

INSTRUMENTATION AMPLIFIER

WGA-900A

INSTRUCTION MANUAL

Thank you for purchasing KYOWA's product WGA-900A Instrumentation Amplifier.
Read this Instruction Manual carefully in order to make full use of the high performance capabilities of the product.
Do not use the product in methods other than described in this Manual.

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STANDARD ACCESSORIES

The WGA-900A comes with the following standard accessories. When unpacking, check to be sure that all the listed accessories are included.

Instruction Manual	1 (CD-R) *1
Test Data Sheet and Warranty	1 each

*1. Including a PC software for a SD card.

OPTIONS

	Model	Manufacture
AC power cable	P-23	KYOWA ELECTRONIC INSTRUMENTS CO., LTD.
INPUT connector	PRC03-12A10-7M10.5	TAJIMI ELECTRONICS CO., LTD
I/O connector	PCR-S36FS+, PCR-LS36LA	HONDA TSUSHIN KOGYO CO., LTD.
RS-232C connector	FCN-361J008-AU, FCN-360C008-B	FUJITSU COMPONENT LIMITED
BCD output option: BCD connector	FCN-361J040-AU, FCN-360C040-B	FUJITSU COMPONENT LIMITED
RS-485 option: RS-485 connector	XM2D-0901, XM2S-0913	OMRON Corporation
BCD and D/A option: BCD connector	10136-3000PE, 10336-52F0-008	Sumitomo 3M Limited

SAFETY PRECAUTIONS

The WGA-900A is designed in accordance with the “10. SPECIFICATIONS.” Do not use the WGA-900A in an environment exceeding the specifications. Or, failure of the WGA-900A may result.

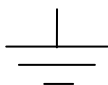
PRIOR TO USE

This Instruction Manual describes detailed instructions for operating the WGA-900A Instrumentation Amplifier (hereinafter referred to as the WGA-900A).

For safe use of the WGA-900A, do not forget to read the “Safety Precautions” prior to use.

Kyowa Electronic Instruments Co., Ltd. assumes no liability for any damages resulting from user’s failure to comply with the safety precautions.

For safety operation of the WGA-900A, the following symbol mark is attached to the WGA-900A.

	Indicates “PROTECTIVE GROUND TERMINAL.” Be sure to connect the GND terminal to the ground. Excluding when using a 3P AC power cable for grounding.
---	--

For safety operation of the WGA-900A, the following symbol marks are used in the Instruction Manual.

 WARNING	Improper operation of the system may result in death or severe injury of the operator.
 CAUTION	Improper operation of the system may result in injury of the operator and physical damage of the system.





WARNING

●Power Supply

To prevent a fire hazard, before connecting the power cable, be sure to check the local line voltage is matched with the operating voltage specified for the WGA-900A.

●Power Cable and Power Outlet

To prevent an electric shock or fire hazard, connect a power cable and 3P-2P conversion adapter to a plug with protective ground terminal.

When using 3P power cable, use a 3P power plug with protective ground terminal.

Operators must be cautioned that use of an extension power cable with no ground conductor disables the protective ground function.

Check the Instruction Manual in advance, connect the power cable to the WGA-900A and connect the power plug to an outlet.

●Protective Ground

To prevent an electric shock hazard, be sure to ensure protective ground before connecting the power cable.

When using the 3P-2P conversion adapter, be sure to ground the grounding wire of the adapter to the GND terminal.

When using a plastic 2P power cable, be sure to connect an optional grounding wire to the protective grounding terminal.

●For Electrical Operator Safety

To prevent an electric shock hazard, operators must be cautioned not to cut the protective grounding conductor or disconnect the GND terminal.

●Confirmation of Protective Ground

To prevent an electric shock hazard, be sure to check safe protective ground function before operating the WGA-900A. If any abnormal matters are found in the protective ground function, fuse holder, etc., do not operate the WGA-900A.

●External Connection

To prevent an electric shock hazard, ensure the safe protective ground of all concerned instrument and then, connect the WGA-900A to the measuring object and external devices, PC, etc.

●Fuse

Used for preventing a fire hazard.

If you want to replace fuses, contact KYOWA or our representatives.

●Inflammable Gaseous Environment

To prevent fire and explosion hazards, do not operate the WGA-900A where it is exposed to inflammable gases, inflammable vapors or inflammable dust.

●If Any Trouble Occurs

To prevent a fire hazard, if smoke is emitted from the WGA-900A, immediately disconnect the AC adaptor from the receptacle and stop using the WGA-900A.

●Maximum Input Voltage Range

The WGA-900A is a measuring instrument specified for strain gage transducers and strain gages. Do not input high voltage. Or, deteriorated performance and damage of the product may result.



WARNING

About built-in lithium battery

- Do not short-circuit the battery terminals. Or, it may cause an overheating and fire.
- Never throw the battery into a fire or put it near a fire.
It may cause an overheating, fire, and explosion.
- Do not charge the using battery since it is not rechargeable.
Or, it may explode.





CAUTION

- **After the power OFF, wait more than 5 seconds to power ON again.**

If the power switch is repeated turned ON and OFF within 5 seconds, fuse may blow out due to rush current generated by switching the power ON and the WGA-900A reliable function may not be guaranteed.

- **Do not use the WGA-900A under excessively high/low temperature.**

Use the WGA-900A in the specified operating temperature range 0 to 40°C.

Use at temperatures exceeding the specified range may lower the performance and cause trouble.

If use under direct sunlight or in a cold place is inevitable, prepare a sunscreen or take proper measures to keep it warm.

- **Do not use the WGA-900A under high humidity.**

Use in a humid place exceeding the specified range 20 to 85%. Or where it is exposed to splashing water may lower the performance and cause trouble.

- **Immediately stop the WGA-900A if operating environment changes abruptly.**

Leave the WGA-900A as it is until it becomes adaptable to the environment.

Abrupt change in ambient temperature due to transportation, etc. may cause dew condensation result to deteriorate its performance and cause trouble.

- **Do not use the WGA-900A under dusty environment.**

If dust is entered into the WGA-900A, performance of the WGA-900A may become deteriorated. Be sure to keep away from dust not only when operating but also storage.

- **Take care when operating the WGA-900A at a location with excessive vibration.**

If excessive vibration is applied to the WGA-900A, performance of the WGA-900A may become deteriorated.

Adopt vibration-proof measures such as shock absorber, etc.

- **Do not use the WGA-900A under poor power condition.**

When using the AC power cable, use the WGA-900A with 85 to 264 VAC, 50/60 Hz.

Use the WGA-900A in an environment without instantaneous voltage drop or interfering noise.

- **Do not pull cords and cables.**

Lay cords and cables with a certain allowance so that no unreasonable force is applied to the connections.

Pulling or applying unreasonable force may cause trouble or interrupt the measurement.

- **Preheat the WGA-900A before use.**

Preheat the WGA-900A for about 30 to 60 minutes after the power ON.



CAUTION

For using the SD card

- **Capacity of the SD card corresponding to the WGA-900A is up to "2 GB."**

Note that the WGA-900A does not support the SDHC standard SD card 4 GB or more.

If the SD card 4 GB or more is inserted, the WGA-900A stops its operation and turning OFF and ON the power is required.

Never insert the SD card 4 GB or more.

Or, it may also damage external control devices.



NOTATIONS USED IN THE INSTRUCTION MANUAL

Notational Words

To express strain, “ 10^{-6} strain”, $\mu\text{m}/\text{m}$ or “ $\mu\epsilon$ ” is used properly.

This Manual uses “ $\mu\epsilon$ ” relating to the on-panel indications, and “ 10^{-6} strain” when referring to strain in general.

Informational Notes

Certain notations are used as necessary to attract your attention to information that requires special care when handling the WGA-900A, and to information provided for reference purposes.

Examples of Notations

MEMO

Essential precautions when handling the WGA-900A.

NOTE

Reference items when handling the WGA-900A.

Links in this Instruction Manual (PDF file)

For the  mark

Place cursor on the mark that is on the lower left of every page and click to go to “4-1 SETTING TREE” (page 25).

Links in “4-1 SETTING TREE”

Place cursor on the underlined setting items (Ex.: Calibration) on the tree and click to go to the target page (Ex.: Calibration is described in page 35.) that is describing the target item.



1. PRODUCT OUTLINE

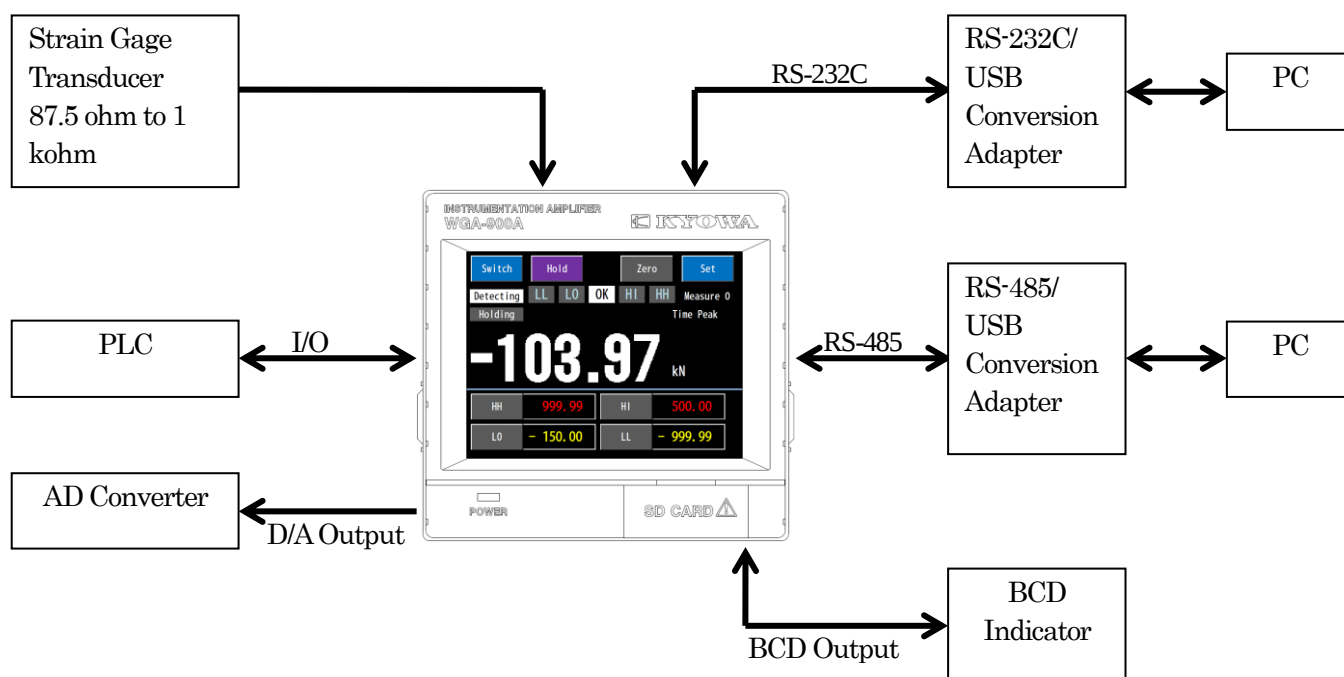
1-1. PRODUCT OUTLINE

- Easy-to-see numbers
 - Zoom in function enables large size numbers.
- Display waveform function
 - Capable of loading waveforms by various ways such as automatic, loading once.
 - Capable of saving recorded waveform in a SD card.
- Easy calibration and operation
 - Manual input calibration enables input of requiring settings for the calibration in good order.
 - TEDS-compatible sensor enables easy calibration.
- Easy setting and operation
 - Easy settings using the touch panel.
 - Simple sentences on the side of keys enable easy operation without this Instruction Manual.
- SD card functions and dedicated PC software
 - Capable of editing a setting value with the dedicated PC software for the SD card and capable of updating a setting value of the WGA-900A by writing the setting value in the SD card.
 - Capable of saving the setting value of the WGA-900A in the SD card and capable of reading it with the PC software for the SD card.
 - Capable of reading a recorded waveform with the PC software for the SD card, capable of converting the waveform data to the CSV format, capable of viewing or editing the data on the EXCEL format.
- Updating the firmware
 - Capable of updating the firmware by loading the written program in the SD card after mounting the WGA-900A to a control panel.
- Various checking functions
 - Capable of checking the WGA-900A and sensor.
 - Capable of checking external devices such as control input/output.



1-2. SYSTEM CONFIGURATION

General system configuration when using the WGA-900A for measurement is described below.



The WGA-900A is designed to connect a Strain Gage Transducer to input as described in the above figure.

For example, the WGA-900A is mounted to the control device of the factory line.

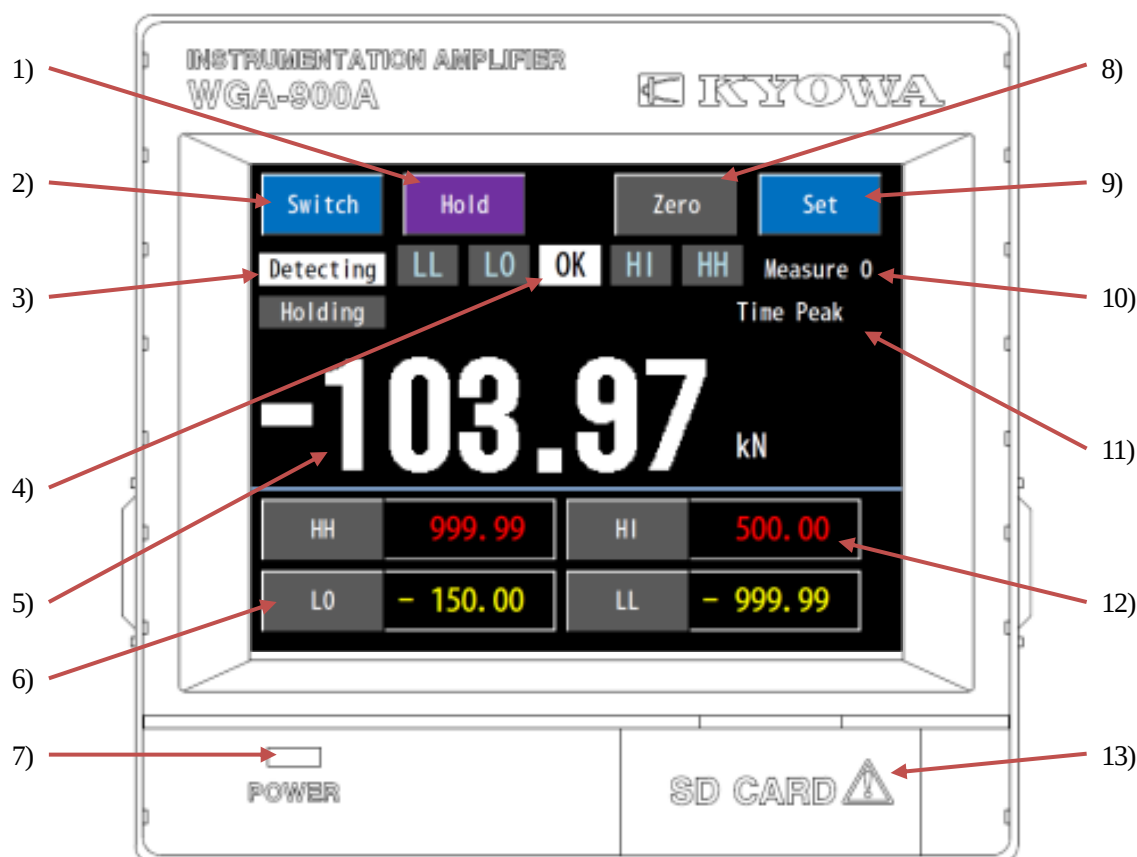
When a load cell is connected to the WGA-900A and if an applied load to the load cell exceeds a comparator value, the WGA-900A sends output signal to an external control device for stopping machines.



2. CONTROLS AND FUNCTIONS

2-1. FRONT PANEL

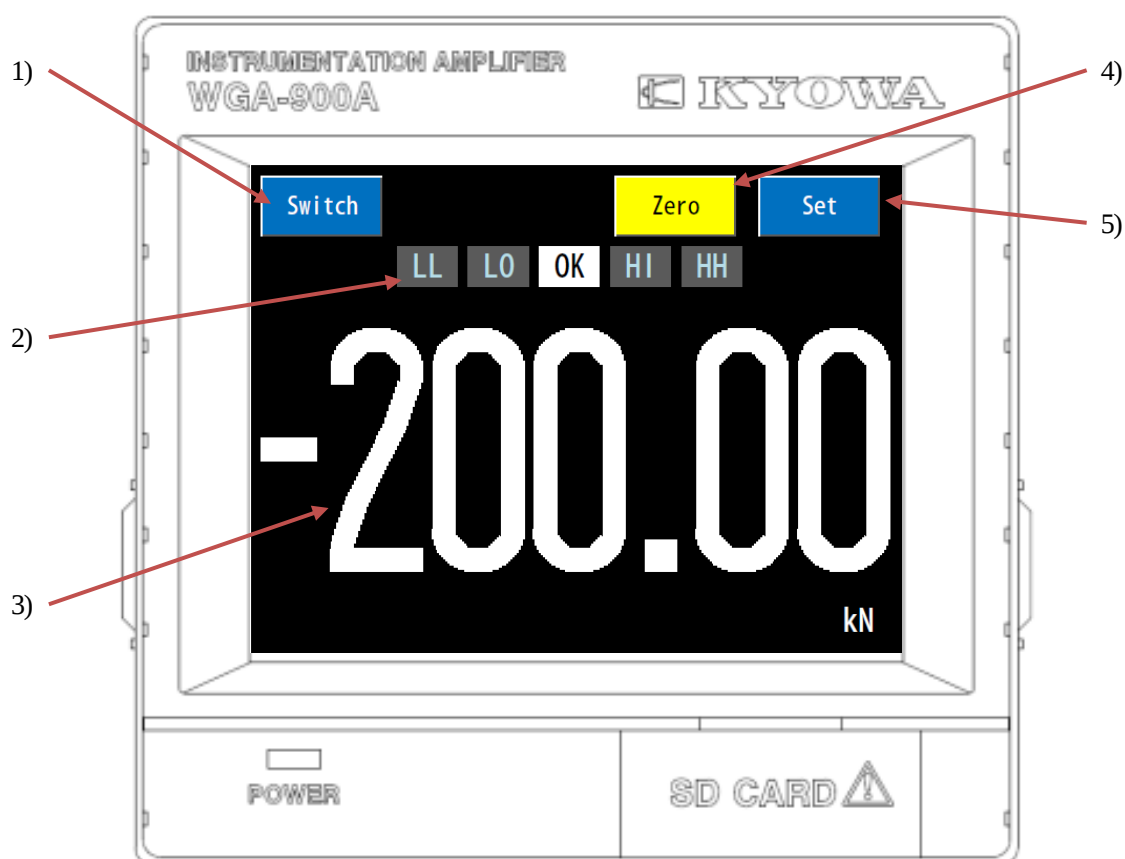
2-1-1. Measuring Window (Number for other than the [Block Peak-Bottom] and [Time Peak-Bottom])



- | | |
|---|---|
| 1) [Hold] key | Manually starts a detection and holding. |
| 2) [Switch] key | Display changes in order from “Number” - “Zoom in number” - “Waveform” by pressing the key. |
| 3) [Detecting] lamp
[Holding] lamp | [Detecting] lamp lights up in white during detection and [Holding] lamp lights up in white during holding respectively. |
| 4) Comparator status lamp | When turning ON the comparator outputs, the [HH] and [HI] light up in red, [OK] lights up in white, and [LO] and [LL] lights up in yellow. |
| 5) Measured value | Displays a measured value with unit. |
| 6) Compared value setting key | Displays the “Compared value” setting window of comparator. |
| 7) Power LED | Lights up in green when the power is ON.
Lights up in red while updating the firmware. |
| 8) [ZERO] key | Conducts digital zero to set the display of the measured value to 0 (or additional value). |
| 9) [Set] key | Displays the setting menu window. |
| 10) Measuring condition No. | Displays the current measuring condition setting No. |
| 11) Operation mode | Displays “operation mode” of “measuring function.” |
| 12) Compared value | Displays “Compared value” of comparators. |
| 13) SD cap | Pull the rubber SD cap and insert a SD card to a slot. |



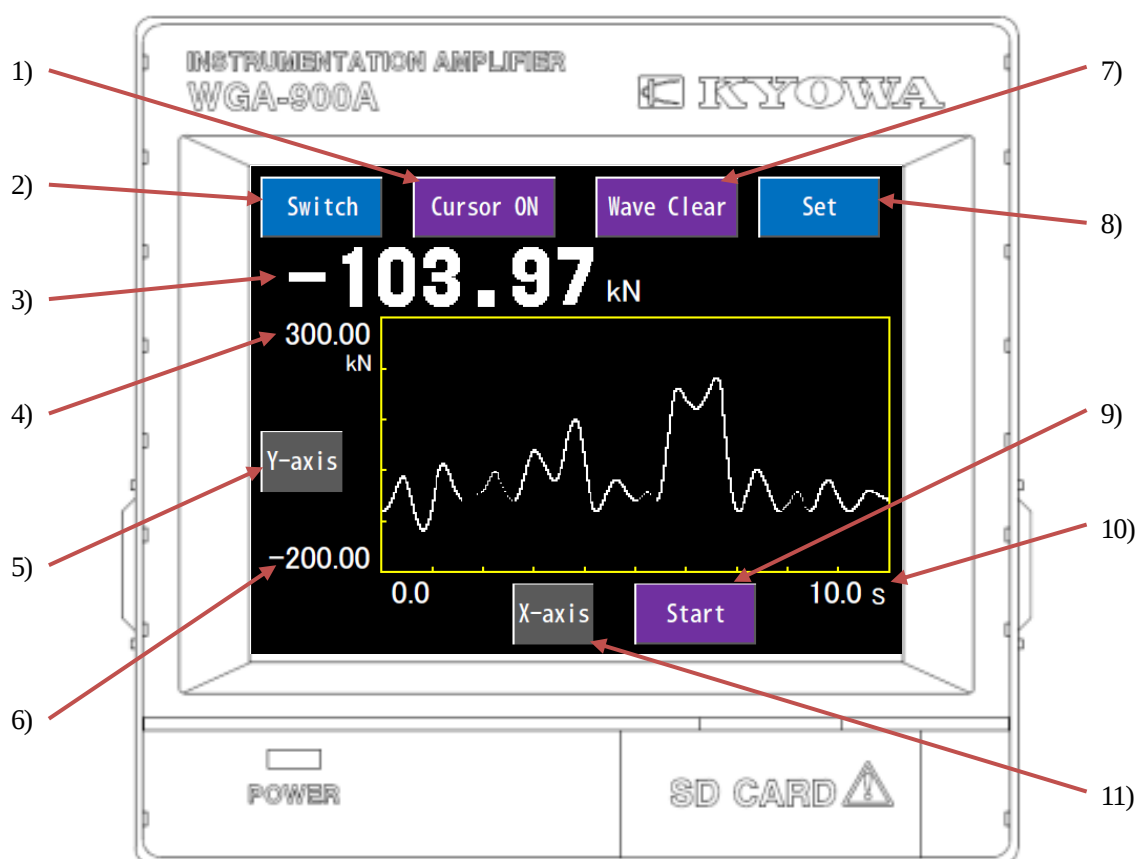
2-1-2. Measuring Window (Zoom In Number for other than the [Block Peak-Bottom] and [Time Peak-Bottom])



- | | |
|---------------------------|--|
| 1) Switch key | Display changes in order from “Number” - “Zoom in number” - “Waveform” by pressing the Switch key. |
| 2) Comparator status lamp | When turning ON the comparator outputs, the [HH] and [HI] light up in red, [OK] lights up in white, and [LO] and [LL] light up in yellow. |
| 3) Measured value | Displays a measured value with unit. |
| 4) ZERO key | Conducts digital zero to set the display of the measured value to 0 (or additional value). |
| 5) Set key | Displays the setting menu window. |



2-1-3. Measuring Window (Waveform for other than the [Block Peak-Bottom] and [Time Peak-Bottom])



- 1) **Cursor ON** key
- 2) **Switch** key
- 3) Measured value
- 4) Y axis end point
- 5) **Y-axis** key
- 6) Y axis start point
- 7) **Wave Clear** key
- 8) **Set** key
- 9) **Start** key/**Stop** key
- 10) X axis end point
- 11) **X-axis** key

The “Cursor” window appears to display a cursor.

