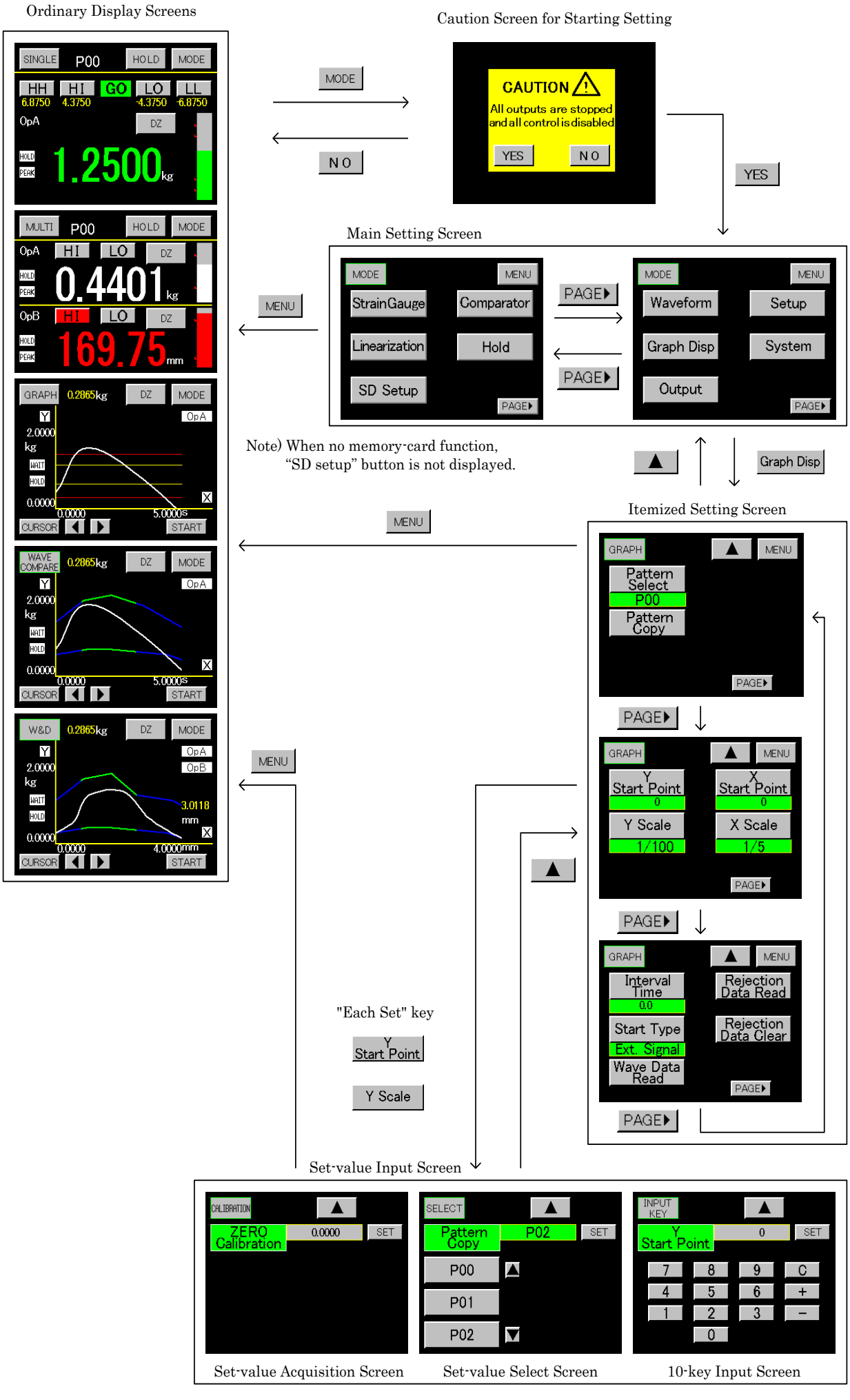
(15) Display indicated value of X-axis.

・Display the displacement indicated value and unit of Bch in X-axis, only in the Waveform & Displacement Comparison.

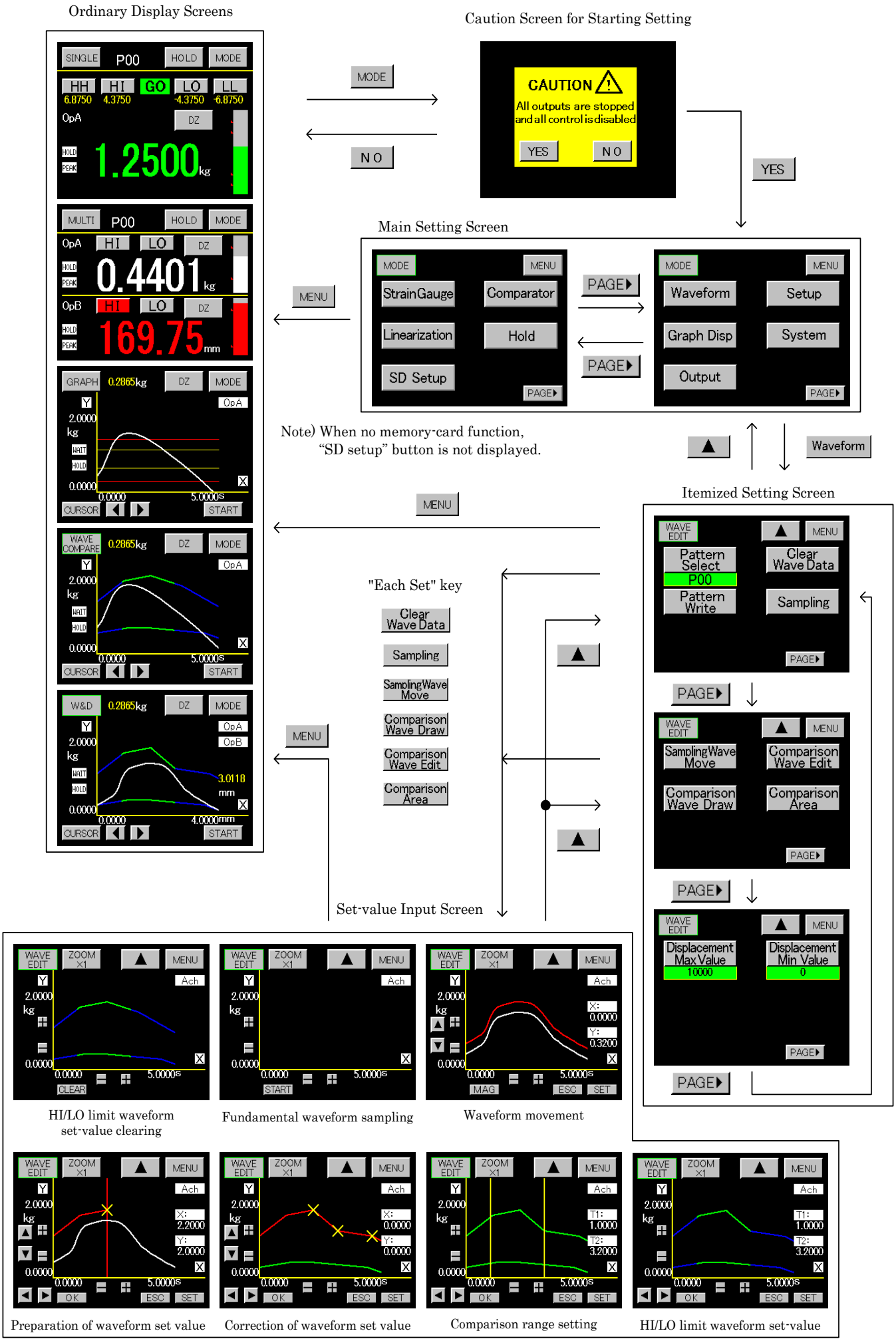
Unit setting is performed by「7-1,3. Analog Input Setting (Ach/Bch)」.

5. Screen Configurations and Setting Procedures

5-1. Meter, Graph (Example)

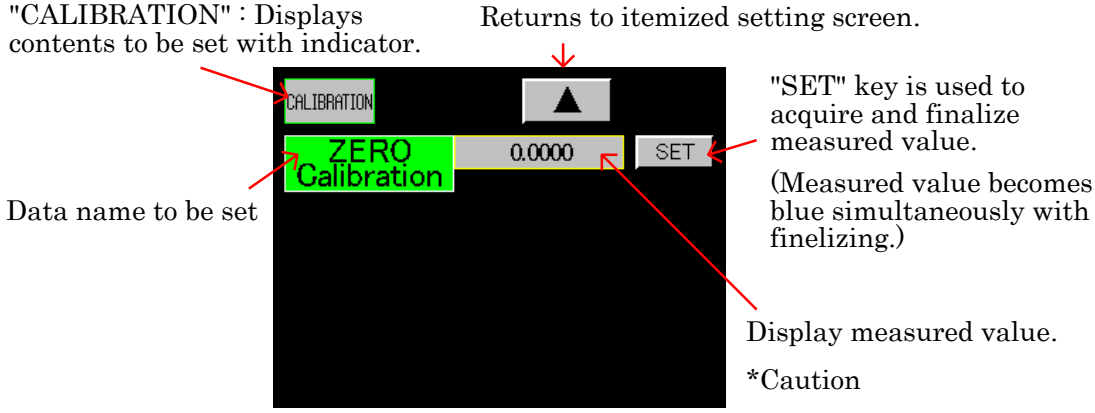


5-2. Waveform Comparison / Waveform & Displacement Comparison (Example)



5-3. Set-Value Input Screen

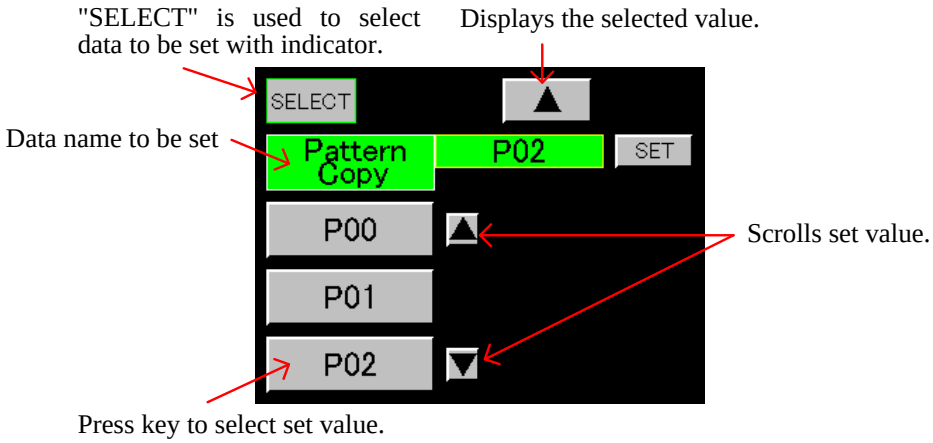
1) Measured-value acquisition screen



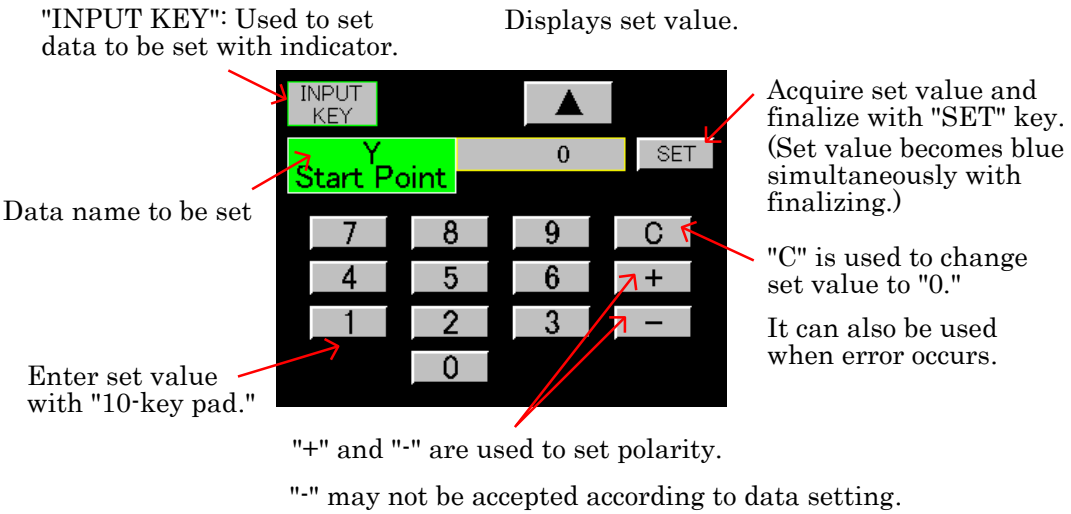
* Caution

When「6. 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.

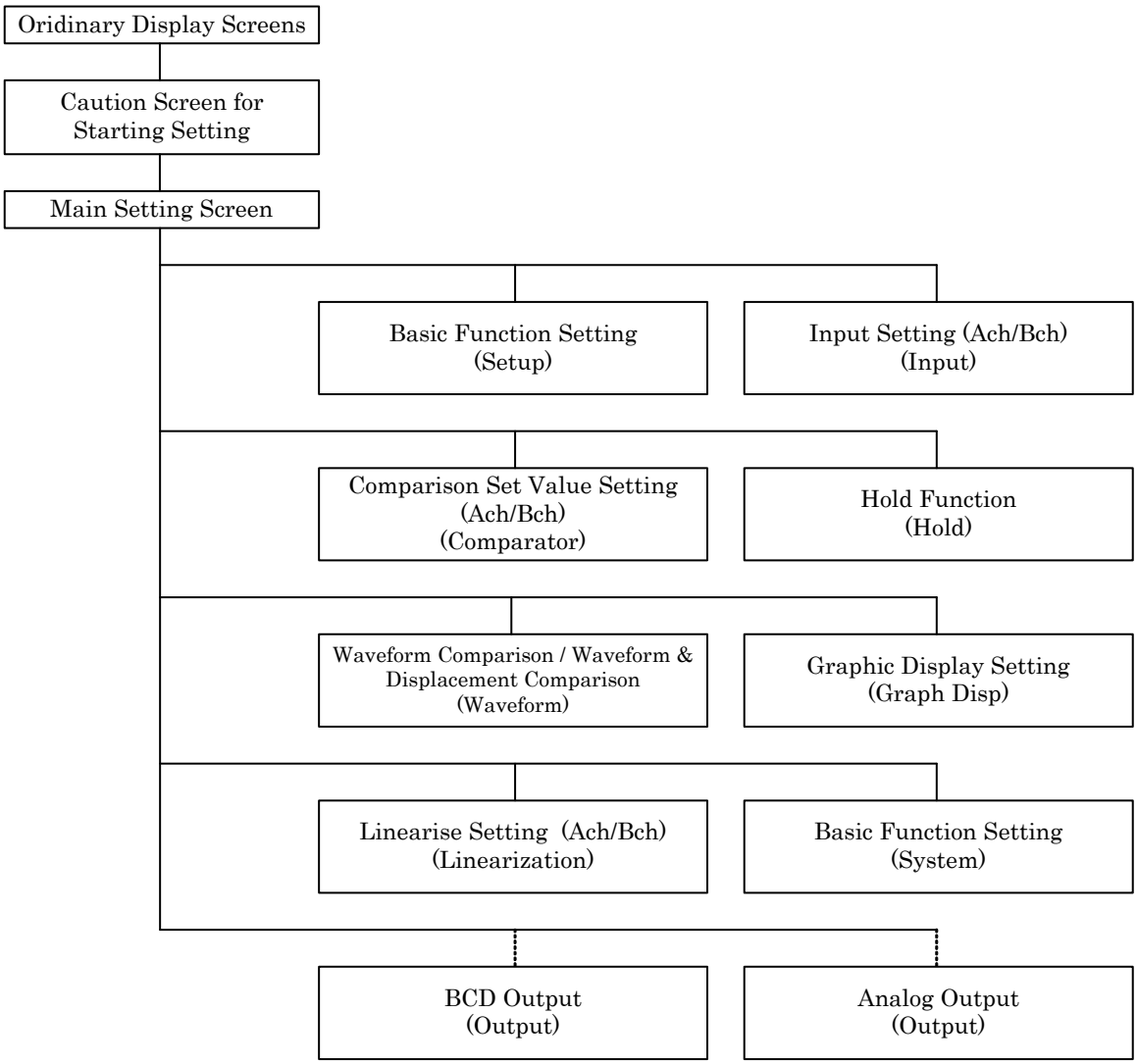
2) Set-value select screen



3) 10-key input screen



5-4. Data Setting Tree



・When an output unit is equipped with, can set output (analog or BCD) setting.

* Caution

・If you cut off the power supply in screen setting, the data will be lost. Make sure that cut off the power supply after returning to ordinary display screen.

・While changing the setting in setting screen, don't change the setting by RS-232C, RS-485 or change the pattern. There is danger that setting data fail.

5-5. Data Setting List

Setup Basic Function Setting

Setting item	Default value	Setting range
Meter Setup	A channel	A channel, B channel, 2 channel, Waveform comparison Ach (Wave Ach), Waveform comparison Bch (Wave Bch), Waveform & Displacement comparison (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
Motion Detect (Time) (MD Time)	0.0	Time 0.0 to 9.9(sec.)
Motion Detect (Width) (MD Width)	1	Width 01 to 99(digit)
Zero Tracking (Time) (ZT Time)	0.0	Time 0.0 to 9.9(sec.)
Zero Tracking (Width) (ZT Width)	0	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
Offset 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

Comparison Set Value Setting
(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
(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) Maximal Value (16) Minimal Value (17) Inflection Point *Level = Start level
Start Level	100	±99999
Start Condition	Pass	Pass Rising Edge Trailing Edge More Less
Detection Time	1000	1 to 9999
Minimal 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
(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
(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	－－－－－－	(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
(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

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) Analog output, BCD output (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

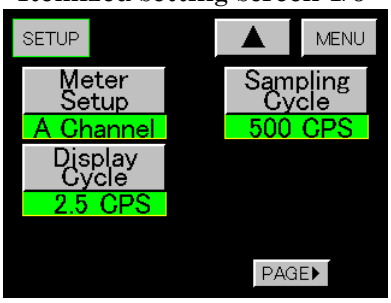
For model with BCD output

Setting item	Default value	Setting range
Pattern Select	―――――	P00 to 15
Pattern Copy	―――――	P00 to 15
Output Channel	A channel	A channel, B channel

6. Basic Function Setting (Setup)

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

Itemized setting screen 1/6

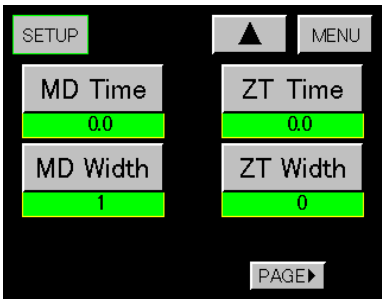


1) Meter Setup
・Set meter operation on the set-value select screen.
(1) A channel
(2) B channel
(3) 2 channel
(4) Wave Ach
(5) Wave Bch
(6) W&D

2) Display Cycle
・Set the period for updating the indicated value on the set-value select screen.
・Setting item : 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

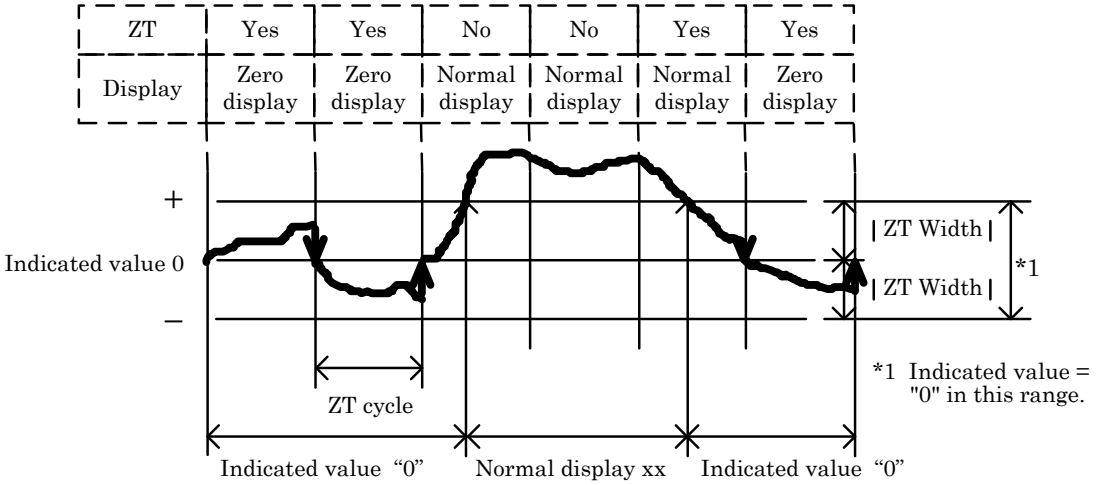
Itemized setting screen 2/6



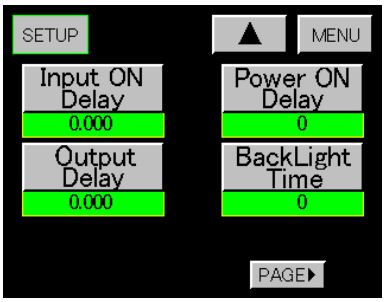
4) Motion Detect (MD = Motion Detect)
・Set MD Time and MD Width on the 10-key input screen.
・MD Time : 0.0 to 9.9 seconds
・MD Width : 1 to 99 digits
・Stable state
When the difference of the last measured value (at 1/sampling speed) and the present measured value is within the MD Width and when this state 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) Zero Tracking (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 digit
・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



Itemized setting screen 3/6

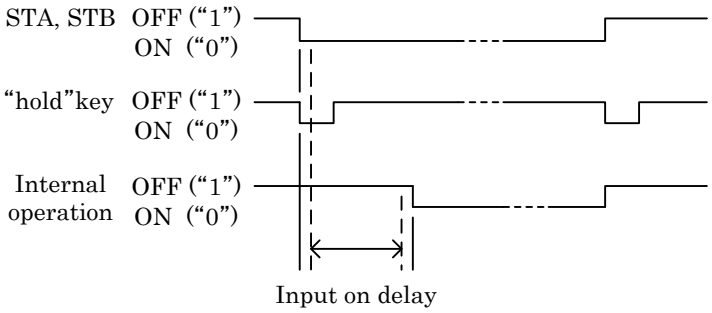


6) Input ON Delay

・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 terminal 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 / Waveform & Displacement Comparison)

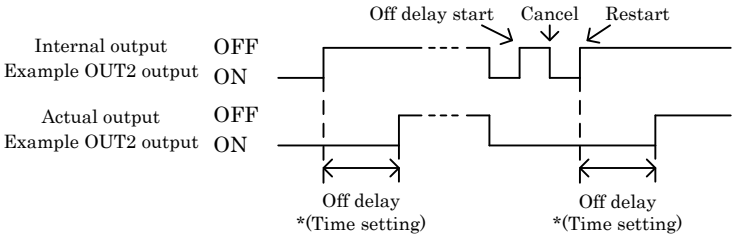
・Set time on the 10-key input screen.

Delay range (Output Delay) : 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.

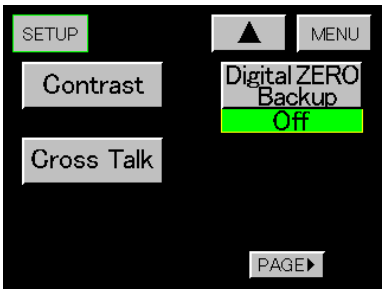


* For time setting, priority is given to Td and other settings than Td are considered as same setting.
Td=1/sampling speed.
For example, sampling of 10 times/second means Td = 100ms.
For time-setting = 0.001 to 0.100,
For time-setting = 0.501 to 0.600, operation is done as time setting = 0.600.

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.

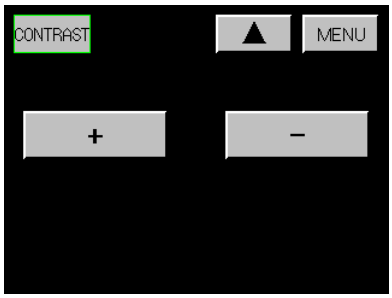
9) Back Light Time
・Set time on the 10-key input screen.
・Delay range : 0 to 99 minutes
・When the touch panel is never touched during the preset time (minute), the back light of LCD is turned off.
Touching the touch panel while light is off turns on the back light of LCD.
・Back light time = 0 it lights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

Itemized setting screen 4/6



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/Cross talk 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.

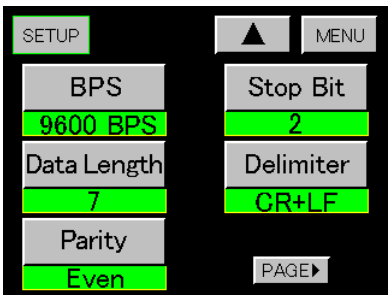
・It is possible to backup for each channel.

13) Language

・It is possible to change the language displayed by each key and monitor. Choose between Japanese and English

・Press "Language" key to choose between Japanese and English.

Itemized setting screen 5/6



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

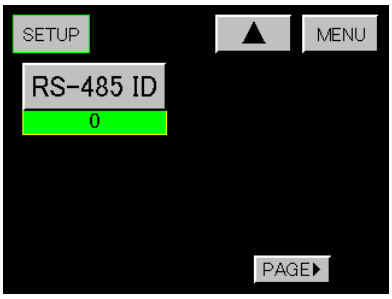
・Parity : Even, Odd, None

・Stop Bit : 1, 2

・Delimiter : CR＋LF, CR, LF

Caution : Even if address is changed while the line is occupied, it will change after returning to normal operation once.

Itemized setting screen 6/6



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.

7. 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.

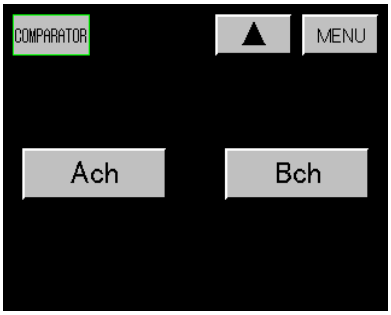
・Protect Strain Gauge function on「15. Basic Function Setting 2 (System), 2) Protect Strain Gauge」is set to "ON", no setting can be performed. Perform setting by turning it "OFF".

・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.

7-1. 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.

Itemized setting screen 1/5



1) Setting Channel

・Select Ach

・When Bch is selected,「7-3. Analog Input (Bch)」is performed.

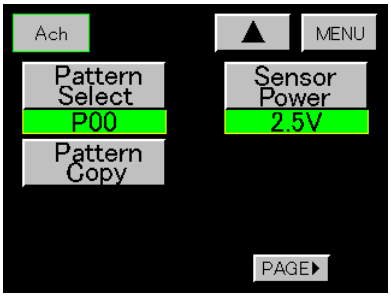
2) Pattern Select

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

・Setting range：0 to 15

* Select a Pattern Select before changing the set value.

Itemized setting screen 2/5



3) Pattern Copy

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

・Setting range：0 to 15

4) Sensor Power

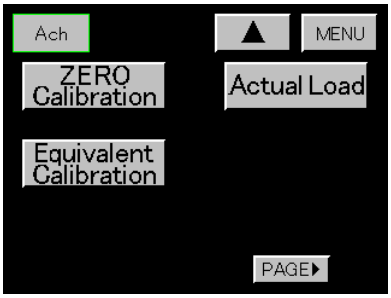
・Set voltage applied to the strain gauge sensor to be used.

・Set it on the set-value select screen.

・Setting voltages：10V, 5V, 2.5V

Set it before connecting the strain gauge sensor.

Itemized setting screen 3/5



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.

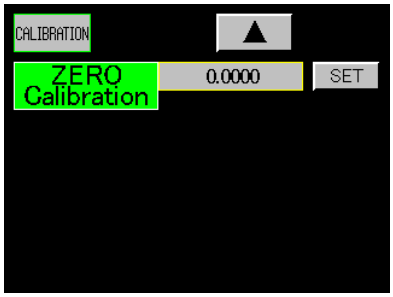
・It is performed on the measured-value acquisition screen.

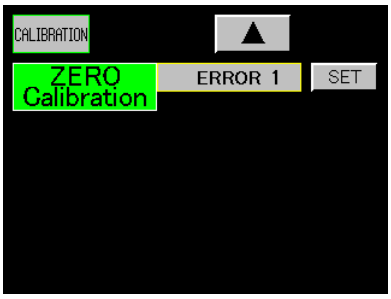
・It is used in case of Equivalent Calibration and Actual Load.

* Caution

When「6. 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.

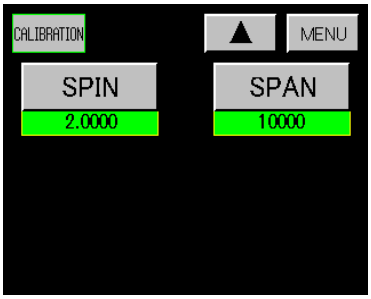
・Acquire measured value and finalize with "SET" key.
(Measured value becomes blue simultaneously with finalizing.)





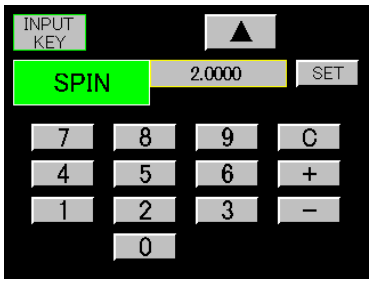
・When the acquired ZERO value falls under the following case, it is judged an Error and resetting is performed.
Error 1 : When the acquired ZERO value is smaller than -4.0mV/V.
Error 2 : When the acquired ZERO value is larger than -3.0mV/V.
・Perform resetting by pressing the "▲" key and then pressing the "ZERO Calibration" key.

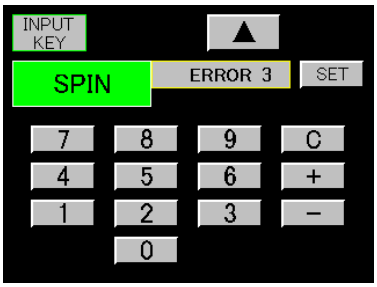
6) Equivalent Calibration
・Set the rated output value (mV/V value) for the strain gauge sensor and the indicated value at the time.
・The setting rage of the rated output value (SPIN value) for the strain gauge sensor is 0.1 to 3.0mV/V.
・The setting range of SPAN set value (indicated value) is 100 to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

a) SPIN value
・Acquire set value and finalize with "SET" key.
(Set value becomes blue simultaneously with finalizing.
SPIN value (Finalized output value)　　SPIN 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.

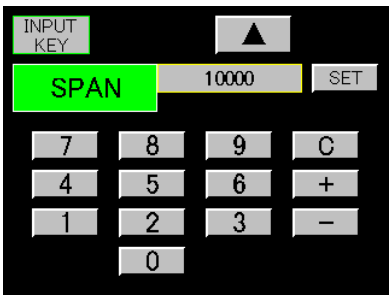
b) SPAN set value

・Set the indicated value when the SPIN value (rated-output value) is acquired and finalized.

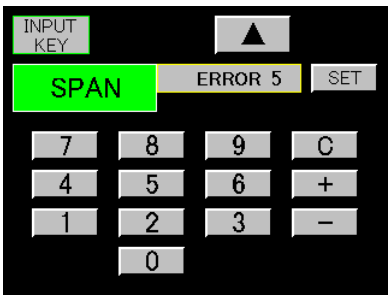
・Acquire set value and finalize with "SET" key.

(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= SPAN set-value / (SPIN value × 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

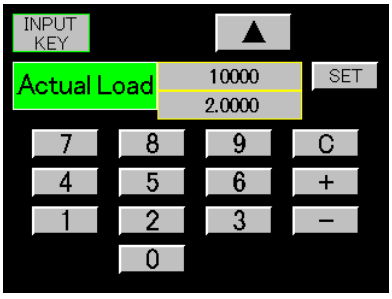
When「6. Basic Function Setting (Setup) 4) Motion Detect」is active, measured value becomes red while analog output is not stable.

Setting is possible even during unstable state.

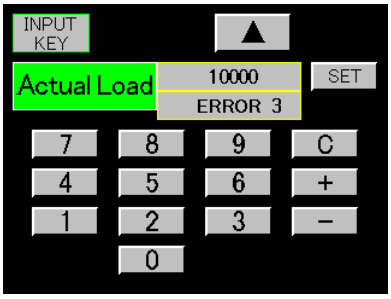
・Acquire both SPAN set value and measured value (SPAN value) and finalize with "SET" key.

(Set value becomes blue simultaneously with finalizing.)

SPAN set value



When SPIN value is error



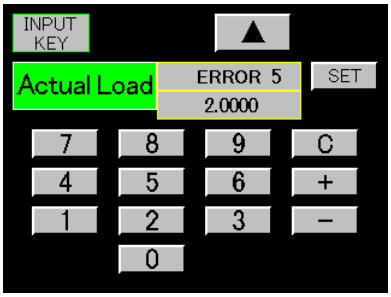
・A value obtained by subtracting ZERO value from the acquired measured value (SPAN value) is converted into SPIN value (mV/V value) and it is checked. In the following cases, it is judged an error and resetting is performed.

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= SPAN set value / (SPIN value ×10000)

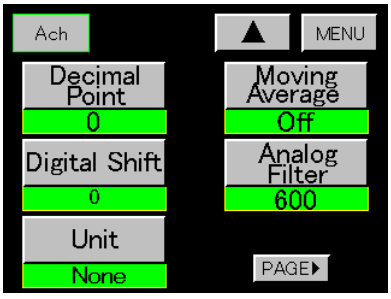
・Error 5 is displayed at the time of k1 > 1.

・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.

Itemized setting screen 4/5



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.

・79 different setting items (including those without display)

Refer to「29. Setting of Units.」

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

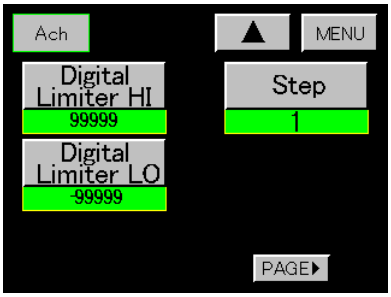
12) Analog Filter

・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

Itemized setting screen 5/5



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

7-2. Procedure for Equivalent Calibration and Actual Load

・When doing a calibration, first set items other than「5). Zero Calibration, 6). Equivalent Calibration, and 7). Actual Load」.

Sampling speed is fixed at 50 times/second.

1) Turning OFF protect setting : Press "Protect Strain Gauge" key on the Basic Function Setting 2 (System) screens 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.

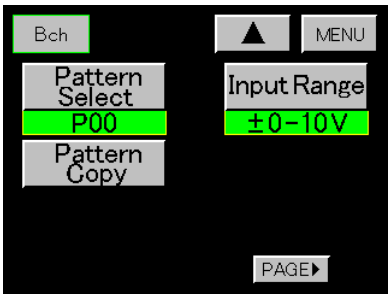
5) Actual load : Actual load is performed by applying actual load to the connected strain gauge sensor, and by setting the indicated value (SPAN set value) at the time.
(Accurate calibration with least error occurrence can be attained.)

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.

7-3. Analog 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 is already set, it is displayed.

Itemized setting screen 2/5



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

Itemized setting screen 3/5

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

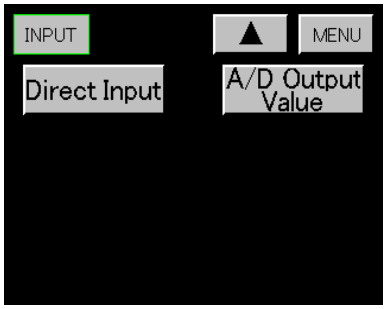
・Setting range

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

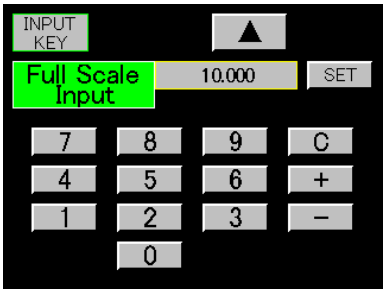
・Full Scale : Set the indicated value when a Full Scale Input value is entered.

・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 (Direct Input) or use the indicated value (A/D Output Value) according to circumstances.



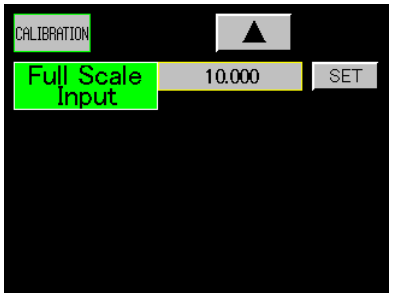
・When the "Full Scale Input" key or "Offset Scale Input" key is pressed on the itemized setting screen 3/5, choose between setting on the 10-key input screen (Direct Input) and using the measured value (A/D Output Value).



・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."



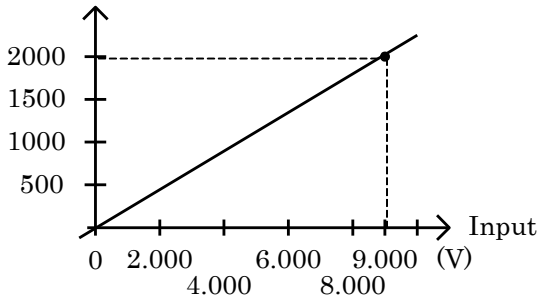
・When the "A/D Output Value" key is pressed, perform on the measured-value acquisition screen.
・Acquire set value and finalize with "SET" key. (Measured value becomes blue simultaneously with finalizing.)
・To reset, press "▲" to return to the above-mentioned select screen, and press the "A/D Output Value"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

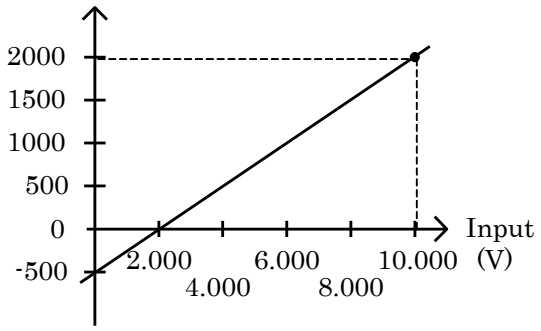
Display



Example of scaling setting

Full Scale Input = 10.000V
Full Scale (indicated value) = 2000
Offset Scale input = 2.000V
Offset Scale (indicated value) = 0

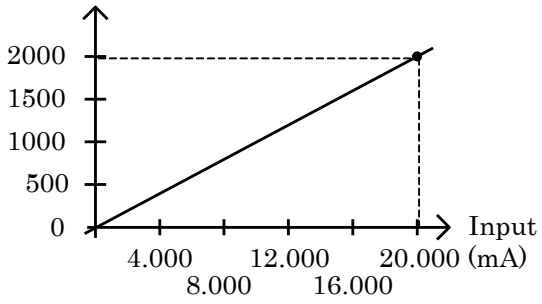
Display



Example of scaling setting

Full Scale Input = 20.000mA
Full Scale (indicated value) = 2000
Offset Scale Input = 0mA
Offset Scale (indicated value) = 0

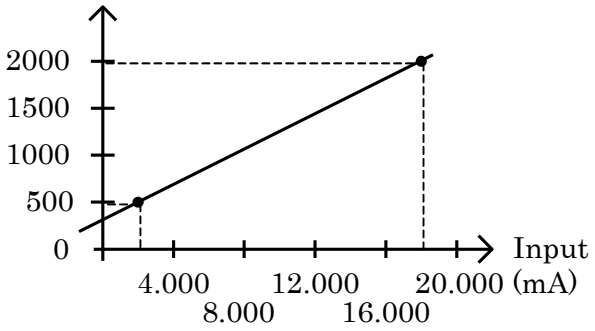
Display



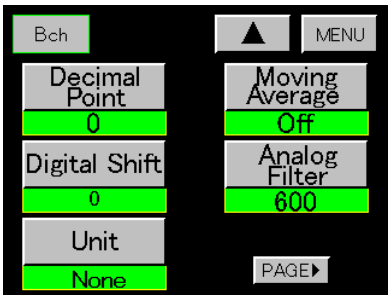
Example of scaling setting

Full Scale Input = 18.000mA
Full Scale (indicated value) = 2000
Offset Scale Input= 2.000mA
Offset Scale(indicated value) = 500

Display

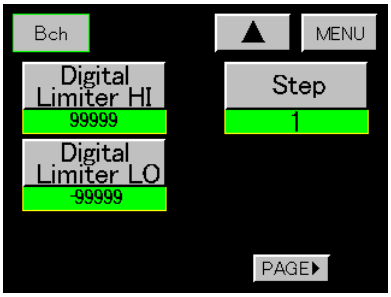


Itemized setting screen 4/5



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) + (digital shift value)
・Set it on the 10-key input screen.
・Setting range : ±99999
7) Unit
・Set the unit corresponding to the indicated value.
・Set it on the set-value select screen.
・79 different setting items (including those without display)
「Refer to 29. Setting of Units」
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

Itemized setting screen 5/5



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

8. Operation of Waveform Display

・The acquisition of analog input waveform and graphic drawing is performed when meter run in single display screen (A channel, B channel), multi display screen (2 channel) or graphic display screen, while the contents of item in 8-1. and 8-2. are satisfied.
Graphic drawing is performed in the background in case of single display screen and multi display screen.
Display the drawn graph (In case of multi-display screen only for Ach) by "SINGLE" key or "MULTI" key
For details, refer to「4-6. Functional Description」.

8-1. Necessary Conditions for Display

1) Select the start condition for the acquisition of analog input waveform and graphic drawing from the following start types (4 types). Set start type on「13. Graphic Display Setting (Graph Disp)」.
(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.
* Caution:
In case of Wave Ach, Wave Bch or W&D be selected at「6. Basic Function Setting (Setup) 1) Meter Setup」, operation is performed by the above (4) E.S. + W.S., irrespective of the above setting.

2) In case of the above (3) (4) Wave Start Level be selected, wave start condition is supplemented.
Set Wave Start Level and Start Condition at「11. Hold Function (Hold)」.
・Start Condition has following 5 items.

Pass	: when the indicated value crossed the set value of Wave Start Level in (+) or (-) direction,	start acquisition of waveform and graphic drawing.
Rising Edge	: when the indicated value crossed the set value of Wave Start Level in (+) direction,	
Trailing Edge	: when the indicated value crossed the set value of Wave Start Level in (-) direction,	
More	: when the indicated value is larger than the set value of Wave Start Level,	
Less	: when the indicated value is smaller than the set value of Wave Start Level,	

3) The acquisition of waveform and graphic drawing is finished when STOP signal (or "START" key) turned ON, or 2048 points of waveform are acquired.
4) In case of "START" key and START signal turned ON at the same time, priority is given to input of START signal ON.
After starting the acquisition of waveform and graphic drawing by START signal ON, it can be cancelled by "START" key ON.
The acquisition of waveform and graphic drawing can't be started by "START" key ON, while START signal be ON status.
・START signal, STOP signal is active when turned from OFF to ON.
・The minimum width of START, STOP must be more than Td + 1ms.
Td = 1/Sampling Cycle. For example, sampling of 500 times/second means Td = 2ms.
5) In case of comparison output OUT1(HH), OUT2(HI), OUT4(LO), OUT5(LL) turned ON in acquisition of waveform, waveform is updated in Rejection Data Store automatically.
However, if the setting of Rejection Data Store is "OFF", no updating is available.
(For details, refer to「13. Graphic Display Setting (Graph Disp) 10) Rejection Data Read」).

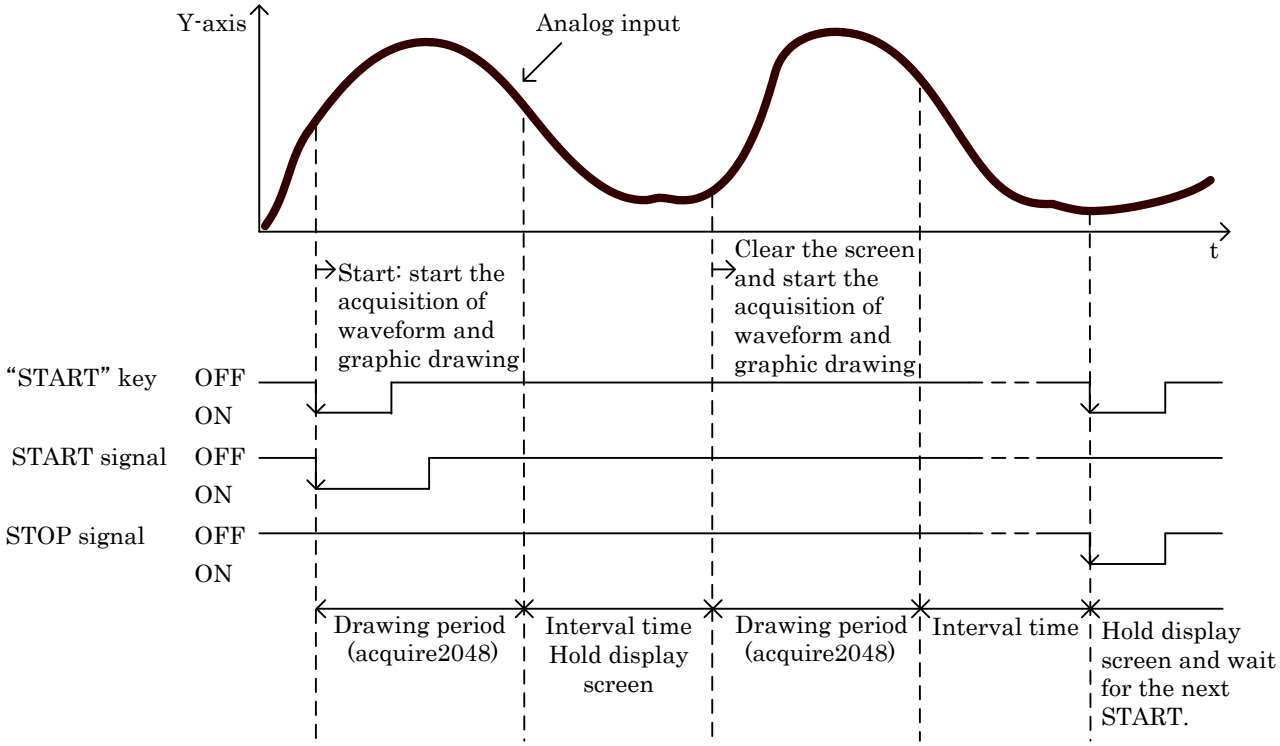
8-2. Start Type

(1) Case of Free Run

・When "START" key or START signal turns ON, start the acquisition of waveform and graphic drawing. When the acquisition of 2048 points of waveform is finished, hold the display screen at intervals time, then clear the screen and start the next acquisition of waveform and graphic drawing at the same time. Repeat the above operation until "START" key or STOP signal turns ON

・Set interval time at「13. Graphic Display Setting (Graph Disp)」.

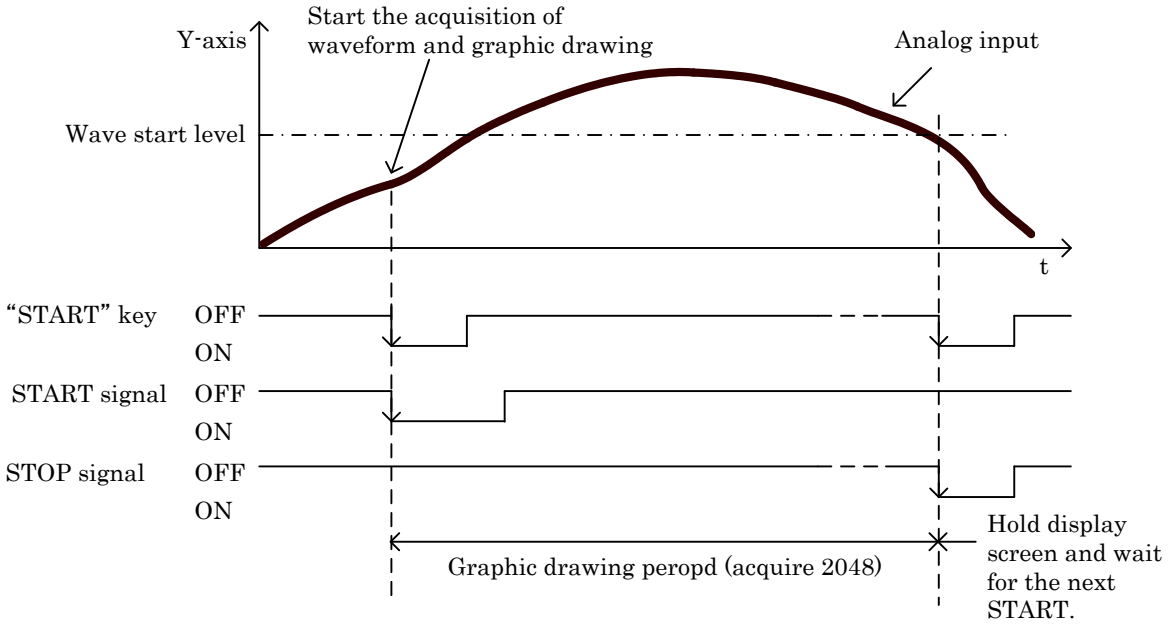
・When "START" key or STOP signal turns ON, stop the acquisition of waveform and hold the display screen, wait the next "START" key or START signal turning ON.



(2) Ext. Signal (START signal)

・When "START" key or START signal turns "ON", clear the screen and start the acquisition of waveform and graphic drawing. If "START" key or STOP signal turns ON during the time, cancel the drawing, or if the acquisition of 2048 points of waveform is finished, hold the display screen. Wait the next "START" key or START signal turning ON.

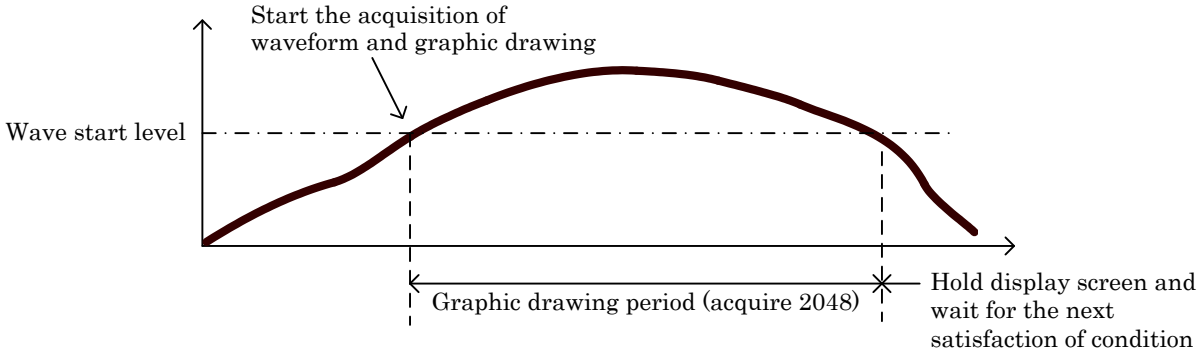
・Wave Start Level is not used.



(3) Wave Start Level

・When the indicated value satisfies「Wave Start Level + Start Condition」, clear the screen and start the acquisition of waveform and graphic drawing.
When the acquisition of 2048 points of waveform is finished, hold the display screen.
Wait the next satisfaction of「Wave Start Level + Start Condition」.
・"START" key or START signal is not used.

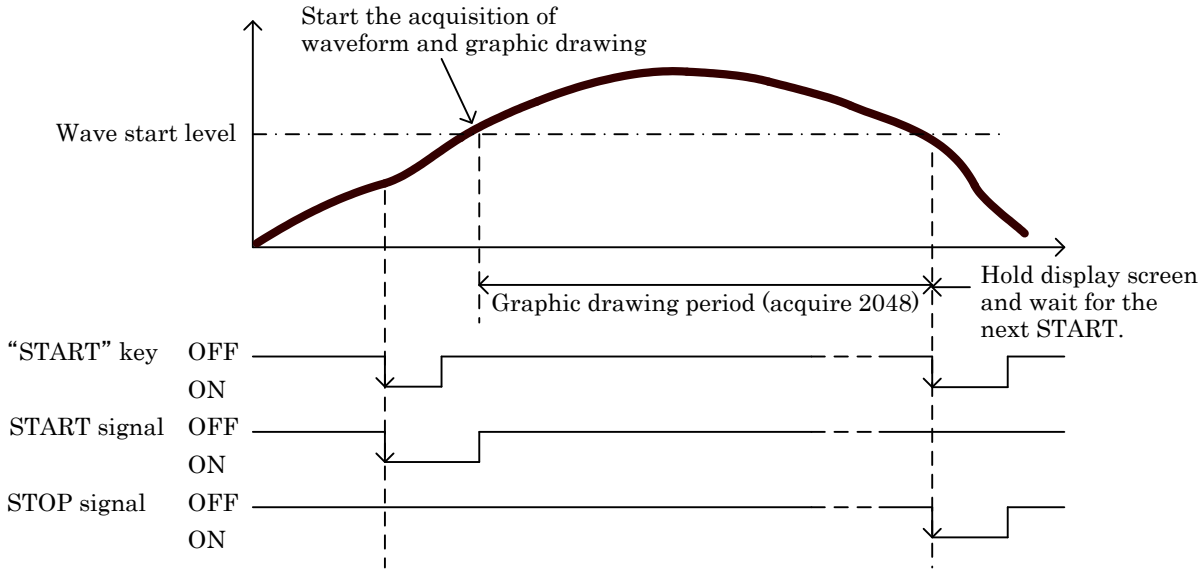
Example : Start Condition ＝ Case of Rising Edge



(4) E.S. + W.S

・When "START" key or START signal turns ON, and the indicated value satisfies「Wave Start Level + Start Condition」, clear the screen and start the acquisition of waveform and graphic drawing.
・If "START" key or STOP signal turns ON during the time, cancel the drawing, or if the acquisition of 2048 points of waveform is finished, hold the display screen.
Wait the next "START" key or START signal turning ON.

Example : Start Condition = Case of Pass



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

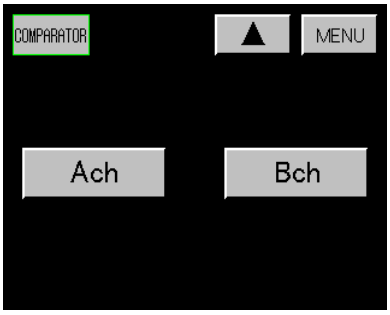
・Setting procedure → "MODE" key → Caution Screen for Starting Setting → Main setting screen → "COMPARATOR" key

・When using the comparison set value, set it as follows on「6. Basic Function Setting (Setup) 1) Meter Setup」.

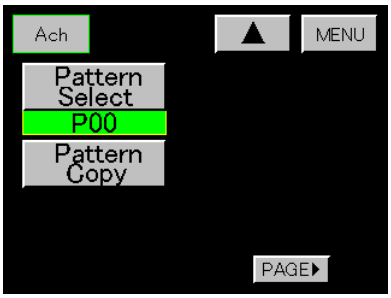
Selection of meters
- (1) A channel
- (2) B channel
- (3) 2 channel

・Set each set value on each of Ach and Bch.

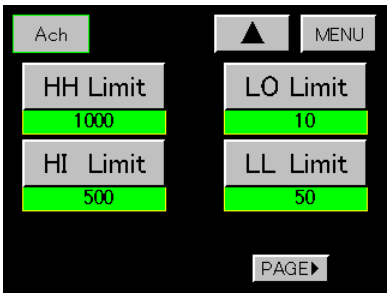
Itemized setting screen 1/5



Itemized setting screen 2/5



Itemized setting screen 3/5



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

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

・Setting range：0 to 15

* Select a Pattern Select 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" or "Rank" are selected as Comparison output type (Type) on 6), some setting conditions are provided.

(For details, refer to「10-2. 2) Area type (Area), 3) Rank type (Rank)」)

* 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 10-key input value of 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

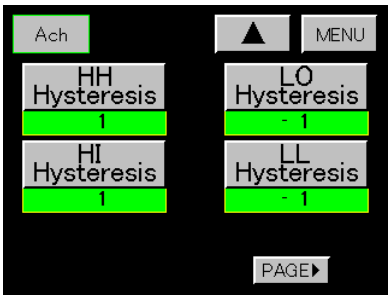
HH set value (HH Limit)

HI set value (HI Limit)

LO set value (LO Limit)

LL set value (LL Limit)

Itemized setting screen 4/5



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

(For details, refer to「10-2. 2) Area type (Area), 3) Rank type (Rank)」)

* 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 10-key input 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

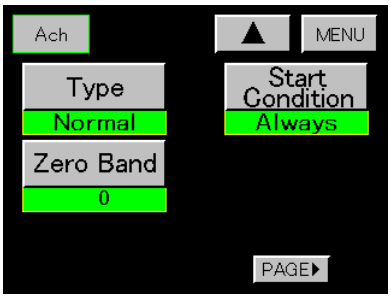
HH hysteresis set value (HH Hysteresis)

HI hysteresis set value (HI Hysteresis)

LO hysteresis set value (LO Hysteresis)

LL hysteresis set value (LL Hysteresis)

Itemized setting screen 5/5



6) Comparison output type (Type)

・Set a Type of comparison output (Type) on t he set-value select screen.

・Setting items

(1) Normal
(2) Area
(3) Rank

For contents of operation, refer to 「10. Comparison Operation」.

7) Zero Band

・Set 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 (Start Condition) given in the next paragraph.

8) Comparison output start conditions (Start Condition)

・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 range.

(For description of (3) Motion, refer to 4) of「6. Basic Function Setting (Setup)」.)

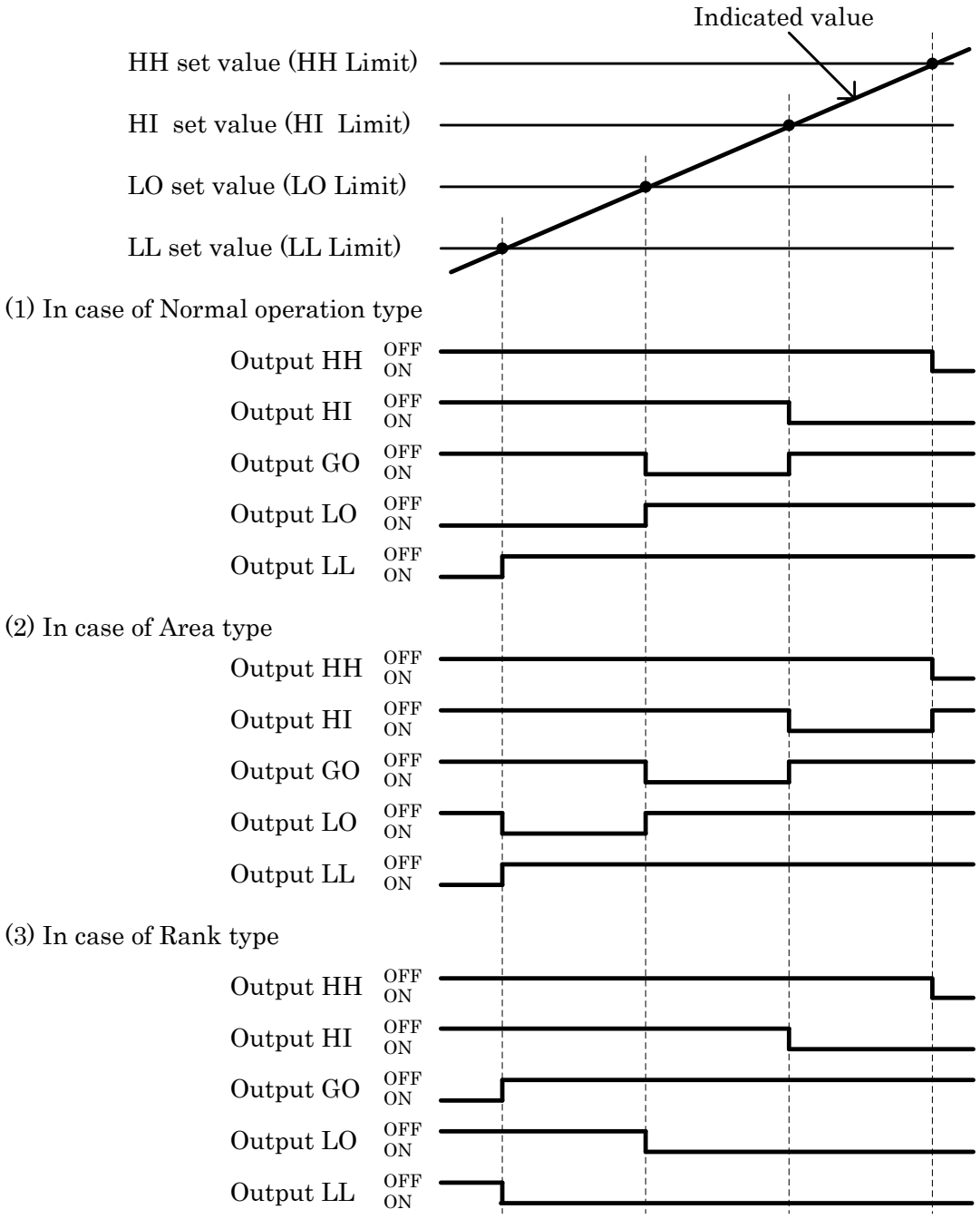
10. Comparison Operation

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

10-1. Comparison Output Type (Type)

A Comparison output type (Type) can be selected from among 3 types.

(It corresponds to A channel, B channel, and 2 channel.)



10-2. Comparison Set Value

1) Normal operation type (Normal)

・Comparison set value：setting range　±99999

・Setting conditions：no limit to the value and hysteresis set value.

・Hysteresis set value：setting range　±0 to 9999

When setting the hysteresis set value, also set the polarity to decide the comparison operation.
In case of polarity "+", plus mode operation will be performed, each hysteresis value is：(each set value) - (＋each hysteresis set value).
In case of polarity "-", minus mode operation will be performed, each hysteresis value is：(each set value) - (-each hysteresis set value).

・Comparison conditions

-->plus mode operation

Comparison output ON：indicated value ＞ each set value
Comparison output OFF：indicated value ≦ each set value - (＋each hysteresis set value).

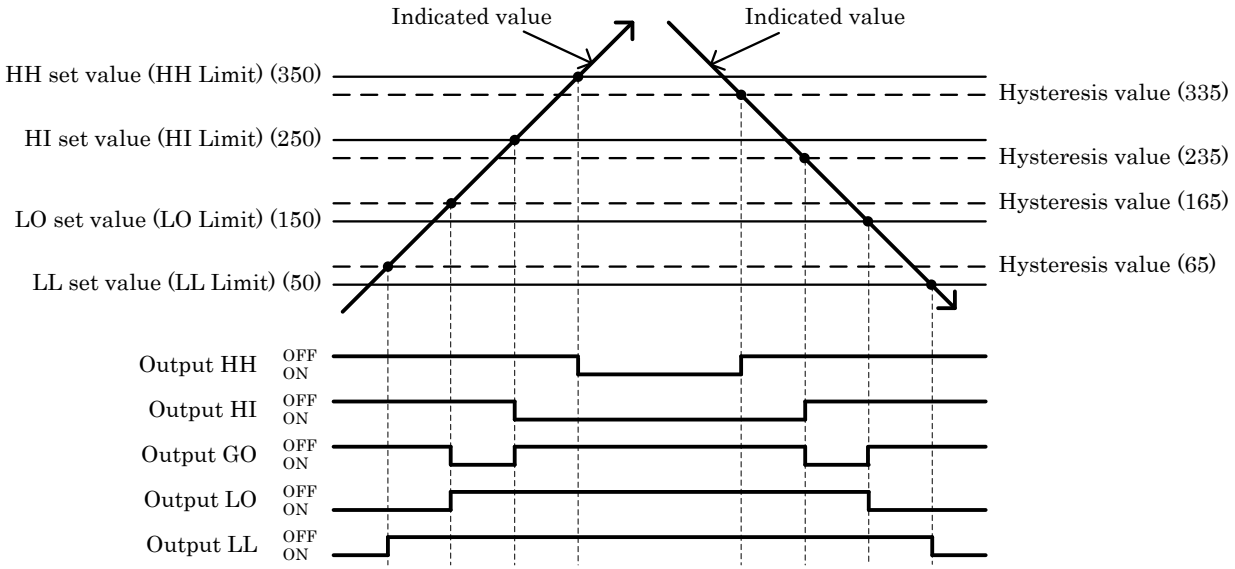
--> minus mode operation

Comparison output ON：indicated value ＜ each set value
Comparison output OFF：indicated value ≧ each set value - (-each hysteresis set value).

In case of comparison output being normal operation type, the mode can be changed between plus and minus for each set value individually, according to the polarity of hysteresis set value.

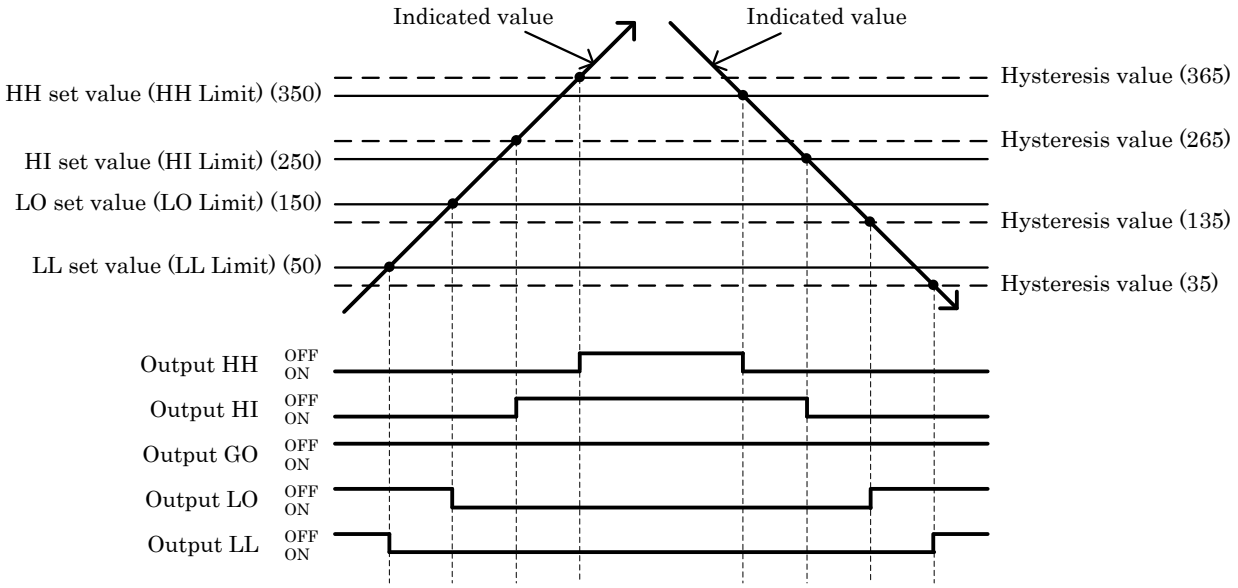
-->Setting example 1(plus mode operation)

Each set value		Each hysteresis set value	Each hysteresis value
HH Limit	350	HH Hysteresis +15	350-15=335
HI Limit	250	HI Hysteresis +15	250-15=235
LO Limit	150	LO Hysteresis -15	150+15=165
LL Limit	50	LL Hysteresis -15	50+15= 65



--> Setting example 2(minus mode operation)

Each set value		Each hysteresis set value	Each hysteresis value
HH Limit	350	HH Hysteresis -15	350+15=365
HI Limit	250	HI Hysteresis -15	250+15=265
LO Limit	150	LO Hysteresis +15	150-15=135
LL Limit	50	LL Hysteresis +15	50-15= 35



2) Area type (Area)

・Comparison set value : setting range ±99999

・Setting conditions : HH set value ＞ HI set value ＞ LO set value ＞ LL set value
(HH Limit) (HI Limit) (LO Limit) (LL Limit)
Each set value should be set according to setting conditions.
Setting can't be performed if conditions are not satisfied.