Display changes in order from “Number” - “Zoom in number” - “Waveform” by pressing the **Switch** key.

Displays a measured value with unit.

Displays the end point of the Y-axis that is set in the “Y-axis setting” of the “Waveform display setting.”

Opens the “**Y-axis setting**” window of the “Waveform display setting.”

Displays the start point of the Y-axis that is set in the “Y-axis setting” of the “Waveform display setting.”

Clears the current displaying waveform.

Opens the setting menu window.

Press the **Start** key to start the waveform display according to the preset condition in the “Waveform display setting.”

After pressing the **Start** key, it changes to **Stop** key. Press the **Stop** key to stop the waveform display.

Displays the end point of the X-axis that is set in the “X-axis setting” of the “Waveform display setting.”

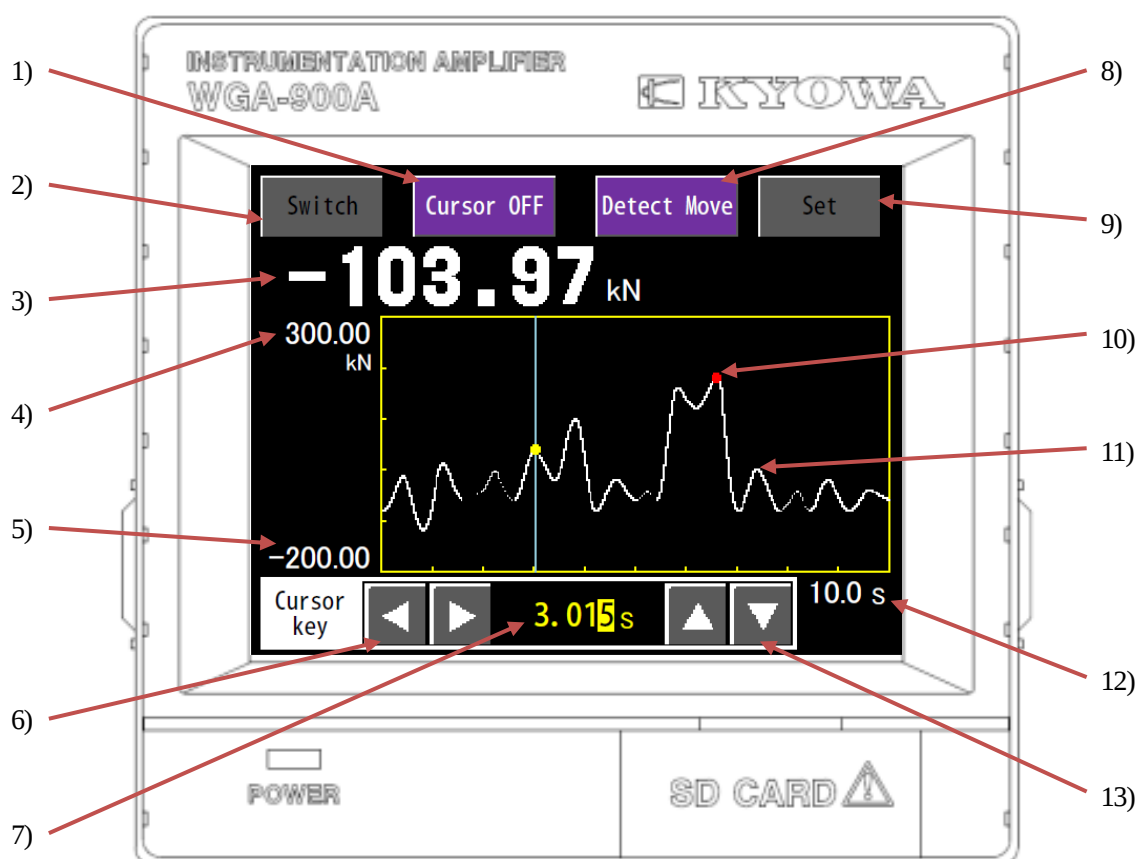
Opens the “**X-axis setting**” window of the “Waveform display setting.”

The **X-axis** key is displayed in gray and key operation is invalid during displaying the waveform.

The key operation becomes valid before displaying the waveform or after clearing it.



2-1-4. Measuring Window (Cursor)

1) **Cursor OFF** key2) **Switch** key

3) Measured value

4) Y axis end point

5) Y axis start point

6) keys

7) Cursor position time

8) **Detect Move** key9) **Set** key

10) Detecting point

11) Measuring waveform

12) X axis end point

13) keys

The cursor disappears and gets back to the “Waveform display” window.

The **Switch** key is displayed in gray and no key operation can be performed.

Displaying a measurement waveform data (value of the Y-axis) at the yellow point on the cursor.

Displays the end point of the Y-axis that is set in the “Y-axis setting” of the “Waveform display setting.”

Displays the start point of the Y-axis that is set in the “Y-axis setting” of the “Waveform display setting.”

Moves the target digit (highlight) of the cursor position time.

Displays time (X-axis) of the cursor position.

Immediately moves the cursor to the **Detecting point** of the item 10).

The **Set** key is displayed in gray and no key operation can be performed.

Displays a detecting point (peak point) with a red point when conducting a measurement other than normal.

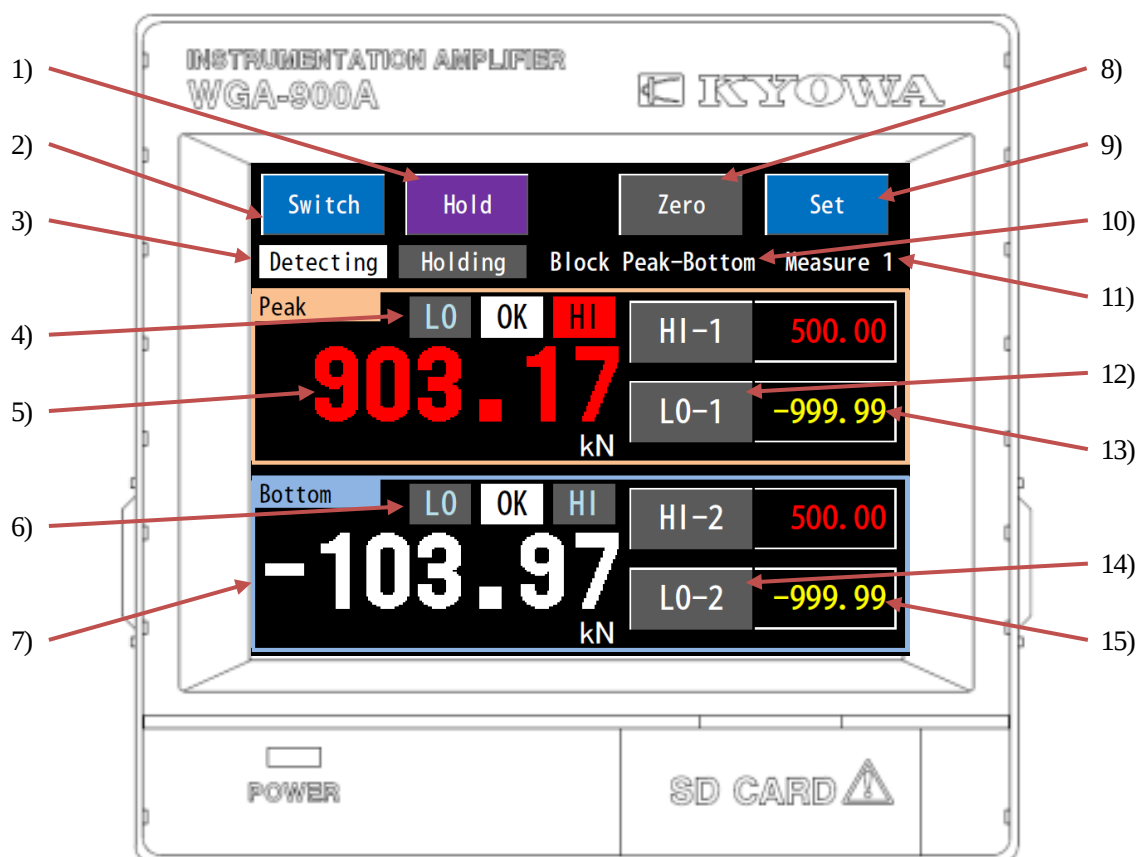
Displays a measuring waveform when the **Cursor OFF** key is pressed.

Displays the end point of the X-axis that is set in the “X-axis setting” of the “Waveform display setting.”

Increases or decreases the number of the time setting digit for moving the cursor to right or left.



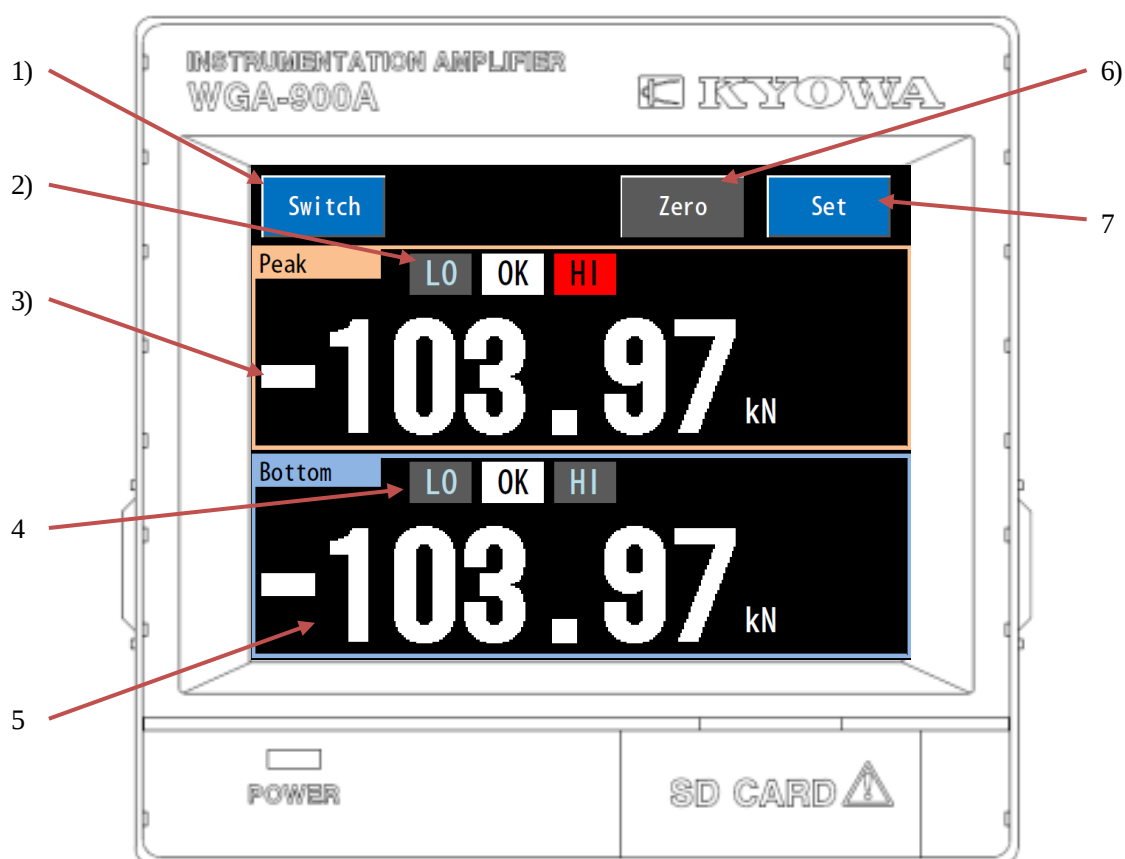
2-1-5. Measuring Window (Number View Dual Display for [Block Peak-Bottom] and [Time Peak-Bottom])



- | | |
|--|--|
| 1) Hold key | Manually starts a detection and holding. |
| 2) Switch key | Display changes in order from “Number View Dual Display” - “Zoom In Number View Dual Display” - “Waveform View Dual Display” by pressing the Switch key. |
| 3) [Detecting] lamp [Holding] lamp | [Detecting] lamp lights up in white during detection and [Holding] lamp lights up in white during holding respectively. |
| 4) Comparator status lamp for peak value | Based on the detecting peak value, when turning ON the comparator outputs, the [HI-1] light up in red, [OK] lights up in white, and [LO-1] lights up in yellow. |
| 5) Peak value | Displays a peak value with the unit. |
| 6) Comparator status lamp for bottom value | Based on the detecting bottom value, when turning ON the comparator outputs, the [HI-1] light up in red, [OK] lights up in white, and [LO-1] lights up in yellow. |
| 7) Bottom value | Displays the bottom value with the unit. |
| 8) ZERO key | Conducts digital zero to set the display of the measured value to 0 (or additional value). |
| 9) Set key | Displays the setting window. |
| 10) Operation mode | Displays “operation mode” of the “measuring function.” |
| 11) Measuring condition No. | Displays the current measuring condition setting No. |
| 12) Compared value setting key of the peak value | Displays the “HI-1” or “LO-1” window of the peak value. |
| 13) Compared value of the peak value | Displays the “HI-1” or “LO-1” value of the peak value. |
| 14) Compared value setting key of the bottom value | Displays the “HI-2” or “LO-2” window of the bottom value. |
| 15) Compared value of the bottom value | Displays the “HI-2” or “LO-2” value of the bottom value. |



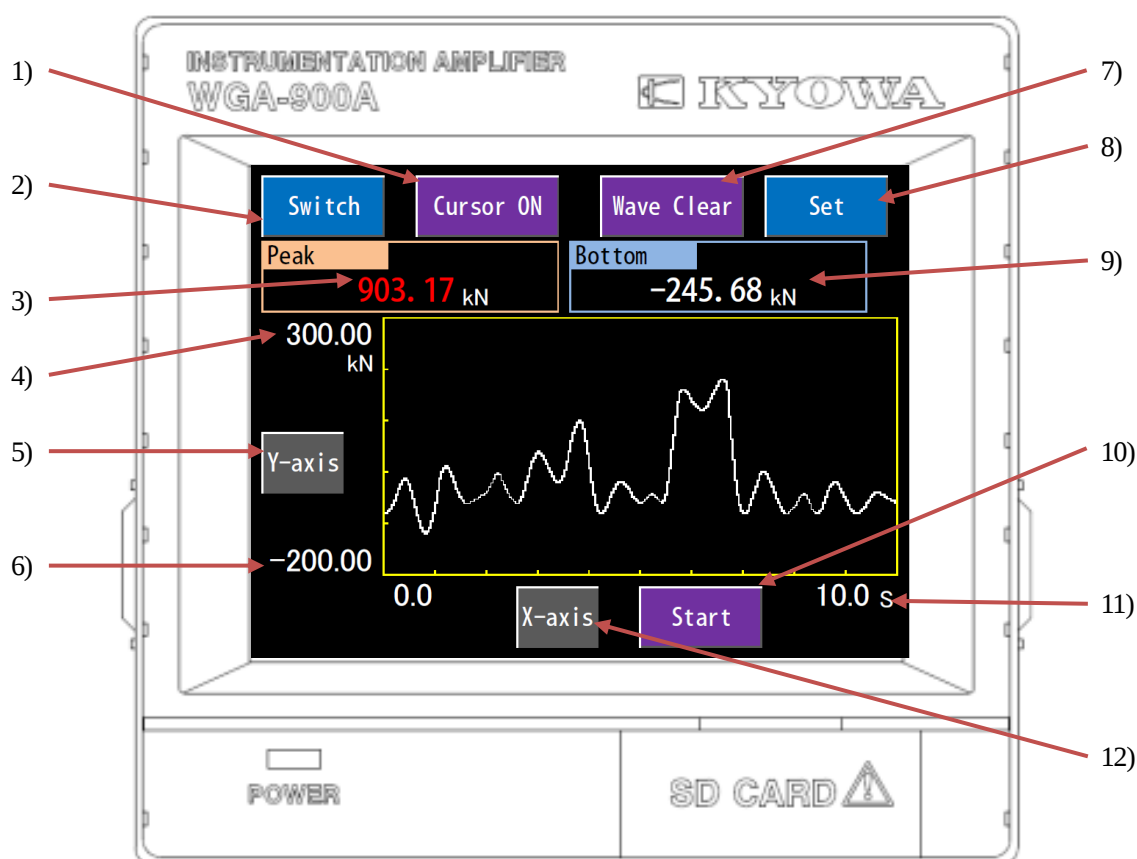
2-1-6. Measuring Window (Zoom In Number View Dual Display for [Block Peak-Bottom] and [Time Peak-Bottom])



- | | |
|--|--|
| 1) Switch key | Display changes in order from “Number View Dual Display” - “Zoom In Number View Dual Display” - “Waveform View Dual Display” by pressing the Switch key. |
| 2) Comparator status lamp for peak value | Based on the detecting peak value, when turning ON the comparator outputs, the [HI-1] light up in red, [OK] lights up in white, and [LO-1] lights up in yellow. |
| 3) Peak value | Displays a peak value with the unit. |
| 4) Comparator status lamp for bottom value | Based on the detecting bottom value, when turning ON the comparator outputs, the [HI-2] light up in red, [OK] lights up in white, and [LO-2] lights up in yellow. |
| 5) Bottom Value | Displays the bottom value with the unit. |
| 6) ZERO key | Conducts digital zero to set the display of the measured value to 0 (or additional value). |
| 7) Set key | Displays the setting window. |



2-1-7. Measuring Window (Waveform View Dual Display for [Block Peak-Bottom] and [Time Peak-Bottom])



- 1) **Cursor ON** key
- 2) **Switch** key
- 3) Peak value
- 4) Y axis end point
- 5) **Y-axis** key
- 6) Y axis start point
- 7) **Wave Clear** key
- 8) **Set** key
- 9) Bottom value
- 10) **Start** key/**Stop** key
- 11) X axis end point
- 12) **X-axis** key

The "Cursor" window appears to display a cursor.

Display changes in order from "Number View Dual Display" - "Zoom In Number View Dual Display" - "Waveform View Dual Display" by pressing the **Switch** key.

Displays a peak value with the unit.

Displays the end point of the Y-axis that is set in the "Y-axis setting" of the "Waveform display setting."

Opens the "**Y-axis setting**" window of the "Waveform display setting." While displaying waveforms, the Y axis end point key is displayed in gray and no key operation can be performed. Before displaying waveforms or after clearing waveforms, the Y axis end point key operation can be performed.

Displays the start point of the Y-axis that is set in the "Y-axis setting" of the "Waveform display setting."

Clears the current displaying waveform.

Displays the setting window.

Displays the bottom value with the unit.

Press the **Start** key to start the waveform displaying according to the preset condition in the "Waveform display setting." After pressing the **Start** key, it changes to **Stop** key. Press the **Stop** key to stop the waveform display.

Displays the end point of the X-axis that is set in the "X-axis setting" of the "Waveform display setting."

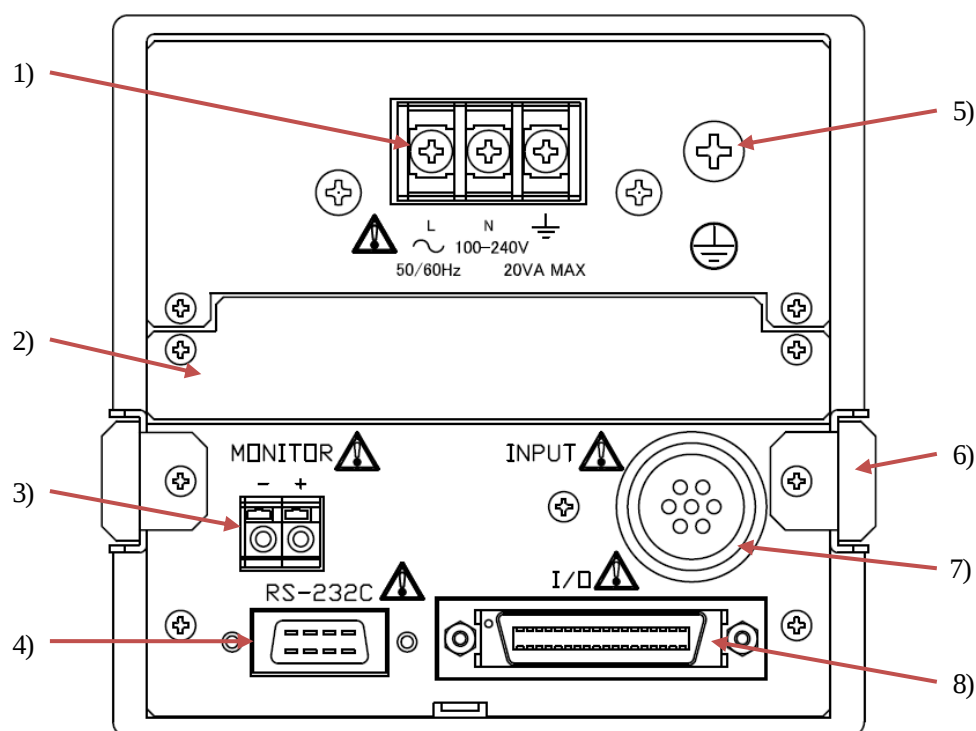
Opens the "**X-axis setting**" window of the "Waveform display setting."

While displaying waveforms, the Y axis end point key is displayed in gray and no key operation can be performed.

Before displaying waveforms or after clearing waveforms, the X axis end point key operation can be performed.

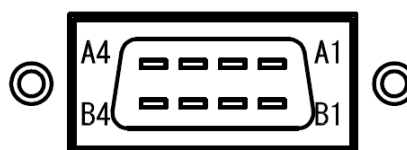


2-2. BACK PANEL



- | | |
|--------------------------------|---|
| 1) Terminal block for AC power | Connects AC power.
Voltage range: 85 VAC to 264 VAC |
| 2) Option slot | Any of the following option can be mounted. <ul style="list-style-type: none"> • BCD output • D/A output • RS-485 A blank panel is mounted if no option is required. |
| 3) Terminal board for monitor | Monitors a voltage output to the sensor output. |
| 4) Connector for RS-232C | Sends and receives data such as measuring data, setting value, etc with the RS-232C. |
| Applicable connector | Jack: FCN-361J008-AU FUJITSU COMPONENT LIMITED
Cover: FCN-360C008-B FUJITSU COMPONENT LIMITED |

Pin No.	Signal Name
A1	DCD
B1	RXD
A2	TXD
B2	DTR
A3	GND
B3	DSR
A4	CTS
B4	RTS



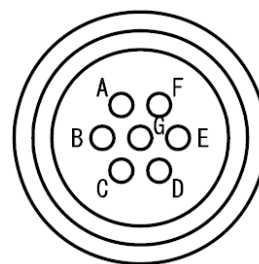
Connector pin assignment of the WGA-900A

- | | |
|----------------------------------|--|
| 5) Protective grounding terminal | To prevent an electronic shock hazard, be sure to ground the terminal. |
| 6) Fitting metal | For mounting a panel. |



- 7) Sensor connector For connecting the strain gage sensor.
 Applicable connector Model: PRC03-12A10-7M10.5
 Manufacture: TAJIMI ELECTRONICS CO., LTD.