・Hysteresis : not used.

3) Rank type (Rank)

・Comparison set value : setting range ±99999

・Hysteresis set value : setting range ±0 to 9999
Polarity of hysteresis (HH Hysteresis to LL Hysteresis) is automatically set to "+", operating as plus mode.

・Setting conditions : for each comparison set value, hysteresis set value.
・(HH set value) - (+HH Hysteresis) ≧ HI set value
(HH Limit) - (+HH Hysteresis) ≧ HI Limit
・(HI set value) - (+HI Hysteresis) ≧ LO set value
(HI Limit) - (+HI Hysteresis) ≧ LO Limit
・(LO set value) - (+LO Hysteresis) ≧ LL set value
(LO Limit) - (+LO Hysteresis) ≧ LL Limit
Each set value should be set according to setting conditions.
Setting can't be performed if conditions are not satisfied.

11. 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.

・When「6. Basic Function Setting (Setup) 6) Input ON Delay」is set, it is adopted.
(Input ON Delay is used for STA/STB signal and "HOLD" key.)

* Caution
When STA/STB signal be 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, Input ON Delay operation is also stopped.)

・"HOLD" key is active in the A channel, B channel, and 2 channel to be set on「6. Basic Function Setting (Setup)」. In case of the multi display screen, it is active in both Ach and Bch.

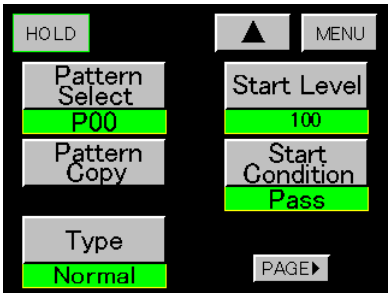
・"HOLD" key can be used in A channel, B channel (single display screen), and 2 channel (multi-display screen).

When "HOLD" key is turned ON in 2 channel (multi display screen), Ach and Bch (single display screen) operate simultaneously. Turning ON "HOLD" key with both STA/STB signals turned ON will not be accepted. Priority is given to STA/STB signal.

11-1. Hold Function Setting

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

Itemized setting screen 1/3



1) Pattern Select
・Set a pattern to be set on the set-value select screen.
Setting range : 0 to 15
*Select a Pattern Select 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 motion	(Normal)
(2) Sample hold	(Sample)
(3) Peak hold	(Peak)
(4) Valley hold	(Valley)
(5) Peak valley hold	(Peak Valley)
(6) Area peak hold	(Area Peak)
(7) Area valley hold	(Area Valley)
(8) Area peak valley hold	(Area Peak Valley)
(9) Time peak hold	(Time Peak)
(10) Time valley hold	(Time Valley)
(11) Time peak valley hold	(Time Peak Valley)
(12) Level + time peak hold	(Level + Time P)
(13) Level + time valley hold	(Level + Time V)
(14) Level + time peak valley hold	(Level + Time P-V)
(15) Level + maximal value hold	(Maximal Value)
(16) Level + minimal value hold	(Minimal Value)
(17) Level + Inflection point hold	(Inflection Point)

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 is held for output.

c) In case of graphic display screen, the indicated value of the point appropriate for the type of hold is held for output, "." is displayed for the waveform.

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 (Hold) or Waveform comparison (Waveform)

The Waveform start level (Start Level) is used for (12) "Level + Time P" to (17) "Inflection Point" of the above-mentioned 3) Hold type (Type), and waveform comparison.

It is also used when (3) Wave Start Level or (4) E.S. +W.S. is selected at「13. Graphic Display Setting (Graph Disp) 8) Start Type」.

For details, refer to「8. Operation of Waveform Display」.

・In case of Waveform & Displacement Comparison (W&D)

a) Set the Waveform start level (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.

b) Execute starting with the Waveform start level (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

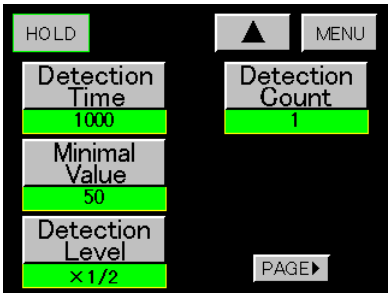
(2) Rising edge

(3) Trailing edge

(4) More

(5) Less

Itemized setting screen 2/3



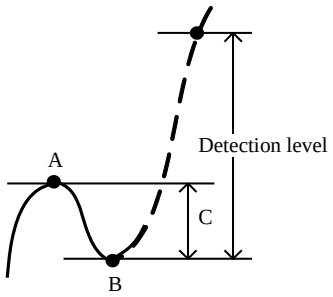
6) Detection Time

・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 (Td × set value). (Td = (1/sampling speed))



7) Maximal value and Minimal value hold

・Use it, when maximal value or minimal value hold is selected as a Hold Function (Hold).

Set minimal value, detection level, and detection count.

a) Detection minimal value (Minimal Value)

Set it on the 10-key input screen.

Setting ranges : 1 to 9999

b) Detection level (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 count (Detection Count)

Set it on the 10-key input screen.

Setting ranges : 1 to 9

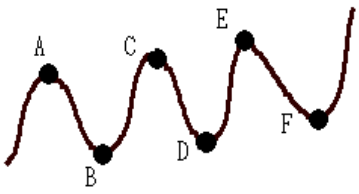
・Detection of maximal value and minimal value

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

・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.

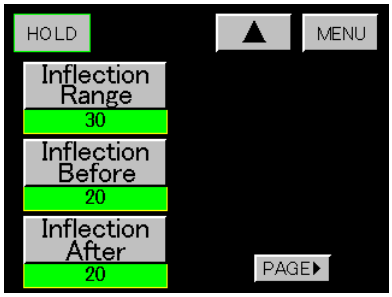
・In case of a waveform of which maximal value and minimal value repeat, the maximal value and minimal value of which number of times is set as a Detection Count is hold.



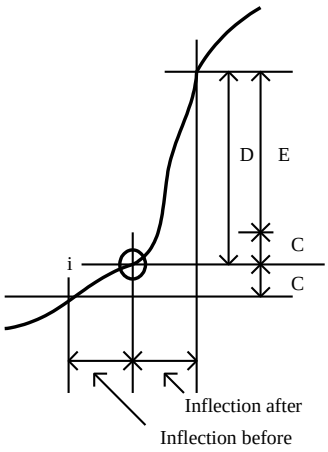
> Caution !
> When the indicated value contains much noise, the maximal value and minimal value of noise may be sometimes detected. Check the indicated value on the screen and set the proper minimal value (Minimal Value).

For example, at the setting of Detection Count = 3, E is held as maximal value and F as minimal value.

Itemized setting screen 3/3



Method of detecting point-of-inflection



(Usually, Inflection before = after)

8) Inflection point hold

・Use it when inflection point hold ((17)) is selected by the Hold Function (Hold).

Set the detected Inflection range, inflection before and inflection after.

a) Detected point of inflection value (Inflection Range)

Set it on the 10-key input screen.

Setting ranges : 1 to 99999

b) Detection time A (Inflection Before)

Detection time is (1/sampling speed × set value).

Set it on the 10-key input screen.

Setting range : 1 to 999

c) Detection time B (Inflection After)

Detection time is (1/sampling speed x set value).

Set it on the 10-key input screen.

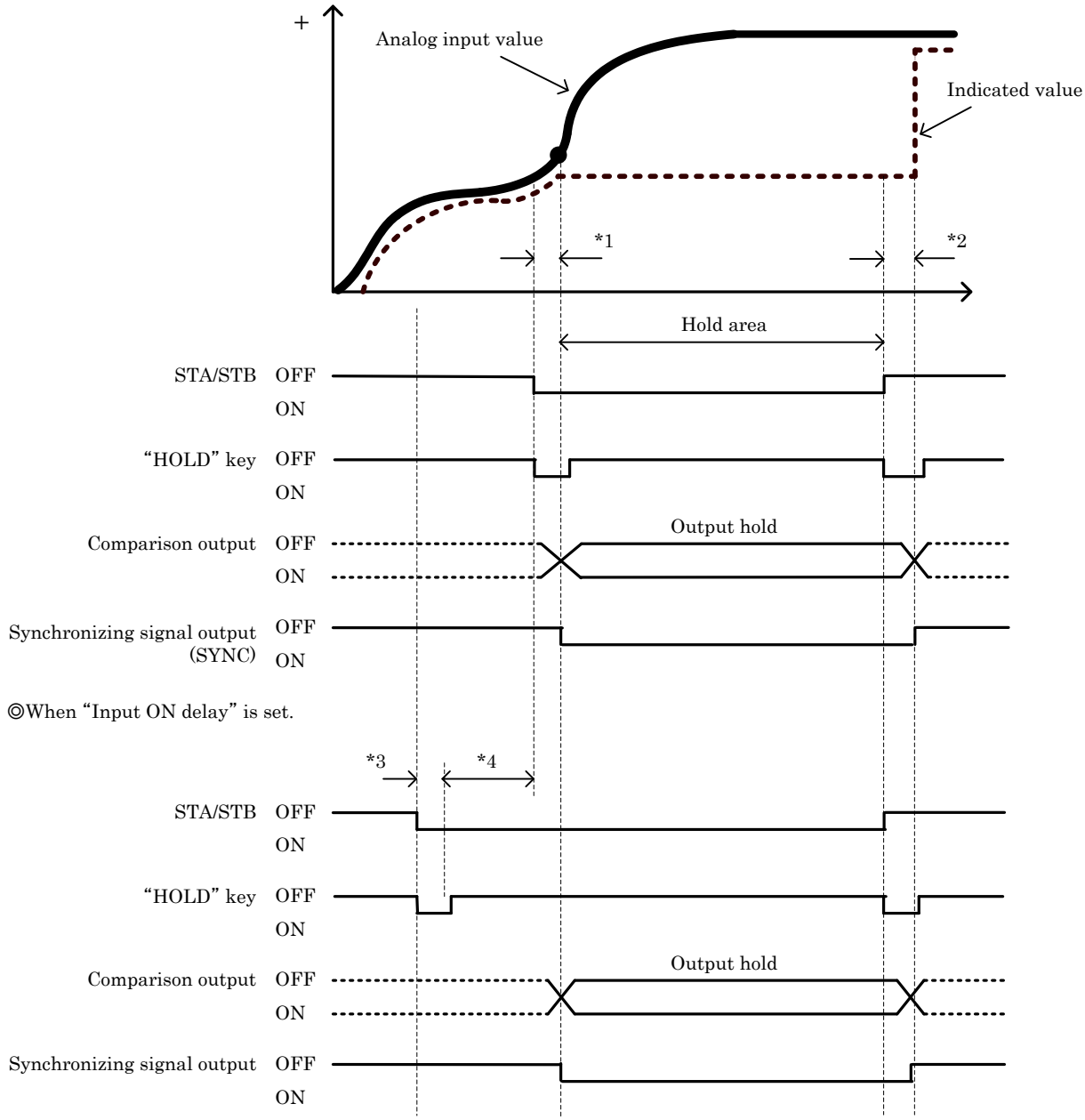
Setting ranges : 1 to 999

・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.

11-2. Sampling Hold

・Hold the indicated value when STA/STB signal is turned ON and output the result.



・While in hold, synchronizing signal output turns ON and continues in hold area.

*1 : The delay time from STA/STB signal turning ON to holding the indicated value: Td + 1.0ms (MAX)
*2 : The necessary delay time from STA/STB signal turning OFF to releasing hold for the indicated value : Td + 1.0ms (MAX)
*3 : The delay time from STA/STB signal turning ON to starting the timer of delay : Td ms (MAX)
*4 : Input ON delay time : set time　0.001 to 4.999 seconds

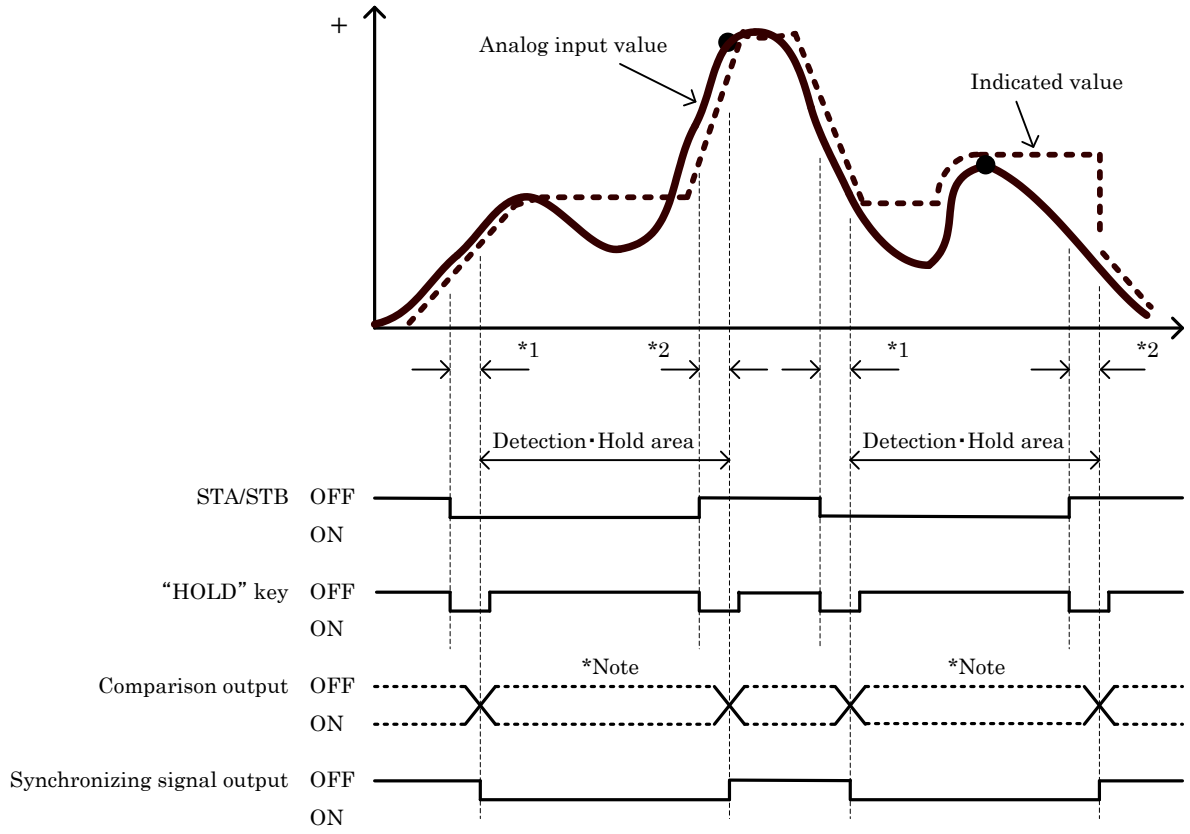
*Caution

・Input ON Delay is performed after setting in「6. Basic Function Setting (Setup)」.
Input ON Delay is available in「11-2. Sampling Hold to 11-9. Maximal, Minimal, and Inflection Point Hold」. But not used in「11-8. Level + Time Hold」.

・For time setting, priority is given to Td and other settings less than Td are considered as same setting. Td = 1/sampling speed.
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.

11-3. Peak Hold

・Hold the peak value when STA/STB signal is "ON".



・While in detection・hold, synchronizing signal output turns ON and continue in Detection・Hold area.

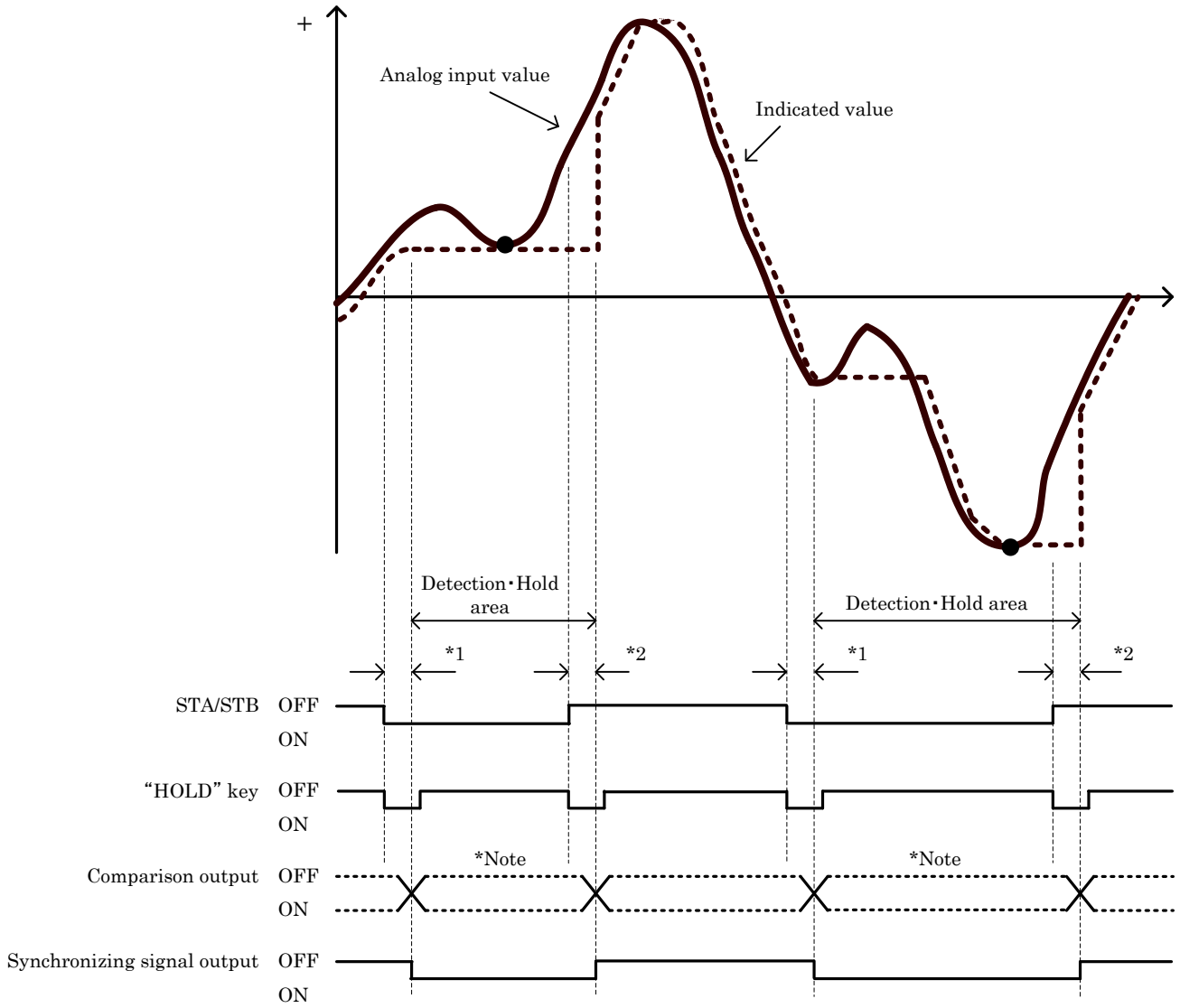
* Note : The comparison output changes with the change of analog input value.
(Perform the comparison with the indicated value of dotted-line)

*1 : The delay time from STA/STB signal turning ON to holding the indicated value: Td + 1.0ms (MAX)

*2 : The necessary delay time from STA/STB signal turning OFF to releasing hold for the indicated value : Td + 1.0ms (MAX)

11-4. Valley Hold

・Hold the value when STA/STB signal is "ON".



・While in detection・hold, synchronizing signal output turns ON and continue in Detection・Hold area.

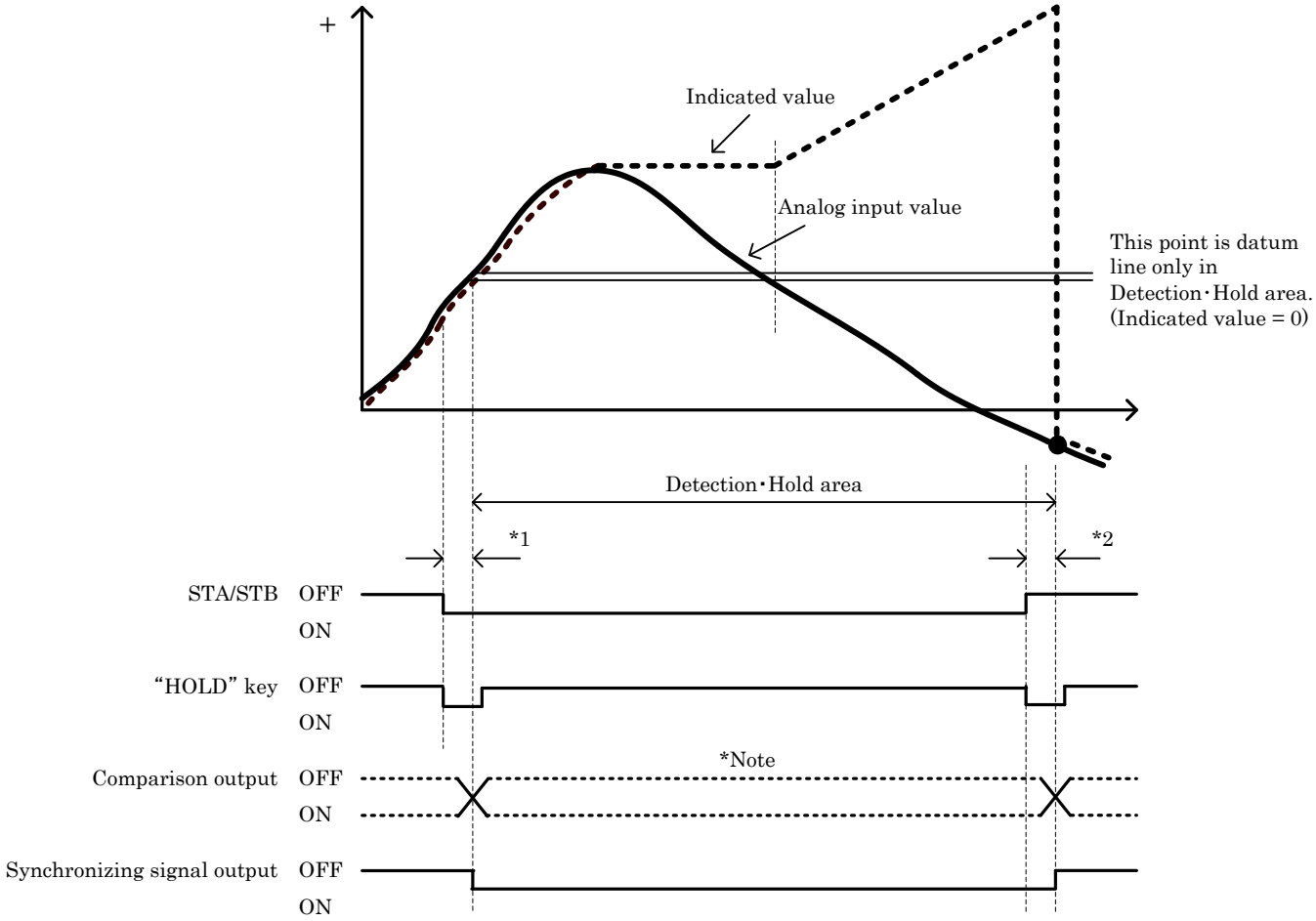
*Note : The comparison output changes with the change of analog input value.
(Perform the comparison with the indicated value of dotted-line)

*1 : The delay time from STA/STB signal turning ON to holding the indicated value: Td + 1.0ms (MAX)

*2 : The necessary delay time from STA/STB signal turning OFF to releasing hold for the indicated value : Td + 1.0ms (MAX)

11-5. Peak Valley Hold

・Hold the maximum of difference (peak value - valley value) from STA/STB signal turned ON.



・While in detection・hold, synchronizing signal output turns ON and continue in Detection・Hold area.

* Note : The comparison output changes with the change of analog input value.
(Perform the comparison with the indicated value of dotted-line)

*1 : The delay time from STA/STB signal turning ON to holding the indicated value: Td + 1.0ms (MAX)

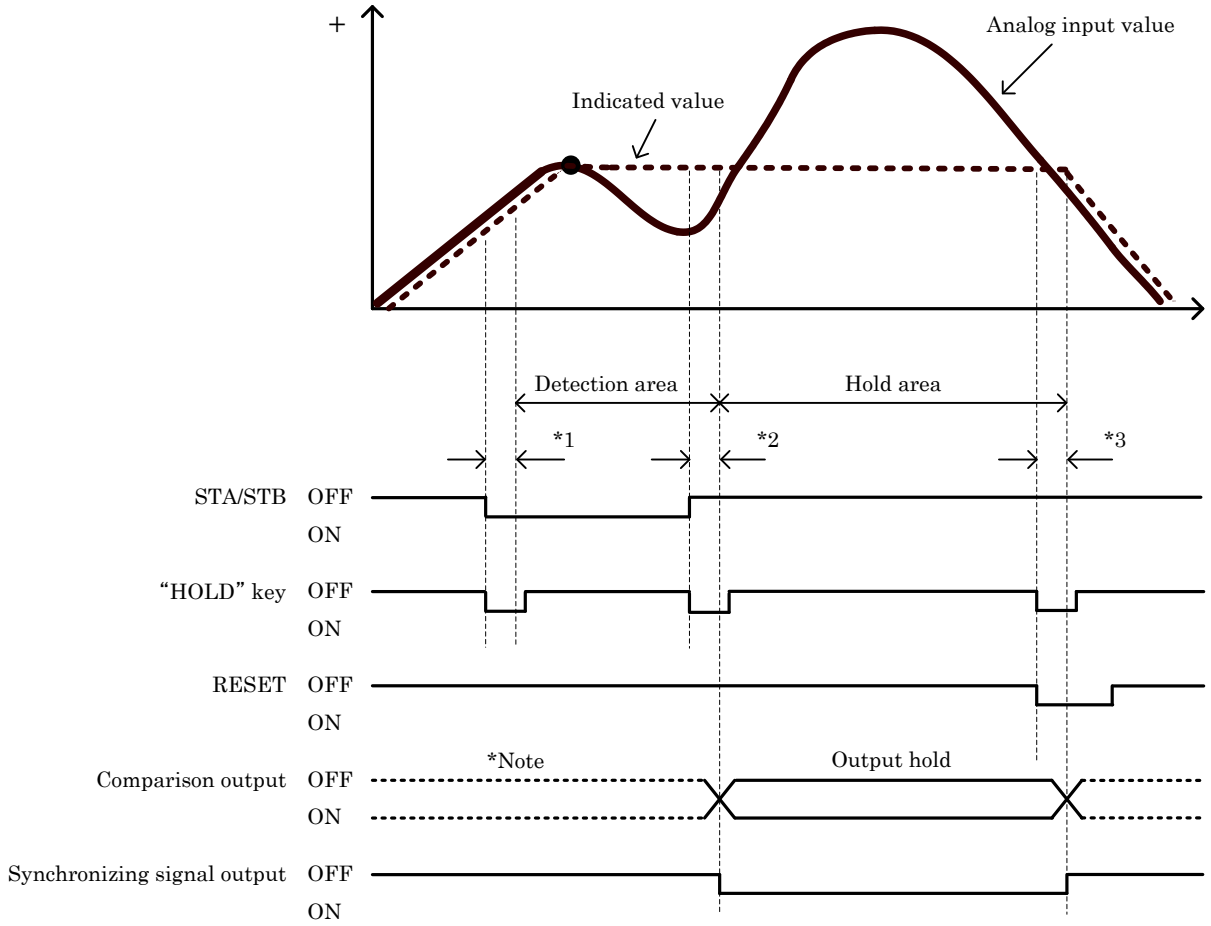
*2 : The necessary delay time from STA/STB signal turning OFF to releasing hold for the indicated value : Td + 1.0ms (MAX)

11-6. Area Hold　(For peak, valley and peak-valley)

・Area of hold detection is determined by STA/STB signal.

・The release of hold is performed by RESET signal ON or "HOLD" key.
But can't be released in detection area.

Example : Area peak hold



・While in hold, synchronizing signal output turns ON and continue in Hold area.

*Note : The comparison output changes with the change of analog input value.
(Perform the comparison with the indicated value of dotted-line)

*1 : The delay time from STA/STB signal turning ON to holding the indicated value: Td + 1.0ms (MAX)

*2 : The delay time from STA/STB signal turning OFF to holding the indicated value and output :
Td + 1.0ms (MAX)

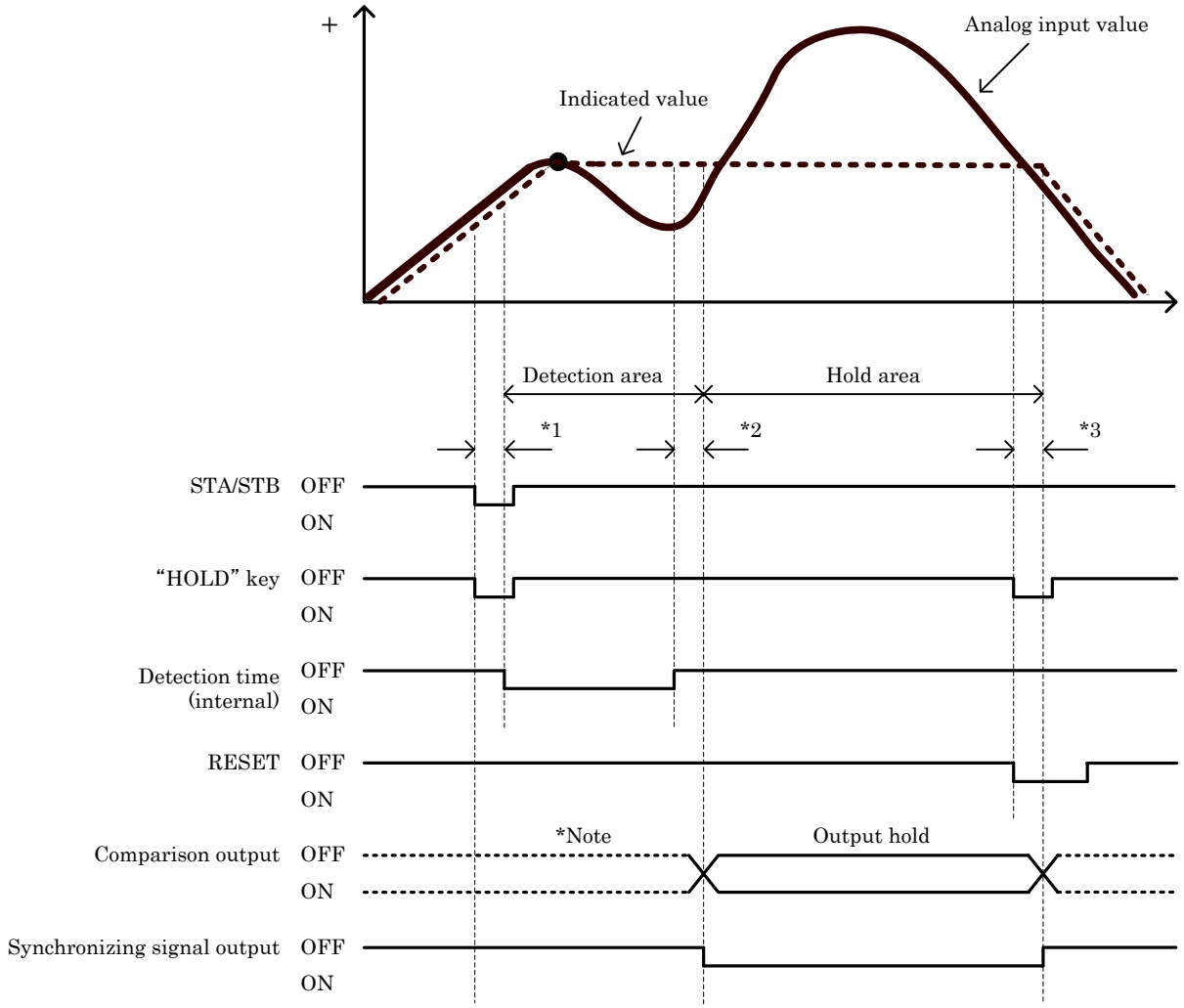
*3 : The minimum width of RESET signal from RESET signal turning ON to releasing hold :
Td + 1.0ms (MIN)

11-7. Time Hold　(For peak, valley and peak-valley)

・Start the detection time and enter the hold detection area when STA/STB signal turned ON.