Pin No.	Signal Name
A	+BV (Red)
B	-SIG (White)
C	-BV (Black)
D	+SIG (Green)
E	Shield
F	TEDS (+) (Yellow)
G	TEDS (-) (Blue)



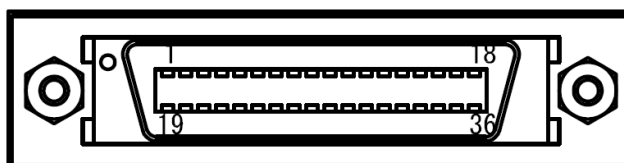
Connector pin assignment of the WGA-900A

MEMO

Cable colors described the above are KYOWA's standard color codes.

- 8) Control I/O connector Connection I/O terminal for controlling.
 Signal type of the control input is non voltage connection signal or open collector signal.
 Output type of the control output is open collector.
- Applicable connector Connector model: PCR-S36FS+
 Manufacture: HONDA TSUSHIN KOGYO CO., LTD.
 Case model: PCR-LS36LA
 Manufacture: HONDA TSUSHIN KOGYO CO., LTD.

Pin No.	I/O	Content	Pin No.	I/O	Content
1	Output	HH comparator output	19	Input	ZERO command
2	Output	HI comparator output	20	Input	HOLD command
3	Output	OK comparator output	21	Input	RESET command
4	Output	LI comparator output	22	Input	TEDS command
5	Output	LL comparator output	23	Input	Waveform command
6	Output	Abnormal channel	24	Input	Measuring condition select 0
7	Output	Abnormal memory	25	Input	Measuring condition select 1
8	Output	Communication error	26	Input	Measuring condition select 2
9	Output	Healthy	27	Input	Measuring condition select 3
10	Output	SD	28	Input	N. C
11	Output	N. C	29	Input	N. C
12	Output	N. C	30	Input	N. C
13	Output	N. C	31	Input	N. C
14	Output	N. C	32	Input	N. C
15	Output	N. C	33	Input	N. C
16	Output	N. C	34	Input	N. C
17	Output	Output COM	35	Input	Input COM
18	Output	Output COM	36	Input	Input COM



Connector pin assignment of the WGA-900A



MEMO

The pin No. 9 [Healthy] is for checking the power (ON) of the WGA-900A. The open collector output becomes ON when turning ON the WGA-900A and becomes OFF when turning OFF the WGA-900A. (*1)

The pin No. 9 is also for checking that the WGA-900A is working correctly. The open collector output of the [Healthy] becomes OFF when any of the output of [Abnormal channel], [Abnormal memory], [Communication error] becomes ON

*1. When the open collector output is turned ON, electrical continuity between pins No. 9 [Healthy] and No. 17 (or 18) [Output COM] is broken.



3. CONNECTION

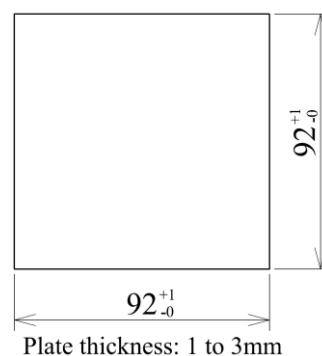
3-1. INSTALLATION ONTO A PANEL

To install the WGA-900A to a panel, prepare the panel according to the specified panel cut dimensions shown at the right.

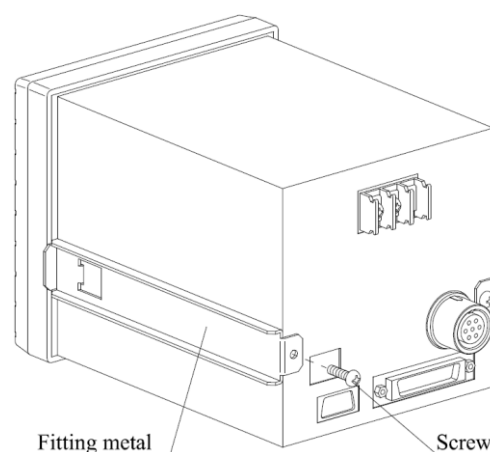
Then, install the WGA-900A by referring to the following instructions.

1) Cut out the panel according to the panel cut dimensions.

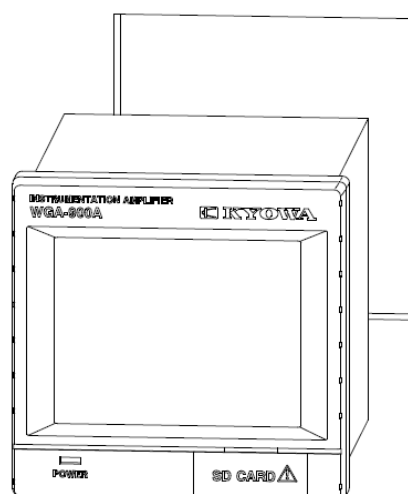
●Panel cut dimensions



2) Remove screws of the fitting metals attached on both sides of the WGA-900A and then, pull out the fitting metals.

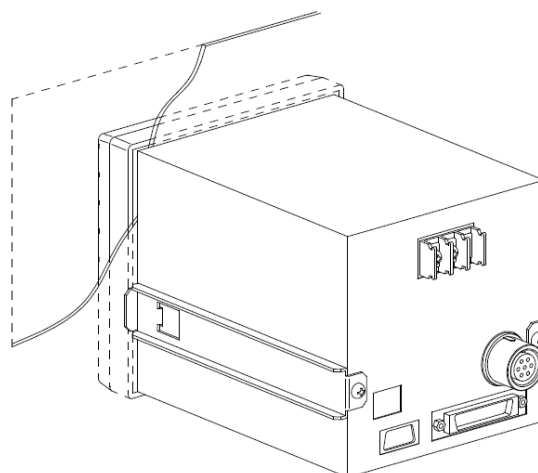


3) Set the WGA-900A into the cut out panel frame.



4) Set the fitting metals on both sides of the WGA-900A.

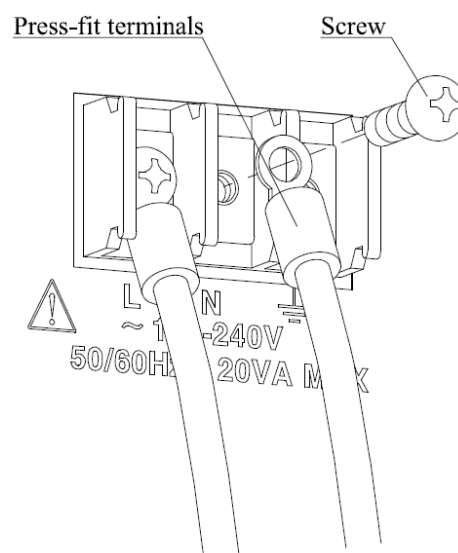
5) Tighten the screws and firmly fix the WGA-900A into the panel.



3-2. WIRING

3-2-1. Connecting AC Power

- Connecting the terminal block for AC power
 - It is recommended to attach insulating coated press-fit terminals to the connecting wires.
 - Use a press-fit terminal for copper wire (JIS C 2805 1.25-3) or equivalent.
 - Remove a cover from the terminal board.
 - Remove a screw as the right figure before connecting the press-fit terminal.
 - After completing terminal block wirings, do not forget to cover the terminal block.



WARNING

To prevent an electronic shock hazard, be sure to mount the terminal block cover.

■ Checking power voltage

NOTE

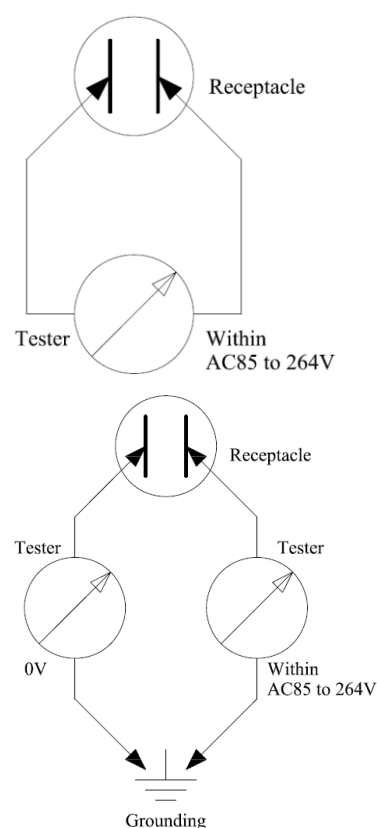
Before connecting the power cable to the AC outlet, check the power voltage.

The operating power voltage of the WGA-900A is from 85 to 264 VAC, 50/60 Hz, 20 VA or less. Be sure to keep this operating power voltage.

If the power voltage exceeds the above specified voltage range or if the power voltage terminal has potential with excessive power voltage against the ground, no connection is made and it may cause trouble or damage to the WGA-900A.

How to confirm the power voltage is described in the following.

- (1) Measure voltage between AC receptacle terminals with a tester and confirm it is between 85 to 264VAC.
- (2) Measure the voltage between the ground and each end of the AC power receptacle with a tester. Confirm one end has 0 V and the other, 85 to 264 VAC.
- (3) If the WGA-900A is used at site using apparatuses generating interfering noise, for example, induction motor, electric welding machine, etc., power supply condition may be deteriorated due to excessive noise. Take appropriate countermeasures against the noise by using an insulation transformer or commercially available noise-cut transformer.



3-2-2. Connecting Sensor

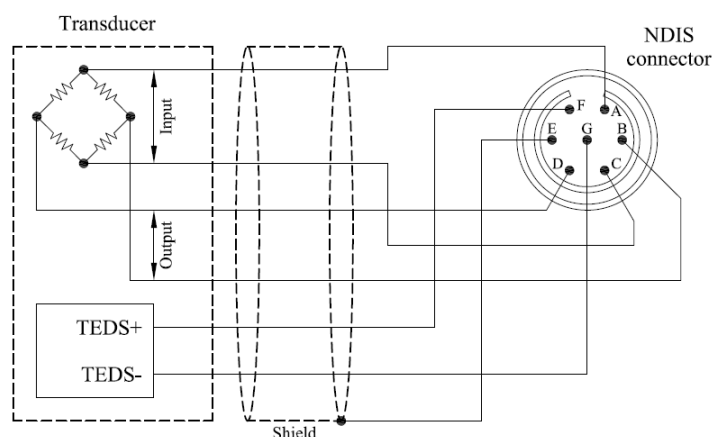
- Input connector is NDIS one-touch connector.
- When using a KYOWA's sensor with the NDIS standard connector at the tip of the cable, the both TEDS-compatible and non-TEDS-compatible sensors (excluding six-wire system remote sensing) can be directly connected to an input connector
- When using the KYOWA's sensor without a connector at the tip of the cable or when using other manufactures made sensor, connect the sensor to the NDIS standard connector (option) as follows.

Applicable connector Model: PRC03-12A10-7M10
 Manufacture: TAJIMI ELECTRONICS CO., LTD.

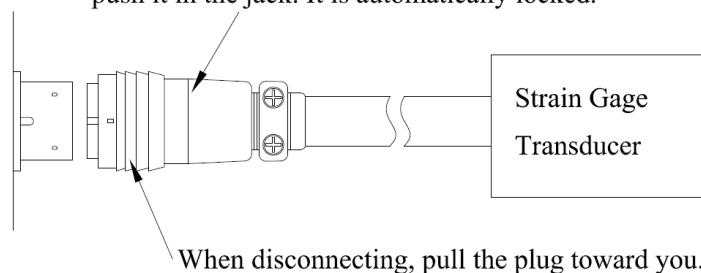
Pin No.	Signal Name
A	+BV (Red)
B	−SIG (White)
C	−BV (Black)
D	+SIG (Green)
E	Shield
F	TEDS(+) (Yellow)
G	TEDS(−) (Blue)

MEMO

Cable colors described above are KYOWA's standard color codes.



When connecting the cable, hold the plug and push it in the jack. It is automatically locked.



NOTE 1

- For transducer wiring, use shortest possible 4-conductor or 6-conductor shielded cable. In addition, locate it apart from the power cable or other wirings that may generate noise.
- Bridge excitation voltage is set to 2 V prior to shipment. Since it can be selected to 10 V, set the voltage appropriate for sensor specifications (within the recommended excitation voltage).

NOTE 2

- Never connect a 6-wire system remote sensing sensor. Or, the WGA-900A may cause trouble or accident.
- When connecting a non-TEDS-compatible sensor, don't connect the F and G terminals of the NDIS standard connector.



3-2-3. Connecting Control Input

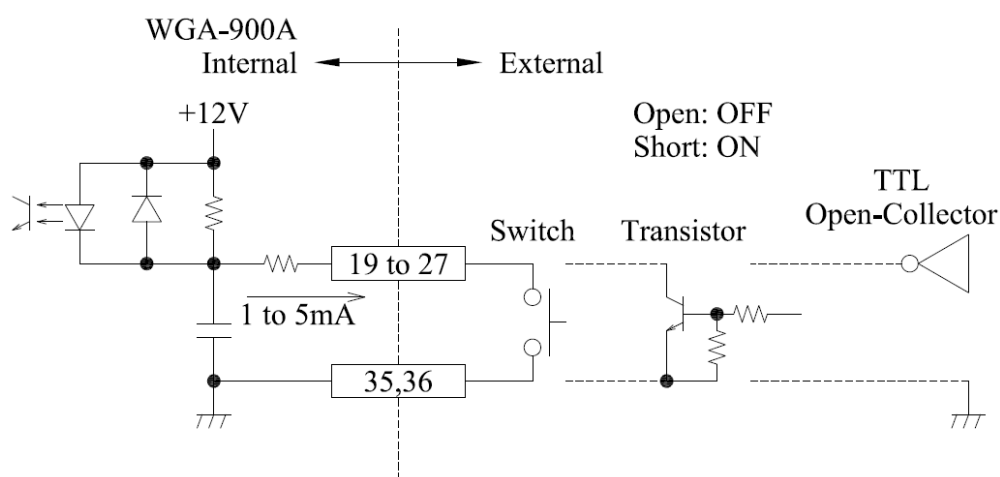
- Applicable connector of the cable side is as follows.

Connector model:	PCR-S36FS+	Manufacture:	HONDA TSUSHIN KOGYO CO., LTD.
Case model:	PCR-LS36LA	Manufacture:	HONDA TSUSHIN KOGYO CO., LTD.

- Pin numbers and signal names of the control input are as follows.

Pin No.	Signal Name	Pin No.	Signal Name
19	ZERO command	28	N. C
20	HOLD command	29	N. C
21	RESET command	30	N. C
22	TEDS command	31	N. C
23	Waveform command	32	N. C
24	Measuring condition select 0	33	N. C
25	Measuring condition select 1	34	N. C
26	Measuring condition select 2	35	Input COM
27	Measuring condition select 3	36	Input COM

- When using external switch, open collector, etc. to control inputs, connect as shown in the following figure.



NOTE

- The external element of control input requires 10 mA or more current.
- Leakage current on the external element of control input must be below 50 μ A.
- A voltage on the external element of control input must be below 2 V when it is put [ON] (short-circuited) connector.

NOTE for wiring

- For connecting more than 1-m long cable, use a twisted cable.
- For connecting more than 3-m long cable, use a shielded cable and always ground the shielded cable to the ground terminal.
- In addition, for connecting more than 30-m long cable or using outdoors, take special countermeasures against noise.



3-2-4. Connecting Control Output

- The control output signal is open collector output and sink type.
- Applicable connector of the cable side is as same as that of the control input side.
- Pin numbers and signal names of the control output are as follows.

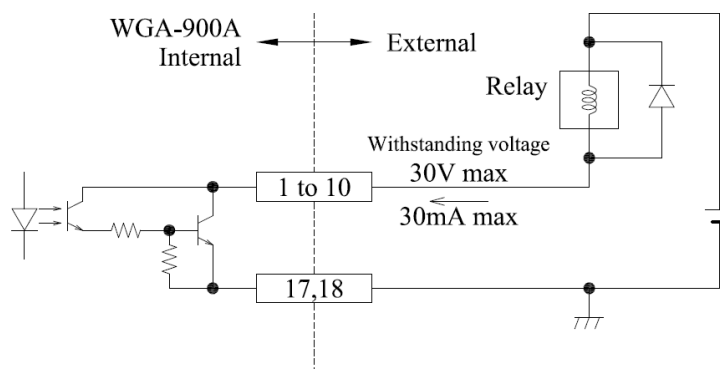
Pin No.	Signal Name	Pin No.	Signal Name
1	HH comparator output	10	SD
2	HI comparator output	11	N. C
3	OK comparator output	12	N. C
4	LO comparator output	13	N. C
5	LL comparator output	14	N. C
6	Abnormal channel	15	N. C
7	Abnormal memory	16	N. C
8	Communication error	17	Output COM
9	Healthy	18	Output COM

- Equivalent circuit is described as the right figure.

Output Signal	Transistor
0	ON
1	OFF

* Suppose output logic is “Negative logic.”

For the “positive logic,” the transistor output is reverse of the above table.



- Capacity of the open collector is 30 VDC, 30 mA or less.

NOTE

- Arrange an external power supply for relay drive.
In addition, pay attention to the capacity of the external power.
- To connect a relay to control output, add a diode in parallel to the coil of a relay.
Absence of a diode can cause damage.
- Insert a surge killer in the contact of a relay.
For detailed information about a surge killer, contact the manufacture of a relay in use.

NOTE for wiring

- For connecting more than 1-m long cable, use a twisted cable.
- For connecting more than 3-m long cable, use a shielded cable and always ground the shielded cable to the ground terminal.
- In addition, for connecting more than 30-m long cable or using outdoors, take special countermeasures against noise.



3-2-5. Connecting RS-232C Interface

- Applicable connector of the cable side is as follows.

Jack: FCN-361J008-AU

Manufacture:

FUJITSU COMPONENT LIMITED

Cover: FCN-360C008-B

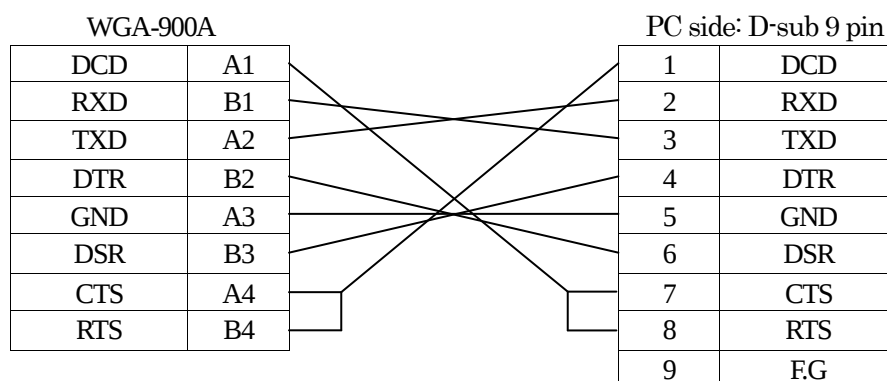
Manufacture:

FUJITSU COMPONENT LIMITED

- Pin numbers and signal names are described as follows.

Pin No.	Signal Name
A1	DCD
B1	RXD
A2	TXD
B2	DTR
A3	GND
B3	DSR
A4	CTS
B4	RTS

- Use a commercially available RS-232C/USB conversion adapter, etc. when there is no COM port for the RS-232C is attached to your PC.



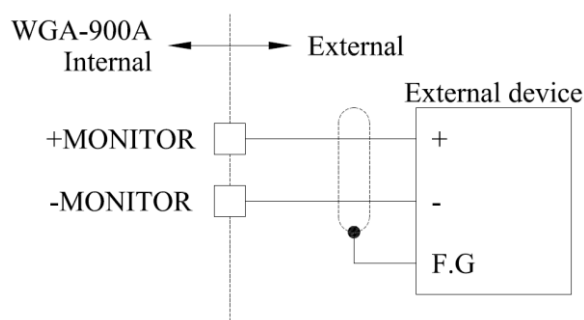
NOTE

Do not forget to turn OFF both WGA-900A and the external device before connection.
Or, correct operation may not be obtained or may cause damage.



3-2-6. Monitor Output

- A voltage output is available on the terminal board provided on the amplifier's rear.
- Outputs approx. $\pm 5\text{ V} / \pm 3.2\text{ mV}$.
- Use this voltage output to perform initial balancing, maintenance and inspection as well as operational testing.
- It also lets you to review measured waveform on an oscilloscope.



<How to connect>

1) Peel off a jacket of a connecting wire approx. 10 to 11 mm and twist the tip of the wire for not to loosen.

Available wire range is

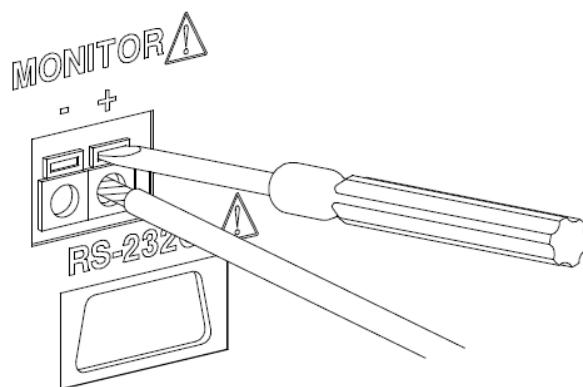
Single wire: $\phi 0.4\text{ mm}$ (AWG24) to $\phi 1.2\text{ mm}$ (AWG16), Twist wire: 0.2 mm^2 (AWG24) to 1.25 mm^2 (AWG16).

2) Press the upper button hard with a slotted screwdriver.

Use the slotted screwdriver with blade diameter 3 mm and width of blade edge 2.6 mm (precision screwdriver, etc).

3) Carefully insert the twisted wire to the lower hole.

4) Release the slotted screwdriver from the upper button and lightly pull the cable to check that the cable is securely clamped.



NOTE 1

- For connecting more than 1-m long cable, use a twisted cable.
- For connecting more than 3-m long cable, use a shielded cable and always ground the shielded cable to the ground terminal.
- In addition, for connecting more than 30-m long cable or using outdoors, take special countermeasures against noise.
- Do not solder the wire or mount the press-fit terminal.
- Be sure to turn OFF the WGA-900A before connecting cables.
- For connecting multiple wires, twist them in advance. Check that the twisted wires are within the above range.

NOTE 2

- Despite executing of no-load ZERO or digital zero, a monitor output does not change. It does not agree with a measured value which has been digitally processed.
- A response frequency of the monitor output is same with the setting of the "Analog Filter."
- A monitor output is not electrically isolated from the internal circuitry. To connect it to an external instrument, therefore use a shielded cable which is shorter than 3 meters. A longer cable is apt to be affected by noise.
- Do not short-circuit the terminals between +MONITOR and -MONITOR. Or, the WGA-900A may be damaged.
- Do not apply an external voltage. Or, the WGA-900A may be damaged



3-2-7. SD Card

- Capable of updating a setting value of the WGA-900A by reading the setting value that is saved in the SD card.
- Capable of saving the setting value of the WGA-900A in the SD card.
- Capable of saving a recorded waveform in the SD card by pressing the **Start** key on the “Waveform” window.

NOTE 1

Capacity of the SD card corresponding to the WGA-900A is up to “2 GB.”

Note that the WGA-900A does not support the SDHC standard SD card 4 GB or more.

If the SD card 4 GB or more is inserted, the WGA-900A stops its operation and turning OFF and ON the power is required.

Never insert the SD card 4 GB or more.

Or, it may also damage external control devices

NOTE 2

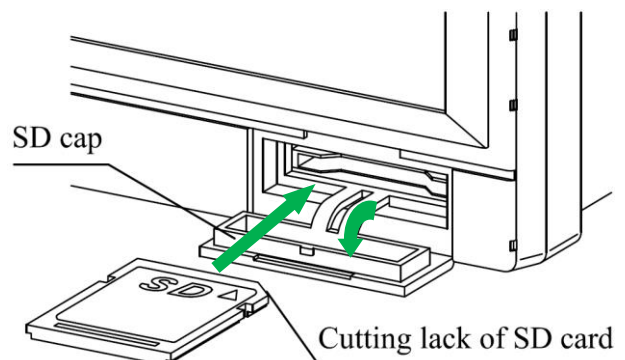
The reading/writing speed of the SD card may be slowed and time to write the waveform data to the SD card may be delayed according to speed class of the SD card.

Recommended SD card is as follows.

Model: RSDC-S2GC4, Capacity: 2 GB, Speed class: CLASS4, Manufacture: BUFFALO

■ Inserting SD card

- 1) Pull the SD cap.
- 2) Insert the SD card (notch on right) as the right figure.
- 3) Push the SD card until it clicks.
- 4) Close the SD cap.

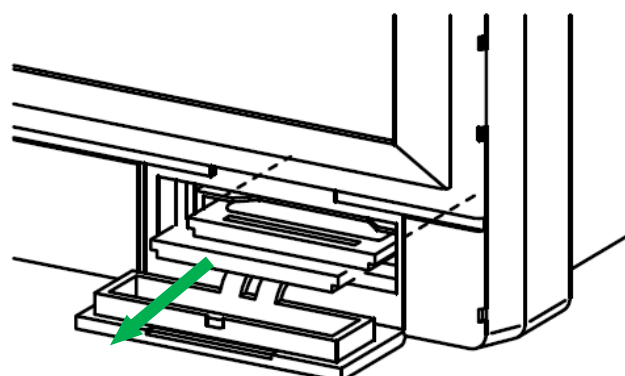


NOTE

Note that after inserting the SD card, the measured value cannot be updated (the display value does not vary even if the input changes) and the key operation cannot be performed for approx. 2 seconds due to the process

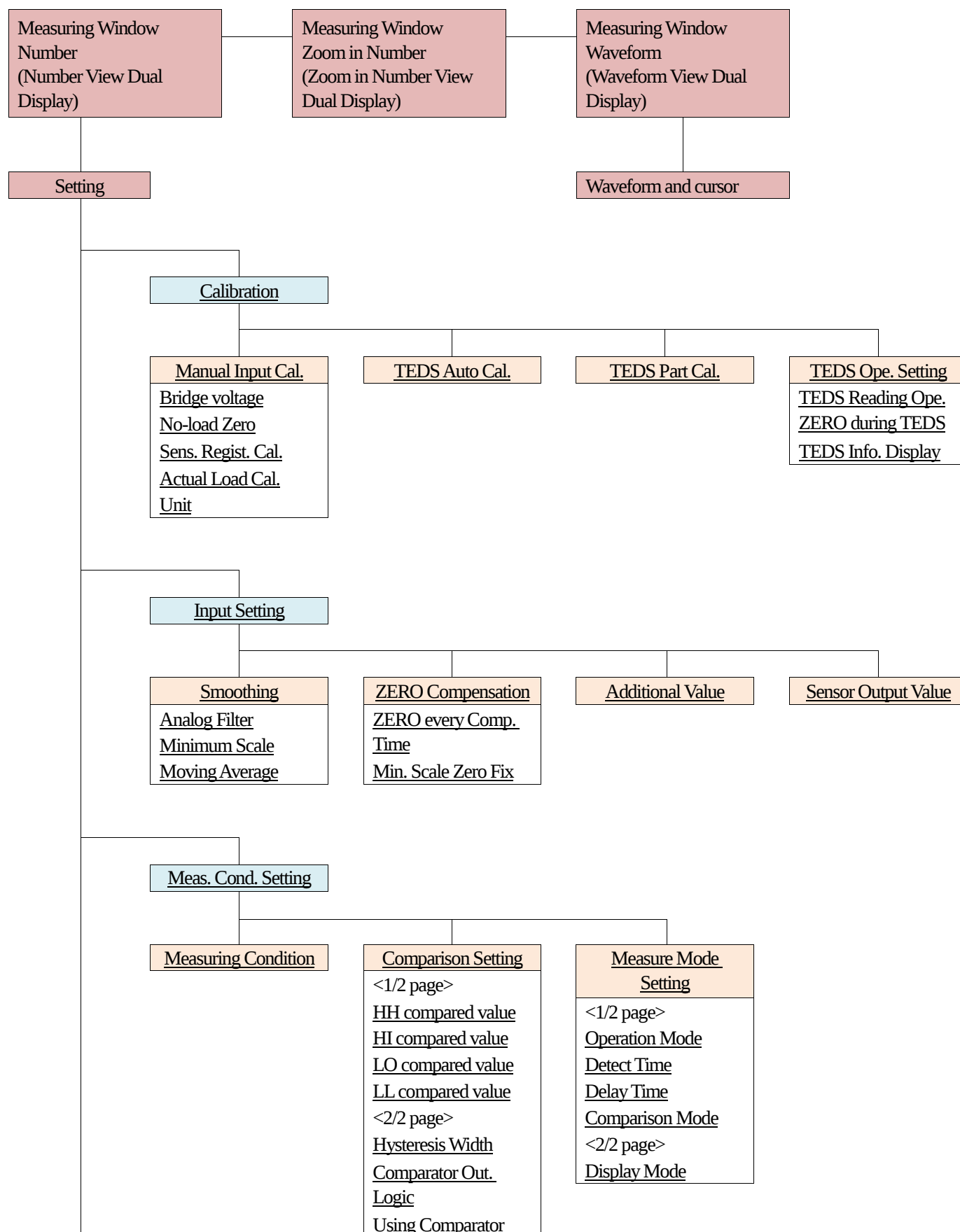
■ Removing SD card

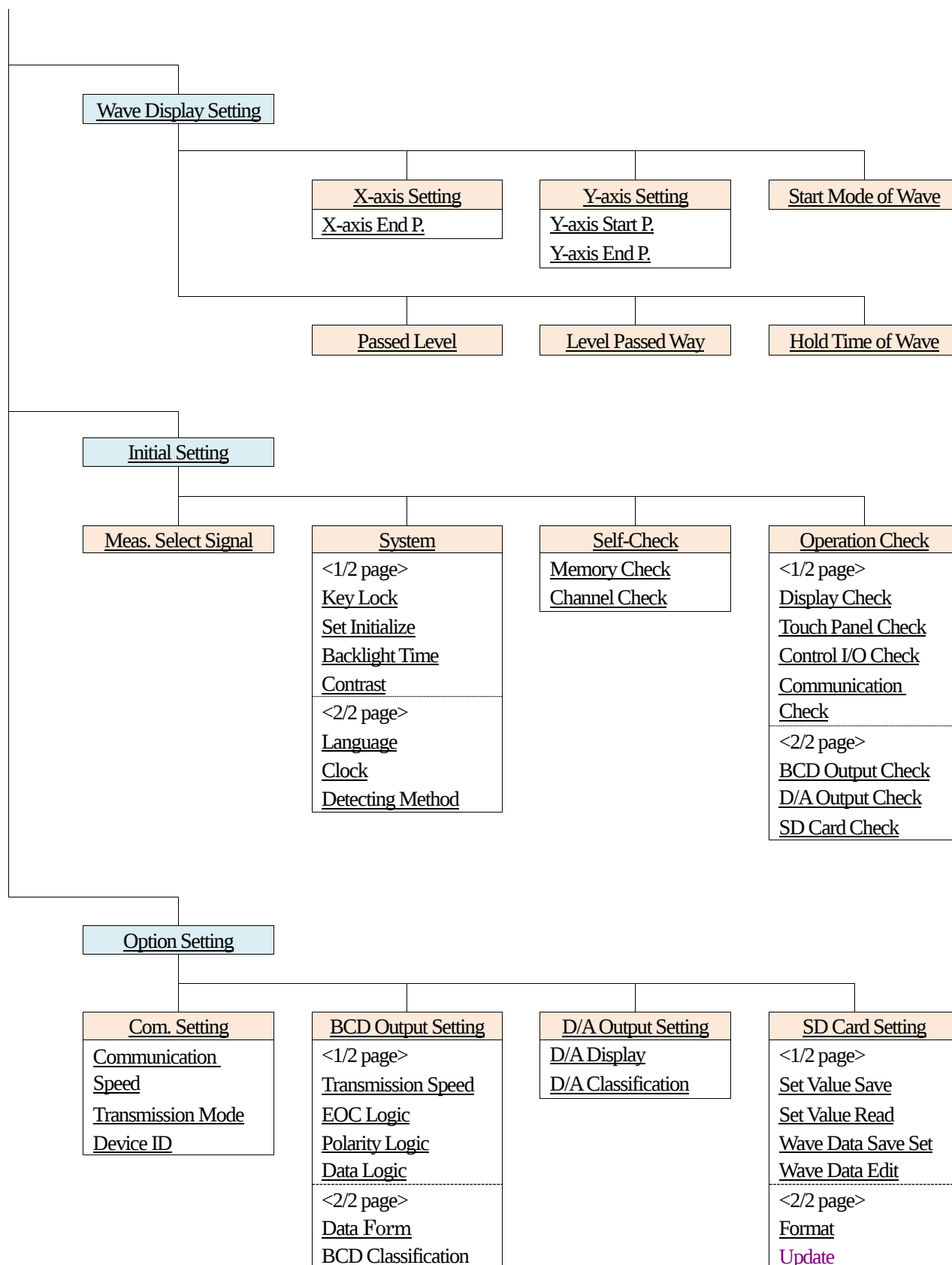
- 1) Check that the SD card is not conducting procession such as reading, saving a setting value, etc.
- 2) Pull the SD card.
- 3) Push the SD card until it clicks and it comes out little.
- 4) Pull out the SD card for removing and close the SD cap.



4. BASIC OPERATION PROCEDURES

4-1. SETTING TREE

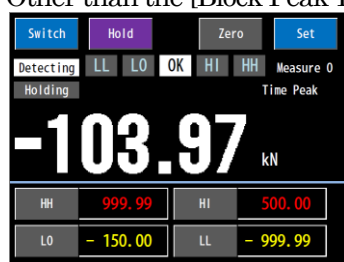




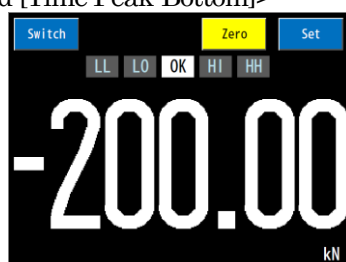
4-2. CONFIGURING WINDOWS

*The previous turned OFF window is displayed when turning ON the WGA-900A.

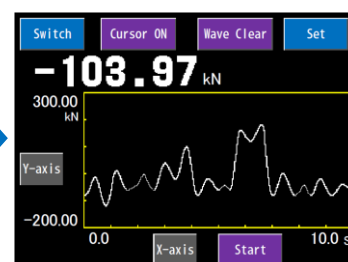
< Other than the [Block Peak-Bottom] and [Time Peak-Bottom]>



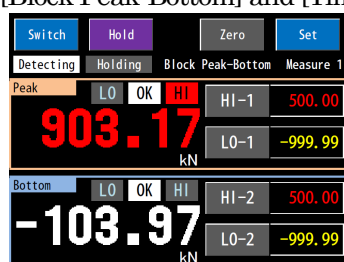
Switch



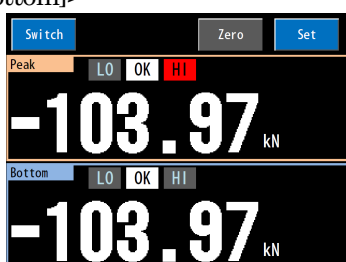
Switch



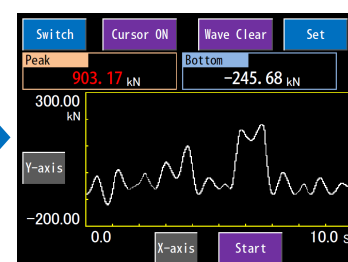
<[Block Peak-Bottom] and [Time Peak-Bottom]>



Switch

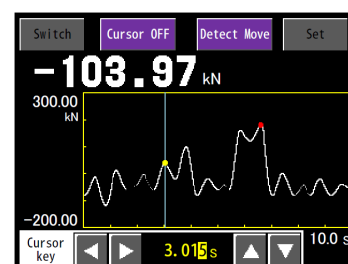


Switch



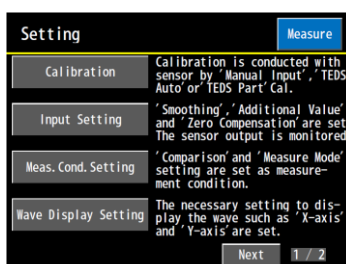
Cursor ON

Cursor OFF

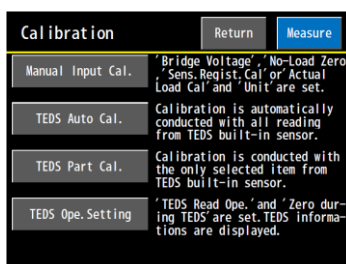


Measure

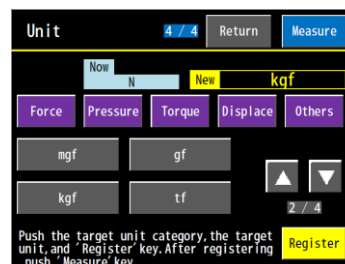
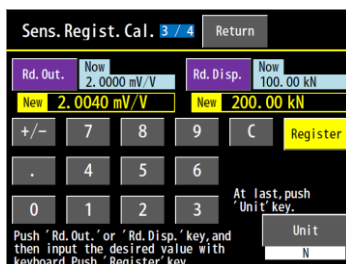
Measure



Main item keys



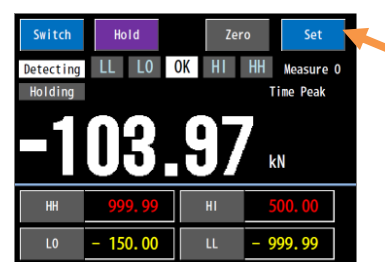
Item keys



4-3. BASIC OPERATION OF SETTING

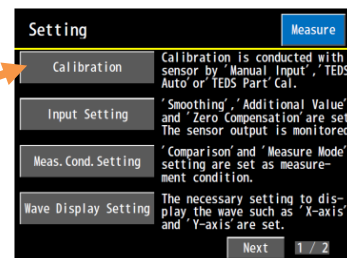
Setting windows appear as follows.

1) Press the **Set** key on the “Measuring” window.



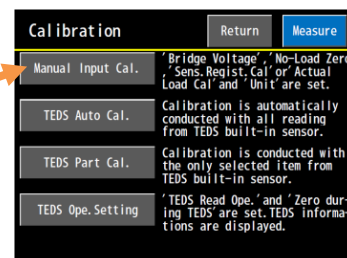
2) Press the target main item key on the “Setting” window.

Main item key



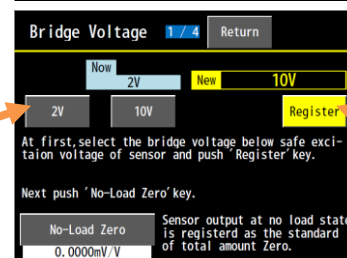
3) Press the target item key on the main item window.

Item keys



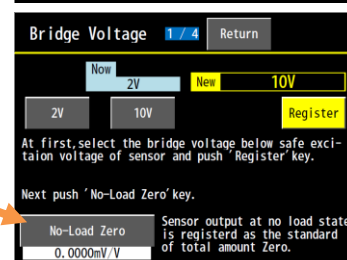
4) Press the target key and **Register** key on the item window.

Target key



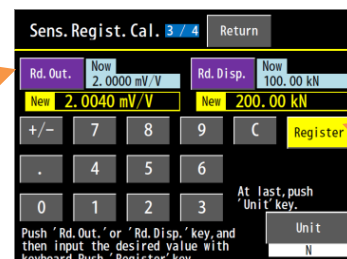
5) Press the target function key on the item window.

Function key



6) If parameter exists, press the target parameter key, input a setting value and press the **Register** key.

Parameter key



4-4. HOW TO OPERATE WAVEFORM AND CURSOR WINDOWS

■ “Waveform” window

Press the **Start** key. Displaying waveform starts when conditions which were set in the “Waveform” window are satisfied. After pressing the **Start** key, the key changes to the **Stop** key. Press the **Stop** key to stop loading the waveform data. While loading the waveform, no key operation other than the **Stop** key can be performed and all keys other than the key are displayed in gray.

After loading the waveform for one window, the detecting point is displayed with a red point when detecting the point such as peak value with the operation mode other than the “Normal.”

Cursor ON Key
The “Cursor” window appears.

Detecting value such as the current measured value, peak value, etc.

Y-axis Key
The “Y-axis Setting” window

Wave Clear Key
Clears the current displaying waveform.

X-axis Key
The “X-axis Setting” window appears. The **X-axis** key is displayed in gray and key operation is invalid during displaying the waveform.

Start / **Stop** Key
Starts displaying the waveform/ stops loading the waveform.

NOTE

Displays a waveform that describes an input variation regardless of setting of the “Operation Mode” in the “Measure Mode Setting” window.

However, the measured value on the upper left is the value related to the preset “Operation Mode” (such as peak value). Therefore, a value of the Y-axis on the waveform is different from the upper left value.

Suppose the “Peak Hold” is selected.

Though the upper left value displays the updating peak value, a waveform shows the input variation as-is. Therefore, the Y-axis value on the waveform does not coincide with the upper left value (peak value).

■ “Cursor” window

While stopping the loading of the waveform, press the **Cursor ON** key to display the “Cursor” window.

Cursor OFF Key
Gets back to the “Waveform”

Displays the data of the Y-axis (measured value) at the yellow point on the cursor.

Cursor key Key
Moves the target digit (highlight) of the cursor position time.

Displays the data of the X-axis (time) at the yellow point on the cursor.

Detect Move Key
The cursor moves directly to the Detecting point. For the [Block Peak Bottom] and [Time Peak Bottom], the cursor moves to the peak value and bottom value alternately.

[Detecting Point]
A red point appears for the measured detecting point (peak value, etc.). A blue point appears for the bottom value.

Up/Down Key
Increases or decreases the number of the time setting digit for moving the cursor to right or left.



5. CALIBRATION

5-1. OUTLINE OF CALIBRATION

Three types of calibrations are available. “Manual Input Calibration”, “TEDS-based Automatic Calibration”, and “Partial Calibration based on TEDS Calibration Data.”

- “Manual Input Calibration”

Inputs calibration data manually. The “Manual Input Calibration” has 2 types to conduct an appropriate calibration.

“Sensitivity registering Calibration”: Registers values in the Test Data Sheet of the sensor.

“Actual Load Calibration”: Applies a known load to the sensor.

- “TEDS-based Automatic Calibration”

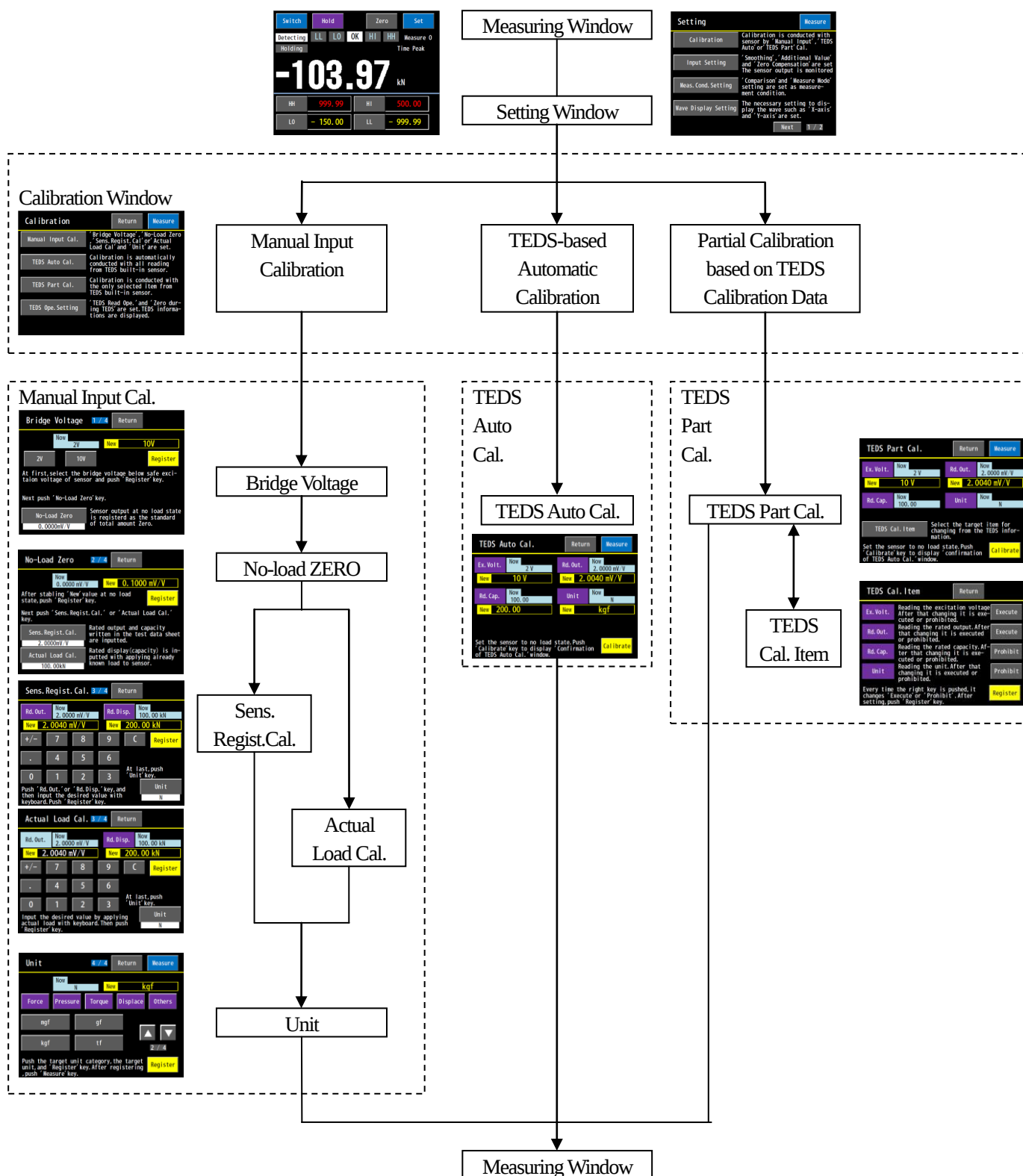
Valid for the TEDS-built in sensor. After starting the automatic calibration, all required information for the calibration is read from the TEDS information.

- “Partial Calibration based on TEDS Calibration Data”

Capable of selecting the target calibration data when calibrating the sensor by reading the TEDS information.