・The release of hold is performed by RESET signal ON or "HOLD" key.
But can't be released in detection area.

Example : Time peak hold



・While in hold, synchronizing signal output turns ON and continue in Hold area.

*Note : The comparison output changes with the change of analog input value.
(Perform the comparison with the indicated value of dotted-line)

*1 : The delay time from STA/STB signal turning ON to starting the hold detection: Td + 1.0ms (MAX)

*2 : The delay time from the end of detection time to holding the indicated value and output :
Td + 1.0ms (MAX)

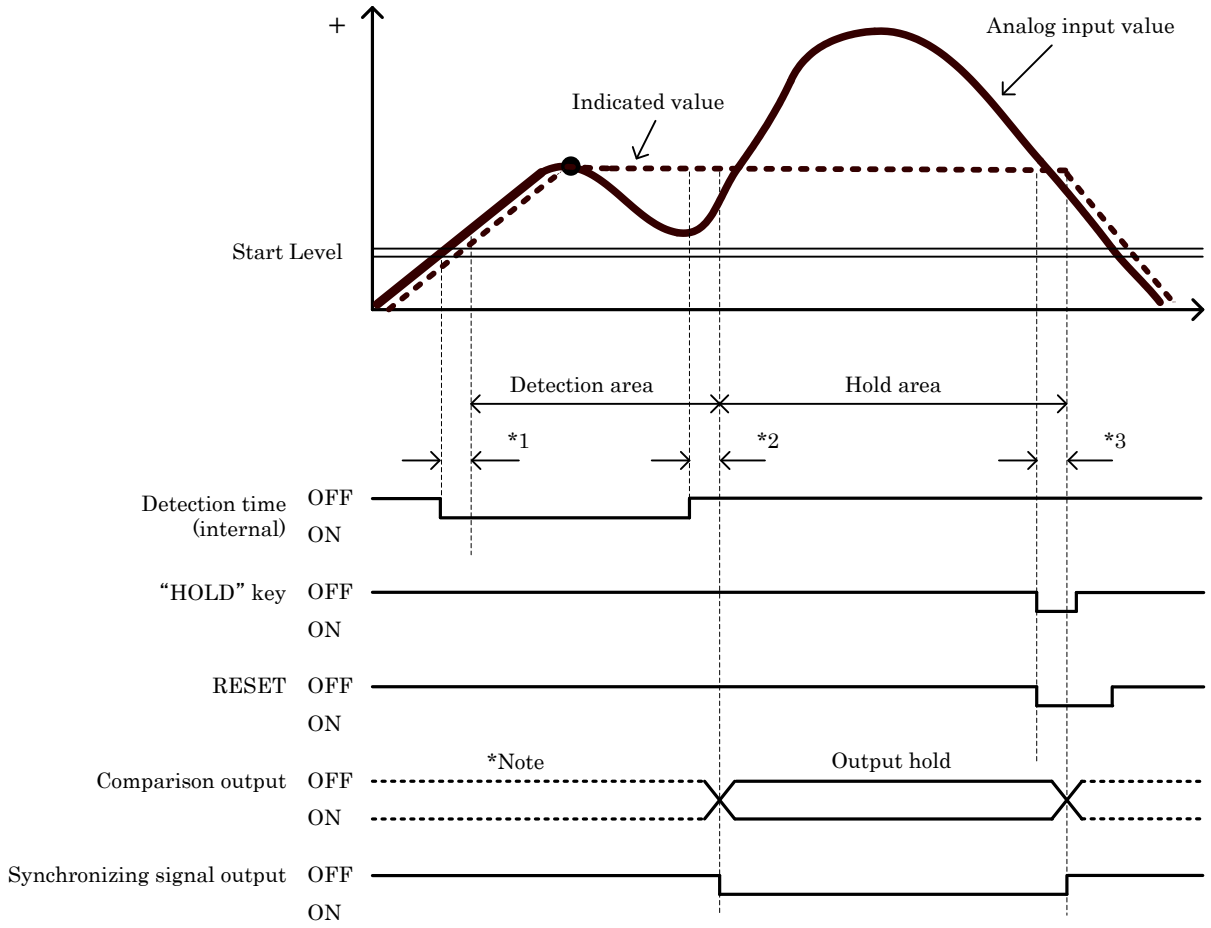
*3 : The minimum width of RESET signal from RESET signal turning ON to releasing hold :
Td + 1.0ms (MIN)

11-8. Level＋Time Hold　(For peak, valley and peak-valley)

・Start the Detection Time and enter the hold detection area when the indicated value satisfied (Start Level + Start Condition).

・The release of hold is performed by RESET signal ON or "HOLD" key.
But can't be released in detection area.

Example：Level + Time hold (Start Level＝Rising Edge)



・While in hold, synchronizing signal output turns ON and continue in Hold area.

*Note：The comparison output changes with the change of analog input value.
(Perform the comparison with the indicated value of dotted-line)

*1：The delay time from the indicated value exceeding the Start Level to starting the hold detection：
Td ms (MAX)

*2：The delay time from the end of detection time to holding the indicated value and output：
Td + 1.0ms (MAX)

*3：The minimum width of RESET signal from RESET signal turning ON to releasing hold：
Td + 1.0ms (MIN)

11-9. Maximal, Minimal and Inflection Point Hold

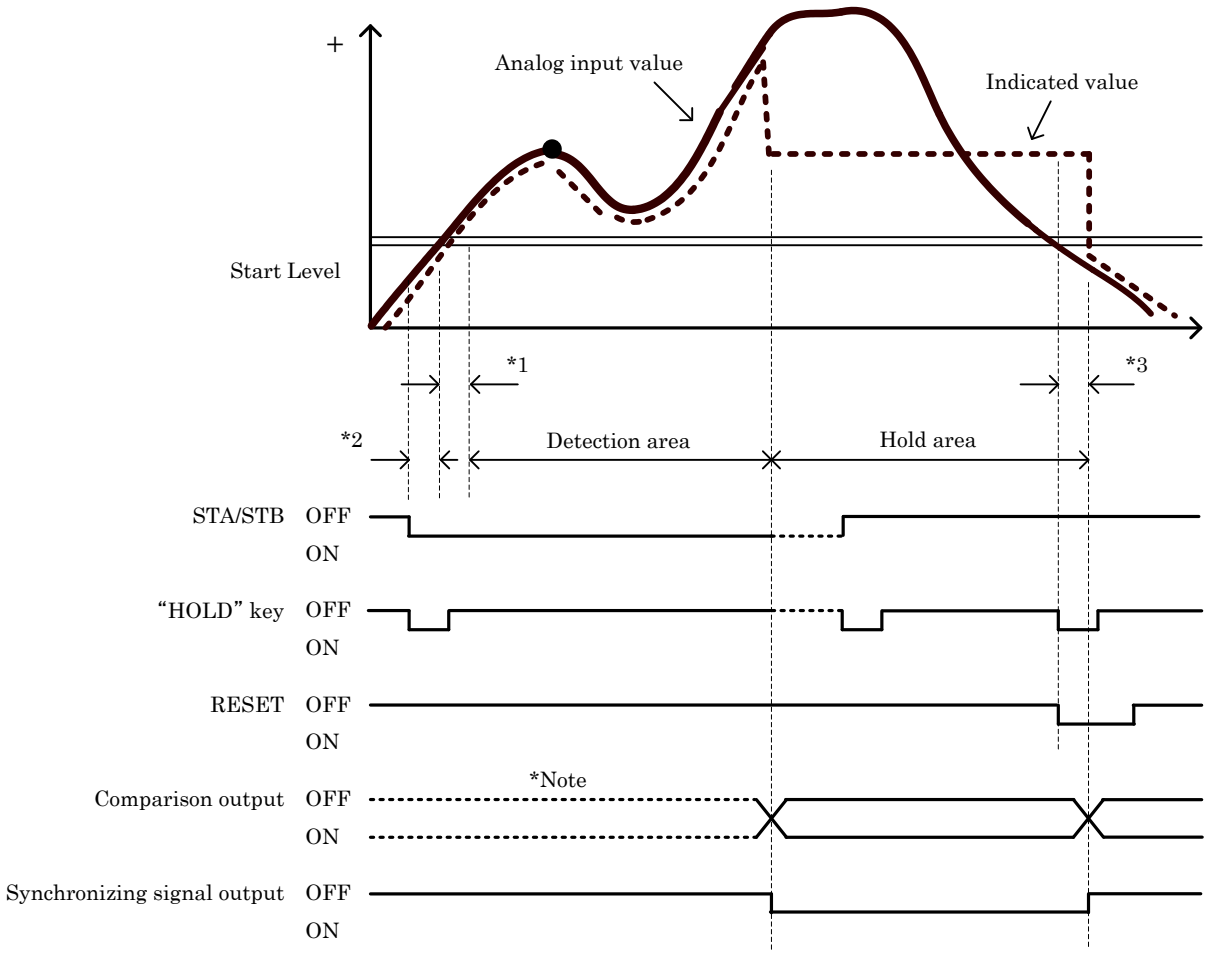
・After the STA/STB signal turned "ON", and the indicated value satisfied「Start Level + Start Condition」, perform the detection until STA/STB signal turns "OFF".

・Hold will not be done when STA/STB signal turns OFF or "HOLD" key is pressed during the detection area.

・The detected maximal value and minimal value depends on the Detection Count.

・The release of hold is performed by RESET signal ON or "HOLD" key.
But can't be released in detection area.

Example : Maximal hold (Start Level＝Rising Edge)



・While in hold, synchronizing signal output turns ON and continue in Hold area.

*Note : The comparison output changes with the change of analog input value.
(Perform the comparison with the indicated value of dotted-line)

*1 : The delay time from the indicated value exceeding the Start Level to starting the hold detection : Td ms (MAX)

*2 : The delay time from STA/STB signal turning ON to starting detection of start level for the indicated value : Td + 1.0ms(MAX)

*3 : The minimum width of RESET signal from RESET signal turning ON to releasing hold : Td + 1.0ms (MIN)

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

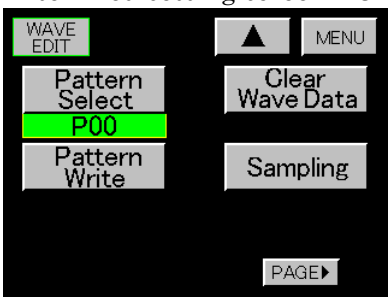
・Waveform Comparison / Waveform & Displacement Comparison (Waveform) is, perform the A/D conversion of the analog input waveform which changes with time or displacement, compare the converted value (indicated value) with HI/LO limit waveform set-values, then output the result.

・The operating state can be easily checked and quality judgment can be performed.

12-1. Various Setting and Correction Methods

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

Itemized setting screen 1/3



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 Pattern Select 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.

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 1/3.
*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

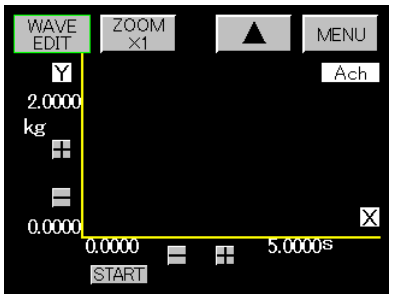
Displays itemized setting screen.

ZOOM X1 Enlarges the screen.

Moves the screen.

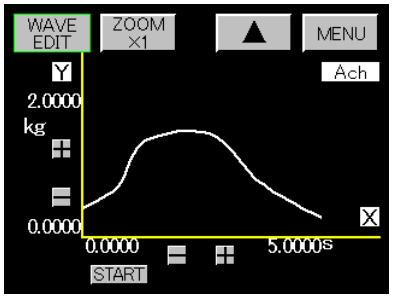
4) Waveform sampling (Sampling)

・Samples a waveform to be used as reference when making a comparison waveform.



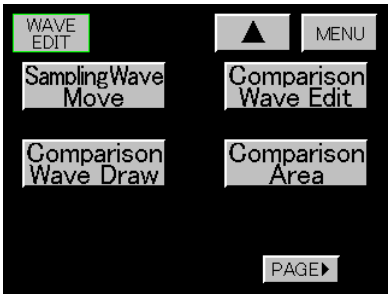
・Sampling is started by START signal ON, after pressing "START" key.

・Waveform sampling is started from the time of satisfying「Start Level + Start Conditions」.



・Checks the sampled waveform.

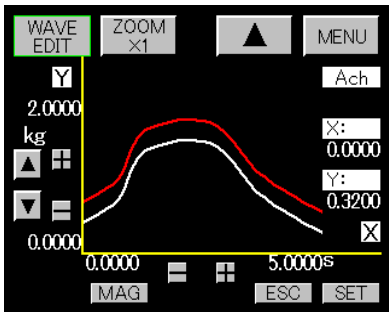
Itemized setting screen 2/3



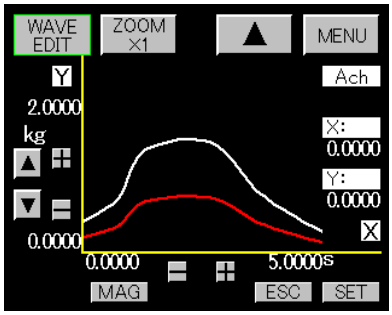
5) Sampling waveform movement (Sampling Wave Move)

・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.

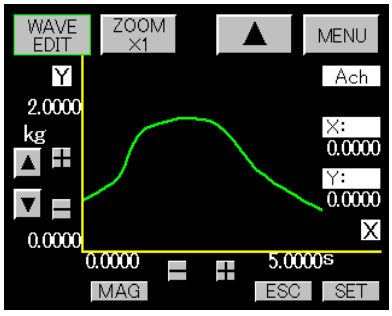


・ ▲ ▼ Used to move the waveform up and down.



・Enlarge or reduce the waveform vertically with the "MAG" key.
Enter at a scaling of 1 to 250% on the 10-key input screen.
(When setting at 100%, no scaling is performed.)
"ESC" key is used to return to the waveform used before scaling.

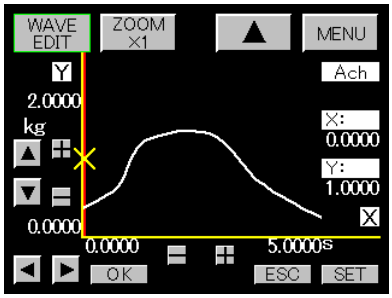
・When waveform preparation is completed, press "SET" key to save the comparison waveform in the buffer temporarily.
(The prepared waveform turns into green.)



6) Comparison waveform drawing (Comparison Wave Draw)

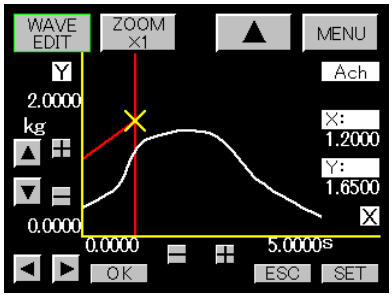
・Move the cursor on the screen to determine a point and prepare a comparison waveform by connecting between points with a straight line.

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



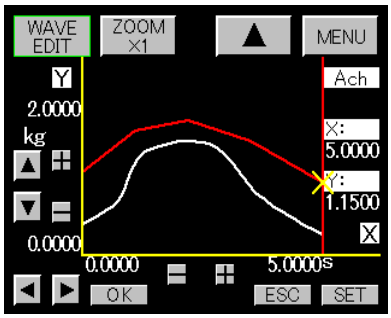
・ ▲ ◀ ▶ ▼ Move the cursor with the key, determine a drawing starting point, and press "OK" key to set it.

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

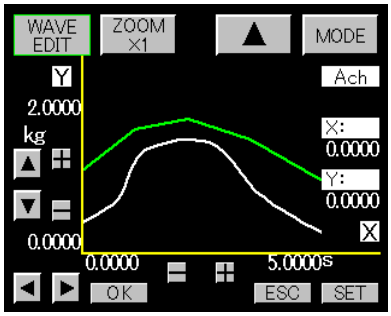


・When the cursor is moved furthermore to determine the next drawing point and press "OK" key, so that the last determined points are connected with a straight line.

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



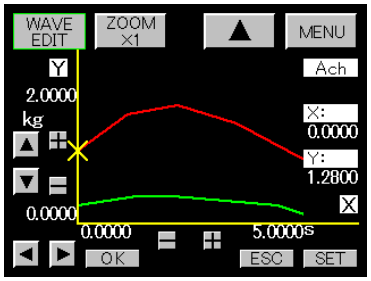
・Draw a waveform by repeating the above-mentioned procedure.



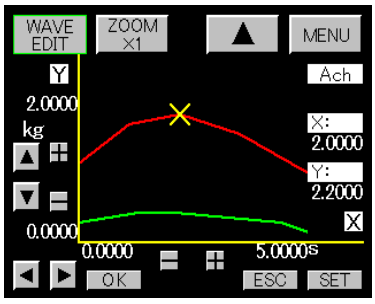
・When drawing is completed, press "SET" key to save the comparison waveform in the buffer temporarily.
(The prepared waveform turns into green.)

7) Comparison waveform edit (Comparison Wave Edit)

・Correct the prepared comparison waveform.

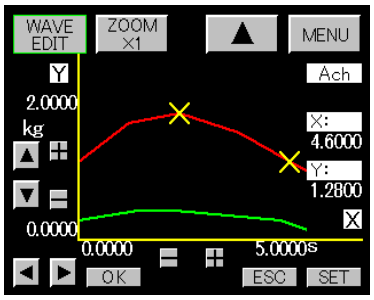


・Select a waveform (HI Limit waveform or LO Limit waveform) to be edited with "Up/down cursor" key.



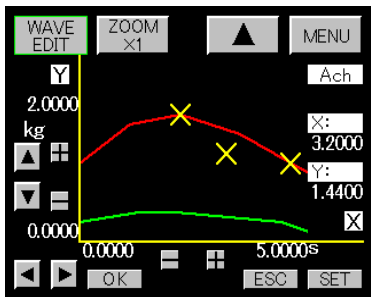
・Move the cursor, determine an edit starting point, and press "OK" key.

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

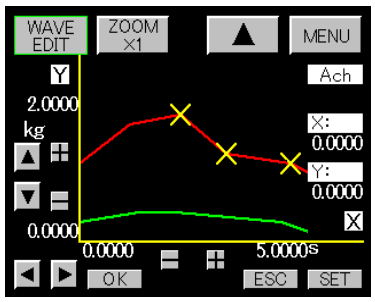


・Move the cursor, determine an edit end point, and press "OK" key.

Pressing "ESC" key after completion of setting will reset the edit ending.

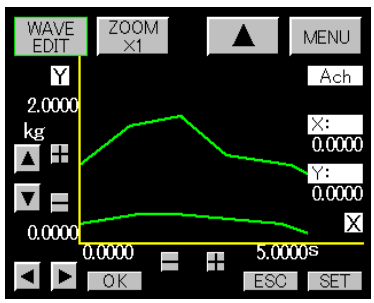


・Move the cursor, determine an edit pass point, and press "OK" key.



・A straight line connecting the edit starting point-Pass point and edit end point is prepared.

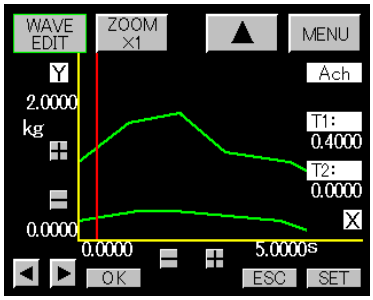
Pressing "ESC" key will reset the edit pass point.



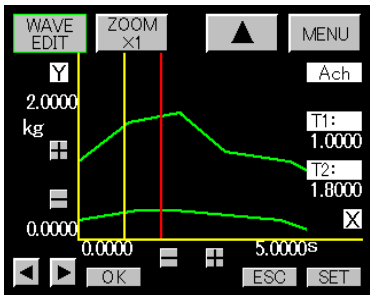
・When editing is completed, press "SET" key to save the comparison waveform in the buffer temporarily.

8) Comparison area setting (Comparison Area)

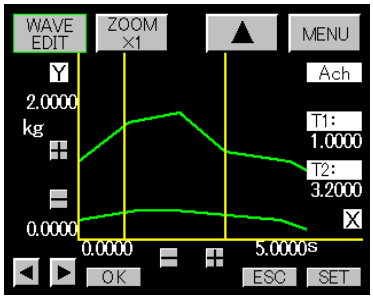
・Determine the starting point/end point of the comparison range, and set the waveform portion for comparison.



・ ◀ ▶ 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.

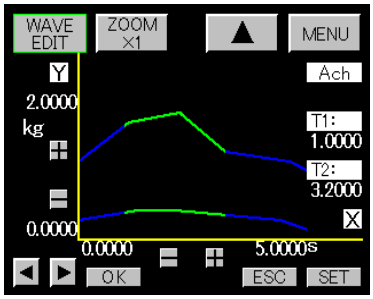


・Move the cursor furthermore and determine the end point of the comparison area.



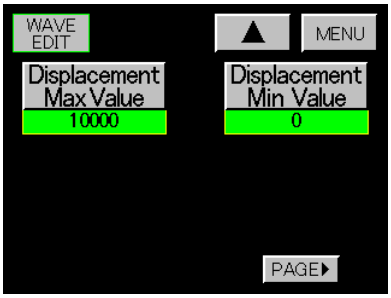
・Determine the end point of the comparison area with "OK" key.

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.

Itemized setting screen 3/3



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 (6) W&D is selected by 「6. 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.

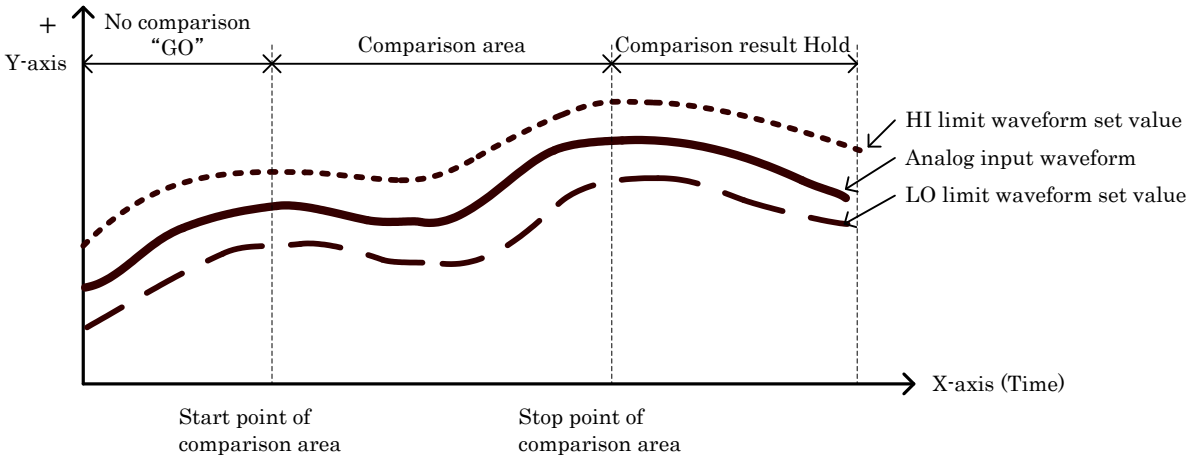
12-2. Waveform Comparison (X-axis = Time)

・Compare the analog input waveform (indicated value) which changes along with the time with HI/LO limit waveform set values, then output the result.

2048 HI/LO limit waveform set values are saved in each pattern. Comparison is performed in order from the start point of comparison area to the stop point of comparison area. Comparison result is held after the stop point of comparison area.

・When analog input waveform is outside the setting range of HI/LO limit waveform, output of "HI" / "LO" will be set to ON. If the output of "HI" / "LO" isn't ON, "GO" will be set to ON.

Comparison Condition	Comparison Result
Analog input waveform (indicated value) ＞ HI limit waveform set value	"HI" output ON
Analog input waveform (indicated value) ＜ LO limit waveform set value	"LO" output ON



12-3. Waveform & Displacement Comparison (W&D) (X axis=Displacement)

・Compare analog input waveform (indicated value) which changes along with displacement input (indicated value) with HI/LO limit waveform set value, then output the result. Other operations are as same as waveform comparison.

・Analog input waveform of Y-axis is fixed to Ach, displacement input of X-axis is fixed to Bch.

・Displacement value of X-axis(mm etc) is the full scale value (Full Scale) set by Bch scaling.

・Digital Zero

In case of waveform start level (Start Level) be a value other than -99999, after START signal or "STRAT" key turning ON, when the indicated value of Y-axis satisfied「Start Level +Start Condition」, digital zero is automatically performed internally for the displacement indicated value of X-axis, acquisition of analog input waveform is started from the displacement indicated value "0" point.

No backup is available for automatically performed digital Zero.

・Acute change of X-axis displacement (indicated value)

The countermeasure for acute change of X-axis displacement indicated value in one sampling is, to divide the analog input waveform (indicated value) into blocks for each 10 data, if more than 1 analog input waveforms (indicated value) are in the block, graphic drawing become possible.

If there is no analog waveform (indicated value) in the block, it means edentulous waveform happened. Set Error signal to ON along with edentulous waveform.

In this kind of situation, it is necessary to reduce the changing rate of displacement (indicated value).

The clearing of Error signal is performed when the next START signal or "START" key turns ON.

・Compelling update for display screen

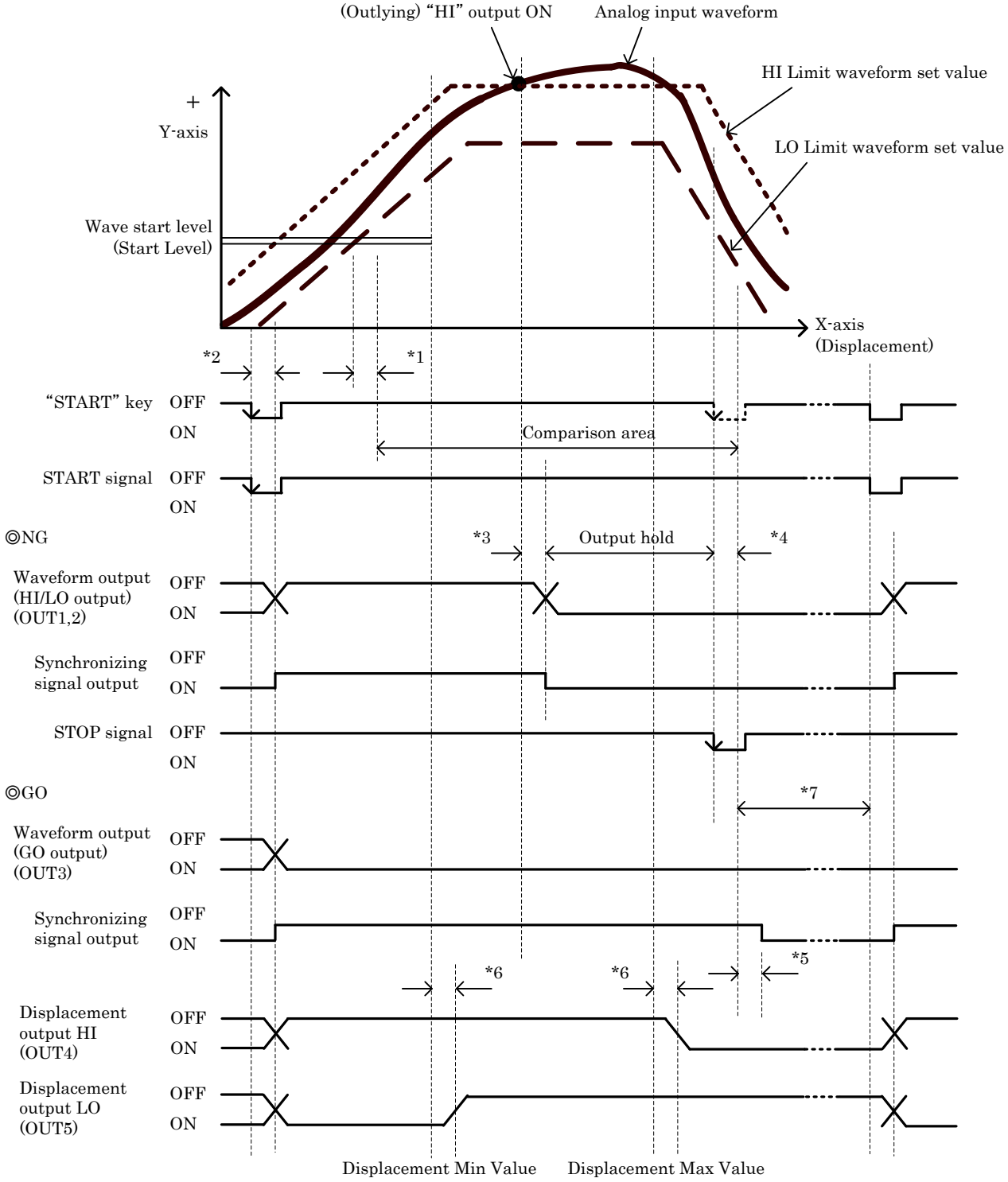
When the acquisition of analog input waveform (indicated value) and graphic drawing are started, if the changing quantities of X-axis displacement (indicated value) isn't updated even (Td × 4000) periods later, stop the acquisition compulsively, output the Error signal and update the display screen. (If STOP signal is inputted inside the period, then priority is given STOP signal. The acquisition will be stopped and the display screen will be updated.)

*Td=1/Sampling Cycle　　example：when sampling cycle is 500 times/second, Td is 2ms.

12-4. Timing Chart for Waveform Comparison / Waveform & Displacement Comparison

・After START signal or "START" key turned ON, if the indicated value satisfies「Start Level +Start Condition」, then clear the screen and start waveform acquisition and graphic drawing, comparison is performed in order from the start point of comparison area to the stop point of comparison area.

If "START" key or STOP signal turns ON inside the period, stop drawing and comparison, or hold the display screen and comparison results when finishing the drawing of 2048 points.



*1 : Delay time from the indicated value getting across Wave Start Level (Start Level) (when W&D, displacement is "0") to starting comparison. Td ms (MAX)

*2 : Delay time from START signal or "START" key turning ON to starting operation. Td + 1ms

*3 : Delay time from outlying occurring to outputting comparison output and synchronizing signal output. Td + 1ms

*4 : Delay time from STOP signal or "START" key turning ON to stopping the acquisition of analog input waveform (indicated value). Td + 1ms

*5 : Delay time from stopping the acquisition to outputting comparison output and synchronizing signal output.　Td + 1ms

*6 : Delay time from producing the displacement comparison output to outputting comparison output. Td + 1ms

*7 : Delay time from STOP signal or finishing acquisition to receiving the next START signal. 100ms

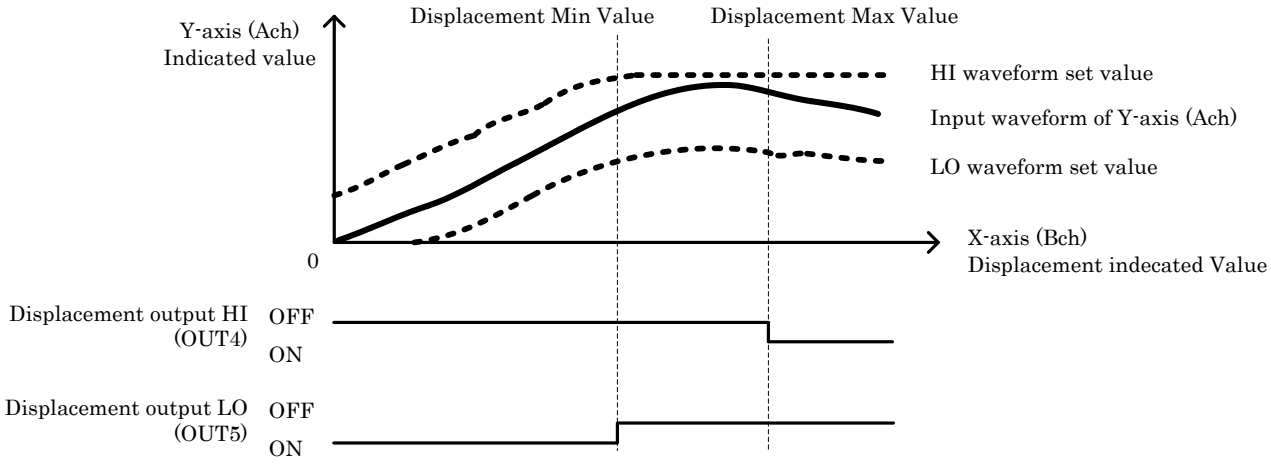
12-5. Waveform & Displacement Comparison Output（Bch）

・Compare X-axis displacement indicated value with HI displacement limit (Displacement Max Value) and LO displacement limit (Displacement Min Value), then output the result.

・The displacement indicated value is shown in display screen as it is, however, the displacement indicated value is held as peak value and performed comparison by HI/LO limit inside.

Comparison Condition	Comparison Result
Displacement indicated value ＞ Displacement Max Value	"HI" output ON
Displacement indicated value ＜ Displacement Min Value	"LO" output ON

Note : GO is not outputted

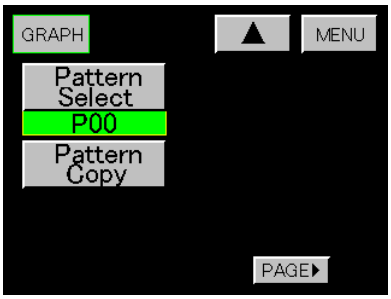


13. Graphic Display Setting (Graph Disp)

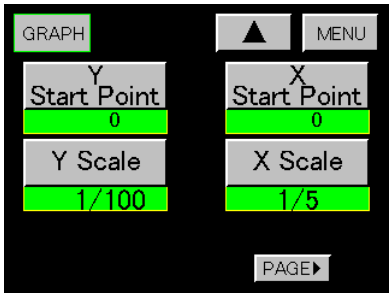
Set the function necessary for waveform display.

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

Itemized setting screen 1/3



Itemized setting screen 2/3



1) Pattern Select

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

Setting range : 0 to 15

*Select a Pattern Select 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) Y Start Point

・Set it 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 select screen.

Setting magnifications : 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.

・Reference

◎Y Scale and display range (Used with Y Start Point)

Y Scale	Display range
1/1	100
1/2	200
1/5	500
1/10	1000
1/20	2000
1/50	5000
1/100	10000
1/200	20000
1/500	50000
1/1000	100000
1/2000	200000

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

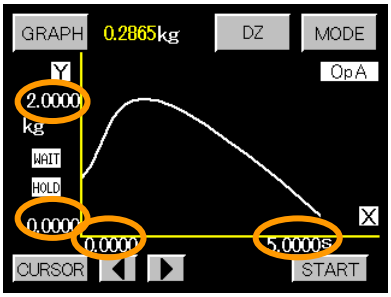
◎Time of acquiring the waveform according to the combination of Sampling Cycle and X Scale.
(Each HOLD / Waveform comparison)

Sampling Cycle	X Scale			
	1/1	1/2	1/5	1/10
4000 times/sec	0.05 s	0.1 s	0.25 s	0.5 s
2000	0.1	0.2	0.5	1
1000	0.2	0.4	1	2
500	0.4	0.8	2	4
200	1	2	5	10
100	2	4	10	20
50	4	8	20	40
20	10	20	50	100
10	20	40	100	200

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)

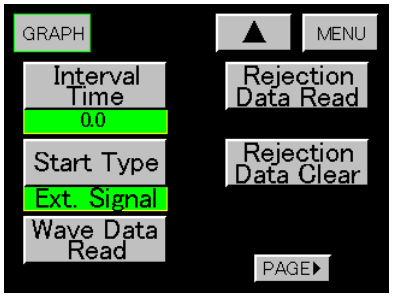
Y-axis scale

Y-axis start



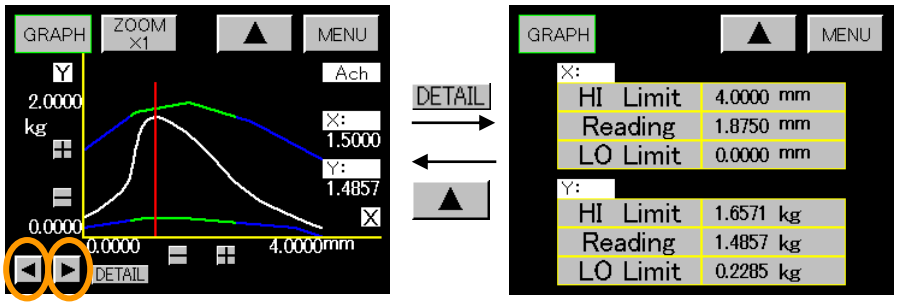
X-axis start X-axis scale

Itemized setting screen 3/3



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.
*For details ,refer to「8-1. Necessary Conditions for Display」.
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　　Each point display screen



cursor key

・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.)

・If「6. Basic Function Setting (Setup) 1) Meter Setting」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.

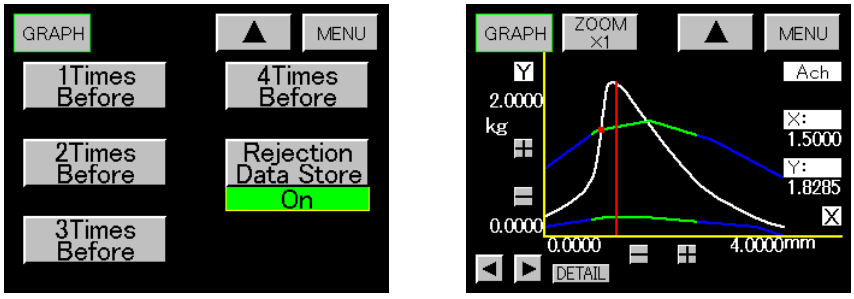
(1) 1 Times Before
(2) 2 Times Before
(3) 3 Times Before
(4) 4 Times Before
(5) Rejection Data Store

・"Rejection Data Store" 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.

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.

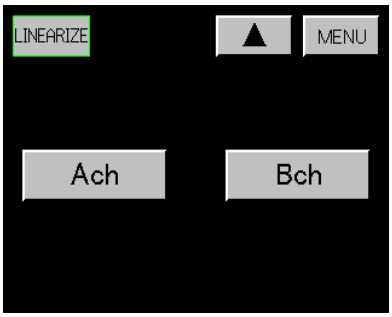
14. Linearize Setting (Ach/Bch) (Linearization)

・The function is for correcting the deflection of analog input signal, the number of correction points is 32 at most.

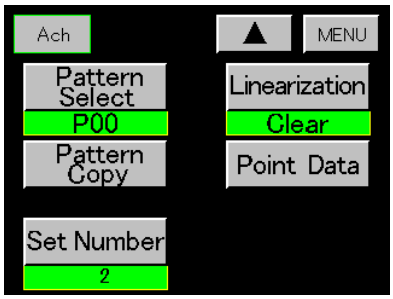
・Setting procedure → "MODE" key → Caution Screen for Starting Setting → Main setting screen → "LINEARIZE" key

・Set each set value on each of Ach and Bch.

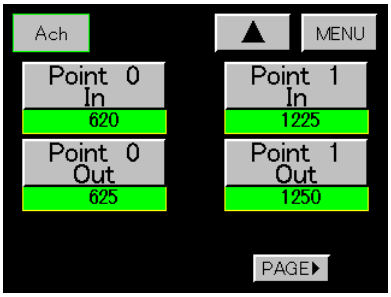
Itemized setting screen 1/18



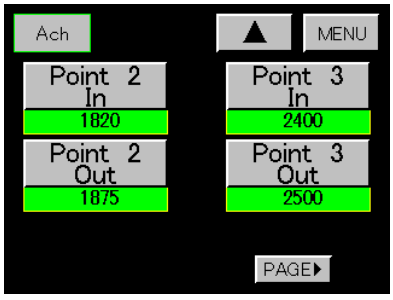
Itemized setting screen 2/18



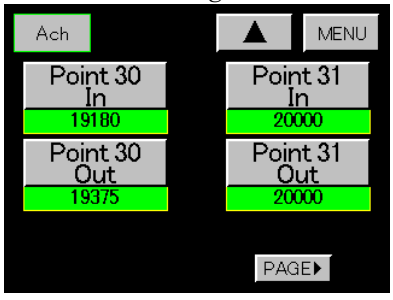
Itemized setting screen 3/18



Itemized setting screen 4/18



Itemized setting screen 18/18



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 Pattern Select 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) Set Number

・Set the set number used in linearization.

・Setting range : 2 to 32 (Set each set value on each of Ach and Bch)

・The same range is provided for setting conditions check.

5) Operation Setting (Linearization)

・Set operation on the set-value select screen.

・Setting item

(1) ON Perform linearization.

(2) OFF Don't perform linearization.

(3) CLEAR Clear input/output data to "0".

6) Data Setting (Point Data)

・Set input value and output value.

・Set it on the 10-key input screen.

・Input/output number : 0 to 31.

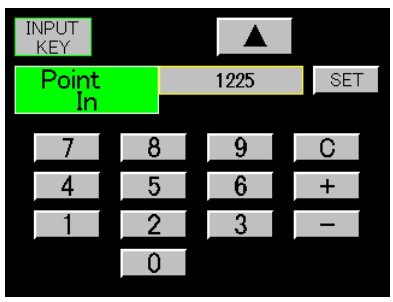
・Setting range : ±99999

・Setting condition Please input according to following condition :

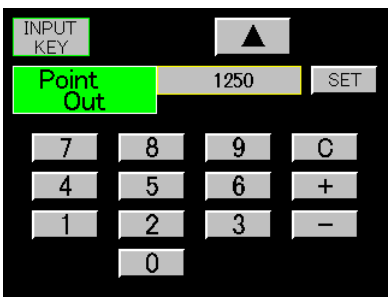
「Point 0 In ＜Point 1 In ＜ ....＜Point 31 In」

*When the above condition isn't satisfied, measurement may be performed wrongly.

Input setting screen



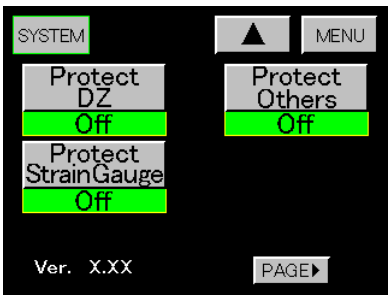
output setting screen



15. Basic Function Setting 2 (System)

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

Itemized setting screen 1/4



*Display the version of program in the left above margin of screen.

1) Digital Zero (DZ) key protect (Protect DZ)

・Switch ON/OFF when "Protect DZ" key is pressed for about 3 seconds continuously.

・Used for denying "DZ" key in Digital Zero (DZ) Function.
"DZ" key is not available when ON/OFF setting is ON.

・In case of ON, "DZ" key of A channel, B channel (single display screen), 2 channel (multi display screen) turns disable, and not available when pressing.

2) Input setting protect (Protect Strain Gauge)

・Switch ON/OFF when "Protect Strain Gauge" key is pressed for about 3 seconds continuously.

・Used for disable of analog input setting (Ach) and analog input setting (Bch). When ON/OFF setting is ON, change is forbidden.

・In case of ON, "Strain Gauge" key of main setting screen and each initializing key of bellow mentioned「4)Initialize」turn disable and not available when pressing.

3) Setting value protect (Protect Others)

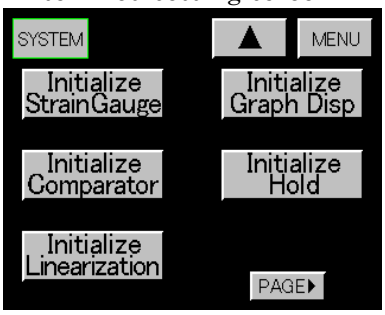
・Switch ON/OFF, when press for about 3 seconds continuously.

・Used for disable of the setting value of bellow mentioned.
When ON/OFF setting is ON, change is forbidden.

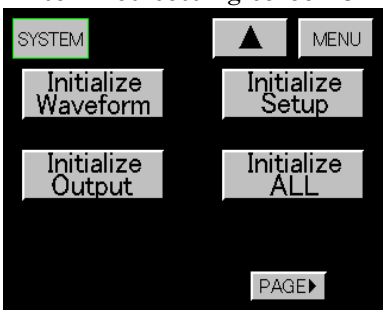
・In case of ON, the key (1) to (7) of bellow mentioned in main setting screen and the key (2) to (9) of bellow「4)Initialize」mentioned turn disable and not available when pressing.

(1) Comparator
(2) Hold
(3) Linearization
(4) Waveform
(5) Graph Disp
(6) Setup
(7) Output

Itemized setting screen 2/4



Itemized setting screen 3/4



4) Initialize

・Set each value into default value.
(When any protect is ON, priority is given to protect.)

・Itemized setting

(1) Initialize Strain Gauge
(2) Initialize Comparator
(3) Initialize Linearization
(4) Initialize Graph Disp
(5) Initialize Hold
(6) Initialize Waveform
(7) Initialize Output
(8) Initialize Setup

Select pattern after selecting the items.

(9) Initialize All (The above-mentioned patterns of (1) to (8))

・Caution Screen for Starting Setting is displayed after you select (1) to (7) and press the key.

Press "YES" key, the setting value screen will be displayed. Select the pattern and press the "SET" key, the setting value turns into default values. Pressing "NO" key returns to previous screen.

・Select (8) or (9) and press the key, Caution Screen for Starting Setting will be displayed.

Pressing "YES" key the setting value turns into default values.

Pressing "NO" key returns to previous screen.

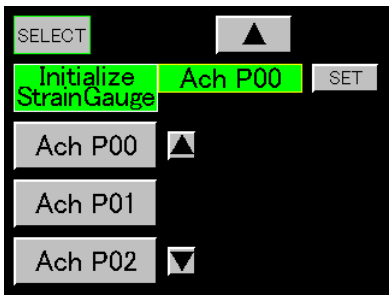
*Caution : It takes about 2 minutes to execute (9)Initialize All.

Please don't shut down the power while Caution screen is displayed.

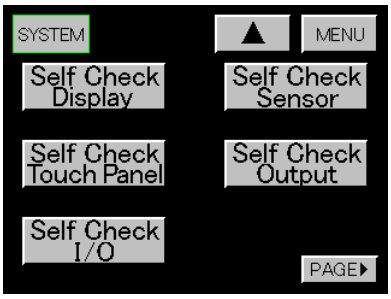
If the power is shut down while doing initialization, system is the case that does not operate normally at next power-on.

・Action example　Pressing " (1) Initialize Strain Gauge" key.

Caution Screen for Starting Executing　　Setting Value Screen

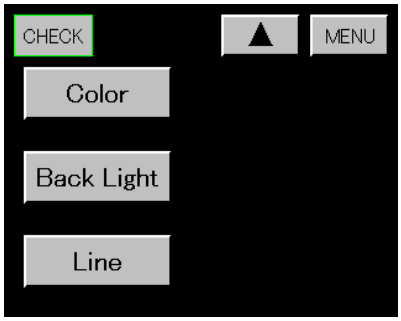


Itemized setting screen 4/4



*"Self Check Output" key is only available when output unit is mounted.

5) Self Check Display

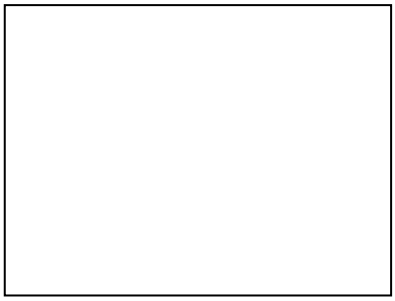


Display check screen

a) Color check (Color)

b) Back light check (Back Light)

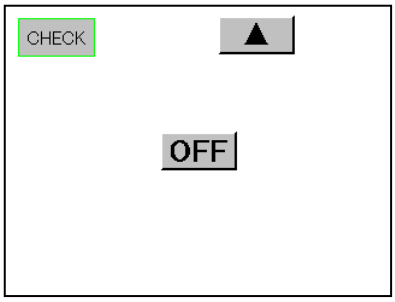
c) Line check (Line)



a) Color check screen

・Touching the screen changes the screen as follows :

White → Black → Red → Green → Blue → Display check screen



b) Back light check ON screen

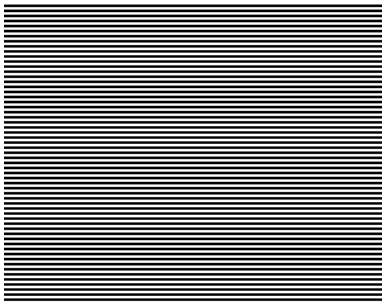
・Back light check (Back Light)

Backlight turns off by "OFF" key on the display screen.

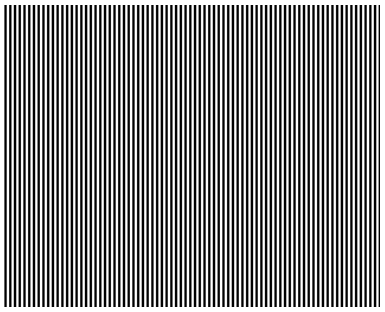
"▲" key is used to return to the display check

b') Back light check OFF screen

・Touching the screen returns to back light check "ON" screen above mentioned after ensuring ON/OFF.

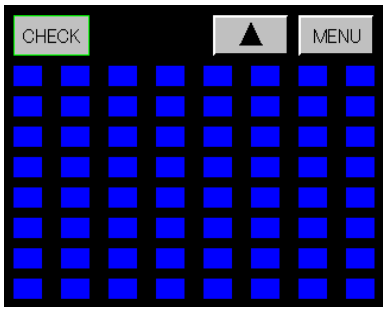


c) Line check screen (horizontal)
・Line check (Line)
Touching the screen switch to line check screen (vertical).
Check if each line is connected.



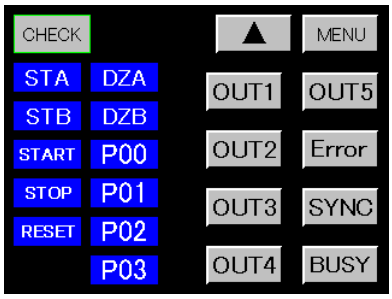
c') Line check screen (vertical)
・Touching the screen returns to the display check.

6) Self Check Touch Panel



・Touching the blue portion of the screen blackens the screen. Check that the screen entirely blackens.

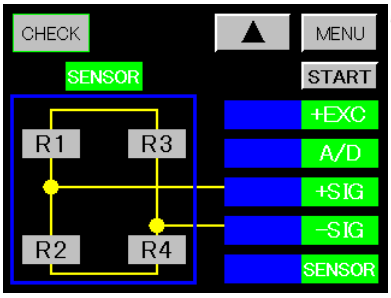
7) Self Check I/O



・The signal on the screen changes from blue to yellow while each input signal is set to "ON".
・Pressing each output signal key turns ON/OFF output signal alternately.

Initial screen

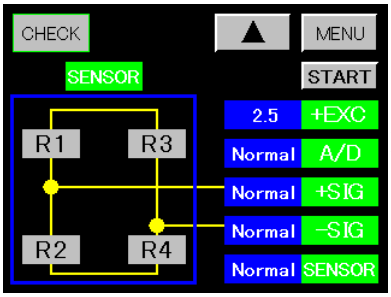
8) Self Check Sensor



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 result 1

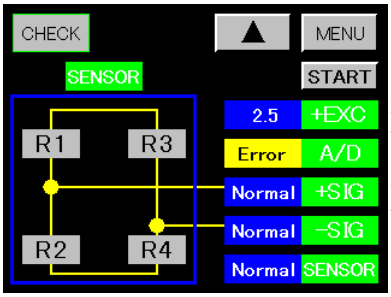


There are check result 1 to 7.

・Check result 1 : All of them display the normal states.

In case of normal, "Normal" is displayed.

Check result 2

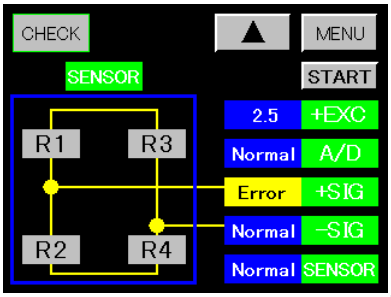


・Check result 2 : It is a case where A/D in this Meter is faulty

When A/D in this Meter is faulty, Error is displayed as the check result of「A/D」.

When A/D in this Meter is faulty,「+SIG」,「-SIG」, and「SENSOR」cannot be checked, but the check result of「+SIG」,「-SIG」, and「SENSOR」is displayed as Normal.

Check result 3

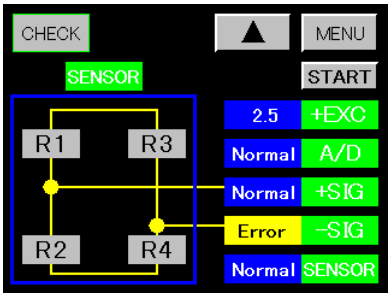


・Check result 3 : It is a case where「+SIG」 line is disconnected

When connection between the sensor and +SIG terminal is disconnected, the check result of「+SIG」is displayed as Error.

In case of disconnection,「SENSOR」cannot be checked, but the check result of「SENSOR」is displayed as Normal.

Check result 4

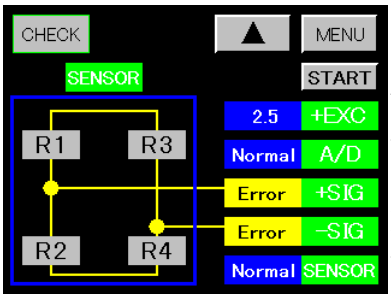


・Check result 4

When connection between the sensor and -SIG terminal is disconnected, the check result of「-SIG」is displayed as Error.

In case of disconnection,「SENSOR」cannot be checked, but the check result of「SENSOR」is displayed as Normal.

Check result 5

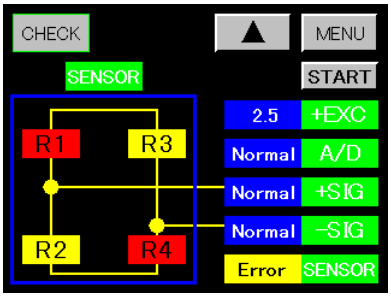


・Check result 5

When connection between the sensor, +SIG and -SIG terminal is disconnected, the check result of「+SIG」and「-SIG」is displayed as Error.

In case of disconnection,「SENSOR」cannot be checked, but the check result of「SENSOR」is displayed as Normal.

Check result 6



・Check result 6

When +SIG terminal and -SIG terminal are connected, 「SENSOR」 is checked.

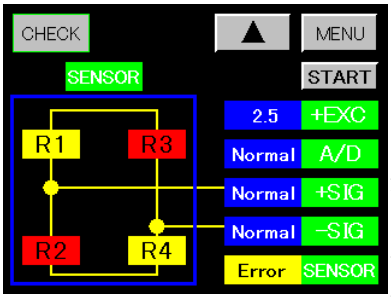
Two check result screens 6 and 7 are available for this SENSOR test.

Red : short, Yellow : open

Check result screen 6 represents that 「R1」 and 「R4」 short, and 「R2」 and 「R3」 open.

Or it represents that one of 「R1」, 「R2」, 「R3」, and 「R4」 is in this state.

Check result 7



・Check result 7

Check result screen 7 represents that 「R1」 and 「R4」 open, and 「R2」 and 「R3」 short.

Or it represents that one of 「R1」, 「R2」, 「R3」, and 「R4」 is in this state.

*Caution : 「SENSOR」 check function cannot check other troubles than the above-mentioned accurately. Therefore, it is recommendable to remove the sensor itself and then check it.

9) Analog output (Only available when DAC output unit is mounted)

・Pressing "0%", "50%", or "100%" key outputs voltage or current from the terminal of the selected type

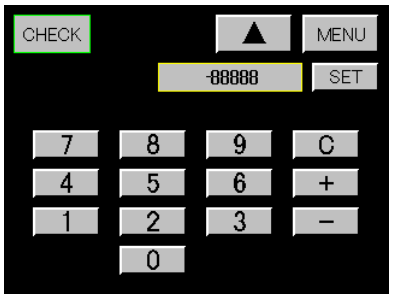
Key	±10V type	4 to 20mA type
0%	-10V	4mA
50%	0V	12mA
100%	10V	20mA

・Pressing "▲" key returns to 「Itemized setting screen 4/4」.

・Pressing "MENU" key returns to the normal display screen.

Analog output becomes an output corresponding to the indicated value.

10) 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 "▲" key returns to 「Itemized setting screen 4/4」.

・Pressing "MENU" key returns to the measurement screen.

BCD output becomes an output corresponding to the indicated value.

・An input of 99999 or -99999 will output and over signal.

16. Communication Specifications (RS-232C, RS-485)

・About connection，refer to「16-4. Connection of RS-232C」,「16-5. Connection of RS-485」.

*Caution：When RS-232 and RS-485 are updating the settings, don't update the setting on display screen and don't change the pattern by pattern select terminal, otherwise, settings may be performed wrongly.

16-1. Specifications

	RS-232C (EIA RS-232C standard)	RS-485 (EIA RS-485 standard)
Synchronizing Mode	Asynchronous Mode	
Communication Type	Full duplex	2-wire half duplex (polling selecting style)
BPS	2400, 4800, 9600, 19200, 38400 bps	
Data Length	7, 8	
Error Detection (parity)	Even, Odd, None	＋BCC(block check character) check sum
Stop Bit	1, 2	
Literal Code	ASCII	
Delimiter	CR＋LF, CR, LF	
Transfer Control Sequence	No sequence	
Name of Using signal	TXD, RXD, RTS, CTS, SG	Non-inverted (+), Inverted (-)
Number of Connecting meters	1	31 meters
Cable Length	15m	500m at max. (total)

1) Communication setting

・BPS
・Data Length
・Parity
・Stop Bit
・Delimiter
・RS-485 ID

Each setting, refer to「6. Basic Function Setting (Setup) 14) Communication and Related Items, 15) Address (RS-485 ID)」

2) Common

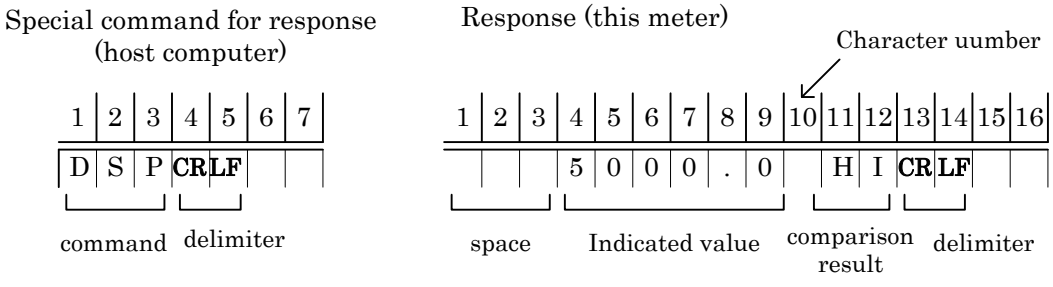
・If only delimiter is received, there is no response.
・Special command for output unit can be received only when relevant unit is mounted.
・Character and response of command are uppercase letters. (Except unit)

3) Response for Communication Error (Setting related Error is described in each setting.)

・Over Run "Error A"
・Parity "Error B"
・Framing "Error C"

16-2. Command Format and Response Format (In case of RS-232C)

1) Command format (example)



2) Setting command (example)

Special command for response (host computer)

1	2	3	4	5	6	7	8	9
M	T	R		1	CR	LF		

command, space, data, delimiter

Response (this meter)

1	2	3	4	5	6	7	8
Y	E	S			CR	LF	

YES response, delimiter

・Response when command is Identified and operated.

Response (this meter)

1	2	3	4	5	6	7	8
N	O		?		CR	LF	

NO? response, delimiter

・Response when command format or setting data is wrong.
・NO ? Response is used commonly by each command.

16-3. Command Format and Response Format (In case of RS-485)

1) Occupation and releasing of communication line

(1) Line occupation ("ENQ" 00 to 99)

1	2	3	4	5 (Character number)
ENQ	9	9	CR+LF	

(2) Response to line occupation ("ACK" 00 to 99)

1	2	3	4	5 (Character number)
ACK	9	9	CR+LF	

(3) Line releasing ("EOT")

1	2	3 (Character number)
EOT	CR+LF	

(4) Line occupation when continuous (occupation, response, releasing・occupation, response)

Line occupation

ENQ	1	2	CR+LF

Line response

ACK	1	2	CR+LF

Line releasing/ Line occupation

ENQ	1	5	CR+LF

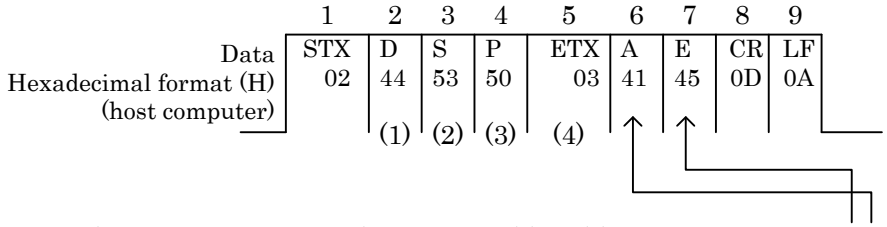
Line response

ACK	1	5	CR+LF

2) Format of transmit/receiving

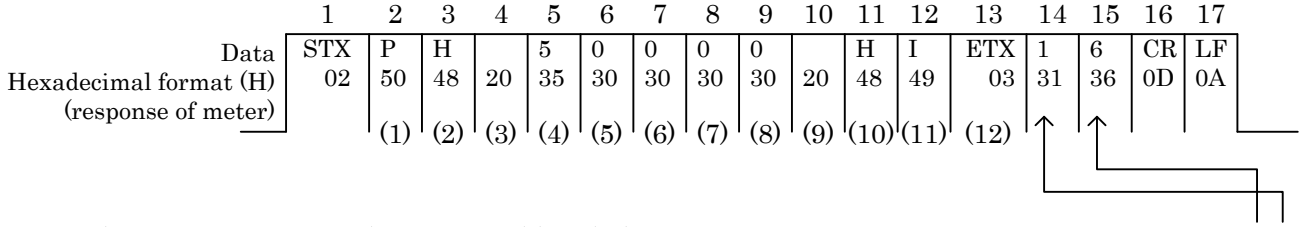
STX	Command,data	ETX	BCC L	BCC H	CR+LF

・transmit example



BCC (block check character) checksum (1) to (4) = 44+53+50+03 = EAH

・receiving example



BCC (block check character) checksum (1) to (12) = 50+48+20+35+30+30+30+30+20+48+49+03 = 2 6 1 H

3) Control code

Control Code	Hexadecimal Format(H)	Name
STX	02	Start of Text
ETX	03	End of Text
EOT	04	End of Transmission
ENQ	05	Enquiry
ACK	06	Acknowledge

(1) No response for line releasing "EOT".

(2) No BCC (block check character) appended for "ACK", "EOT" and "ENQ".

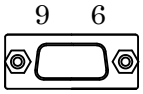
(3) BCC (block check character) is added in both transmit and receiving.

4) ASCII code table

High bit / Low bit	0	1	2	3	4	5	6	7
	Control character		Number, mark		Upper case character		Lower case character	
0	NUL	DLE	SPACE	0	@	P	`	p
1	SOH	DC1	!	1	A	Q	a	q
2	STX	DC2	"	2	B	R	b	r
3	ETX	DC3	#	3	C	S	c	s
4	EOT	DC4	$	4	D	T	d	t
5	EN	NAK	%	5	E	U	e	u
6	AC	SYN	&	6	F	V	f	v
7	BEL	ETB	'	7	G	W	g	w
8	BS	CAN	(	8	H	X	h	x
9	HT	EM	)	9	I	Y	i	y
A	LF	SUB	*	:	J	Z	j	z
B	VT	ESC	+	;	K	[	k	{
C	FF	FS	,	<	L	＼	l	|
D	CR	GS	-	=	M	]	m	}
E	SO	RS	.	>	N	^	n	～
F	S I	US	/	?	O	-	o	DEL

16-4. Connection of RS-232C

RS-232C connector



Terminal No.	Direction of signal	Name of pin	Terminal No.	Direction of signal	Name of pin
1		－－	6		－－
2	Input	RXD	7	Output	RTS
3	Output	TXD	8	Input	CTS
4		－－	9		－－
5		SG			

"－－" means not used.

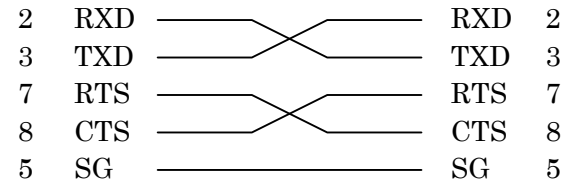
・Recommended connector : 17JE-13090-02 (D1) (Welding type connector) made by DDK
17JE-09H-1C

・This meter use 5 wires : Receiving Terminal (RXD), Transmitting Terminal (TXD), Request to send (RTS), Permit to send (CTS) and Signal Ground (SG), other control signals are not used.

・Connect example 1　9 pins connector

◎host computer etc(9pins)　◎this meter (9pins)

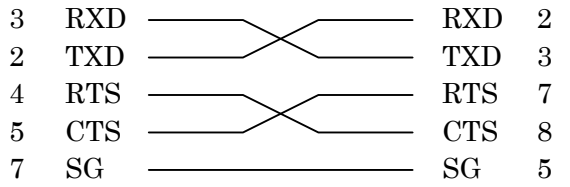
pin No.



・Connect example 2　25 pins connector

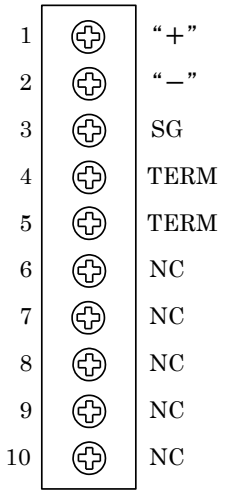
◎host computer etc (25pins)　◎this meter (9pins)

pin No.