5.2. PROCEDURES OF CALIBRATION



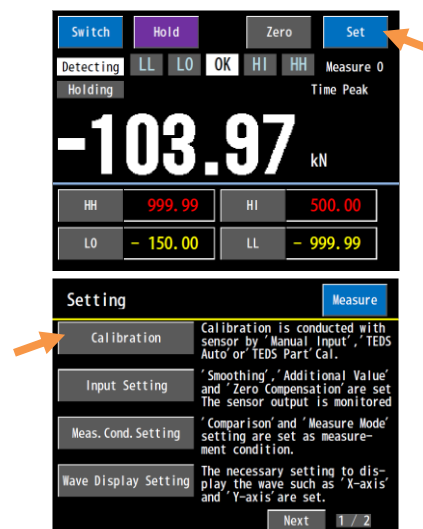
5-3. HOW TO CALIBRATE

5-3-1. Calibration Window

<How to operate>

- 1) Press the **Set** key on the “Measuring” window.

- 2) Press the **Calibration** key on the “Setting” window.



5-3-2. Manual Input Calibration

Conducts calibration by manual setting in order of excitation voltage, no-load zero, Sensitivity registering calibration or in order of actual load calibration and unit.

(1) Bridge Voltage (Excitation Voltage)

Capable of setting the excitation voltage that applies to the sensor from 2 V or 10 V.

Select the higher voltage within the recommended excitation voltage of the sensor.

<Setting range>

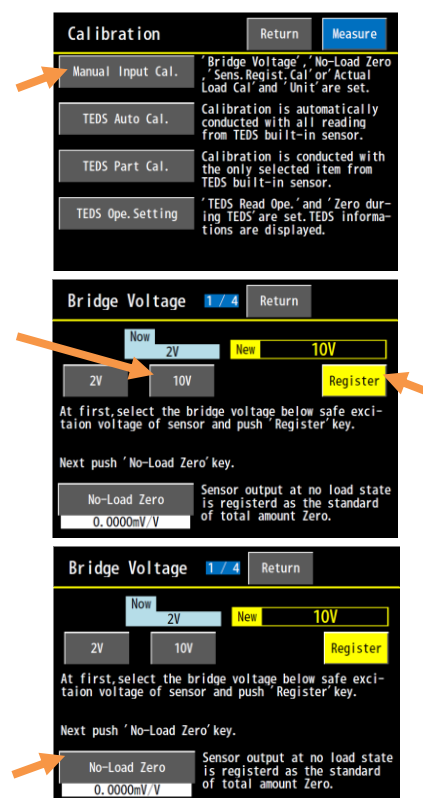
2 V or 10 V

<How to operate>

- 1) Press the **Manual Input Cal.** key on the “Calibration” window.

- 2) Press either **2V** or **10V** key and press the **Register** key to register the setting value.

- 3) After the registration, press the **No-Load Zero** key to move to the “No-load Zero” window.



(2) No-Load ZERO

Loads the output voltage of the sensor with no-load applied and registers it as a reference of a total zero. No-load zero adjustment range is same with the measuring range.

<Setting range>

(-3.2000 to +3.2000 mV/V; display only)

<How to operate>

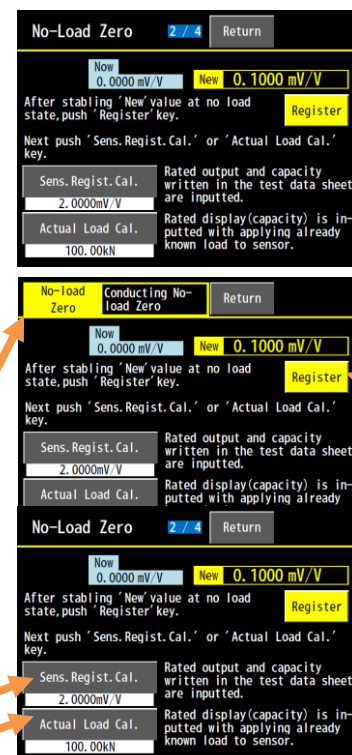
- 1) Set the sensor in no-load state. Current sensor output value is displayed on the “New” column.

- 2) After stabilizing the value in the “New” column, press the

Register key.

The “No-Load Zero” window on the upper left blinks, the sensor output is loaded and the zero point output at the no-load state is registered.

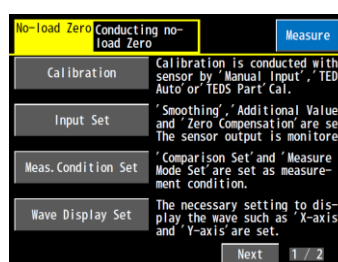
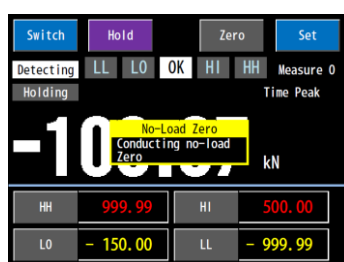
- 3) After the registration, press either **Sens. Regist. Cal.** or **Actual Load Cal.** key to move to the target calibration window.



MEMO

The “No-Load Zero” window blinks when conducting the no-load zero with the following operations during the measurement or during the setting.

- When conducting the no-load zero with communication.
- After setting “Execute” in “ZERO during TEDS” window and before reading the TEDS information for conducting the TEDS-based automatic calibration or partial calibration based on TEDS calibration data.



(3-a) Sensitivity Regist. Cal. (Sensitivity Registering Calibration)

Inputs the rated capacity and rated output described in the Test Data Sheet for equivalent calibration with the actual load when the actual load cannot be applied to the sensor. Suppose that you are using a transducer with the “Rated Capacity: 200 kN” and “Rated Output: 2.0040 mV/V.” In order to read “200.00” against a load of 200 kN that you will give to the transducer, do as follows.

NOTE

Set the rated display 100000 count or less per rated output 0.1 mV/V.

<Setting range>

Rated Output: -3.2000 to +3.2000 mV/V (excluding 0)

Rated Display: -99999 to 99999 (excluding 0)

<How to operate>

- 1) After pressing the **Rd. Out.** key, input a setting value with a numeric keyboards. In the case of example, if “2.0040” is input, “2.0040 mV/V” is displayed in the “New” column.

In addition, the **Rd. Out.** key blinks during the setting.

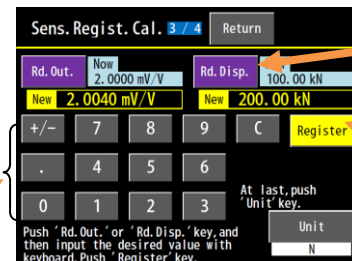
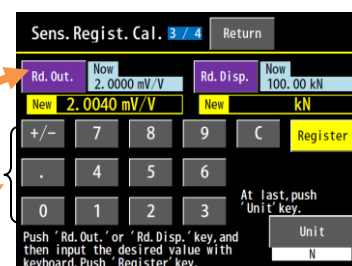
Press the **Register** key. The “Sens. Registering” window on the upper left blinks and the “Rated Output” is registered.

- 2) After pressing the **Rd. Disp.** key, input a setting value with a numeric keyboards. In the case of example, if “200.00” is input, “200.00 kN” is displayed in the “New” column.

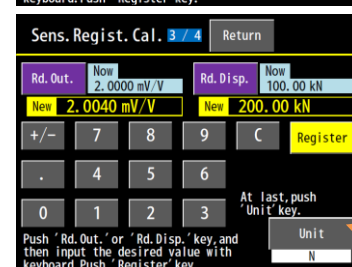
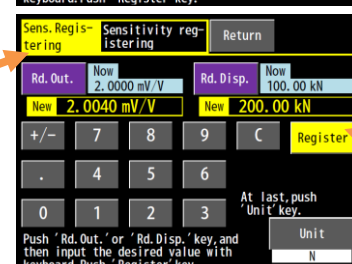
In addition, the **Rd. Disp.** key blinks during the setting.

- 3) Press the **Register** key. The “Sens. Registering” window on the upper left blinks and the “Rated Output” is registered.

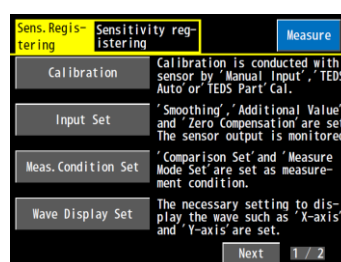
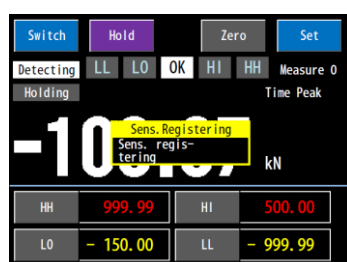
- 4) After the registration, press the **Unit** key to move to the “Unit” window.



Blinks

**MEMO**

The “Sens. Registering” window blinks when conducting the sensitivity registering calibration with communication during the measurement or during the setting.



(3-b) Actual Load Cal. (Actual Load Calibration)

Actual load is applied to the sensor for the calibration. Displays the output when an actual load is applied as the rated output.

Suppose that you are using a transducer with the “Rated Capacity: 200 kN” and “Rated Output: 2.0040 mV/V.” In order to read “200.00” against a load of 200 kN that you will give to the transducer, do as follows.

<Setting range>

Rated Output: (-3.2000 to +3.2000 mV/V; display only, excluding 0)

Rated Display: -99999 to 99999 (count; excluding 0)

<How to operate>

- 1) When a load is applied to the sensor, the output is displayed to the “New” column of the rated output.

Check that the value is stabilized.

[2.0040 mV/V] is displayed in the right figure.

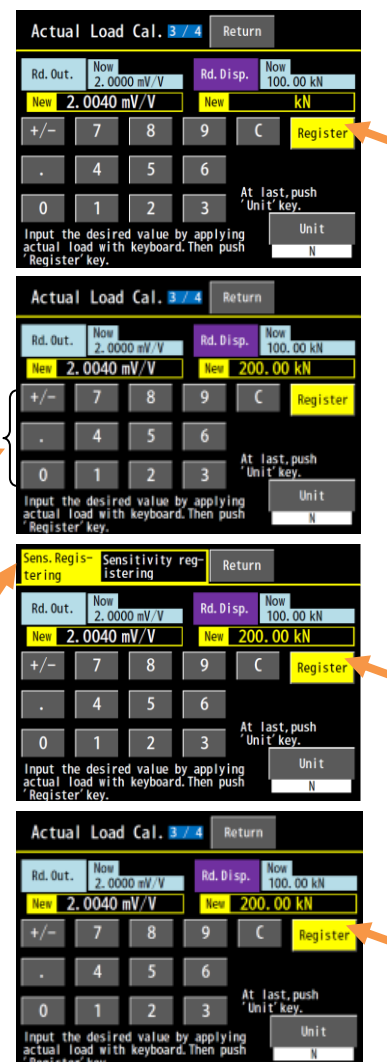
- 2) Input a setting value of the “Rated Output” with the numeric keyboard.

Suppose “200.00” is input, “200.00 kN” is displayed in the “New” column.

- 3) Press the **Register** key. The “Sens. Registering” window on the upper left blinks and the “Rated Output” and “Rated Display” are registered.

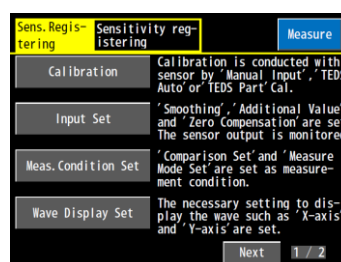
Blinks

- 4) After the registration, press the **Unit** key to move to the “Unit” window.



MEMO

The “Sens. Registering” window blinks when conducting the actual load calibration with communication during the measurement or during the setting.



(4) Unit

Set the target unit.

Refer to “11-2 UNIT LIST” for available unit.

In order to display “kgf,” do as follows.

<Setting range>

Refer to “11-2 UNIT LIST.”

<How to operate>

1) Select the type of the unit first and press the target key.

Press the **Force** key as an example.

2) Units of the selected type appear below. Press the target key.

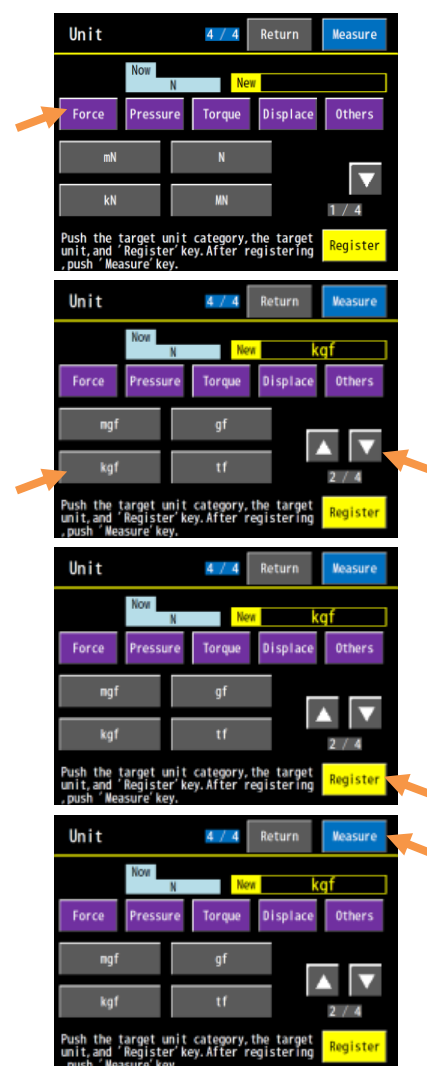
Press **▲** **▼** key when the target unit is not displaying on the window.

Press the **kgf** key to display the [kgf] on the “New” column as an example.

3) Press the **Register** key to register the setting value.

4) Calibration finishes.

Press the **Measure** key at last to move to the “Measuring” window.



5-3-3. TEDS Auto Cal. (TEDS-based Automatic Calibration)

The calibration is automatically conducted by reading the required information for the calibration (applied voltage, rated output, and unit) from the TEDS built-in sensor and the calibration data that is saved inside is overwritten.

However, the “TEDS-based Automatic Calibration” is valid when “**Allow**” is selected in the “**Key Ops.**” of the “**TEDS Reading Operation**” window.

The **TEDS Auto Cal.** key is invalid and displayed in grey when “**Prohibit**” is selected.

In addition, the TEDS information is read after conducting the no-load zero and calibration is conducted when selecting “**Execute**” in the “**Zero during TEDS**” window.

<How to operate>

1) Press the **TEDS Auto Cal.** key on the “**Calibration**” window.

2) After pressing the **Calibrate** key, the “**Confirmation of TEDS Auto Cal.**” window appears.

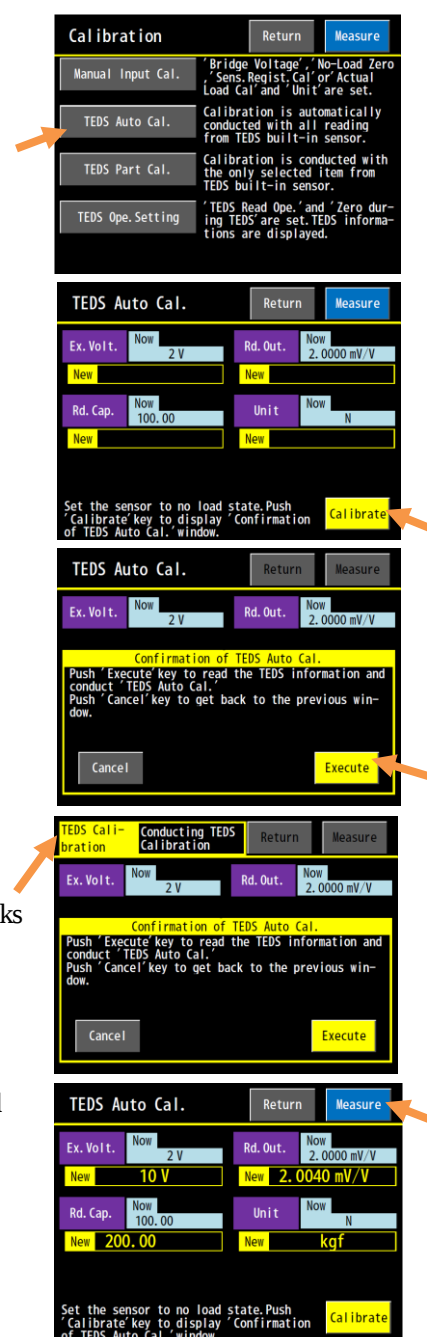
3) Press the **Execute** key. After conducting the no-load zero, the TEDS information is read and the calibration is started.

Press the **Cancel** key to cancel the calibration and gets back to the previous window.

4) The calibration starts and the “**TEDS Calibration**” window on the upper left blinks.

5) The calibration is finished after a short time and a new calibration value is displayed on the “**New**” column.

Press the **Measure** key at last to move to the “**Measuring**” window.

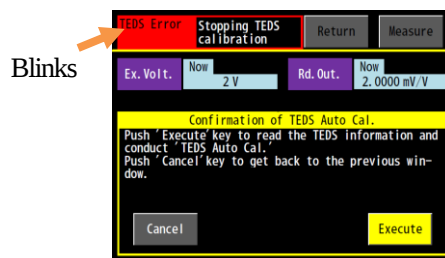


NOTE

“**TEDS Error**” window blinks when the TEDS information cannot read correctly or TEDS information value is out of specifications.

After stopping the reading of the TEDS information, the “**TEDS Error**” window blinks approx. 3 seconds. After that, the current calibration value is displayed.

At this time, the calibration value is not updated.

**MEMO**

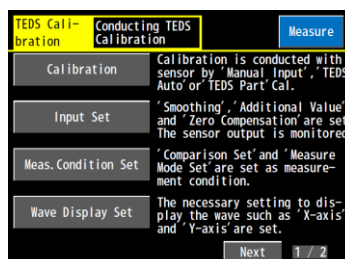
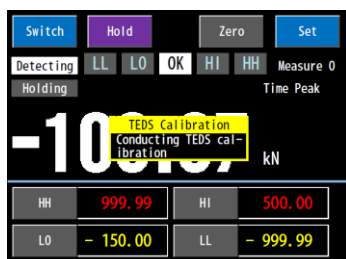
The “**TEDS Calibration**” window blinks after the following settings or conducting the following operations during the setting or during the setting.

<Setting>

Set “Cnt. Input”, “Power On”, “Command” to “**Allow**” in the “**TEDS Reading Operation**” window.

<Operation>

- TEDS command of the control input is turned ON.
- Receives a communication command (EID) that executes the automatic sensitivity registering calibration with the TEDS.
- After turning ON the power again.



5-3-4. TEDS Part Cal. (Partial Calibration Based on TEDS Calibration Data)

Only the selected information from the TEDS built-in sensor (select one or multiples from the applied voltage, rated display, rated output, unit) is updated the calibration data that was saved internally and calibrated automatically.

However, the “**Partial Calibration Based on TEDS Calibration Data**” is valid when selecting the “**Key Ope.**” in the “**TEDS Reading Operation**” to “**Allow.**”

The **TEDS Part Cal.** key is invalid and displayed in gray when setting “**Key Ope.**” to “**Prohibit.**”

In addition, the TEDS information is read and calibration is conducted after conducting the no-load zero when setting the “**Zero during TEDS**” to “**Execute.**”

Select the target item for updating in the “**TEDS Cal. Item**” window.

<Setting Range>

(Common to the **Ex. Volt.**, **Rd. Out.**, **Rd. Cap.**, and **Unit**) Execute or Prohibit

<How to operate>

1) Press the **TEDS Part Cal.** key on the “**Calibration**” window.

2) Press the **TEDS Cal. Item** key on the “**TEDS Part Cal.**” window.

3) Every time the right key of the calibration item is pressed, **Execute** or **Prohibit** changes.

After the setting, press the **Register** key.

After the registration, press the **Return** key.

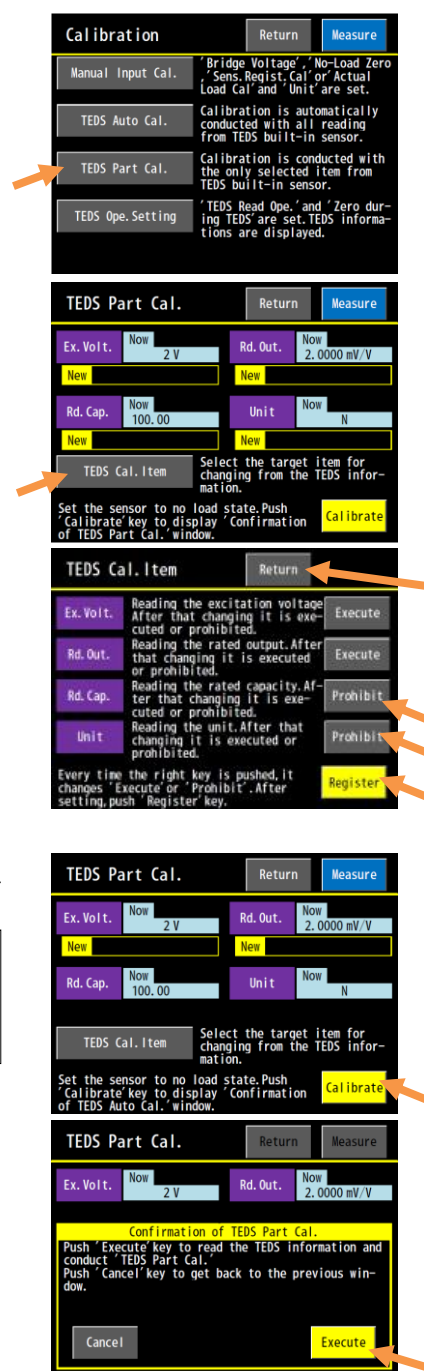
4) Press the **Calibrate** key to display the “**Confirmation of TEDS Part Cal.**” window.

MEMO

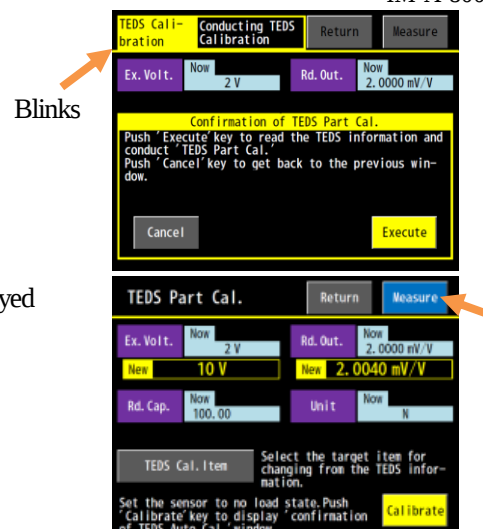
Calibration item with the “**Prohibit**” selected in the “**TEDS Cal. Item**” window, “**New**” column is not displayed in the “**TEDS Part Cal.**” Window.

5) Press the **Execute** key. After conducting the no-load zero, the TEDS information is read and the calibration starts.

Press the **Cancel** key to cancel the calibration and gets back to the previous window without conducting the calibration.



6) The calibration starts and the “**TEDS Calibration**” window on the upper left blinks.



7) The calibration finishes after a short time and a new calibration value is displayed on the “**New**” column.

Press the **Measure** key at last to get back to the “Measuring” window.

NOTE

“**TEDS Error**” window blinks when the TEDS information cannot read correctly or TEDS information value is out of specifications.

After stopping the reading of the TEDS information, the “**TEDS Error**” window blinks approx. 3 seconds. After that, the current calibration value is displayed.

At this time, the calibration value is not updated.

MEMO

The “**TEDS Calibration**” window blinks after the following settings or conducting the following operations during the setting or during the setting.

<Setting>

Set “Cnt. Input”, “Power ON”, “Command” to “**Allow**” in the “**TEDS Reading Operation**” window.

<Operation>

- TEDS command of the control input is turned ON.
- Receives a communication command (EID) that executes the automatic sensitivity-registering calibration with the TEDS.
- After turning ON the power again.



6. OPERATION AND FUNCTION

6-1. CALIBRATION

For the “Manual Input Calibration,” “TEDS-based Automatic Calibration,” and “Partial Calibration Based on TEDS Calibration Data,” refer to “5. CALIBRATION.”

This chapter describes how to operate the digital zero function on the “**Measuring**” window and how to set for the TEDS operation.

6-1-1. Digital Zero Function

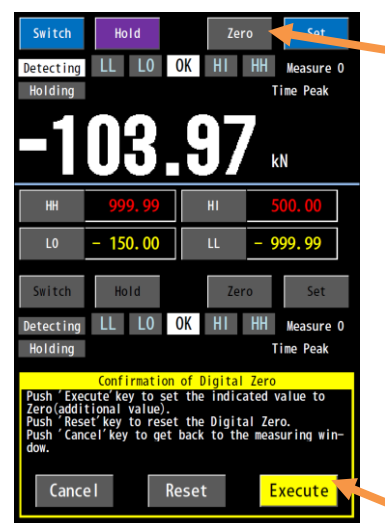
Sets the current displaying value to “0 (additional value when setting the value to other than 0).”

This is pretty much same as resetting a pointer to ‘0’ before you puts an object on a scale.

The digital zero function has 2 ways, by key operation and by control input operation from the rear panel.

(1) By key operation

1) Press **Zero** key on the “**Measuring**” window.



2) The “**Confirmation of Digital Zero**” window appears.

Press the **Execute** key to conduct digital zero and the display value becomes zero.

An additional value is displayed when the value is set to other than zero.

Press the **Reset** key to release the digital zero and the display value gets back to the measured value that is based on the no-load zero.

Press the **Cancel** key to cancel the digital zero and gets back to the measured value.

NOTE

The zero point value that is obtained by the key operation is maintained even if the WGA-900A is turned OFF.

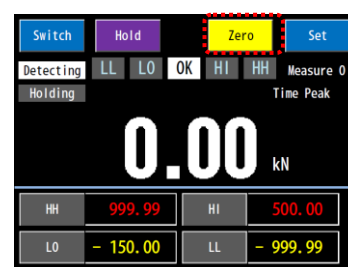
3) After conducting the digital zero and gets back to the “**Measuring**” window, the

Zero key changes to yellow.

MEMO

Yellow key: Conducting digital zero.

Gray key: Digital zero is released.



(2) By the control input operation from the rear panel

- 1) Short circuit the terminals between No. 35 or No. 36 (Input COM) and No. 19 (Zero command) of the rear panel I/O connector to conduct the digital zero.
- 2) Capable of conducting while the setting is locked.
- 3) The display value is kept in “0 (or the additional value)” since the zero calculation is conducted during the short-circuit state.
- 4) Open the circuit. The WGA-900A becomes the same measuring mode of conducting the digital zero.

NOTE

After turning OFF the WGA-900A, the obtained zero point value by the control input is released.
At that time, it is required to conduct the digital zero again after turning ON the WGA-900A.

6-1-2. TEDS Ope. Setting (Setting TEDS Operation)

The TEDS function of the WGA-900A reads the applied voltage, rated output, rated capacity, and unit from the TEDS built-in sensor and automatically calibrates them.

Capable of connecting up to 4 same standard sensors.

(1) TEDS Reading Ope. (TEDS Reading Operation)

The TEDS function of the WGA-900A reads the applied voltage, rated output, rated capacity, and unit from the TEDS built-in sensor and automatically calibrates them.

Capable of connecting up to 4 same standard sensors.

1) **Key Ope.**

Enables the calibration by the key operation in the “TEDS-based Automatic Calibration” and “Partial Calibration Based on TEDS Calibration Data.”

For detailed of the operations, refer to “5. CALIBRATION.”

2) **Cnt. Input**

Short circuit the terminals between No. 35 or No. 36 and No. 23 (TEDS command) of the rear panel I/O connector for 2 seconds or more, the “**TEDS Calibration**” window blinks, the TEDS information is read and the calibration is conducted.

3) **Power ON**

If the **Power ON** is set to “**Allow**”, the “**TEDS Calibration**” window blinks on the starting window when turning ON the WGA-900A at the next time, the TEDS information is read and the calibration is conducted.

4) **Command**

After receiving command from the PC, etc. by the RS-232C or RS-485 interface, the “**TEDS Calibration**” window blinks, the TEDS information is read and the calibration is conducted.

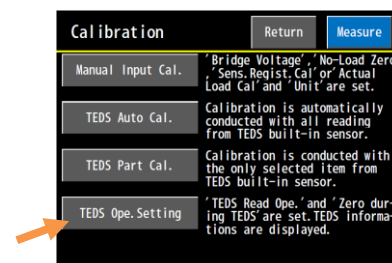
For detailed of the automatic calibration command with the TEDS, refer to “7-1-5 Details of Control Commands.”

<Setting Range>

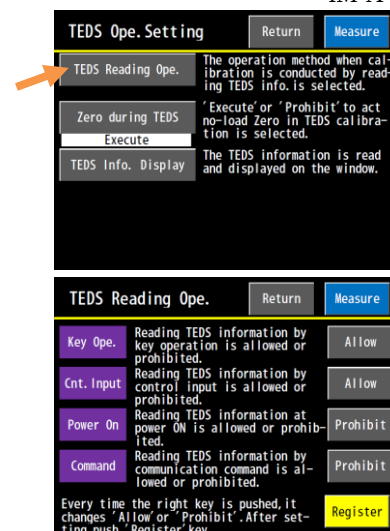
(Common to **Key Ope.**, **Cnt. Input**, **Power ON**, and **Command**) Allow or Prohibit

<How to operate>

- 1) Press the **Set** key on the “**Measuring**” window.
- 2) Press the **Calibration** key on the “**Setting**” window.
- 3) Press the **TEDS Ope. Setting** key on the “**Calibration**” window.



4) Press the **TEDS Reading Ope.** key on the “**TEDS Ope. Setting**” window.



5) Every time the right key of the target item is pressed, **Prohibit** or **Allow** key appears alternately.

After setting every reading operation item, press the **Register** key.

(2) ZERO during TEDS

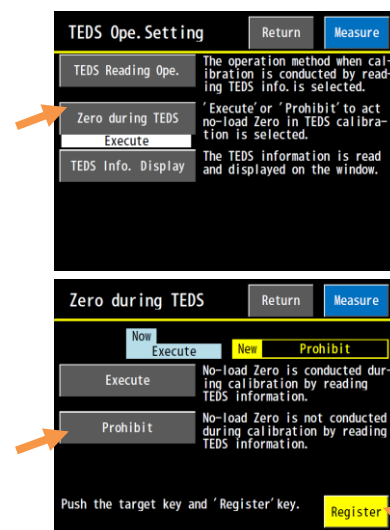
Capable of selecting whether conduct or prohibit the no-load zero at the same time when reading the TEDS information for the calibration.

<Setting Range>

Execute or Prohibit

<How to operate>

1) Press the **Zero during TEDS** key on the “**TEDS Ope. Setting**” window.



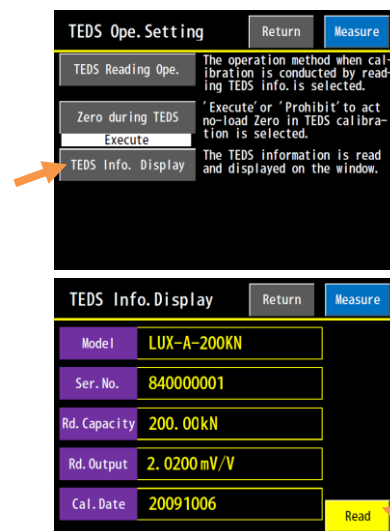
2) Select and press either **Execute** / **Prohibit** key and select the **Register** key for registering the setting value.

(3) TEDS info. Display (TEDS information Display)

The TEDS information is read and displayed on the window.

<How to operate>

1) Press the **TEDS Info. Display** key on the “**TEDS Ope. Setting**” window.



2) After pressing the **Read** key, the WGA-900A starts reading the TEDS information and the information is displayed on the window.



(4) Supplemental explanations of the TEDS function

(1) Executing the TEDS calibration at the initial value.

Set the sensor in no-load state and conduct the calibration with the TEDS. The no-load zero is automatically conducted and the display value is set to “0 (or additional value)” when the **Execute** is selected in the “**ZERO during TEDS**” window.

Then automatically conducts the sensitivity registering calibration, updates calibration values of the excitation voltage, rated output, rated display (including a decimal digit position), and unit.

Capable of executing the TEDS calibration by the key operation on the window, control input, when turning ON the power and by communication command.

However, executing no-load zero to the initial value when turning ON the power is prohibited.

MEMO

For replacing the sensor to the same model and same capacity one because of the sensor's faulty, set the **Rd. Out.** of the **TEDS Cal. Item** in the “**TEDS Part Cal.**” window to “**Execute**” and **Ex. Volt.**, **Rd. Cap.** and **Unit** to “**Prohibit**” for the easy calibration.

(2) Applied voltage

The applied voltage should be equal or less to the recommended applied voltage and higher one should be selected.

[Example] 2 V is set for the recommended applied voltage of 3 V.

(3) Calculation of the calibration coefficient

Register the calibration coefficient that is obtained from the following expression.

Rated capacity of the sensor (y) ÷ Rated output (x)

(4) No-load zero

No-load zero of the TEDS calibration is same with that of the manual input calibration.

(5) Display value and unit

Decimal point of the rated capacity (display) and unit after conducting the TEDS calibration is automatically set corresponding to the total number of display digits of 5.

[Example] 5 N = 5.0000 N, 500 N = 500.00 N, 50 N = 50.000 N, 5 kN = 5.0000 kN

(6) Multiple connection of the TEDS-compatible sensor

Combined rated capacity and rated output are calculated as follows when connecting the multiple TEDS-compatible sensors (2 to 4) in parallel.

Rated Capacity (combined): Total value of the rated capacities of the sensors.

Rated Output (combined): Average value of the rated outputs of the sensors (Value obtained by dividing the total value of sensors with the number of units.).

(7) Model, serial No., and calibrated date of the TEDS

For reading the KYOWA made sensor only.

The information may not be read when connecting the other made TEDS-compatible sensor.



(8) When displaying error:

During the TEDS calibration, due to the following causes, the TEDS information cannot be read, displays the “**TEDS Error**” and sensitivity registering may not be conducted.

- TEDS signal lines are wrongly connected. Check the wiring by referring to “3-2 WIRING”
- The connecting number of sensors is not applicable. Check that the connecting number of sensors is within 1 to 4.
- Cable is too long.

TEDS information may not function correctly if the cable length exceeds 30 m.

Pay attention when using an extension cable to the sensor.

- Connecting non-TEDS-compatible sensor.

After disappearing the “**TEDS Error**” display, the calibration value of the TEDS information is not applied and the WGA-900A operates with the calibration values that are registered before the TEDS calibration.



6-2. INPUT SETTING

6-2-1. Smoothing

Smoothing is a function whereby fluctuations of the display values are made stable by eliminating unnecessary noise component. Though the most popular noise at the site is a hum noise due to the AC power, noise due to the motor in the control system also generates frequently.

The smoothing function has analog and digital methods.

(1) Analog Filter

Creates the low-pass filter circuit by using the analog circuit, offers easy-passage to input signal smaller than the preset frequency and eliminates the input signal over than that.

<Setting Value>

1 Hz, 30 Hz, 300 Hz, and None (1 kHz or more)

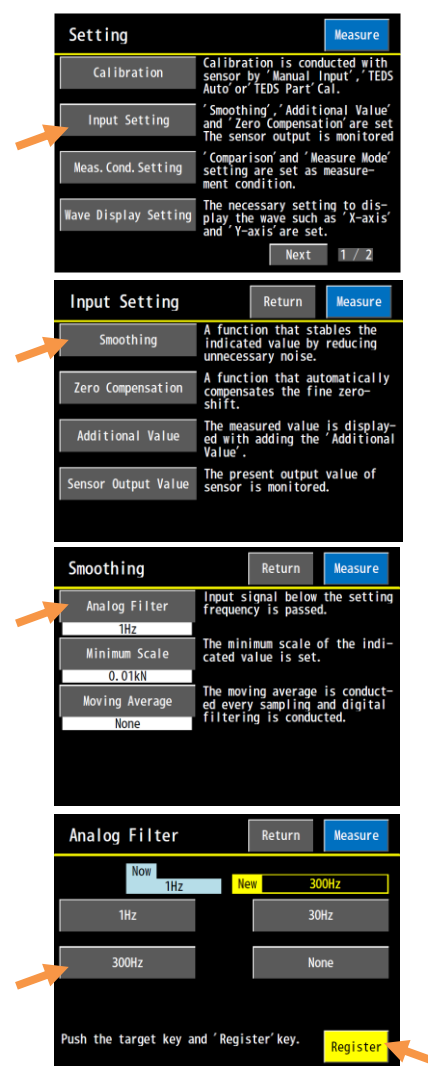
<How to operate>

- 1) Press the **Set** key on the “**Measuring**” window.
- 2) Press the **Input Setting** key on the “**Setting**” window.

- 3) Press the **Smoothing** key on the “**Input Setting**” window.

- 4) Press the **Analog Filter** key on the “**Smoothing**” window.

- 5) After pressing the target key, press the **Register** key to register the setting value.



(2) Minimum Scale (division)

Sets the minimum digit that changes the number.

However, the minimum scale not only suppresses the variation of the display value but also not to update the display value higher than the requiring resolution.

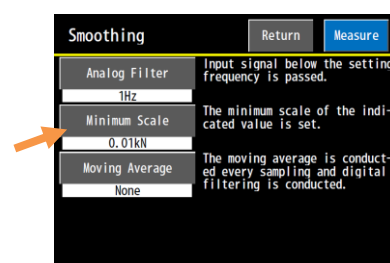
Displays the setting values of the minimum scale according to the preset decimal position that was set in the rated display of the calibration.

<Setting Value>

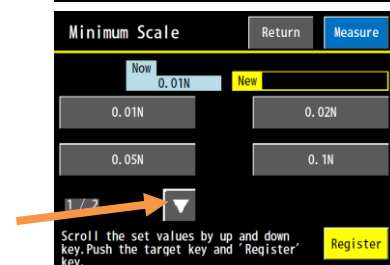
1, 2, 5, 10, 20, 50, 100 (count)

<How to operate>

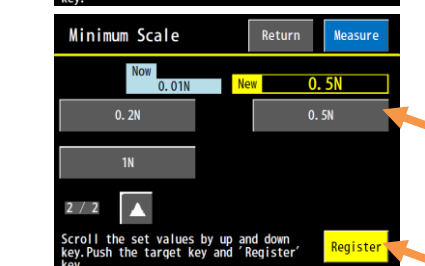
1) Press the **Minimum Scale** key on the “**Smothing**” window.



2) Press the **▲▼** key to change pages until the target value is displayed.



3) Select and press the target key and press the **Register** key to register the setting value.

**MEMO**

Decimal positions with displaying “0” all the time are not displayed based on the zero suppression.

[Example]

Suppose the rated display: 500.00.

The setting value of the minimum scale is [0.01, 0.02, 0.05, 0.1, 0.2, 0.5, and 1].



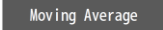
(3) Moving Average

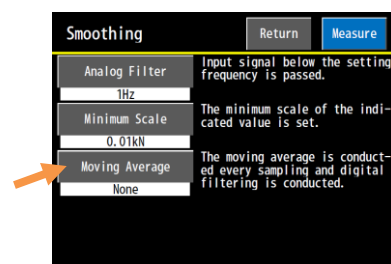
Conducts the moving average for the preset times for filtering.

<Setting value>

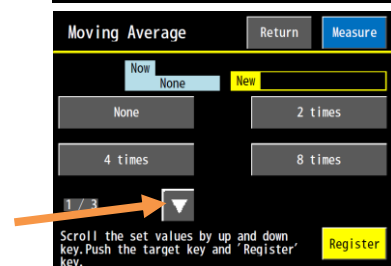
None, 2, 4, 8, 16, 32, 64, 128, 256, 512, 1024, and 2048 times

<How to operate>

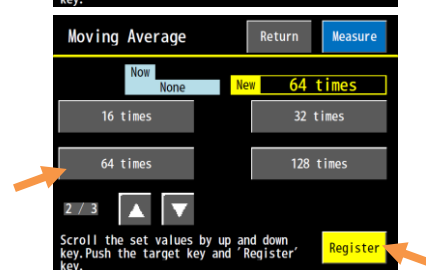
1) Press the  key on the “Smoothing” window.



2) Press the  key to change pages until the target value is displayed.



3) Select and press the target key and press the  key to register the setting value.



6-2-2. Zero Compensation

Automatically corrects subtle zero point drifts.

It effectively reduces measurement error inducible to zero drifts on a sensor or on the WGA-900A as well as zero drifts caused by deposits on a measuring object.

(1) ZERO every Comp. Time (Zero Tracking)

Conducts digital zero and automatically sets the display value to “0” when the measured value is within the compensation range (tracking band) at every determination time (tracking delay) passes.

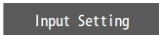
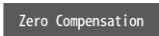
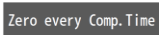
The additional value is displayed when it is set.

<Setting Range>

J.Time (Judging Time): 0.00 to 9.99 (sec)

C.Range (Compensation Range): 0 to 99999 (count)

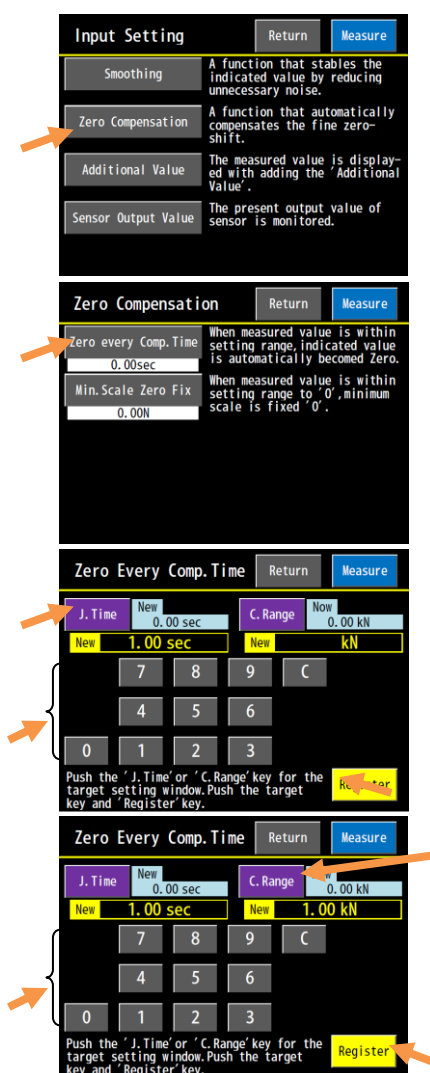
<How to operate>

- 1) Press the  key on the “Measuring” window.
- 2) Press the  key on the “Setting” window.
- 3) Press the  key on the “Input Setting” window.
- 4) Press the  key on the “Zero Compensation” window.
- 5) After pressing the  key, input a setting value with the numeric keyboard and press the  key to register the setting value.
- 6) After pressing the  key, input a setting value with the numeric keyboard and press the  key to register the setting value.

MEMO

The compensation range is + and - sides of 0.

The “ZERO every Comp. Time” is not conducted when the “J. Time” is set to 0.00 sec.



(2) Min. Scale Zero Fix (Zero around zero)

Means least significant digit fixed at zero.

Automatically sets the display number of the least significant digit (the rightmost digit) to “0” when the measuring value is within the setting range of + and - directions.

The Min. Scale Zero Fix does not affect to the measured value but affect to the display numbers only. It improves the appearance of the zero point.

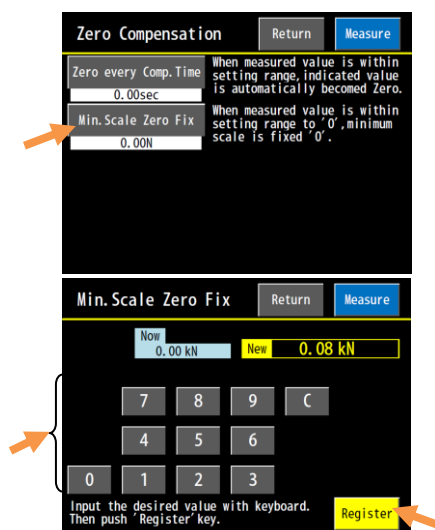
The additional value is displayed when it is set.

<Setting Range>

0 to 9 (count)

<How to operate>

- 1) Press the **Min. Scale Zero Fix** key on the “Zero Compensation” window.



- 2) Input a setting value with the numeric keyboard and press the **Register** key to register the setting value.

6-2-3. Additional Value

Adds the setting value to the measured value and displays it.

After conducting the digital zero with the additional value set to other than “0,” the setting value is displayed.

(Displayed value) = (Measured value after conducting the digital zero) + (Additional value)

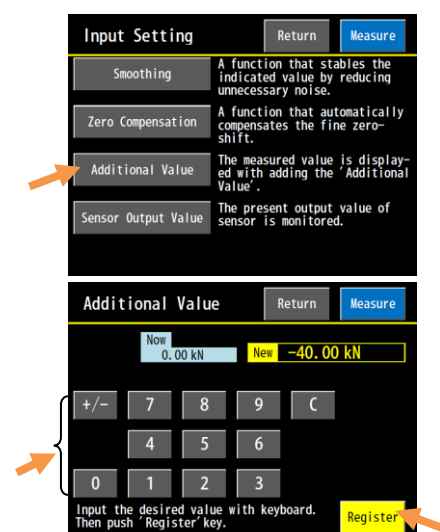
<Setting Range>

-99999 to 99999 (count)

<How to operate>

- 1) Press the **Set** key on the “Measuring” window.
- 2) Press the **Input Setting** key on the “Setting” window.
- 3) Press the **Additional Value** key on the “Input Setting” window.

- 4) Input a setting value with the numeric keyboard and press the **Register** key to register the setting value.



6-2-4. Sensor Output Value (Original Value)

Displays the current output value of the sensor on the monitor.

After pressing the **Display** key, the output value is measured for every 0.5 second and displayed in both units “mV/V” and “ $\mu\epsilon$.”

<Setting Range>

-3.2000 to 3.2000 (mV/V) (-6400.0 to 6400.0 $\mu\epsilon$)

<How to operate>

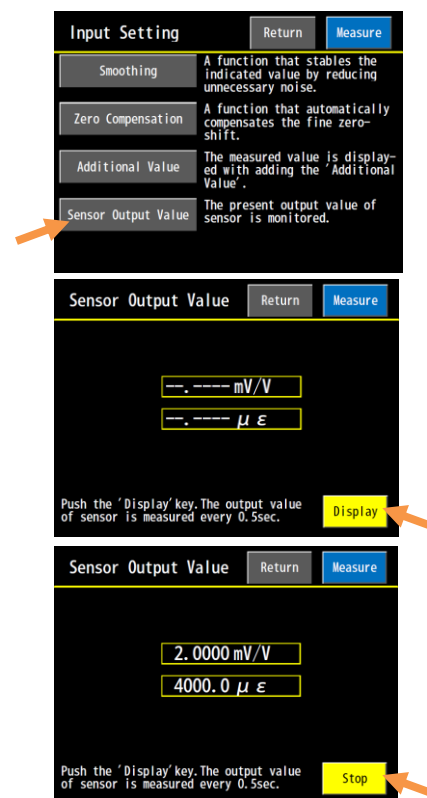
- 1) Press the **Set** key on the “**Measuring**” window.
- 2) Press the **Input Setting** key on the “**Setting**” key.
- 3) Press the **Sensor Output Value** key on the “**Input Setting**” key.