16-5. Connection of RS-485

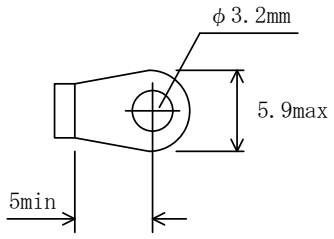
Screw terminal for I/O units



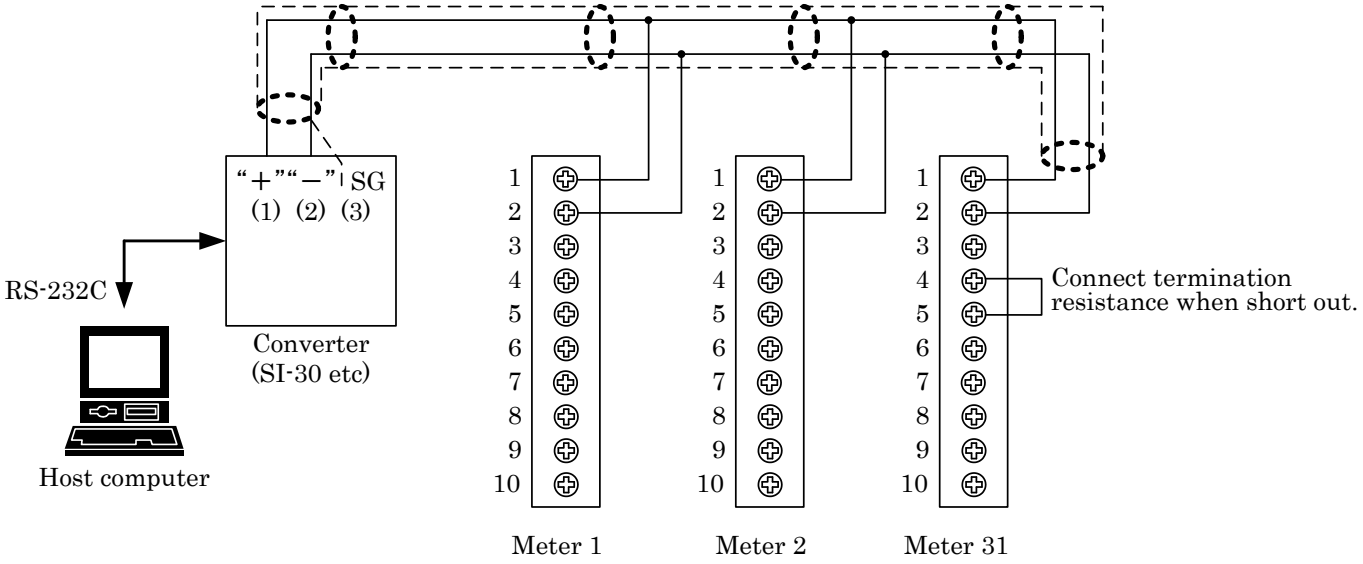
Terminal No.	Direction of signal	Signal name	Contents	
1	Input output	＋	Non-inverted output	
2	Input output	-	Inverted output	
3	－－	SG	Signal ground	
4	－－	TERM1	Termination resistance1 for connection	*a
5	－－	TERM2	Terminal resistance2 for connection	*a
6		NC	*	
7		NC	*	
8		NC	*	
9		NC	*	
10		NC	*	

*NC is blank terminal, but do not use it as relay terminal.

*a　When terminal No.4 and terminal No.5 are short-circuited externally, termination resistance is connected between lines. (Termination resistance 150Ω)



・RS-485 is connected with host computer by interface converter (RS-232C / RS-485 signal level converter, etc). This meter can connect 31 meters at most. Connect it with "+" (Non-inverted output) and "-" (Inverted output) of the screw terminal.
・For RS-485, termination resistance is attached to meters connected in two sides of transmit line.
・Please use the cable of 2 wires with shielding wire, and attach to host computer in 1 point.
・Interface converter is sold in the market (SI-30 etc. made by LINE EYE Co., Ltd.), please buy in addition.



17. Special Command for Response

1) Respond the indicated value and comparison result for Ach/Bch individually.

2) Respond the status of action by the first two characters of receiving data.

- " " In case of space, respond for normal action
- "＜＝" Respond when over happened, and the indicated range or measuring range is outside.
- "PH", "VH", "PV", "MX", "MN" and "IF" Respond when hold function is performed.
- "WA", "WB" and "WD" Respond when Waveform Comparison / Waveform & Displacement Comparison is performed.

3) When "DSP", "DSB", "MES" and "MSB" is performed, the first 3 characters of received data indicate the polarity.

- " " In case of space, means plus.
- " - " Means minus.

special for response of indicated value and comparison result

Function	Transfer data	Character	Receive data
Ach indicated value and comparison result	D S P CR LF ・＋respond the indicated value with Decimal Point setting,comparison result.		5 0 0 0 . 0 L L L O H I H H CR LF
	・〃		0 . 5 G O CR LF
	・－respond the indicated value with Decimal Point setting,comparison result.		－ 0 . 5 L O CR LF
	・－respond the indicated value without Decimal Point setting,comparison result.		－ 8 L O CR LF
	・〃		－ 5 0 0 0 0 L O CR LF
	・respond the ＋indicated value with Decimal Point setting,comparison result.		5 . 0 0 0 0 H I CR LF
	・respond the ＋overflow without Decimal Point setting,comparison result.		＜ ＝ 9 8 0 0 0 H H CR LF
	・respond the －overflow with Decimal Point setting,comparison result.		＜ ＝ － 9 . 8 0 0 0 L L CR LF
	・respond the peak,＋indicated value without Decimal Point setting,comparison result.		P H 9 8 0 0 0 H I CR LF
	・respond the valley,－indicated value without Decimal Point setting,comparison result.		V H － 5 0 L O CR LF
	・respond the peak-valley,＋indicated value with Decimal Point setting,comparison result.		P V 9 . 9 9 9 8 H I H H CR LF
	・respond the maximal, ＋indicated value without Decimal Point setting,comparison result.		M X 9 8 0 0 0 H I CR LF
	・respond the minimal,＋indicated value with Decimal Point setting,comparison result.		M N 9 8 0 0 . 0 H I CR LF
	・respond the inflection point ＋indicated value, without Decimal Point setting,comparison result.		I F 9 8 0 0 0 H I CR LF
	・respond the waveform comparison,indicated value without Decimal Point setting,comparison result.		W A 1 2 0 0 H I CR LF
	・respond the W&D comparison,Ach's indicated value without Decimal Point setting,comparison result.		W D 5 5 0 0 G O CR LF
	respond the Bch's indicated value(displacement) without Decimal Point setting,comparison result at the same time, .		W D 1 8 0 0 L O CR LF
Bch indicated value and comparison result	D S B CR LF ・respond the ＋indicated value without Decimal Point setting,comparison result. Other actions are the same as Ach, except for W&D comparison.		5 0 0 0 0 H I CR LF
Ach indicated value's response	M E S CR LF		5 0 0 0 0 CR LF
			－ 5 . 0 0 0 0 CR LF
	・character number of response is fixed, only respond the indicated value.		＜ ＝ 9 8 0 0 0 CR LF
			＜ ＝ － 9 . 8 0 0 0 0 CR LF
Bch indicated value's response	M S B CR LF		5 0 0 0 0 CR LF
Ach comparison result's response	J G M CR LF		H I CR LF
			G O CR LF
	・character number of response is fixed, only respond the comparison result.		L O CR LF
	・respond when comparison result are all OFF.		O F F CR LF
			L L L O H I H H CR LF
Bch comparison result's response	J G B		H I CR LF

4) Respond to the setting contents of each item.

・Append " * " in the end of setting command.

・Respond all the setting value as the example of response.

Function		Transfer data																									Character	Receive data																									
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Special use for setting value respondence	Setting value respondence	C	O	N	D	*	CR	LF		・Basice function setting (Setup)																		M	T	R		2	CR	LF																				
																												D	U	T		1	2	.	5	CR	LF																
				・Respondecn to the setting in normal action.(Right side) The respondence ex																									S	M	P		1	0	0	0	CR	LF																
				The respondence command as the COND* is under.																									M	D	T		T	=	5	.	5		W	=	9	9	CR	LF									
																												T	R	K		T	=	0	.	5		W	=	5	0	CR	LF									
																												S	D	T		O	N	=	1	.	1	1	1		O	F	F	=	2	.	2	2	2	CR	LF
		C	A	L	A	*				・Analog input setting(Ach) (Strain Gauge)																		R	L	D		4	.	9	9	9	CR	LF																
		C	A	L	B	*				・Analog input setting(Bch) (Strain Gauge)																		P	O	N		2	0	CR	LF																				
																												B	K	L		5	5	CR	LF																
		C	O	M	A	*				・Comparison setting value set(Ach) (Comparator)																		C	T	1		1	0	0	CR	LF																
		C	O	M	B	*				・Comparison setting value set(Bch) (Comparator)																		C	T	2		1	2	5	CR	LF																
																												B	D	Z		O	N	CR	LF																
		L	I	N	A	*				・Linearizing setting(Ach) (Linearization)																		R	S	−		1	9	2	0	0	−	7	−	E	−	2	−	C	R	/	L	F	CR	LF		
		L	I	N	B	*				・Linearizing setting(Bch) (Linearization)																		A	D	R		1	9	CR	LF				・Only when output unit RS−485.														
		D	S	T	*					・Display setting (Graph Disp)																																															
		H	L	D	*					・Hold function setting (HOLD)																																														
		W	C	O	*					・Waveform＆Displacement comparison setting(Waveform)																																															
		A	O	P	*					・Analog output setting(Available when mounted analog outpu																																														
		B	O	P	*					・BCD output setting (Available when mounted BCD)																																														

18. Individual Command

・Confirming the setting contents of each set value while running in normal operations is possible. Changing the setting is also possible.

18-1. Basic Function Setting (Setup)

・The setting of display screen is performed by RS-.
For details, please refer to「6. Basic Function Setting (Setup)」.

・After executing "SAV COND", measurement operation is stopped, each output is set to "OFF" and the set value is saved in Flash ROM.

・Although decimal point isn't set in the setting of time (cycle), decimal point should be added in response.

Basic Function Setting (Setup)

Function	Transfer data	Character	Receive data
response for meter setting (Meter Setup)	M T R CR LF ・1＝A Channel ・2＝B Channel ・3＝2 Channel ・4＝Wave Ach ・5＝Wave Bch ・6＝W&D ・setting range: 1 to 6		M T R 3 CR LF
Meter Setup setting	M T R 1 CR LF		Y E S CR LF
display update cycle response (Display Cycle)	D U T CR LF ・1＝12.5 times/second ・2＝6.25 〃 ・3＝2.5 〃 ・4＝1.0 〃 ・5＝0.5 times/second ・setting range: 1 to 5		D U T 1 2 . 5 CR LF
Display Cycle setting	D U T 2 CR LF		Y E S CR LF
sampling cycle response (Sampling Cycle)	S M P CR LF ・SMP is set to 4000, 2000, 1000, 500, 200, 100, 50, 20, 10 times/second (In case of 2 Channel, W&D, can't be set to 4000times/second-->		S M P 1 0 CR LF S M P 4 0 0 0 CR LF N O ? CR LF response)
Sampling Cycle Setting	S M P 2 0 0 0 CR LF		Y E S CR LF
Motion Detect response (Motion Detect)	M D T CR LF ・response of T=0 means no this Function ・response setting time and width ・setting range: T=0 to 9.9(s), W=1 to 99		M D T O F F CR LF M D T T = 5 . 5 W = 9 9 CR LF
MD Time setting	M D T T = 0 CR LF M D T T = 4 5 CR LF		Y E S CR LF Y E S CR LF
MD Width setting	M D T W = 3 0 CR LF M D T T = 5 5 W = 9 9 CR LF		Y E S CR LF Y E S CR LF
zero tracking response (Zero Tracking)	T R K CR LF ・response of W=0 means no this Function ・response setting time and width ・setting range: T=0 to 9.9(s), W=0 to 99		T R K O F F CR LF T R K T = 4 . 9 W = 2 5 CR LF
ZT Time setting	T R K W = 0 CR LF T R K T = 4 9 CR LF		Y E S CR LF Y E S CR LF
ZT Width setting	T R K W = 5 0 CR LF T R K T = 4 9 W = 2 5 CR LF		Y E S CR LF Y E S CR LF

Function	Transfer data																									Character	Receive data																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Basic Function Setting(Setup)																																																	
Input ON Delay response (Input ON Delay)	S	T	D	CR	LF																						S	T	D		O	N	=	O	F	F	CR	LF												
	S	T	D	CR	LF																						S	T	D		O	N	=	1	.	2	2	2	CR	LF										
											• response while ON=0.																																										
											• respond the setting contents.																																									
											• Setting range: ON=0 to 4.999(s)																																									
Input ON Delay setting	S	T	D		O	N	=	0	CR	LF																	Y	E	S				CR	LF																	
	S	T	D		O	N	=	1	2	2	2	CR	LF														Y	E	S				CR	LF																	
Output OFF Delay response (Output Delay)	R	L	D	CR	LF																						R	L	D		O	F	F	CR	LF																
	R	L	D	CR	LF																						R	L	D		4	.	9	9	9	CR	LF														
											• response of "RLD 0" means no this function.																																										
											• respond the setting contents.																																									
											• Setting range: 0 to 4.999(s)																																									
Output Delay setting	R	L	D		4	9	9	9	CR	LF																	Y	E	S				CR	LF																	
Power ON Delay response (Power ON Delay)	P	O	N	CR	LF																						P	O	N		O	F	F	CR	LF																
	P	O	N	CR	LF																						P	O	N		3	0	CR	LF																
											• response of "PON 0" means no this function.																																										
											• respond the setting contents.																																									
											• Setting range: 0 to 30(s)																																									
Power ON Delay setting	P	O	N		3	0	CR	LF																			Y	E	S				CR	LF																	
	P	O	N		0	CR	LF																				Y	E	S				CR	LF																	
Back Light Time response (BackLight Time)	B	K	L	CR	LF																						B	K	L		O	F	F	CR	LF																
	B	K	L	CR	LF																						B	K	L		5	0	CR	LF																
											• response of "BKL 0" means no this function, continuously lighting.																																									
											• respond the setting contents.																																									
											• Setting range: 0 to 99 (min)																																									
BackLight Time setting	B	K	L		5	0	CR	LF																			Y	E	S				CR	LF																	
Contrast response (Contrast)	C	T	1	CR	LF																						C	T	1		2	CR	LF																	
Contrast setting	C	T	1		1	CR	LF				• Setting range: 0 to 255																Y	E	S				CR	LF																	
Cross Talk response (Cross Talk)	C	T	2	CR	LF																						C	T	2		2	CR	LF																	
Cross Talk setting	C	T	2		1	CR	LF				• Setting range: 0 to 63																Y	E	S				CR	LF																	
Digital ZERO Backup response (Digital ZERO Backup)	B	D	Z	CR	LF																						B	D	Z		O	N	CR	LF																	
	B	D	Z	CR	LF																						B	D	Z		O	F	F	CR	LF																
											• response in case of backup.																																										
											• response in case of no backup.																																									
											• setting as ON/OFF.																																									
Digital ZERO Backup setting	B	D	Z		O	F	F	CR	LF																		Y	E	S				CR	LF																	

Function	transfer data																									Character	receive data																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Basic Function Setting (Setup)																																																	
communication function parameter response (BPS,Data Length,Parity,Stop Bit,Delimiter)	R	S	−	CR	LF																						R	S	−		1	9	2	0	0	−	7	−	E	−	2	−	C	R	/	L	F	CR	LF	
	R	S	−	CR	LF																						R	S	−		9	6	0	0	−	7	−	E	−	2	−	C	R	/	L	F	CR	LF	
communication function parameter setting	R	S	−		9	6	0	0	−	7	−	E	−	2	−	C	R	/	L	F	CR	LF					Y	E	S				CR	LF																		• set−value is available immediately after setting.
	R	S	−		1	9	2	0	0	−	7	−	E	−	2	−	C	R	/	L	F	CR	LF				Y	E	S				CR	LF																		• set−value is available immediately after setting.
RS−485 address setting response (RS−485 ID) RS−485 ID setting response	A	D	R	CR	LF						• can response and set when RS−485 is available.																A	D	R		1	9	CR	LF																			
	A	D	R		5	CR	LF																				Y	E	S				CR	LF																		• be not available when changes in line occupation. be available when next line releasing or line occupation.
basic function set−value save	S	A	V		C	O	N	D	CR	LF	• Basic function setting can be changed on normal operation,however,when power turns off,the contents of change will disappear and return to what it was.if the contents are not wanted to disappear even if power turns off,execute SAV COND.																Y	E	S				CR	LF																		

・After executing "SAV COND", measurement operation is stopped, and data is saved in Flash ROM.

18-2. Basic Function Setting 2 (System)

・The setting of display screen is performed by RS-.

For details, please refer to「15. Basic Function Setting 2 (System)」.

・After executing "SAV COND2", measurement operation is stopped, each output is set to "OFF" and the set value is saved in Flash ROM.

・After executing the clearing of each set value, measurement operation is stopped, each output is set to "OFF" and the default value is saved in Flash ROM.
(But in case of protect be "ON", saving is forbidden.)

	Function	transfer data																									Character	receive data																									
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Basic Function Setting 2 (System)	protect response	P	R	O	CR	LF						・Respond the 3 items together.																P	R	O		1		O	N	CR	LF																			
	(Protect)																											P	R	O		2		O	F	F	CR	LF																
																												P	R	O		3		O	N	CR	LF																
	protect setting													・Perform the protect setting individually.																																											
	(DZ)	P	R	O		1		O	F	F	CR	LF		・ON＝unaccept.														Y	E	S			CR	LF		・DZ key receiving is set by ON/OFF.																			
	(Strain Gauge)	P	R	O		2		O	N	CR	LF			・ON＝change is forbidden..														Y	E	S			CR	LF		・Relative change of strain gauge is set by ON/OFF.																			
	(Others)	P	R	O		3		O	F	F	CR	LF		・ON＝change is forbidden.														Y	E	S			CR	LF		・Changes other than above mentioned are set by ON/OFF.																			
	basic function set-value 2	S	A	V		C	O	N	D	2	CR	LF																Y	E	S			CR	LF																						
	save								・Basic function setting2(System) can be changed on normaloperation,however,when power turns off,the contents of change will disappear and return to what it was.if the contents are not wanted to disappear even if power turns off,execute SAV COND2.																																																		
	(System)																																																						
	set-value initialize	D	E	F		C	A	L	A		P	−	1	CR	LF	(Strain Gauge (Ach))												Y	E	S			CR	LF		・Set the pattern in which initialize is default.(P0 to 15)																			
	(Initialize)	D	E	F		C	A	L	B		P	−	4	CR	LF	(Strain Gauge (Bch))												Y	E	S			CR	LF		〃																			
		D	E	F		C	O	M	A		P	−	3	CR	LF	(Comparator (Ach))												Y	E	S			CR	LF		・Set the pattern in which initialize is default.(P0 to 15)																			
		D	E	F		C	O	M	B		P	−	4	CR	LF	(Comparator (Bch))												Y	E	S			CR	LF		〃																			
		D	E	F		L	I	N	A		P	−	1	CR	LF	(Linearization (Ach))												Y	E	S			CR	LF		・Set the pattern in which initialize is default.(P0 to 15)																			
		D	E	F		L	I	N	B		P	−	5	CR	LF	(Linearization (Bch))												Y	E	S			CR	LF		〃																			
		D	E	F		D	S	T			P	−	1	1	CR	LF	(Graph Disp)												Y	E	S			CR	LF		・Set the pattern in which initialize is default.(P0 to 15)																			
		D	E	F		H	L	D			P	−	1	2	CR	LF	(Hold)												Y	E	S			CR	LF		・Set the pattern in which initialize is default.(P0 to 15)																			
		D	E	F		W	C	O			P	−	7	CR	LF	(Waveform)												Y	E	S			CR	LF		・Set the pattern in which initialize is default.(P0 to 7)																			
		D	E	F		B	O	P			P	−	0	CR	LF	(Output)												Y	E	S			CR	LF		・Set the pattern in which initialize is default.(P0 to 15)																			
		D	E	F		A	O	P			P	−	1	5	CR	LF	(Output)												Y	E	S			CR	LF		・Set the pattern in which initialize is default.(P0 to 15)																			
		D	E	F		C	O	N	D	CR	LF																	Y	E	S			CR	LF		・Set all the items of basic function to default.																			
		D	E	F		A	L	L	CR	LF																		Y	E	S			CR	LF		・Set all the set-values above mentioned to default.																			

However,the priority is given to contents of protect setting.

19. Setting Command for Each Item

(1) After the setting command is executed, measurement operation is stopped, each output is set to "OFF", and setting is performed.

(2) The data name which is signed "□" in the front of the receiving data donates the aim of skip. (The purpose is to shorten the time to change the data.)

Action example CALA CR+LF P-12CR+LF
JCR+LF SRP 2.5CR+LF
JCR+LF DEPA 1CR+LF
JCR+LF MAVA OFFCR+LF
JCR+LF SRP 2.5CR+LF

(3) When setting range is Error, the Error response is given immediately, so need to reset the setting again.

(4) When setting condition is Error, it is checked after setting is completed, the Error response is given, so need to reset the setting from the beginning of setting value.

(5) When the setting is performed differently from the designated setting method, the NO? response is given, so need to reset the setting again.

(6) Setting range and setting condition is the same as the items of setting screen.

(7) In principle don't set the decimal point. (Perform setting by "DEPA", "DEPB" of "CALA", "CALB" .)

(8) After complete the setting and intend to return to normal screen, perform "R" and "SAV".

"R" --> Change the setting value in RAM for using pattern. After changing, if using pattern is changed, or turn the power supply OFF/ON, or perform setting in setting screen, the contents changed in RAM will be replaced by the contents acquired from FlashROM. (Used only for ensuring the action.) (If the pattern is changed while setting, "R" is not available and "NO ?" response is given.)

"SAV"-->It is possible to designate the pattern for setting and execute the setting. The setting is saved into FlashROM for each executing.

19-1. Analog Input Setting (Ach)

- Set items before calibration.
- Calibration is set by items of "CA1" and "CA2".
- Though decimal point setting is not performed when setting digital shift and digital limiter of Ach, respond with decimal point if the decimal point position is set in "DFPA".

Function	Transfer data	Character	Receive data
Analog input setting (Ach)	Analog Input setting(Ach) (Strain Gauge)	CALA CR LF	PR12 CR LF ・Respond the used pattern(setting pattern).
		1 CR LF ・Set the setting pattern to 0 to 15.	P1 CR LF
		N CR LF	SRP 2.5 CR LF
		3 CR LF ・1=2.5V, 2=5.0V, 3=10V. Set to 1 to 3.	SRP 10 CR LF ・Set the sensor power.
		N CR LF	DEPA 0 CR LF
		1 CR LF ・Set to: 0=none, 1=0.0, 2=0.00, 3=0.000, 4=0.0000	DEPA 1 CR LF ・Set the decimal point position.
		N CR LF	SFTA 10 CR LF
		5 CR LF ・Set range:±99999	SFTA 5 CR LF ・Set the digital shift.
		N CR LF	UTA 13 CR LF
		1 0 CR LF ・Set to 0 to 79. Select from "29, Setting of Unit".	UTA 10 CR LF ・Set the unit.
		N CR LF	MAVA OFF CR LF
		3 2 CR LF ・Set to OFF, 2, 4, 8, 16, 32, 64, 128, 256, 512, 1024	MAVA 32 CR LF ・Set the average times of moving average.
		N CR LF	AFA 600 CR LF
		3 0 CR LF ・Set to 10, 30, 300, 600	AFA 30 CR LF ・Set the cut-off frequency of analog filter.
		N CR LF	DHIA 98765 CR LF
		8 5 0 0 0 CR LF ・Set range: −99998 to 99999	DHIA 85000 CR LF ・Set the digital limiter HI.
		N CR LF	DLOA −98765 CR LF
		− 8 5 0 0 0 CR LF ・Set range: −99999 to 99998.	DLOA −85000 CR LF ・Set the digital limiter LO.
		N CR LF	STPA 1 CR LF
		2 CR LF ・Set to 1, 2, 5, 10。	STPA 2 CR LF ・Set the step.
		N CR LF ・Set again from "SRP".	SRP 2.5 CR LF
		R CR LF ・Select "R" or "SAV"。	YES CR LF

19-2. Analog Input Setting (Bch)

・Though decimal point setting is not performed when setting scaling (Full Scale, Offset Scale), digital shift and digital limiter of Bch, respond with decimal point if the decimal point position is set in "DFPB".

Function	Transfer data							Character	Receive data							
	1	2	3	4	5	6	7		1	2	3	4	5	6	7	8
Analog input setting (Bch)	Analog input Setting(Bch) (Strain Gauge)	C	A	L	B	CR	LF			P	−	1	2	CR	LF	
		N	CR	LF				・Respond to input range of Bch and the setting of input range is:		R	A	G	B		0	−
		0	−	1	0	CR	LF	0 to 10V , 0 to 20mA , 4 to 20mA.		R	A	G	B		0	−
		N	CR	LF						F	S	C	B		9	9
		2	0	0	0	CR	LF	・Setting range 0 to 99999 to set.		F	S	C	B		2	0
		N	CR	LF				・Setting range −10000 to 10000.		F	I	N	B		3	.
		1	0	0	0	5	CR	LF Turn Error when outside the setting range and reset.		E	r	r	o	r	CR	LF
		1	0	0	0	0	CR	LF ・Set again.		F	I	N	B		1	0
		N	CR	LF						O	F	S	B		0	CR
		1	5	0	CR	LF		・Set again.		O	F	S	B		1	5
		N	CR	LF						O	I	N	B		0	.
		S	CR	LF				・Set by display value.Start measuring.		Y	E	S			CR	LF
		H	CR	LF				・Respond to the display value when performing H.		O	I	N	B		0	.
		1	2	3	CR	LF		・Perform setting directly is also able.		O	I	N	B		0	.
		S	CR	LF				・Set by display value again. Start measuring.		Y	E	S			CR	LF
		H	CR	LF				・Respond to the indicated value when performing H.		O	I	N	B		0	.
								Set by above mentioned indicated value in FINB and OINB.								
		N	CR	LF				・Setting：0=No, 1=0.0, 2=0.00, 3=0.000, 4=0.0000		D	E	P	B		0	CR
		N	CR	LF						S	F	T	B		−	9
		N	CR	LF				・Be set by 0 to 78. Select from「29. Unit setting」		U	T	B		6	CR	LF
		N	CR	LF				・Setting：OFF, 2, 4, 8, 16, 32, 64, 128, 256, 512, 1024		M	A	V	B		O	F
		N	CR	LF				・Setting：10, 30, 300, 600.		A	F	B		6	0	0
		N	CR	LF				・Setting range −99998 to 99999 to set.		D	H	I	B		9	9
		N	CR	LF				・Setting range −99999 to 99998 to set.		D	L	O	B		−	9
		N	CR	LF				・Setting：1, 2, 5, 10.		S	T	P	B		1	0
		R	CR	LF				・Select"R" or "SAV".		Y	E	S			CR	LF

Function	Receive data															
	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Analog input setting (Bch)																	
	0	CR	LF														
	1	0	CR	LF			・Set the input range.										
	9	9	9	9	CR	LF											
	0	0	0	CR	LF		・Set the full scale.										
	5	0	0	0	CR	LF											
	0	.	0	0	0	CR	LF	・Set the full scale input.									
	0	CR	LF														
	0	0	0	0	CR	LF	・Set the offset.										
	0	.	0	0	0	0	CR	LF									
	0	.	0	0	5	0	CR	LF	・Set the offset input .								
	0	.	0	1	2	3	CR	LF									
	0	.	0	0	0	5	CR	LF									
	0	CR	LF				・Set the scaling position.										
	9	9	CR	LF			・Set the digital shift.										
	CR	LF					・Set the unit.										
	F	F	CR	LF			・Set the average time of moving average.										
	0	0					・Set the barrier frequency of analog filter.										
	9	9	9	9	CR	LF		・Set the digital limiter HI.									
	9	9	9	9	CR	LF		・Set the digital limiter LI.									
	0	CR	LF				・Set the step.										
	CR	LF															

・If not satisfy the setting condition FSCB ＞ OFSB, turns Error and sets it again from FSCB.

19-3. Calibration　(Ach Actual Load Calibration)

・Though decimal point setting is not performed when setting SPAN set value, respond with decimal point if the decimal point position is set in "DFPA" of「19-1. Analog Input Setting (Ach)」.

・For details, refer to the setting contents of「7-1. Analog Input Setting (Ach)」.

Function	Transfer data	Character	Receive data
Calibrating setting (Actual load setting)			
Calibration (1)Actual load calibration (Actual Load)	C A 1 **CR** **LF** ・Respond the used pattern.		P – 1 0 **CR** **LF**
	N **CR** **LF** ・Respond the ZERO and perform the ZERO value calibration.		Z E R O **CR** **LF**
	R **CR** **LF** ・Return to normal operation by R and SAV command.		
	J **CR** **LF** ・Cancel the ZERO value calibrating, skip to the setting of SPAN, and respond the current SPAN value. ・J is only available before changing the ZERO value.		
	N **CR** **LF** ・Read the measuring value when N is performed and check the Error 1,2.		E r r o r 1 ・For details of Error, Refers to ″7-1″.
	N **CR** **LF**		E r r o r 2 ・　″
	N **CR** **LF** ・Read the ZERO value and skip to SPAN value setting if input is not Error. Respond the current SPAN setting value.		S P A N 9 8 7 6 **CR** **LF**
	R **CR** **LF** ・Only change the ZERO value and return to normal screen if perform R or SAV now.		
	N **CR** **LF** ・Minus ZERO value form acquired measuring value and transfer the result into SPIN value.		E r r o r 3 **CR** **LF**
	Check the SPIN value and Error 3,4. ・For details of Error, Refers to ″7-1″.		S P A N 9 8 7 6 **CR** **LF**
	N ・Incase of Error 3,4: Respond when actual load is outside the reading range.		E r r o r 4 S P A N 9 8 7 6
	N ・For details of Error 5, refer to ″7-1″. Perform N in case of no problem. Set SPAN setting value again when problem happened.		E r r o r 5 **CR** **LF** S P A N 9 8 7 6 **CR** **LF**
	N ・Read the SPIN value and SPAN setting value.		Y E S **CR** **LF**
	N ・Return to the beginning and reset after performing N.		Z E R O **CR** **LF**
	R ・Return to normal screen after performing R and SAV.		
	1 0 0 0 **CR** **LF** ・Reset the SPAN setting value for clearing Error 5.		S P A N 1 0 0 0 **CR** **LF** ・Error 5 is cleared.
	N **CR** **LF** ・Read the SPIN value and SPAN setting value and finish the setting.		Y E S **CR** **LF**
	N ・Return to the beginning and reset after performing N.		Z E R O **CR** **LF**
	R **CR** **LF** ・Return to normal screen after perform R an SAV.		Y E S **CR** **LF**

19-4. Calibration (Ach Equivalent Calibration)

・Though decimal point setting is not performed when setting SPAN set value, respond with decimal point if the decimal point position is set in "DFPA" of「19-1. Analog Input Setting (Ach)」.

・Though decimal point setting is not performed when inputting mV/V value, respond with "x.xxxx".

・For details, refer to the setting contents of「7-1. Analog Input Setting (Ach)」.

Function		Transfer data																									Character	Receive data																									
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Calibrating setting (Equivalent calibrating)	Calibrating (2)Equivalent calibrating (Equivalent Calibration)	C	A	2	CR	LF																						P	−	1	2	CR	LF																					
		N	CR	LF			・Convert the current ZERO value into mV/V and respond.																					Z	E	R	O		0	.	2	0	0	0	m	V	/	V	CR	LF									
		R	CR	LF			・Return to normal operation by R and SAV command.																																															
		J	CR	LF			・Cacel the calibrating of ZERO value, skip to setting of SPIN, and respond the current SPIN value.																																															
							・J is only available before changing the ZERO value.																																														
		1	2	0	0	CR	LF																							Z	E	R	O		0	.	1	2	0	0	m	V	/	V	CR	LF							
		N	CR	LF			・(1) Respond the setting value after setting ZERO value directly. Perform Error 1,2 checking when N inputted. Read the ZERO value, respond the current SPIN value, and set the SPIN value in case of no Error. Though same as below mentioned (3), the ZERO val																					Z	E	R	O		0	.	1	2	0	0	m	V	/	V	CR	LF							
																												S	P	I	N		2	.	1	0	0	0	m	V	/	V	CR	LF							
		N	CR	LF			・(2) If don't set the ZERO value indirectly and after performing N, read the measuring value and perform Error 1 checking																					E	r	r	o	r		1	CR	LF																	
																												Z	E	R	O		0	.	2	0	0	0	m	V	/	V	CR	LF							
		N	CR	LF			Read the measuring value and perform Error2 checking.																					E	r	r	o	r		2	CR	LF																	
																												Z	E	R	O		0	.	2	0	0	0	m	V	/	V	CR	LF							
		N	CR	LF			・(3) Respond the ZERO value and the current SPIN value when no Error in (2).																					Z	E	R	O		0	.	0	0	0	5	m	V	/	V	CR	LF							
																												S	P	I	N		2	.	1	0	0	0	m	V	/	V	CR	LF							
		R	CR	LF			・Only change the ZERO value and return to normal screen if perform R or SAV now.																					Y	E	S			CR	LF																	
		3	1	0	0	0	CR	LF	・Respond the setting value after SPIN value is set.																					S	P	I	N		3	.	1	0	0	0	m	V	/	V	CR	LF							
		N	CR	LF			・Read the SPIN value and repond the current SPAN setting value when N is performed.																					S	P	A	N		5	0	.	0	0	CR	LF													
		3	2	0	0	0	CR	LF	・Respond the setting value after SPAN setting value is set.																					S	P	A	N		3	2	0	.	0	0	CR	LF											
		N	CR	LF			・Perform Error 3, 4 check while N is performed. Respond the SPIN value before changing in when Error.																					E	r	r	o	r		4																			
																												S	P	I	N		2	.	1	0	0	0	m	V	/	V	CR	LF							
		1	5	0	0	0	CR	LF	・Reset the SPIN setting value and respond the setting value.																					S	P	I	N		1	.	5	0	0	0	m	V	/	V	CR	LF							
		N	CR	LF			・Read the SPIN value while N is performed, and respond the SPAN setting value before changing.																					S	P	A	N		5	0	.	0	0	CR	LF													

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Function	Transfer data								Character	Receive data								
	1	2	3	4	5	6	7	8		1	2	3	4	5	6	7	8	9
Calibration setting (Equivalent calibration)	2	0	0	0	0	CR	LF	・Reset the SPAN set value.Respond the setting value.		S	P	A	N		2	0	0	.
	N	CR	LF					・For details of Error 5, refer to "7－1".		E	r	r	o	r		5	CR	LF
								Perform N when no problem.		S	P	I	N		1	.	5	0
								Reset the SPN setting value when problem happened.										
	N	CR	LF					・Read the SPIN value and SPAN setting value when N is performed, and return to the beginning.		Z	E	R	O		0	.	0	0
	R	CR	LF					・Return to normal screen after performing R and SAV.		Y	E	S						
				・Reset the SPIN value and SPAN setting value for clearing Error 5.						E	r	r	o	r		5	CR	LF
										S	P	I	N		1	.	5	0
	1	5	0	0	0	CR	LF	・Reset SPIN value when Error 6. Respond the setting value.		S	P	I	N		1	.	5	0
	N	CR	LF					・Read the SPIN value when N is performed. Respond the SPAN setting value after changing		S	P	A	N		2	0	0	.
	1	2	0	0	0	CR	LF	・Reset the SPAN setting value. Respond the setting value.		S	P	A	N		1	2	0	.
	N	CR	LF					・Read the SPIN value and SPAN setting value when N is performed, and return to the beginning. Error 5 is cleared. Setting again is possible.		Z	E	R	O		0	.	0	0
	R	CR	LF					・Return to normal screen after performing R and SAV.										

Function	Receive data																								
	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Calibration setting (Equivalent calibration)	0	0	CR	LF												
	0	0	m	V	/	V	CR	LF								
	0	5	m	V	/	V	CR	LF								
	0	0	m	V	/	V	CR	LF								
	0	0	CR	LF												
	0	0	CR	LF												
	0	5	m	V	/	V	CR	LF								

19-5. Comparison Setting Value Setting (Ach/Bch) (Comparator)

・Use comparison setting value when select the below setting in「6. Basic Function Setting (System) 1)Meter Setting」.

(1) A Channel
(2) B Channel
(3) 2 Channel

is selected.

・Though decimal point setting is not performed when setting comparison setting value and hysteresis setting value, respond with decimal point if the decimal point position is set in "DFPA" or "DFPB" of「19-1, 2. Analog Input Setting (A/Bch)」.

Function	Transfer data																									Character	Receive data																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Comparison setting value set (Ach／Bch)	Comparison setting value set	C	O	M	A	CR	LF																					P	−		1	CR	LF																				
		N	CR	LF																								R	A	−	H	H		1	0	0	.	0	CR	LF											
	(Ach)	2	5	0	0	CR	LF			・HH Limit. Setting range: ±99999.																	S	A	−	H	H		2	5	0	.	0	CR	LF											
	(Comparator)	N	CR	LF																								S	A	−	H	I		5	0	.	0	CR	LF												
		1	5	0	0	CR	LF			・HI Limit. Setting range: ±99999.																	S	A	−	H	I		1	5	0	.	0	CR	LF											
		N	CR	LF																								S	A	−	L	O		1	0	.	0	CR	LF												
		1	0	0	0	CR	LF			・LO Limit. Setting range: ±99999.																	S	A	−	L	O		1	0	0	.	0	CR	LF											
		N	CR	LF																								S	A	−	L	L		5	.	0	CR	LF												
		5	0	0	CR	LF				・LL Limit. Setting range: ±99999.																	S	A	−	L	L		5	0	.	0	CR	LF											
		N	CR	LF																								H	A	−	H	H		0	CR	LF															
		1	0	CR	LF					・HH Hysteresis: ±9999																	H	A	−	H	H		1	.	0	CR	LF											
		N	CR	LF																								H	A	−	H	I		0	CR	LF															
		1	0	CR	LF					・HI Hysteresis: ±9999																	H	A	−	H	I		1	.	0	CR	LF											
		N	CR	LF																								H	A	−	L	O		0	CR	LF															
		−	1	0	CR	LF				・LO Hysteresis: ±9999																	H	A	−	L	O		−	1	.	0	CR	LF											
		N	CR	LF																								H	A	−	L	L		0	CR	LF															
		−	1	0	CR	LF				・LL Hysteresis: ±9999																	H	A	−	L	L		−	1	.	0	CR	LF											
		N	CR	LF						・set the comparsion output type. 1=Normal, 2=Area, 3=Rank																	C	O	U	T		1	CR	LF																			
		N	CR	LF																								Z	B	N	D		0	CR	LF															
		1	0	CR	LF					・Zero Band. Setting range: 0 to 99999(absolute value)																	Z	B	N	D		1	.	0	CR	LF											
		N	CR	LF						・Set the Start Condition.																	C	S	R	T		1	CR	LF																			
		2	CR	LF						・Set to 1 to 4. For details,refer to "Comparison Set Value (Comparator) (A/Bch)"																	C	S	R	T		2	CR	LF																			
		R	CR	LF						・slect "R" or "SAV".																	Y	E	S			CR	LF																			
	Comparison setting value set	C	O	M	B	CR	LF			・Setting procedure is the same as Ach.																	P	−		2	CR	LF																			
		N	CR	LF																								S	B	−	H	H		1	0	0	0	CR	LF												
	(Bch)	N	CR	LF																								S	B	−	H	I		5	0	0	CR	LF													
	(Comparator)	N	CR	LF																								S	B	−	L	O		1	0	0	CR	LF													
		N	CR	LF																								S	B	−	L	L		5	0	LF	LF														
		N	CR	LF																								H	B	−	H	H		0	CR	LF															
		N	CR	LF																								H	B	−	H	I		0	CR	LF															
		N	CR	LF																								H	B	−	L	O		0	CR	LF															
		N	CR	LF																								H	B	−	L	L		0	CR	LF															
		N	CR	LF																								C	O	U	T		1	CR	LF															
		N	CR	LF																								Z	B	N	D		0	CR	LF															
		N	CR	LF																								C	S	R	T		1	CR	LF															
		R	CR	LF																								Y	E	S			CR	LF															

19-6. Hold Function Setting (Hold)

Function		Transfer data																									Character	Receive data																									
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Hold function	Hold function setting	H	L	D																								P	–		1	CR	LF																					
		N	CR	LF				・Set the hold type. Set to 1 to 17.																					H	T	P		1	6	CR	LF																			
	(Hold)							For details, refer to "11, Hold Function (Hold)".																																																	
		N	CR	LF				・Set waveform start level. Setting range: ±99999																					W	S	L		1	0	0	CR	LF																			
		N	CR	LF				・Waveform start level condition: 1=Pass, 2=Raising Edge, 3=Trailing Edge, 4=More, 5=Less Set to 1 to 5.																					W	S	C		1	CR	LF																					
		N	CR	LF				・Set the Detection Time. Setting range: 1 to 9999.																					D	T	M		9	9	9	9	CR	LF																	
		N	CR	LF				・Set the Minimal Value. Setting range: 1 to 9999.																					E	D	N		9	9	9	9	CR	LF																	
		N	CR	LF				・Set the Detection Level. Set to 1 to 9. 1=1/4, 2=1/2, 3=3/4, 4=1, 5=1.25, 6=1.5, 7=2, 8=3, 9=4																					D	L	V		3	/	4	CR	LF																			
		2	CR	LF																									D	L	V		1	/	2	CR	LF																			
		N	CR	LF				・Set the Detection Count. Set to 1 to 9.																					D	T	C		2	CR	LF																					
		N	CR	LF				・Set the Inflection Range. Setting range: 1 to 99999.																					I	D	V		9	9	9	9	9	CR	LF																	
		N	CR	LF				・Set the Inflection Before. Setting range: 1 to 999.																					I	T	A		9	9	9	CR	LF																			
		N	CR	LF				・Set the Inflection After. Setting range: 1 to 999.																					I	T	B		9	9	9	CR	LF																			
		R	CR	LF				Select "R" or "SAV".																					Y	E	S				CR	LF																			

19-7. Graph Display Setting (Graph Disp)

・Though decimal point setting is not performed when setting the interval time, respond with " x.x. "

Function		Transfer data																									Character	Receive data																									
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Display setting	Display seting	D	S	T	CR	LF																						P	–		1	CR	LF																					
	(Graph Disp)	N	CR	LF				・Range of the Y Start Point is −99999 to 99999.																					Y	S	P		—	1	0	0	0	CR	LF																	
		N	CR	LF				・Set the Y Scale to 1, 2, 5, 10, 20, 50, 100, 200, 500, 1000, 2000.																					Y	S	C		1	/	1	0	0	CR	LF																	
		N	CR	LF				・X Start Point: from 0. For details of setting range, refer to "Graphic Display Setting (Graph disp)".																					X	S	P		0	CR	LF																					
		N	CR	LF				・Set the X Scale to 1, 2, 5 ,10.																					X	S	C		1	/	1	0	CR	LF																	
		N	CR	LF				・Set the Interval Time for Free Run.																					I	T	T		1	.	0	CR	LF																	
		2	0	CR	LF			Setting range: 0.0 to 99.9 second.																					I	T	T		2	.	0	CR	LF																	
		N	CR	LF				・Set the Start Type.																					W	S	T		2	CR	LF																			
		4	CR	LF				1=Free Run, 2=START/STOP, 3=WaveStartLevel, 4=START/STOP + WaveStartLevel. Set to 1 to 4.																					W	S	T		4	CR	LF																			
		R	CR	LF				Select "R" or "SAV".																					Y	E	S				CR	LF																			

19-8. Waveform Comparison / Waveform & Displacement Comparison Setting

・Though decimal point setting is not performed when setting the Displacement Max/Min Value, respond with decimal point if the decimal point position is set in "DFPB" of「19-2. Analog Input Setting (Bch)」.

Function		Transfer data																									Character	Receive data																									
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Waveform comparison／waveform&displacement comparison setting	Waveform comparison ／ waveform& displacement comparison setting	W	C	O	CR	LF																						P	–		1	CR	LF																					
		N	CR	LF				・Set the start point and end point of comparison range. Setting range: 0 to 200000.																					A	S	T		0	–	2	0	0	0	CR	LF																	
		N	CR	LF				・Set the Displacement Max Value. Setting range: 0 to 99999.																					X	H	I		1	0	0	0	0	CR	LF																	
		N	CR	LF				・Set the Displacement Min Value. Setting range: 0 to 99999.																					X	L	O		0	CR	LF																					
		R	CR	LF				Select "R" or "SAV".																					Y	E	S				CR	LF																			

19-9. Linearizing Setting (Ach)(Linearization)

・The function of compensating the deflection of analog input signal, the compensation number is at most 32.

・Though decimal point setting is not performed when setting the input value/output value, respond with decimal point if the decimal point position is set in "DFPA" or "DFPB" of「19-1,2. Analog Input Setting (A/Bch)」.

	Function	Transfer data (1–25)	Character	Receive data (1–25)
Linearizing (Ach)	Linearizing set	L I N A CR LF		P – 1 CR LF
	(Ach)	N CR LF		D T A 0 CR LF
	(Linearization)	6 CR LF ・Set the Set Number to "2 to 32".		D T A 6 CR LF
		N CR LF ・Set the Linearization to ON, OFF, CLR.		M V A C L R CR LF
		O N CR LF ・ON=execution. OFF=non-execution. CLR=clearing of "0".		M V A O N CR LF
		N CR LF		S T 0 I = 0 CR LF
		N CR LF		S T 0 O = 0 CR LF
		N CR LF		S T 1 I = 0 CR LF
		5 5 0 CR LF ・Perform the setting of input value.		S T 1 I = 5 5 . 0 CR LF
		N CR LF		S T 1 O = 0 CR LF
		2 5 0 CR LF ・Perform the setting of output value.		S T 1 O = 2 5 . 0 CR LF
		N CR LF		S T 2 I = 0 CR LF
		1 1 0 5 CR LF		S T 2 I = 1 1 0 . 5 CR LF
		N CR LF		S T 2 O = 0 CR LF
		5 0 0 CR LF		S T 2 O = 5 0 . 0 CR LF
		N CR LF		S T 3 I = 0 CR LF
		1 6 1 0 CR LF		S T 3 I = 1 6 1 . 0 CR LF
		N CR LF		S T 3 O = 0 CR LF
		7 5 0 CR LF		S T 3 O = 7 5 . 0 CR LF
		N CR LF		S T 4 I = 0 CR LF
		2 2 0 0 CR LF		S T 4 I = 2 2 0 . 0 CR LF
		N CR LF		S T 4 O = 0 CR LF
		1 0 0 0 CR LF		S T 4 O = 1 0 0 . 0 CR LF
		N CR LF		S T 5 I = 0 CR LF
		2 7 5 4 CR LF		S T 5 I = 2 7 5 . 4 CR LF
		N CR LF		S T 5 O = 0 CR LF
		1 2 5 0 CR LF		S T 5 O = 1 2 5 . 0 CR LF
		N CR LF		S T 6 I = 0 CR LF
		R CR LF CR LF ・Select "R" or "SAV".		Y E S CR LF
		Check the setting condition of input vlaue when perform "R" or "SAV" to return to normal operation. Check range is "DTA 6", so perform from ST00 I=0 to ST05 I=275.4. Setting condition: ST00 I=xxxxxx ＜ ST01 I=xxxxxx … ＜ ST05 I=275.4. When condition is n		

19-9'. Linearizing Setting (Bch) (Linearization)

Function	Transfer data																									Character	Receive data																									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Linearzing setting (Bch)	Linearizing setting	L	I	N	B	CR	LF				•Setting procedure is the same as Ach.																P	–		1	CR	LF																							
	(Bch)	N	CR	LF																							D	T	B		8	CR	LF																				
	(Linearization)	N	CR	LF																							M	V	B		O	F	F	CR	LF																	
		N	CR	LF																							S	T	0		I	=	0	CR	LF																	
		N	CR	LF																							S	T	0		O	=	0	CR	LF																	
		N	CR	LF																							S	T	1		I	=	5	5	0	CR	LF														
		N	CR	LF																							S	T	1		O	=	2	5	0	CR	LF														
		N	CR	LF																							S	T	2		I	=	1	1	0	5	CR	LF												
		N	CR	LF																							S	T	2		O	=	5	0	0	CR	LF														
		N	CR	LF																							S	T	3		I	=	1	6	1	0	CR	LF												
		N	CR	LF																							S	T	3		O	=	7	5	0	CR	LF														
		N	CR	LF																							S	T	4		I	=	2	2	0	0	CR	LF												
		N	CR	LF																							S	T	4		O	=	1	0	0	0	CR	LF												
		N	CR	LF																							S	T	5		I	=	2	7	5	4	CR	LF												
		N	CR	LF																							S	T	5		O	=	1	2	5	0	CR	LF												
		N	CR	LF																							S	T	6		I	=	3	2	8	0	CR	LF												
		N	CR	LF																							S	T	6		O	=	1	5	0	0	CR	LF												
		N	CR	LF																							S	T	7		I	=	3	8	5	5	CR	LF												
		N	CR	LF																							S	T	7		O	=	2	0	0	0	CR	LF												
		R	CR	LF						•Select "R" or "SAV".																	Y	E	S				CR	LF																				

20. Remote Control

・Control each input signal of STA/STB, DZA/DZB, START, STOP, RESET, P0 to P3, OUT1 to OUT5 and get the state of terminal by RS-232C/RS-485.

・When perform the settings other than each command, NO? response is given. Need to reset after confirming.

	Function	Transfer data																									Character	Receive																									
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Remote control	Start hold response	S	T	H	CR	LF		・Respond the operation state. Include control terminal, KEY, RS−.																				S	T	H		A	=	O	N		B	=	O	F	F	CR	LF											
	Start hold terminal response	E	S	A	CR	LF		・Respond the state of control terminal STA/STB.																				E	S	A		A	=	O	N		B	=	O	F	F	CR	LF											
	Start hold control「R」	S	T	A		O	F	F	CR	LF		・Ignore the setting of control terminal STA and KEY, set to OFF.																Y	E	S				CR	LF																							
		S	T	A		O	N	CR	LF			・Ignore the setting of control terminal STA and KEY, set to ON.																Y	E	S				CR	LF																							
	(STA/STB signal)	S	T	B		O	F	F	CR	LF		・Ignore the setting of control terminal STB and KEY, set to OFF.																Y	E	S				CR	LF																							
		S	T	B		O	N	CR	LF			・Ignore the setting of control terminal STB and KEY, set to ON.																Y	E	S				CR	LF																							
		S	T	C		O	F	F	CR	LF		・Ignore the setting of control terminal STA/STB and KEY, set to OFF at the same time.																Y	E	S				CR	LF																							
		S	T	C		O	N	CR	LF			・Ignore the setting of control terminal STA/STB and KEY, set to ON at the same time.																Y	E	S				CR	LF																							
	Start hold control release	E	S	M		A	CR	LF			・Release the control of RS−, return the control to terminal STA and KEY.																Y	E	S				CR	LF	・NO ? respond is given when not controled by RS−.																							
		E	S	M		B	CR	LF			・Release the control of RS−, return the control to terminal STB and KEY.																Y	E	S				CR	LF	・NO ? respond is given when not controled by RS−.																							
		E	S	M		C	CR	LF			・Release the control of RS− for 2 channels, return the control to terminal STA/STB and KEY.																Y	E	S				CR	LF	・NO ? respond is given when 2 channels are not controled by RS−.																							
	Reset response	R	E	S	CR	LF		・Respond when not at the time of reset.																				R	E	S		O	F	F	CR	LF																							
	(RESET signal)	R	E	S	CR	LF		・Respond when at the time of reset.																				R	E	S		O	N	CR	LF																							
	Reset terminal response	E	R	A	CR	LF		・Respond the state of control terminal RESET.																				E	R	A		O	F	F	CR	LF																							
		E	R	A																								E	R	A		O	N	CR	LF																							
	Reset control[R]	R	E	S		O	N	CR	LF			・Available when at the time of hold.																Y	E	S				CR	LF																							
		R	E	S		O	F	F	CR	LF																		Y	E	S				CR	LF																							
	Reset control release	E	R	M	CR	LF		・Release the control of RS−, return the control to terminal RESET.																				Y	E	S				CR	LF																							
	Graph start response	G	S	T	CR	LF		・Respond when not at the time of waveform acquisition.																				G	S	T		O	F	F	CR	LF																							
								・Respond when at the time of waveform acquisition.																				G	S	T		O	N	CR	LF																							
	(START signal)																																																									
	Graph start terminal response	E	G	A	CR	LF		・Respond the state of control terminal START.																				E	G	A		O	F	F	CR	LF																							
																												E	G	A		O	N	CR	LF																							
	Graph start control「R]	G	S	T		O	N	CR	LF			・Start the waveform acquisition.																Y	E	S				CR	LF	・Real acquisition depends on the settings of each type and condition.																							
	Graph start control release	E	G	M	CR	LF		・Release the control of RS−, return the control to terminal START.																				Y	E	S				CR	LF																							

Function	Transfer data	Character	Receive
Remote control			
Graphic stop response	GST CR LF ・Respond when at the time of waveform acquisition.		GST OFF CR LF
	GST CR LF ・Respond when not at the time of waveform acquisition.		GST ON CR LF
(STOP signal)			
Graphic stop terminal response	EPA CR LF ・Respond the state of control terminal STOP.		EPA OFF CR LF
			EPA ON CR LF
Graphic stop control「R」	GSP O N CR LF ・Stop when at the time of waveform acquisition.		YES CR LF
Graphic stop control release	EPM CR LF ・Release the control of RS−, return the control to terminal STOP.		YES CR LF
Digital zero response	DZR CR LF ・Respond the operation state. Include control terminal, KEY, RS−.		DZR A=0 B=0 CR LF
			DZR A=0 B=345.50 CR LF
(DZA／DZB signal)	・Respond DZ value when DZ is ON.		DZR A=−1500 B=0200 CR LF
			DZR A=350 B=0 CR LF
Digital zero terminal response	EZA CR LF ・Respond the state of control terminal DZA／DZB.		EZA A=OFF B=OFF CR LF
			EZA A=OFF B=ON CR LF
			EZA A=ON B=OFF CR LF
			EZA A=ON B=ON CR LF
Digital zero control「R」	DZA O N CR LF		YES CR LF ・Ignore the setting of control terminal DZA and KEY, set to ON.
	DZA 1 0 0 CR LF		YES CR LF ・Write into the DZ value of Ach directly.
	DZB O N CR LF ・Not accept when W&D comparison.		YES CR LF ・Ignore the setting of control terminal DZB and KEY, set to ON.
	DZB 1 0 0 CR LF		YES CR LF ・Write into the DZ value of Bch directly.
	DZC O N CR LF ・Not accept when W&D comparison.		YES CR LF ・Ignore the setting of control terminal DZA/DZB and KEY, set to ON.
	DZC 1 0 CR LF		YES CR LF ・Write into the DZ value of 2 channels directly.
Digital zero control release	EZM A CR LF ・Release the control of RS−, return the control to terminal DZA and KEY.		YES CR LF
	EZM B CR LF ・Release the control of RS−, return the control to terminal DZB and KEY.		YES CR LF ・Not accept when W&D comparison.
	EZM C CR LF ・Release the control of RS− for 2 channels, return the control to terminal DZA/DZB and KEY.		YES CR LF ・Real acquisition depends on the settings of each type and condition. ・Not accept when W&D comparison.
Pattern select (P0 to P3)	PSL CR LF ・Respond the operation state. Include control terminal, KEY, RS−.		PSL P−0 CR LF
Pattern select terminal response	PSA CR LF ・Respond the state of control terminal P0 to P3.		PSA P−12 CR LF
Pattern control[R]	PSL 7 CR LF ・Ignore the setting of control terminal and set the using pattern.		YES CR LF
Pattern control release	EPS CR LF ・Release the control of RS−, return the control to terminal P0 to P3.		YES CR LF

21. Waveform Relative

21-1. Reading of Point

・Perform when display is not in Wave Data Read screen.

Function	Transfer data																									Character	Receive data																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Reading of each point Graphic point response	G	P	R	CR	LF			・Respond when the display is not in Wave Data Read screen. (When the cursor is not displayed.) ・Respond the content of point where the cursor is at when display is in Wave Data Read screen.																			N	O		?																								
	G	P	R	CR	LF			・Respond the HI Limit(HOLD), HI waveform setting value. ・Respond the Y−axis indicated value, X−axis(time). ・Respond the LO Limit(HOLD), LO waveform setting value.																			5	0	.	0	0	CR	LF																				
																											5	.	6	7		5	.	0	0	0	CR	LF														
																											0	.	5	0	CR	LF																				
	G	P	R	CR	LF			・Respond when outside of the comparison range in waveform comparison. "−−−−−"																			−	−	−	−	−	CR	LF																				
																											1	8	.	8	9		1	0	.	0	0	0	CR	LF											
								・Respond when outside of the comparison range in waveform comparison. "−−−−−"																			—	—	—	—	—	CR	LF																				
	G	P	R	CR	LF			・Respond the HI waveform setting value and the Displacement Max Value. ・Respond the Y−axis indicated value, X−axis displacement indicated value. ・Respond the LO waveform setting value and the Displacement Min Value.																			3	3	1	.	5		1	8	0	.	0	CR	LF																			
																											3	2	.	7		5	0	.	0	CR	LF															
																											3	1	.	5		5	.	0	CR	LF																
	G	P	R	CR	LF			・Respond when outside of the comparison range in W&D comparison. "−−−−−"																			—	—	—	—	—		1	8	0	.	0	CR	LF															
																											2	.	5		2	0	0	.	0	CR	LF															
								・Respond when outside of the comparison range in W&D comparison. "−−−−−"																			—	—	—	—	—			5	.	0	CR	LF																

21-2. Waveform Reading / Saving

・Read the outlying waveform. Up to 4 outlying waveforms can be read.

(Read the waveform of which the analog input value is equal to or outside HI/LO waveform setting value.)

・"RWD" can also be used to read the current waveform.

・Read the HI/LO waveform setting value.

Pattern for reading is set to 0 to 7.

NO ? response is given when outside the range and need to set again.

・The setting of reading range is 0 to 2047.

NO ? response is given when set by others and need to set again.

Function	Transfer data	Character	Receive data
Waveform reading — Outlying waveform reading	F W D 1 CR LF ・Set the waveform for reading. 1=1 times before, 2=2 times before, 3=3 times before, 4=4 times before.		Y E S CR LF
			N O ? CR LF ・Respond when there is no waveform for reading.
	F W R 0 — 2 0 4 7 CR LF		Y E S CR LF 0 — 9 9 9 . 9 9 CR LF 1 — 9 9 9 . 8 9 CR LF ・ ・ 2 0 4 7 9 9 9 . 9 5 CR LF ・Start reading after setting the range of reading. Range is 0–2047 if range is omitted. Respond in the order of memory address, indicated value.
Waveform reading — Acquired waveform reading (Display screen)	R W D 1 0 0 — 1 5 0 0 CR LF		Y E S 1 0 0 1 . 1 1 CR LF 1 0 1 1 . 1 5 CR LF ・ ・ 1 5 0 0 3 2 . 1 1 CR LF ・Start reading after setting the range of reading. Range is 0–2047 if range is omitted. Respond in the order of memory address, indicated value.
			N O ? CR LF ・Respond when there is no waveform for reading.
Waveform reading — HI/LO waveform setting value reading	R W P 1 CR LF ・Set the pattern for reading.		Y E S CR LF
HI waveform setting value reading	R W H 0 – 1 0 0 CR LF		Y E S CR LF 0 1 0 . 0 0 CR LF LF 1 1 0 . 0 2 CR LF LF ・ ・ 1 0 0 1 2 . 0 0 CR LF LF ・Start reading after setting the range of reading. Range is 0–2047 if range is omitted. Respond in the order of memory address, indicated value.

Function		Transfer data																									Character	Receive data																									
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Waveform reading	LO waveform setting value reading	R	W	L		0	—	1	0	0	CR	LF																Y	E	S																								
																												0		5	.	0	0	CR	LF	LF																		
																												1		5	.	0	2	CR	LF	LF																		
																												1	0	0		7	.	0	0	CR	LF																		
Waveform setting value saving	Buffer clearing for log in (Internal memory)	B	C	L	CR	LF					•Before setting the HI/LO waveform setting value, clear the internal memory for temporary setting.																	Y	E	S			CR	LF																								
	Waveform saving HI waveform setting value	W	W	H		0					•Write into the internal memory for logging in HI/LO waveform setting value. •Start after setting the saving start point 0 to 2047 for HI waveform setting value. Start point is "0" when it is omitted.																	Y	E	S			CR	LF																								
																											•Respond in the order of memory address, setting data.																														
		5	1	0	CR	LF																					•Respond the cleared value after clearing the internal memory.	0		5	1	0	CR	LF																								
		N	CR	LF																							•Over-writing is possible.	1		5	0	2	CR	LF																								
		5	1	2	CR	LF																						1		5	1	2	CR	LF																								
		N	CR	LF																								2		5	0	4	CR	LF																								
		N	CR	LF																								3		5	0	6	CR	LF																								
		R	CR	LF							•Cancel is enabled while in setting.																	Y	E	S			CR	LF																								
		W	W	H		2	CR	LF			•Over-writing from midway is possible, writing will be resumed.																	Y	E	S			CR	LF																								
		5	1	4	CR	LF																						2		5	0	4	CR	LF																								
		N	CR	LF																								2		5	1	4	CR	LF																								
		5	1	6	CR	LF																						3		5	0	6	CR	LF																								
		N	CR	LF																								3		5	1	6	CR	LF																								
		N																																																			
		N																																																			
		N									•Return to memory address "0"																	2	0	4	7		0	0	5	CR	LF																								
		R	CR	LF																									0		5	0	0	CR	LF																								
																												Y	E	S			CR	LF																								

Funtion		Transfer data																									Character	Receive data																									
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Waveform setting value saving	LO waveform setting value	W	W	L		0	CR	LF			•Start after setting the saving start point 0 to 2047 for LO waveform setting value. Start point is "0" when it is omitted.																	Y	E	S			CR	LF																								
																											•Respond in the order of memory address, setting data.	0		3	0	0	CR	LF																								
		3	3	0	CR	LF					•Respond the cleared value after clearing the internal memory.																	0		3	3	0	CR	LF																								
		.									•Over-writing is possible.																			.																												
		.									The other setting method is the same as HI waveform setting value.																			.																												
		R	CR	LF																									Y	E	S			CR	LF																								
	Setting value saving	W	W	P		2	CR	LF			•Save the HI/LO waveform setting value of temporary setting into pattern. Set the saving pattern. •Setting range of pattern: 0 to 7 •Can be used in waveform comparison and W&D comparison late.																	Y	E	S			CR	LF																								

・Clear the buffer (internal memory) for logging in before writing the HI/LO waveform set value.

・Select the HI waveform set value and perform the setting in the order of memory address, setting data, N and setting data.

Interrupting in the midway and setting again is possible. (The same to LO waveform set value.)

・After completing the setting, save the HI/LO set value into the pattern.

The pattern can be set to 0 to 7.

22. Pattern Copy

・Perform the copy between patterns.

・After executing the copy command, measurement operation is stopped, each output is set to "OFF", and then copy is performed.

・The pattern of Waveform Comparison / Waveform & Displacement Comparison is set among "P0 to P7". The pattern of others is set among "P0 to P15"

・Analog output, BCD output can be accepted when mounted.

	Function	Transfer data																									Chara cter	Receive data																								
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Pattern copy	Pattern copy for waveform comparison, W&D comparison	W	V	C		P	1		P	7	CR	LF																Y	E	S			CR	LF			(Example) Copy pattern1 to pattern7. (include HI/LO waveform set value) Pattern range: P0 to P7															
	Pattern copy for all items below, other than waveform comparison, W&D comparison	P	T	C		P	1		P	1	2	CR	LF															Y	E	S			CR	LF			(Example) Copy pattern1 to pattern12. Copy CAC,CBC,LAC,LBC,CMA,CMB,DTC,HDC,AOC,BOC at the same time.															
	Pattern copy for strain gauge	C	A	C		P	1		P	6	CR	LF																Y	E	S			CR	LF			(Example) Copy pattern1to pattern6 of Ach. Pattern range: P0 to P15															
		C	B	C		P	1		P	6	CR	LF																Y	E	S			CR	LF			(Example) Copy pattern1to pattern6 of Bch. Pattern range: P0 to P15															
	Pattern copy for linearization	L	A	C		P	1		P	6	CR	LF																Y	E	S			CR	LF			Copy Ach. Pattern range: P0 to P15															
		L	B	C		P	1		P	6	CR	LF																Y	E	S			CR	LF			Copy Bch. Pattern range: P0 to P15															
	Pattern copy for comparison set-value	C	M	A		P	1		P	6	CR	LF																Y	E	S			CR	LF			Copy Ach. Pattern range: P0 to P15															
		C	M	B		P	1		P	6	CR	LF																Y	E	S			CR	LF			Copy Bch. Pattern range: P0 to P15															
	Pattern copy for display setting	D	T	C		P	1		P	6	CR	LF																Y	E	S			CR	LF			Copy it. Pattern range: P0 to P15															
	Pattern copy for hold setting	H	D	C		P	1		P	6	CR	LF																Y	E	S			CR	LF			Copy it. Pattern range: P0 to P15															
	Pattern copy for analog output	A	O	C		P	1	1		P	1	5	CR	LF														Y	E	S			CR	LF			Be available when there is analog output unit. Copy it. Pattern range: P0 to P15															
	Pattern copy for BCD output	B	O	C		P	1	1		P	1	5	CR	LF														Y	E	S			CR	LF			Be available when there is BCD output unit. Copy it. Pattern range: P0 to P15															

23. Output (In Case of RS-232C, RS-485)

・Respond when analog output or BCD output mounted

NO ? response is given when not mounted.