- 4) After pressing the **Display** key, the output value of the sensor is continuously measured and displayed for every 0.5 second.

MEMO

The sensor output value is displayed in “--.-- mV/V” and “--.-- $\mu\epsilon$ ” before starting the measurement.

- 5) Press the **Stop** key to stop the measurement of the sensor output value.



6-3. MEAS. COND. SETTING (SETTING MEASURING CONDITION)

Capable of storing setting values of the comparison setting and measuring mode setting to the measuring condition file and capable of changing the measuring condition No. by the key operation, control input, or communication command.

The number of the measuring condition files is 32 for the key operation, 16 for the control input, and 32 for the communication command.

The setting values are stored in a file having the displaying No. on the “**Meas. Cond. Setting**” window.

6-3-1. Measuring Condition

Capable of selecting the No. of the measuring condition by the key operation on the window when selecting the “**Key Operation**” in the “**Meas. Select Signal**” of the “**Initial Set**” window.

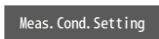
Capable of selecting the No. with the combination of the ON/OFF of the control input “Measurement condition select 0 to 3” when selecting the “**Control Input**” in the “**Meas. Select Signal**.”

The No. of the measuring condition on the window also changes at the same time.

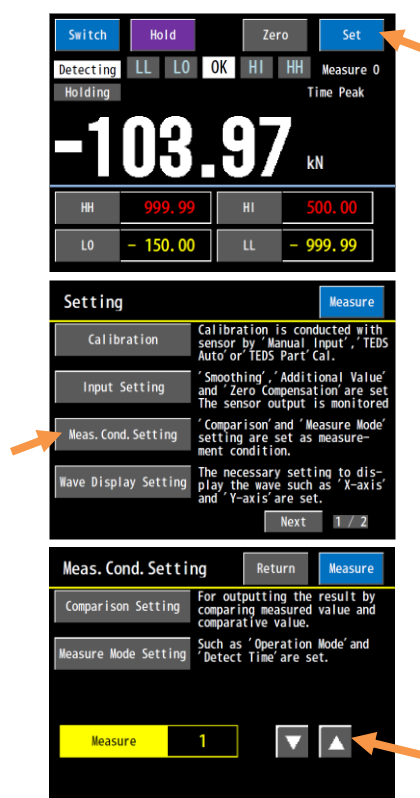
<How to operate>

For the “**Key Operation**” in the “**Meas. Select Signal**” of the “**Initial Set**” window only.

1) Press the  key on the “**Measuring**” window.

2) Press the  key on the setting window.

3) Press the   key to change the number of the [Measure] in the lower window.



MEMO

 and  keys are displayed in gray when selecting the “**Control Input**” and “**Command**” in the “**Meas Select Signal**” window. Therefore the measuring condition No. cannot be changed.

The No. based on the ON/OFF combination of the “Measurement condition select 0 to 3” are displayed when the selecting the “**Control Input**.”

The received command No. from the external device is displayed when selecting the “**Command**”.



■ Switching the measurement conditions with the control input.

For the “**Control Input**” on the “Meas. Select Signal” window only.

Switch the ON/OFF of the control input’s “Measurement condition select 0 to 3” as the following table.

Measuring Condition No.	Measurement Condition Select 0	Measurement Condition Select 1	Measurement Condition Select 2	Measurement Condition Select 3
1	OFF(open)	OFF(open)	OFF(open)	OFF(open)
2	ON(close)	OFF(open)	OFF(open)	OFF(open)
3	OFF(open)	ON(close)	OFF(open)	OFF(open)
4	ON(close)	ON(close)	OFF(open)	OFF(open)
5	OFF(open)	OFF(open)	ON(close)	OFF(open)
6	ON(close)	OFF(open)	ON(close)	OFF(open)
7	OFF(open)	ON(close)	ON(close)	OFF(open)
8	ON(close)	ON(close)	ON(close)	OFF(open)
9	OFF(open)	OFF(open)	OFF(open)	ON(close)
10	ON(close)	OFF(open)	OFF(open)	ON(close)
11	OFF(open)	ON(close)	OFF(open)	ON(close)
12	ON(close)	ON(close)	OFF(open)	ON(close)
13	OFF(open)	OFF(open)	ON(close)	ON(close)
14	ON(close)	OFF(open)	ON(close)	ON(close)
15	OFF(open)	ON(close)	ON(close)	ON(close)
16	ON(close)	ON(close)	ON(close)	ON(close)

6-3-2. Comparison Setting

Compares a measured value with a compared value, and puts out the result.

The comparison result is obtained from the control I/O connector as an open collector output.

In addition, colors of the comparator status lamps on the “**Measuring**” window change.

Capable of preventing chattering or erroneous operations of comparator outputs by setting hysteresis (non-sensitive zone) within a compared value.

(1) HH compared value, HI compared value, LO compared value, LL compared value

<Setting Range>

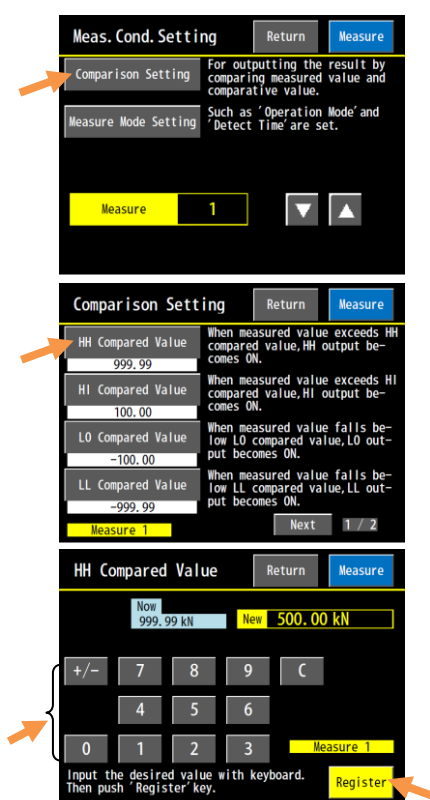
-99999 to 99999 (count)

<Operations from the setting window>

- 1) Set the No. of the Measuring Condition on the “**Meas. Cond. Setting**” window.
- 2) Press the **Comparison Setting** key on the “**Meas. Cond. Setting**” window.

- 3) Press any of the **HH Compared Value**, **HI Compared Value**, **LO Compared Value**, **LL Compared Value** key on the “**Comparison Setting (1/2)**” window.

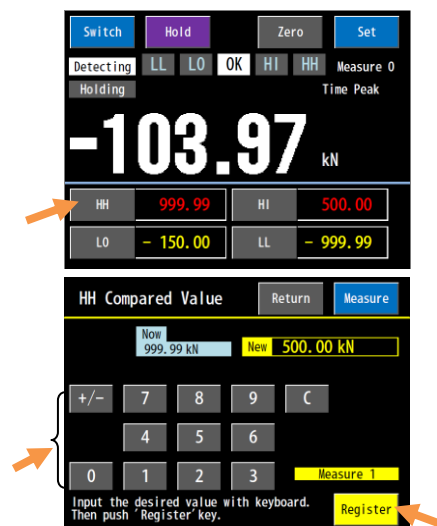
- 4) Input a setting value with the numeric keyboard and press the **Register** key to register the setting value.



<Direct operations from the “Measuring” window>

- 1) Press any of the **HH** **HI** **LO** **LL** key on the “Measuring” window.

- 2) The window changes to the setting window of the target compared values.
Input a setting value with the numeric keyboard and press the **Register** key for registering.



<Classifications of comparators for the [Block Peak-Bottom] and [Time Peak-Bottom]>

For the [Block Peak-Bottom] and [Time Peak-Bottom], control outputs and setting values of every comparator are classified as follows.

Classification	Control Output	Keys and setting values
Upper limit of the peak value	HH comparator	HI1 Compared Value
Lower limit of the peak value	LL comparator	LO1 Compared Value
Upper limit of the bottom value	HI comparator	HI2 Compared Value
Lower limit of the bottom value	LO comparator	LO2 Compared Value

NOTE

Classifications for the control outputs, keys, and setting values are fixed.

(2) Hysteresis Width

Common to all comparators. Sets a width between the comparator's ON and OFF.

<Setting Range>

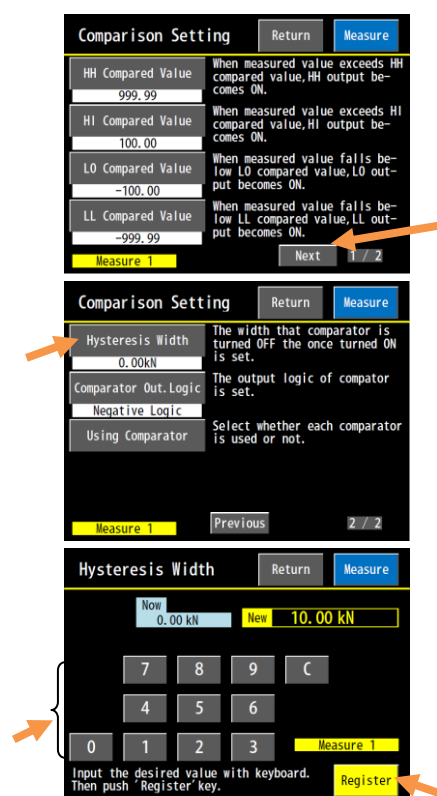
0 to 9999 (count)

<How to operate>

- 1) Press the **Next** key on the “Comparison Setting (1/2)” window.

- 2) Press the **Hysteresis Width** key on the “Comparison Setting (2/2)” window.

- 3) Input a setting value with the numeric keyboard and press the **Register** key for registering.



(3) Comparator Out. Logic

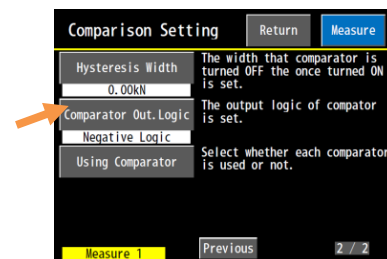
Common to all comparators. Sets the output logic (open collector logic) of comparators.

<Setting Range>

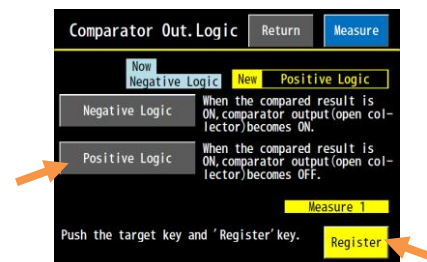
- Negative Logic Comparator output is ON when the comparison result is ON. (Active low)
 Positive Logic Comparator output is OFF when the comparison result is OFF. (Active high)

<How to operate>

- 1) Press the **Comparator Out.Logic** key on the “**Comparison Setting (2/2)**” window.



- 2) Input a setting value with the numeric keyboard and press the **Register** key for registration.



(4) Using Comparator

Select whether or not to use comparators.

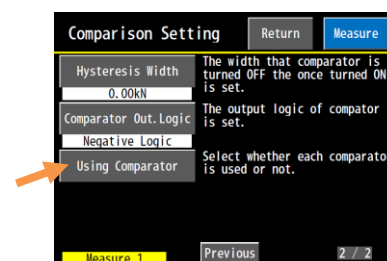
If the **Not use** key is selected, the target comparator key on the “**Measuring**” window is displayed in gray.

<Setting Range>

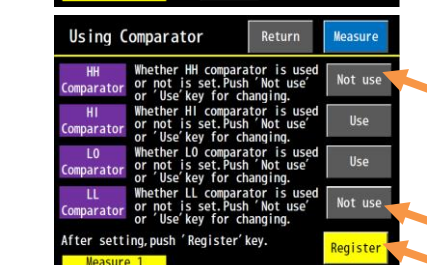
- Use Compares with the measured value with the selected comparator.
 Not Use Does not compare with the measured value and does not use the selected comparator.

<How to operate>

- 1) Press the **Using Comparator** key on the “**Comparison Setting (2/2)**” window.



- 2) **Use** or **Not use** key changes by pressing the right key of the target comparator.
 Press the **Register** key for registering.



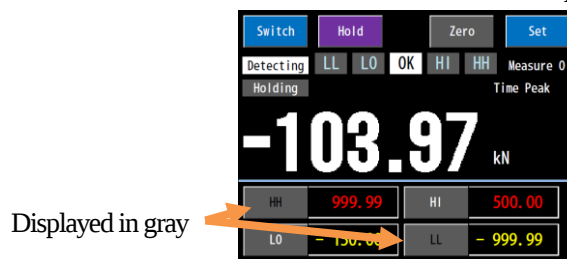
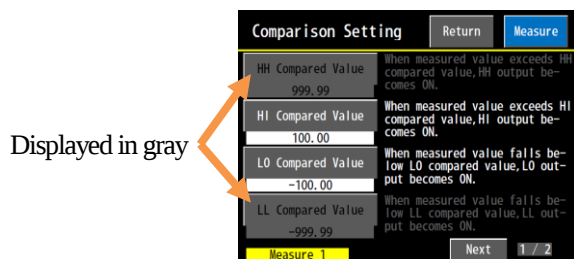
NOTE

The comparator with selecting “**Not use**” in the “**Using Comparator**” window, compared value keys on the “**Comparison Setting**” and “**Measuring**” windows are invalid.

For example, when selecting the HH and LL comparators to Unused, the **HH Compared Value** and **LL Compared Value** keys on the “**Comparison Setting**” window are invalid, the target keys, the current setting values, and the descriptions are displayed in gray.

On the “**Measuring**” window, the **HH** and **LL** keys, **HH** and **LL** lamps are in valid and **HH** and **LL** keys are displayed in gray.





(5) Relation between the comparator outputs and hysteresis width and behaviors of comparator status lamps.

HH comparator (or HI1 comparator)

When the measured value exceeds the HH compared value, the HH comparator output is turned ON and **[HH]** lamp lights up in red. When the measured value lowers the (HH compared value - hysteresis width), the HH comparator output is turned OFF and **[HH]** lamp lights up in gray.

HI comparator (or LO1 comparator)

When the measured value exceeds the HI compared value, the HI comparator output is turned ON and **[HI]** lamp lights up in red. When the measured value lowers the (HI compared value - hysteresis width), the HI comparator output is turned OFF and **[HI]** lamp lights up in gray.

LO comparator (or HI2 comparator)

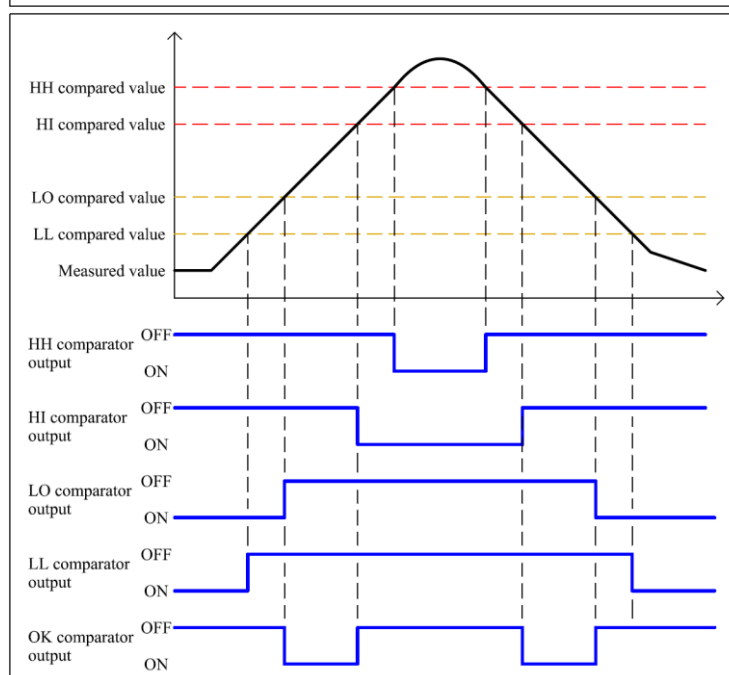
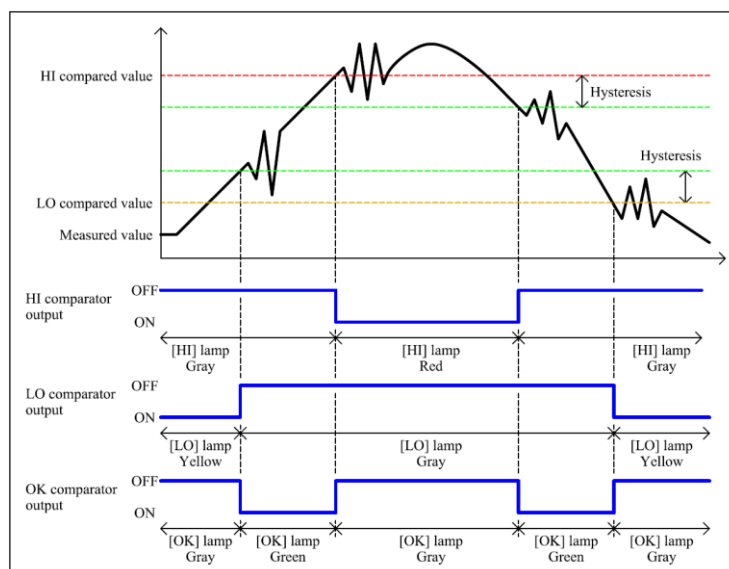
When the measured value lowers the LO compared value, the LO comparator output is turned ON and **[LO]** lamp lights up in yellow. When the measured value exceeds the (LO compared value + hysteresis width), the LO comparator output is turned OFF and **[LO]** lamp lights up in gray.

LL comparator (or LO2 comparator)

When the measured value lowers the LL compared value, the LL comparator output is turned ON and **[LL]** lamp lights up in red. When the measured value exceeds the (LL compared value + hysteresis width), the LL comparator output is turned OFF and **[LL]** lamp lights up in gray.

OK comparator

The OK comparator output is turned ON and **[OK]** lamp lights up in white when all **[HH]**, **[HI]**, **[LO]**, and **[LL]** outputs are OFF (the measured value is between the LO compared value and HI compared value).



6-3-3. Measure Mode Setting

Capable of setting various operating modes of the measurement. In addition, capable of setting the display mode and comparison mode.

The measurement is controlled by the key and control inputs operations.

In addition, operation statuses can be checked with the comparator status lamps on the “**Measuring**” window as follows.

Detecting Block (Detecting the peak value etc.)

 key: Blinks in white.

[Detecting] lamp: Lights up in white **[Hold]** lamp: Gray

Holding Block (Holding the displaying value.)

 key: Blinks in white.

[Detecting] lamp: Gray **[Hold]** lamp: Lights up in white.

(1) Operation Mode

Select the target operation mode from the following 12 types.

For [Peak Hold], [Block-specified Peak], [Time-specified Peak], [Bottom Hold], [Block-specified Bottom], and [Time-specified Bottom], the peak value (maximum value) or bottom value (minimum value) is kept with the both analog hold circuit and digital hold or with the digital hold only. (For switching the operation mode, refer to (7) Detecting method in "6-5-2 System."

For the [Block Peak-Bottom] and [Time Peak-Bottom], both peak and bottom values are kept with the digital hold only.

(Switching the operation mode is not available.) For details, refer to "6-3-4" and after.

<Setting Range>

Normal	Normal measurement that measures and displays all the time.
Peak Hold	When the HOLD command is turned ON and after the lapse of delay time, the peak value is detected and indicated until the HOLD command is turned OFF. The detection of the peak value and hold display are released when the hold command is turned OFF or reset command is turned ON.
Block(-specified) peak (hold)	When the HOLD command is turned ON and after the lapse of delay time, the peak value is detected until the command is turned OFF. Setting the detecting block is known as block-specified operation. If the HOLD command is turned OFF, the indicated value is kept hold. When the RESET command is turned ON, the kept peak value is canceled.
Time(-specified) peak (hold)	When the HOLD command is turned ON and after the lapse of delay time, the peak value is detected for the preset specified time. Setting the detecting time is known as time-specified operation. After the lapse of preset detecting time, the indicated peak value is kept hold. When the RESET command is turned ON, the kept peak value is canceled.
Bottom hold	When the HOLD command is turned ON and after the lapse of delay time, the bottom value is detected and indicated until the HOLD command is turned OFF. The detection of the bottom value and hold display are released when the HOLD command is turned OFF or RESET command is turned ON.
Block(-specified) bottom (hold)	Indicates the bottom value by block-specified operation. When the HOLD command is turned OFF, the indicated bottom value is kept hold. When the RESET command is turned ON, the kept bottom value is canceled.
Time(-specified) bottom (hold)	Indicates the bottom value by time-specified operation. After the lapse of preset detecting time, the indicated bottom value is kept hold. When the RESET command is turned ON, the indicated bottom value is canceled.
Arbitrary point hold	When the HOLD command is turned ON and after the lapse of delay time, the measured value at that moment (arbitrary point) is kept hold until the HOLD command is turned OFF.
Block (-specified) peak (&) bottom (hold)	Indicates the both bottom and peak values by the block-specified operation. When the HOLD command is turned OFF, the indicated peak and bottom values are kept hold. When the RESET command is turned ON, the kept hold values are canceled.
Time (-specified) peak (&) bottom (hold)	Indicates the both bottom and peak values by the time-specified operation. After the lapse of preset detecting time, the indicated peak and bottom values are kept hold. When the RESET command is turned ON, the indicated hold values are canceled.



Block (-specified) average (measurement)	Indicates the average value of measured values by the block-specified operation. When the HOLD command is turned OFF, the indicated average value is kept hold. When the RESET command is turned ON, the indicated average value is canceled.
Time(-specified) average (measurement)	Indicates the average value of measured values by the time-specified operation. When the HOLD command is turned OFF, the indicated average value is kept hold. When the RESET command is turned ON, the indicated average value is canceled.

<How to operate>

- 1) Press the **Set** key on the “Measuring” window.
- 2) Press the **Meas. Cond. Setting** key on the “Setting” window.
- 3) Press the **Measure Mode Setting** key on the “Meas. Cond. Setting” window.
- 4) Press the **Operation Mode** key on the “Measure Mode Setting (1/2)” window.