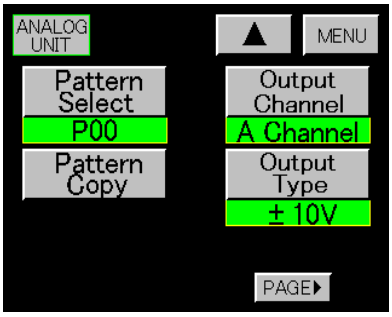
Function		Transfer data																									Character	Receive data																									
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Setting of output board	Analog output setting	A	O	P	CR	LF																						P	–	1	2	CR	LF																					
		8	CR	LF						・Set the setting pattern to 0 to 15.																	P	–	8	CR	LF																								
		N	CR	LF																								C	H	N		A	CR	LF																				
		B	CR	LF						・Set the output channel. Set to A or B.																	C	H	N		B	CR	LF																						
		D	A	CR	LF																							O	P	T		D	A	CR	LF																			
		D	V	CR	LF					・Set the output type. DA=current DV=voltage.																	O	P	T		D	V	CR	LF																					
		8	0	0	0	0	CR	LF																			A	O	H	I		8	0	0	0	CR	LF																
		5	0	0	0	CR	LF			・Set the indicated value which output is 10V or 20 mA.																	A	O	H	I		5	0	0	0	CR	LF																		
		N								・Set the indicated value which output is 0V or 4 mA.																	A	O	L	O		0	CR	LF																						
		R	CR	LF						Select "R" or "SAV".																	Y	E	S			CR	LF																						
	BCD output setting	B	O	P	CR	LF																						P	–	1	2	CR	LF																					
		8	CR	LF						・Set the setting pattern to 0 to 15.																	P	–	8	CR	LF																								
		N	CR	LF																								C	H	N		A	CR	LF																				
		B	CR	LF						・Set the output channel. Set to A or B.																	C	H	N		B	CR	LF																						
		R	CR	LF						Select "R" or "SAV".																	Y	E	S			CR	LF																						

24. Analog Output (Output)

24-1. Analog Output Setting

・When analog 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

・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) Output Channel

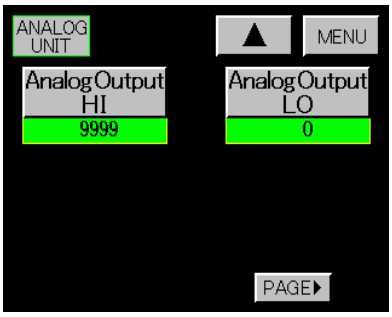
・Set the intended channel through which the indicated value is output on the select screen.

・Setting items : Ach, Bch

4) Output Type

・Select voltage output of ±10V and current output of 4 to 20mA on the select screen.

・Setup item : ±10V, 4 to 20mA



5) Analog Output HI

・Set an indicated value when analog output is 10V or 20mA.

・Setting range : ±99999

6) Analog Output LO

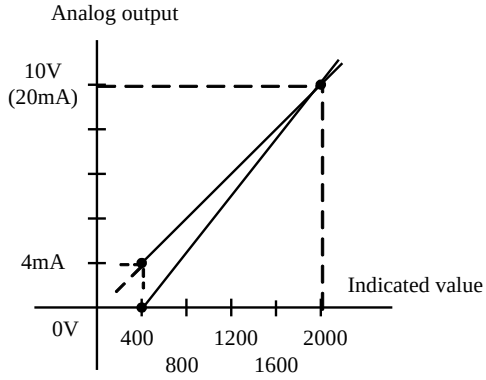
・Set an indicated value when analog output is 0V or 4mA.

・Setting range : ±99999

・Example of analog output setting

Set the indicated value when analog output is 10V (or 20mA) to 2000.

Set the indicated value when analog output is 0V (or 4mA) to 400.



Note1) When the indicated value becomes larger than analog output set value, it is not properly output.

Note2) When the indicated value is -OVER, and analog output is less than 0mA, the output is near 0mA.

24-2. Output Specifications

・Analog output resolution Approx.16bit

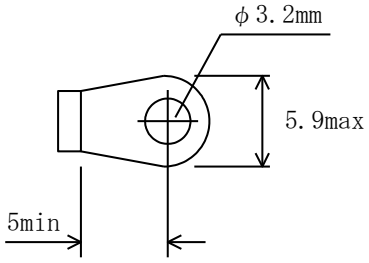
Output	Load resistance	Accuracy	Ripple	Overflow output
±0 to 10V	More than 10kΩ	± (0.5% of FS)	50mVpp	More than Approx. ±12V
4 to 20mA	Less than 550Ω	± (0.5% of FS)	25mVpp	More than Approx. 21mA

Caution 1 : Ripple of 4 to 20mA is only for Load resistance 250Ω and current 20mA.

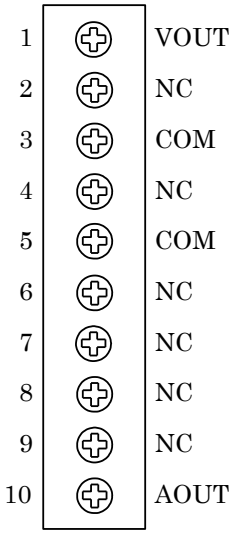
Caution 2 : Overflow output is the output when the indicated value becomes larger than analog output HI/LO set value.

24-3. Connection of Analog Output

Conforming crimp-type terminal size



Screw terminal for I/O units



Terminal No.	Direction of signal	Contents
1	Output	Voltage output
2	*	
3	Common (-)	For voltage output
4	*	
5	Common (-)	For current output
6	*	
7	*	
8	*	
9	*	
10	Output	Current output

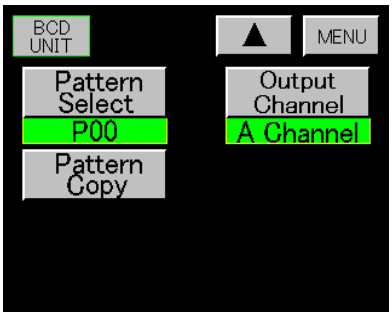
*NC is blank terminal, but do not use it as relay terminal.

25. BCD Output (Output)

25-1. 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

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

・Setting range : 0 to 15

* Select a Pattern Select 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) Output Channel

・Set the intended channel through which the indicated value is output on the select screen.

・Setting items : Ach, Bch

25-2. Input and Output Specifications

1) Output open collector (NPN type)

・BCD signal	When logic "1"	transistor is "ON"
・Polarity (POL)	When minus display	transistor is "ON"
・Overflow signal(OVER)	When overflow display	transistor is "ON"
・Print command signal(PC)	During (Td × 0.5)	transistor is "ON" Td＝(1/sampling cycle)

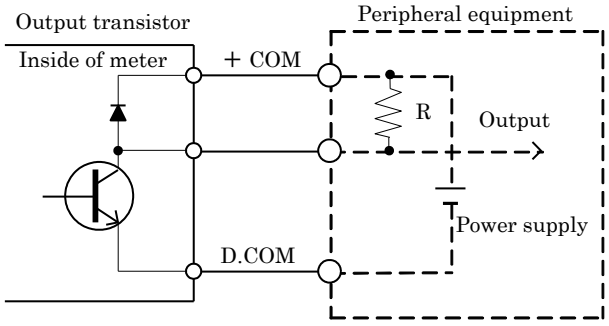
2) Equivalent output circuit

・Open collector output capacity

Voltage MAX. 30V

Current MAX. 15mA

Output saturation voltage above 1.2V when 15mA



3) Input signal

・ENABLE signal

When "0" level, the transistor of BCD signal, polarity signal, overflow signal turns "OFF".

4) Equivalent input circuit

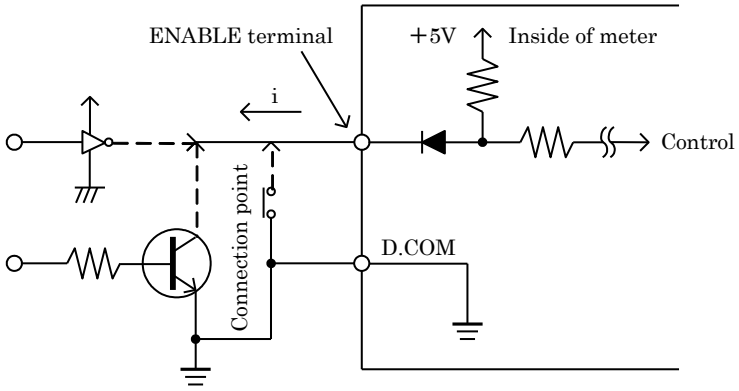
・The input of ENABLE terminal is performed by open transistor, IC (buffer etc.) and no-voltage connection point. (Perform by ON/OFF between each control input and D.COM)

・The rated input of each input terminal

OFF "1" level (open) : approx. 3.5 to 5V

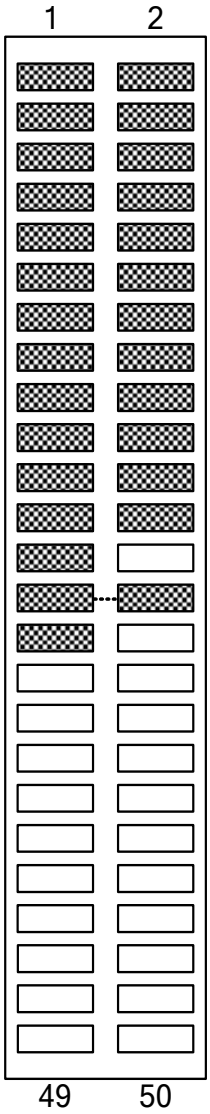
ON "0" level (short) : approx. 0 to1.5V

Input current (I) : above -1mA



25-3. Connection of BCD Output

1) I/O BCD connector



Terminal No.	Direction of signal	Signal name	Terminal No.	Direction of signal	Signal name
1	Output	1	26	－－	NC
2	Output	2	27	Common	D.COM
3	Output	4	28	Common	D.COM
4	Output	8	29	Input	＋COM
5	Output	10	30	－－	NC
6	Output	20	31	－－	NC
7	Output	40	32	－－	NC
8	Output	80	33	－－	NC
9	Output	100	34	－－	NC
10	Output	200	35	－－	NC
11	Output	400	36	－－	NC
12	Output	800	37	－－	NC
13	Output	1000	38	－－	NC
14	Output	2000	39	－－	NC
15	Output	4000	40	－－	NC
16	Output	8000	41	－－	NC
17	Output	10000	42	－－	NC
18	Output	20000	43	－－	NC
19	Output	40000	44	－－	NC
20	Output	80000	45	－－	NC
21	Output	POL	46	－－	NC
22	Output	OVER	47	－－	NC
23	Input	ENABLE	48	－－	NC
24	Input	ENABLE	49	－－	NC
25	Output	PC	50	－－	NC

*Caution

・Signal name "NC" is blank terminal, but do not use it as relay terminal.

・Signal name "+COM" connect to positive side of external power supply.

・Use a connector (supplied) for card edge type ribbon cables.
(HIF5C-50DA-2.54R made by Hirose Electric Co., Ltd.)

・Conforming wire「UL2651」AWG#28 flat cable (7/0.127mm, shield diameter 0.8 to 1.0mm).

26. Overflow

1) When the indicated value (internal) goes beyond ±99999, it is treated as overflow and overlaid on screen by message of overflow.

2) During the overflow of normal operation, overlay message of ±overflow on screen, set comparison output HH to ON when +overflow and set comparison output LL to ON when -overflow.
(Set HI and LO to ON when 2 channel)

3) for peak, valley, peak-valley hold of「11. Hold Function (Hold)」3)Type (3) to (14), when overflow occurs during detection/hold area or hold area, in peak hold or peak-valley hold, overlay message of overflow on screen, set comparison output HH to ON compulsively, and when overflow occurs during valley hold, set comparison output LL to ON and continue it until released.
(Set HI and LO to ON when 2 channel)
Indicated value, comparison output don't change when overflow occurs during the hold area.
Overlay the message of ±overflow on screen.
When ±overflow occurs during the detection of 3)Type (15) to (17), overlay the message of ±overflow on screen, output HH when +overflow and output LL when -overflow.
(Set HI and LO to ON when 2 channel)
Indicated value, comparison output don't change when overflow occurs during the hold area.
Overlay the message of ±overflow on screen.
Releasing is performed by STA/STB signal OFF or pressing HOLD key or RESET ON/OFF, and return to normal operation.

4) When ±overflow occurs in the comparison area of Waveform Comparison / Waveform & Displacement Comparison, overlay the message of ±overflow on screen, output HI to ON when +overflow and output LO to ON when -overflow, and hold until the next START signal turning ON.
When comparison output HI, LO turns ON, synchronizing signal output turns ON at the same time.
When ±overflow occurs during the time from START signal to comparison area's start point, overlay the message of ±overflow on screen, set comparison output GO to ON.
When ±overflow occurs during the time from comparison area's stop point to the next START signal ON, overlay the message of ±overflow on screen, continue the comparison output of comparison area, and set synchronizing signal output to OFF.

27. 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 :

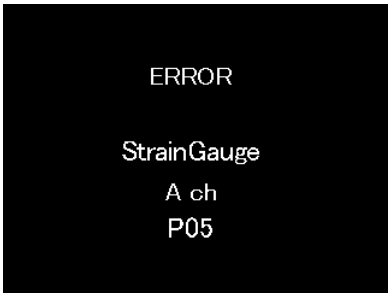
Example of response : Analog input setting (Ach) "P-5" (pattern 5) is different.

"DATE LOST" "CALA P-5" Respond

Broken "command + pattern" are displayed.

Message

Error display 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.

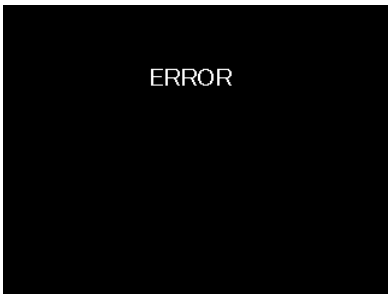


Table of Error messages

Data setting name	Display	Response Command + Pattern	Remarks
Basic Function Setting	ERROR Setup	COND	－－
Basic Function Setting 2	ERROR System	COND2	－－
Analog Input Setting (Ach) Analog Input Setting (Bch)	ERROR Strain Gauge Ach P00 to 15 ERROR Strain Gauge Bch P00 to 15	CALA P-0 to 15 CALB P-0 to 15	(ZERO value, SPIN value and SPAN set value are included.)
Comparison Set Value Setting (Ach) Comparison Set Value Setting (Bch)	ERROR Comparator Ach P00 to 15 ERROR Comparator Bch P00 to 15	COMA P-0 to 15 COMB P-0 to 15	－－ －－
Hold Function Setting	ERROR Hold P00 to 15	HLD P-0 to 15	－－
Graphic Display Setting	ERROR Graph Disp P00 to 15	DST P-0 to 15	－－
Waveform Comparison / Waveform&Displacement Comparison	ERROR Waveform P00 to 07	WCO P-0 to 7	－－
Linearize Setting(Ach) Linearize Setting (Bch)	ERROR Linearization Ach P00 to 15 ERROR Linearization Bch P00 to 15	LINA P-0 to 15 LINB P-0 to 15	－－ －－ －－
Digital Zero Ach	－－	DZA	Execute control terminal or command.
Digital Zero Bch	－－	DZB	Execute control terminal or command.
BCD Output	ERROR Output P00 to 15	BOP P-0 to 15	Only when BCD output is mounted
Analog Output	ERROR Output P00 to 15	AOP P-0 to 15	Only when analog output is mounted.
Internal Data	ERROR	MEMORY	Unrestorable. Contact the dealer or our company directly(to send the memory device)

28. Specifications

●Input unit (Ach)

Sensor power supply : 10V, 5V, 2.5V DC ±10% Output 120mA or less
Conforming sensor : Strain gauge type sensors (4-wire type)
(Up to four 350Ω strain gauge type sensors can be connected in parallel.)
Input signal range : -4.0mV/V to +4.0mV/V
Display : Digital scaling used
Input calibration range : Input calibration range 0.1 to 3.0mV/V
(SPIN value)
Displayed (load) range : 100 to 30000 (at minimum input sensitivity)
(SPAN set value)
Minimum input sensitivity : 0.25μV/digit (at sensor power supply of 2.5V)
0.5μV/digit (at sensor power supply of 5.0V)
1.0μV/digit (at sensor power supply of 10.0V)
Nonlinearity : Within ±0.02% FS +1digit (at 3mV/V input) (23℃±5℃)
Equivalent calibration error : Within ±0.2% FS
Temperature coefficient : ±0.005% of rdg +0.5digit/℃
Analog filter : Select from among10, 30, 300, 600 (Hz).

●Input unit (Bch)

Range	Measuring range	Display	Input impedance	Maximum permissible input	Accuracy
0 to 10	±0 to 10V	Based on digital scaling	Approx. 1MΩ	±30V	±0.1%FS + 1digit
4 to 20	4 to 20mA	Offset : 0 to 10000	50Ω	±70mA	±0.2%FS + 1digit
0 to 20	±0 to 20mA	Full scale : 0 to 10000			

23℃±5℃ (35 to 85%RH)
Nonlinearity : Within ±0.02% FS +1digit (at 3mV/V input) (23℃±5℃)
Temperature coefficient : ±0.005% of rdg + 0.5digit/℃
Analog filter : Select from among 10, 30, 300, 600 (Hz).
Measurement function : Range can be specified on front touch panel screen.

●Measurement and functions (common to Ach/Bch)

Operation method : △∑ conversion method
Number of inputs : 2 inputs (Ach, Bch)
Sampling speed : (4000, 2000, 1000, 500, 200, 100, 50, 20, 10) times/second
Maximum sampling speed at 1ch : 4000 times/second
Maximum sampling speed at 2ch : 2000 times/second
Display updating cycle : (12.5, 6.25, 2.5, 1, 0.5) times/second
Moving average : OFF, 2, 4, 8, 16, 32, 64, 128, 256, 512, 1024
Maximum indication : -99999 to 0 to 99999 (full 5-digit figures)
Display unit : STN color LCD (320×240 dots)
Display range (approx. 74mm × 55mm)
Back light life 40,000[Hr](25℃)

●Analog voltage output for monitors

Ach : Strain gauge input ±4.0mV/V → Approx. ±6V
Bch : Instrumentation input ±0 to 10 → Approx. ±5V
Instrumentation input ±0 to 20mA → Approx. ±5V

●Comparison function
Setting range : ±99999
Hysteresis : ±0 to 9999 (Not used in comparison output type "Area".)
Type of comparison output : Select from among Normal, Area and Rank.
Comparison output : 5kinds (HH, HI, GO, LO, LL)
Photo-coupler output : NPN open collector output (including Waveform Comparison / Waveform & Displacement Comparison)
Output capacitance Voltage MAX.30V Current MAX.30mA
Saturation voltage MAX.1.2V

●Waveform comparison function
Set HI/LO limit set value of 2048 points per pattern (up to 8 patterns can be set). After starting, this function serves to check whether indicated value is within HI/LO limit set value or not for comparison in real time and outputs results.
・Waveform Comparison (X-axis = time)
Comparison output = Y-axis HI, GO, LO
・Waveform & Displacement Comparison (X axis = displacement)
Comparison output = Y-axis HI, GO, LO, X-axis HI, LO (displacement output)

●SD memory function : Can write the reading and writing of setting data of meter and waveform data.
(Option) Setting value can be read out.
Target media － 32M, 64M, 128M, 256M, 512M
Maximum file number － 9999
File size － Management table Approx. 20k byte
Wave data Approx. 100k byte
Setting data Approx. 200k byte

●I/O function
RS-232C output : Various settings are available from host computer. In addition, it is possible to read operating state.
RS-485 output : Up to 31Meters can be connected to host computer.
(Option)
BCD output : Open collector output (NPN type).
(Option) Output capacitance Voltage MAX 30V, current MAX 15mA.
(Output cycle is based on sampling speed) (Channel to be output is selectable.)
・Output signal BCD, OVER, POL, PC
・Output signal ENABLE
Analog output : D/A converter used (Channel to be output is selectable.)
(Option) Resolution Approx. 16bits

Output	Load resistance	Accuracy	Ripple
±0 to 10V	More than 10kΩ	± (0.5% of FS)	50mVpp
4 to 20mA	Less than 550Ω	± (0.5% of FS)	25mVpp

Accuracy (23℃±5℃, 35 to 85%RH)

●Common specifications

Backup : Each data setting = Flash ROM (Written in at completion of setting)
Digital zero value and display screen =Holds for about two weeks from powering off with secondary battery. (Full charging time of secondary battery : About 80hours)

Data setting method : Through each setting menu and touch panel or RS-232C/485.

Power supply : AC = 100 to 240V AC ±10% (50/60Hz) ,DC = 24V DC ±15%

Power consumption : AC = Approx. 32VA (MAX) ,DC = Approx. 17W (MAX)

Outside dimension : 100mm(W)×96mm(H)×153mm(D)

Operating temperature/humidity range : 0 to 40℃, 35 to 85%RH (No dew condensation shall occur.)

Weight : Approx. 1.0kg

Dielectric strength : One minute at 500V/1mA DC applied between input (AG)/comparison output (E.COM), RS-232C/485 (SG), BCD output (D. COM), analog output (COM)
One minute at 1500V/3mA AC applied between power supply/protect ground terminal.
One minute at 500V DC/1mA applied between protect ground terminal/input (AG), comparison output (E.COM), RS-232C (SG), BCD output (D. COM), analog output (COM)

Insulating voltage : 500V DC More than 100MΩ at each of above-mentioned terminal

Accessories : Simplified Instruction Manual, Hardware Setup Manual, Utility CD,
Card edge connector (Option : BCD unit)
Instruction Manual for SD Memory Function (Option : SD Memory Function)

29. Setting of Units

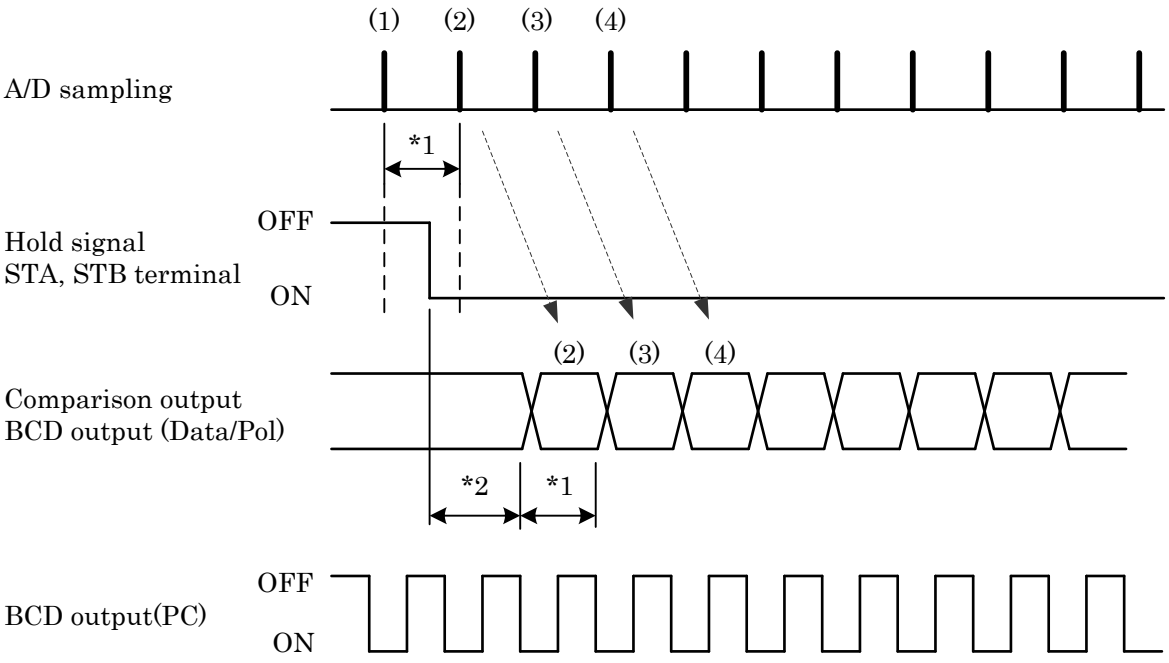
・The unit can be set in「7-1. Analog Input Setting (Ach)」,「7-3. Analog input setting (Bch)」
Set by key and select on the set-value select screen.

・The unit can be set in「19-1. Analog Input Setting (Ach)」,「19-2. Analog Input Setting (Bch)」.
Use RS-232C or RS-485 to set by NO. (number).

No.	Unit	No.	Unit	No.	Unit	No.	Unit
0	A	20	kg/h	40	m/h	60	N/m^2
1	bar	21	$kg \cdot m^2$	41	MHz	61	N・m
2	℃	22	kg/m^3	42	m^3/h	62	Ω
3	cm	23	kHz	43	μA	63	oz
4	cm/min	24	kJ	44	μm	64	Pa
5	deg	25	kN	45	μV	65	%
6	dyne	26	kΩ	46	MJ	66	%RH
7	°F	27	kPa	47	mm	67	‰
8	ft	28	kV	48	m/min	68	pH
9	ftlb	29	kW	49	mm/min	69	ppm
10	g	30	l	50	mm/s	70	psig
11	hPa	31	l/h	51	MN	71	rad
12	Hz	32	l/min	52	MΩ	72	rpm
13	lb	33	l/s	53	MPa	73	s
14	inch	34	m^2/s	54	m/s^2	74	ton
15	inlb	35	m^3	55	m/s	75	V
16	inoz	36	m^3/min	56	ms	76	VA
17	J	37	m^3/s	57	mV	77	W
18	kA	38	m	58	MW	78	No display
19	kg	39	mA	59	N		

30. Timing Chart

・When hold signal (STA,STB) of an external control input did ON, it seems to become chart below in the timing when the comparison output and the BCD output are settled. In this case data of effective inside sampling(A/D) become it after (2).



*1 Sampling time = 1/sampling cycle

*2 Comparison or the BCD(Data/Pol) output is time before it being settled = Within (1/sampling cycle)＋1ms

STA, STB terminal is the case when "Sample Hold" has been set.

31. Table of Terms

Terms in Japanese	Terms in English
±0-10V	0 to 10V
±10V	±10V
±0-20mA	0 to 20mA
4-20mA	4 to 20mA
0.5回/秒	0.5CPS
1回/秒	1CPS
2.5回/秒	2.5CPS
6.25回/秒	6.25CPS
10回/秒	10CPS
12.5回/秒	12.5CPS
20回/秒	20CPS
50回/秒	50CPS
100回/秒	100CPS
200回/秒	200CPS
500回/秒	500CPS
1000回/秒	1000CPS
2000回/秒	2000CPS
4000回/秒	4000CPS
2400bps	2400 BPS
4800bps	4800 BPS
9600bps	9600 BPS
19200bps	19200 BPS
38400bps	38400 BPS
1ファイルの波形データ数	Waveform Data
1波形書込	Single
2chメータ	2 Channels
2つ前の波形	2Times Before
3つ前の波形	3Times Before
4つ前の波形	4Times Before
Achメータ	A Channel
Bchメータ	B Channel
DZキープロテクト	Protect DZ
DZ値バックアップ	Digital ZERO Backup
HHヒステリシス設定	HH Hysteresis
HH比較設定	HH Limit
HIヒステリシス 設定	HI Hysteresis
HI比較設定	HI Limit
LLヒステリシス 設定	LL Hysteresis
LL比較設定	LL Limit
LOヒステリシス 設定	LO Hysteresis
LO比較設定	LO Limit
LV+期間極小値	Minimal Value
LV+期間極大値	Maximal Value
LV+期間変曲点	Inflection Point
LV+時間P	Level+Time P
LV+時間P-V	Level+Time P-V

Terms in Japanese	Terms in English
LV+時間V	Level+Time V
MD時間	MD Time
MD比較幅	MD Width
NG波形連続書込	NG Waveform
SDメモリ容量確認	Available Memory
SDメモリ容量不足時の処理	Overwrite Mode
SD設定	SD Setup
SD保存<1波形>	SD SAVE SINGL
SD保存<NG波形>	SD SAVE NG WAVE
SD保存<連続>	SD SAVE CONT
SPIN値	SPIN
X軸開始点	X Start Point
X軸倍率	X Scale
Y軸開始点	Y Start Point
Y軸倍率	Y Scale
ZT補正周期	ZT Time
ZT補正幅	ZT Width
アナログフィルタ	Analog Filter
アナログ出力HI	Analog Output HI
アナログ出力LO	Analog Output LO
安定	Motion
空き容量	Available
明るさ調整	Contrast
インターバル時間	Interval Time
移動平均	Moving Average
上書モード0	Mode0
上書モード1	Mode1
エリア	Area
オフセット	Offset Scale
オフセット入力値	Offset Scale Input
大きい	More
カーソル	CURSOR
外部信号	Ext.Signal
外部信号+レベル	E.S+W.S.
書込中止	Stop Write
各設定値プロテクト	Protect Others
拡大縮小	MAG
確定	OK
下限変位設定値	Displacement Min Value
カラー	Color
基本機能	Setup
基本機能2	System
基本機能設定初期化	Initialize Setup
奇数	ODD
期間指定P	Area P
期間指定P-V	Area P-V

Terms in Japanese	Terms in English
期間指定V	Area V
グラフ	GRAPH
グラフ表示	Graph Disp
グラフ表示設定初期値	Initialize GraphDisp
クリア	CLEAR
偶数	EVEN
計測	MENU
検出レベル値	Detection Level
検出回数	Detection Count
検出最小値	Minimal Value
検出時間	Detection Time
検出時間A	Inflection Before
検出時間B	Inflection After
サンプリング速度	Sampling Cycle
サンプリング波形移動	Sampring Wave Move
サンプルホールド	Sample
最後	End
最初	Top
削除	Delete
シングル	SINGLE
時間指定P	Time P
時間指定P-V	Time P-V
時間指定V	Time V
時計設定	Date & Time setting
次ページ	PAGE
次頁	Next
実負荷校正	Actual Load
出力	Output
出力オフディレイ	Output Delay
出力タイプ	Output Type
出力チェック	Self Check Output
出力チャンネル	Output Channel
出力データ 0(～30)	Point 0 (to 30) Out
出力データ 1(～31)	Point 1 (to 31) Out
出力設定初期化	Initialize Output
小数点	Decimal Point
詳細	DETAIL
上限変位設定値	Displacement Max Value
常時	Always
ズーム×1	ZOOMx1
スタート	START
スタートタイプ	Start Type
ステップ幅	Step
ストップビット	Stop Bit
スパン設定値	SPAN
セット	SET

Terms in Japanese	Terms in English
ゼロ校正	ZERO Calibration
ゼロ幅	Zero Band
ゼロ幅+安定	Z+M
ゼロ幅設定	Zero Band
ゼロ幅設定	Zero Band
センサセルフチェック	Self Check Sensor
センサ電源	Sensor Power
制御端子チェック	Self Check I/O
設定	MODE
設定データの保存	Setup File Save
設定パターン	Pattern Select
設定ファイルの削除	Setup File Delete
設定ファイルの読込	Setup File Load
設定値コピー	Pattern Copy
前頁	Prev
全設定初期化	Initialize ALL
総容量	Total
測定値設定	A/D Output Value
測定波形書込モード	SD Write Mode
ダイレクト設定	Direct Input
タッチパネルチェック	Self Check Touch Panel
単位	Unit
立ち下がり	Traling Edge
立ち上がり	Rising Edge
ちらつき調整	Cross Talk
小さい	Less
直前の波形	1Times Before
通過	Pass
通常動作	Normal
通信速度	BPS
ディジタルシフト	Digital Shift
ディジタルリミッタHI	Digital Limiter HI
ディジタルリミッタLO	Digital Limiter LO
データ数	Set Number
データ設定	Point Data
データ長	Data Length
デリミタ	Delimiter
取消	ESC
等価校正	Equivalent Calibration
なし	NONE
入力	Strain Gauge
入力オンディレイ	Input ON Delay
入力設定初期化	Initialize StrainGauge
入力設定プロテクト	Protect StrainGauge
入力データ 0(～30)	Point 0 (to 30) Ｉｎ
入力データ 1(～31)	Point 1 (to 31) Ｉｎ

Terms in Japanese	Terms in English
入力レンジ	Input Range
バックライト	Back Light
バックライト点灯時間	BackLight Time
パリティ	Parity
バレーホールド	Valley
パワーオンディレイ	Power ON Delay
波形&変位	W & D
波形&変位比較	W&D
波形サンプリング	Sampling
波形ファイル削除	Waveform File Delete
波形開始レベル	Start Level
波形開始レベル	WaveStartLevel
波形開始条件	Start Condition
波形読取	Wave Data Read
波形比較	WAVE COMPARE
波形比較	Waveform
波形比較Ach	Wave Ach
波形比較Bch	Wave Bch
波形比較設定初期化	Initialize Waveform
範囲外波形クリア	Rejection Data Clear
範囲外波形メモリ	Rejection Data Store
範囲外波形読取	Rejection Data Read
ピーク・バレーホールド	P-V
ピークホールド	Peak
比較	Comparator
比較出力タイプ	Type

Terms in Japanese	Terms in English
比較出力開始条件	Start Condition
比較設定初期化	Initialize Comparater
比較波形クリア	Clear Wave Data
比較波形書込	Pattern Write
比較波形描画	Comparison Wave Draw
比較波形編集	Comparison Wave Edit
比較領域設定	Comparison Area
表示チェック	Self Check Display
表示更新周期	Display Cycle
ファイル名入力	Filename
フリーラン	FreeRun
フルスケール	Full Scale
フルスケール入力値	Full Scale Input
変曲点検出値	Inflection Range
ホールド	Hold
ホールドタイプ	Type
ホールド設定初期化	Initialize Hold
マルチ	MULTI
メータ設定	Meter Setup
読込	Load
ライン	Line
ランク	Rank
リニアライズ	Linearization
リニアライズ設定初期化	Initialize Linearization
連続書込	Continuous

32. Guarantee and After-sale Service

1) The warranty period is one year from the date of delivery. Any trouble that occurs during this warranty period shall be repaired free of charge, provided that the cause of such a trouble is clearly attributed to our company.

2) After-sale service

This Product was carefully inspected and thoroughly tested under a strict quality control before shipment. If it does not operate properly, please contact the dealer or our company directly (to send the Product). (It is recommendable to describe the details of the trouble in a memo and enclose it together with the Product.)

watanabe

WATANABE ELECTRIC INDUSTRY CO., LTD

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.