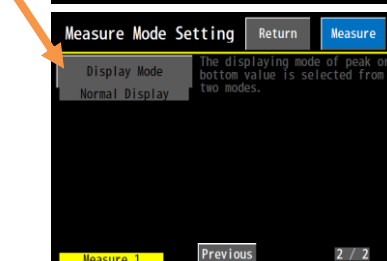
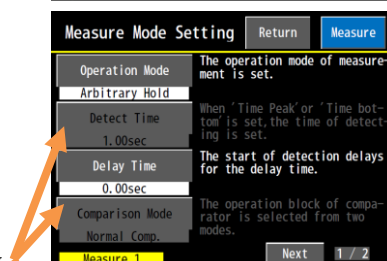
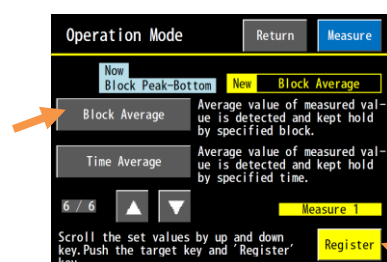
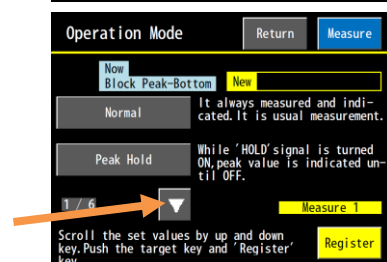
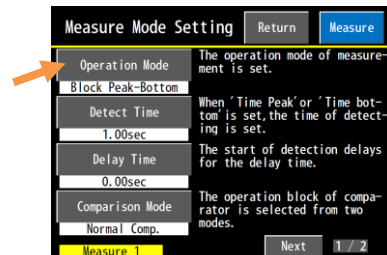
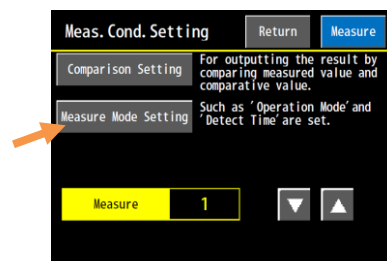
- 5) Press the **▲ ▼** key to display the target mode.
Press the target key and **Register** key for registering.



- 6) If the **Return** key is pressed on the above “Operation Mode” window and gets back to the “Measure Mode Setting” window, some non-target functions are displayed in gray according to the selected mode.
Suppose the “Arbitrary Hold” is selected in the right figure.
The **Detect Time** **Comparison Mode** **Display Mode** keys, the current setting value, and the descriptions are displayed in gray.

NOTE

Some keys become invalid and the setting values and descriptions are displayed in gray according to the type of the “Operation Mode”.



(2) Detect Time

Sets a time of the detecting block. For the “Time-specified Peak”, “Time-specified Bottom”, “Time Peak-Bottom”, and “Time Averaging” in the “Operation Mode” window only.

For other operation modes, setting of the “Detect time” is invalid.

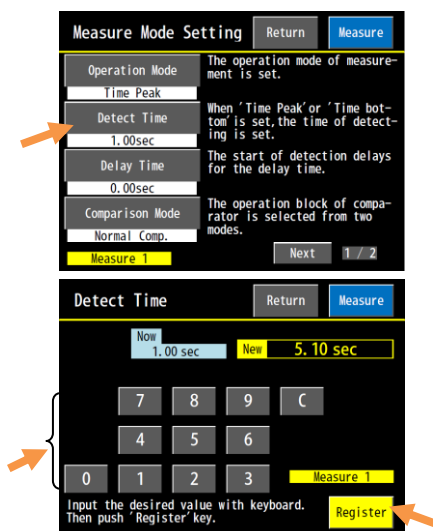
<Setting Range>

0.00 to 9.99 (sec)

<How to operate>

1) Press the **Detect Time** key on the “**Measure Mode Setting (1/2)**” window.

2) Input a setting value with the numeric keyboard and press the **Register** key for registering.

**(3) Delay Time**

Delays the start of the detecting block for the delay time.

For setting modes (excluding “Normal” mode) in the “**Operation Mode**” window only.

For the “Normal” mode, setting of the “Delay Time” is invalid.

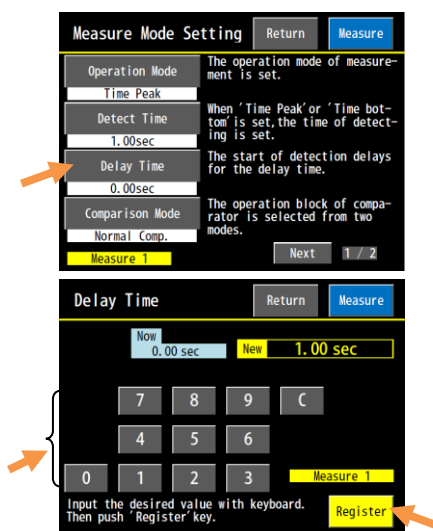
<Setting Range>

0.00 to 9.99 (sec)

<How to operate>

1) Press the **Delay Time** key on the “**Measure Mode Setting**” window.

2) Input a setting value with the numeric keyboard and press the **Register** key for registering.



(4) Comparison Mode

Selects the operation block of the comparators from the two modes.

Sets the target Comparison Mode. For the “Block-specified Peak”, “Block-specified Bottom”, “Time-specified Peak”, “Time-specified Bottom”, “Block Averaging” and “Time Averaging” in the “Operation Mode” window only.

For other operation modes, “Comparison Mode” setting is invalid.

<Setting Range>

Normal Comp. Always compares the measured value and compared value during detecting and holding block.

[Example]

The comparator output turns ON when the measured value exceeds the HI compared value, turns OFF when the measured value lowers the compared value.

Hold Comp. Compares the measured value and compared value during holding block.

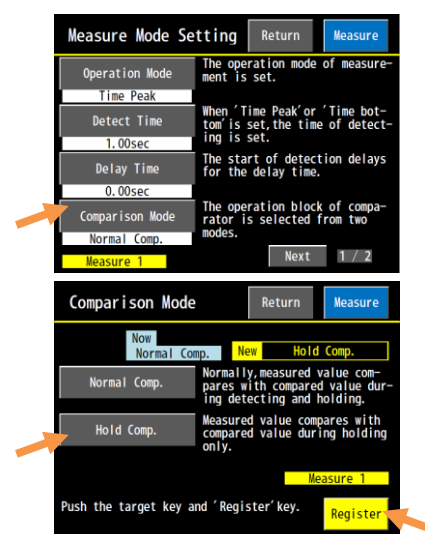
[Example]

Even if the measured value exceeds the HI compared value during detecting block, the comparator output does not turn ON at the time. The comparator output is turned ON when the display value is exceeding the HI compared value and the WGA-900A is in holding block. After resetting, the comparator output is turned OFF.

<How to operate>

1) Press the **Comparison Mode** key on the “**Measure Mode Setting (1/2)**” window.

2) Select and press the target key and press the **Register** key to register the setting value.



(5) Display Mode

Selects the display operation of the peak (bottom) value from the two modes.

Sets the target Display Mode. For the "Block-specified Peak", "Block-specified Bottom", "Time-specified Peak", "Time-specified Bottom", "Block Averaging" and "Time Averaging" in the "Operation Mode" window only.

For other operation modes, "Display Mode" setting is invalid.

<Setting Range>

Normal Disp. The peak (bottom) value is always updated and displayed in response to changes of the input in the detecting block. The peak (bottom) value is held and displayed in the holding block.

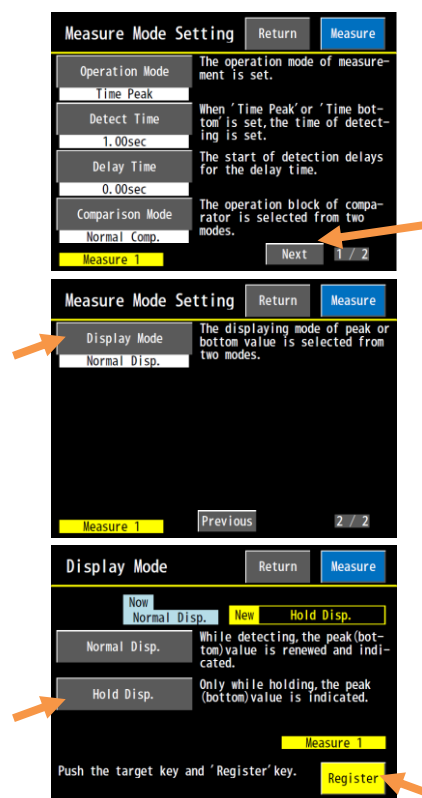
Hold Disp. The measured value immediately after turning ON the holding command is held and displayed in the delay time and detecting block. The peak (bottom) value in the detecting block is displayed when entering the holding block.

<How to operate>

1) Press the **Next** key on the "Measure Mode Setting (1/2)" window.

2) Press the **Display Mode** key on the "Measure Mode Setting (2/2)" window.

3) Select and press the target key and press the **Register** key to register the setting value.



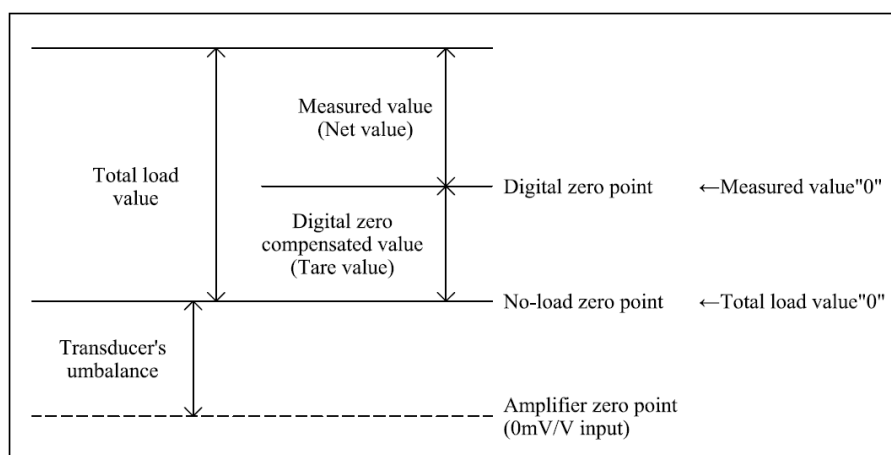
6-3-4. Descriptions of the operation mode

6-3-4-1. Normal

Normal measurement that always measures and displays value.

No control signal for the detection.

“Detect Time”, “Delay Time”, “Comparison Mode”, “Display Mode” cannot be set.

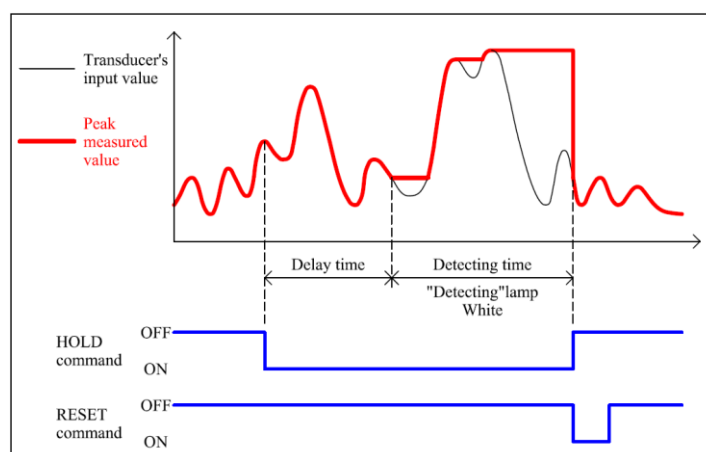


6-3-4-2. Peak Hold

Capable of setting the “Delay time.” However, the “Detect Time”, “Comparison Mode”, and “Display Mode” cannot be set.

(A) Behavior with control input signal

When the HOLD command is turned ON and after the lapse of delay time, the peak value is detected and indicated until the HOLD command is turned OFF. The detection of the peak value and hold display are released when the hold command is turned OFF or reset command is turned ON.

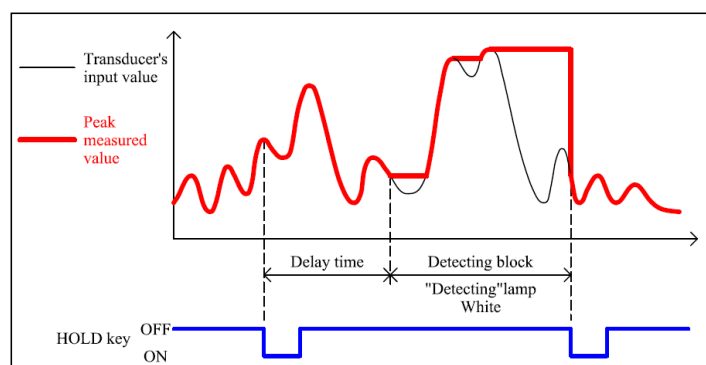


MEMO

- Short circuit the terminals between the Control I/O connector No. 35 or 36 (Input COM) and No. 20 (Hold Command). The hold command is turned ON and the WGA-900A operates with the preset measuring mode.
- Short circuit the terminals between the Control I/O connector No. 35 or 36 (Input COM) and No. 21 (Reset). The reset command is turned ON and the detection and holding are released.

(B) Behavior with key operation

When the **Hold** key is pressed the first time and after the lapse of the delay time, the detecting block starts and displays the peak value until the key is pressed for the second time. Press the **Hold** key for the second time to end the detecting block (reset).



6-3-4-3. Block-specified peak and block-specified bottom

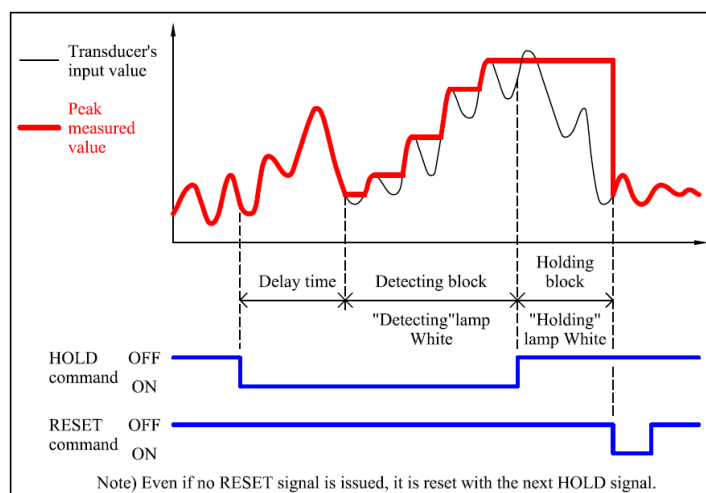
Capable of setting the “Delay time”, “Comparison Mode”, and “Display Mode.” However, the “Detect Time” cannot be set.

(1) Normal Display Mode

(A) Behavior with control input signal

When the HOLD command is turned ON and after the lapse of delay time, the peak (bottom) value is detected until the command is turned OFF. When the HOLD command is turned OFF, the indicated value is kept hold.

When the RESET command is turned ON, the hold mode is canceled.

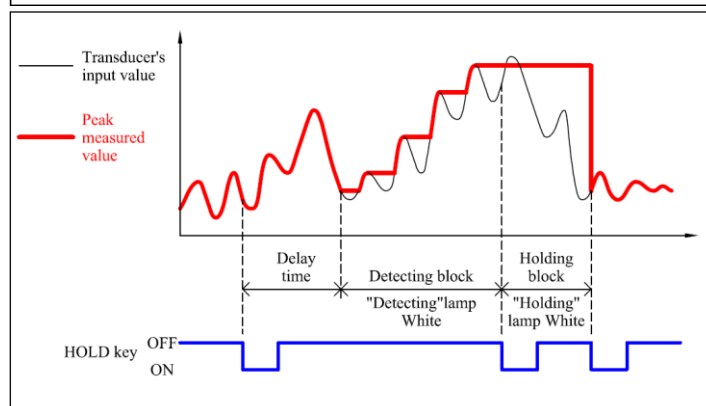


(B) Behavior with key operation

When the **Hold** key is pressed the first time and after the lapse of the delay time, the peak (bottom) value is detected and displayed.

Press the **Hold** key for the second time to hold the display value.

Press the **Hold** key for the third time to cancel the holding value.



(2) Hold Display Mode

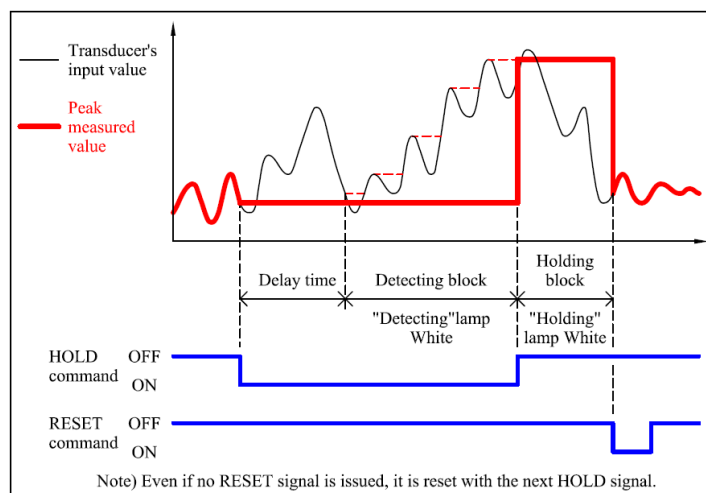
(A) Behavior with control input signal

When the HOLD command is turned ON and after the lapse of delay time, the peak (bottom) value is detected.

The measured value immediately after turning ON the HOLD command is kept hold during the detecting block.

When the HOLD command is turned OFF, the peak (bottom) value during the detecting block is kept hold.

When the RESET command is turned ON, the kept peak (bottom) value is canceled.



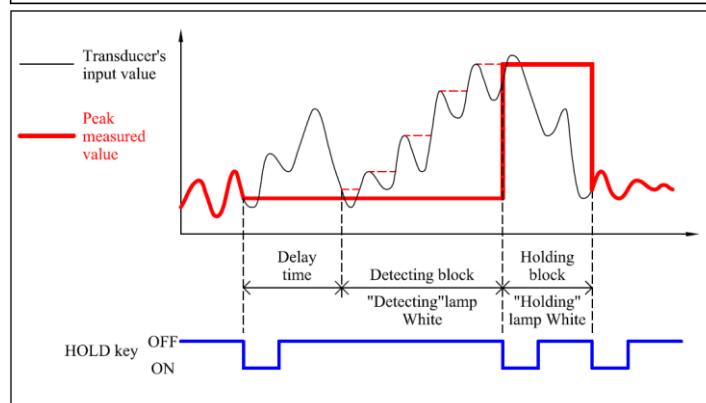
(B) Behavior with key operation

Press the **Hold** key the first time to hold the display value at the time.

Though you cannot see, the WGA-900A is detecting the peak (bottom) value after the lapse of the delay time.

Press the **Hold** key for the second time to display the peak (bottom) value until that moment.

Press the **Hold** key for the third time to cancel the holding value.



6-3-4-4. Time-specified peak and time-specified bottom

Capable of setting the “Detect Time”, “Delay time”, “Comparison Mode”, and “Display Mode.”

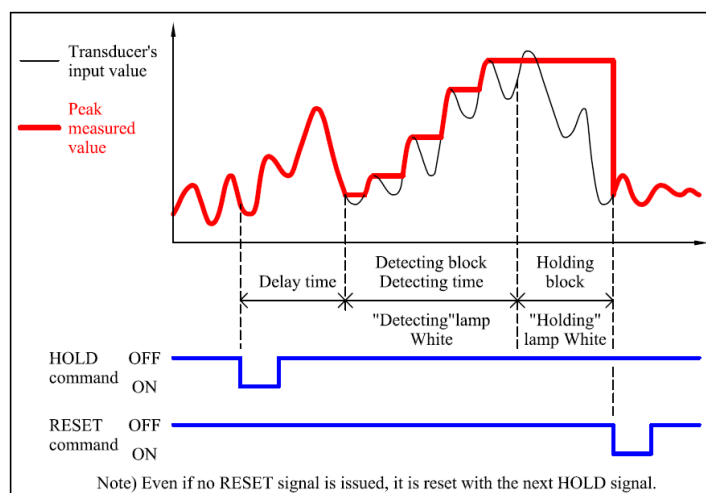
(1) Normal Display Mode

(A) Behavior with control input signal

When the HOLD command is turned ON and after the lapse of delay time, the peak (bottom) value is detected and indicated for the preset detection time.

After the lapse of preset detecting time, the indicated peak (bottom) value is kept hold.

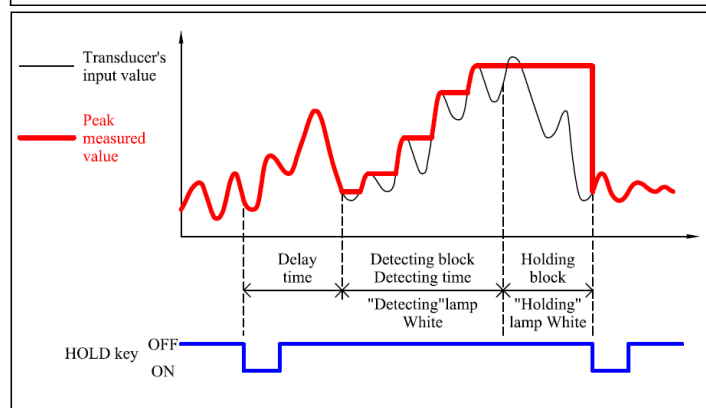
When the RESET command is turned ON, the kept hold peak (bottom) value is canceled.



(B) Behavior with key operation

Press the **Hold** key for the first time. After the lapse of delay time, the peak value (bottom value) is detected for the period of the detecting block (detecting time) and the value is kept hold.

Press the **Hold** key for the second time to cancel the holding value.



(2) Hold Display Mode

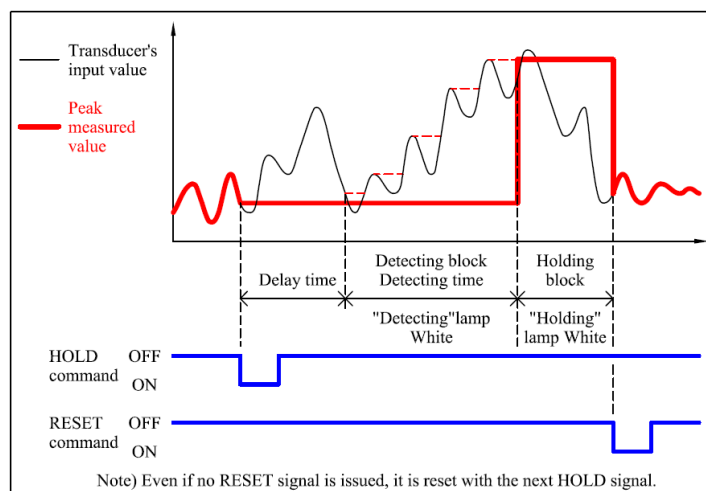
(A) Behavior with control input signal

When the HOLD command is turned ON and after the lapse of delay time, the peak (bottom) value is detected.

The measured value immediately after turning ON the HOLD command is kept hold during the detecting block.

After the lapse of preset detecting time, the peak (bottom) value during the detecting block is kept hold.

When the RESET command is turned ON, the kept hold display peak (bottom) value is canceled.



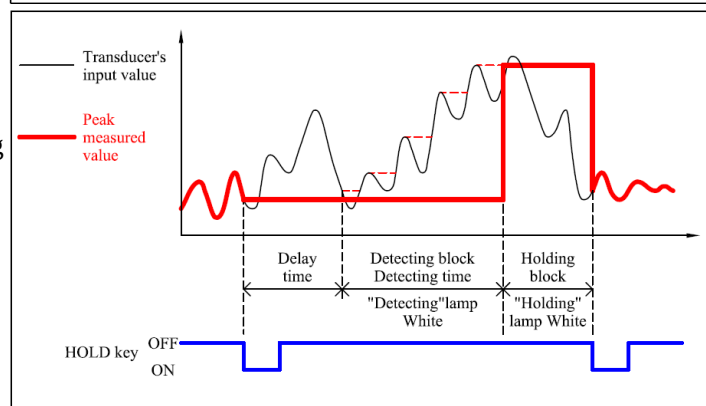
(B) Behavior with key operation

Press the **Hold** key for the first time to hold the display value at the time.

Though you cannot see, the WGA-900A is detecting the peak (bottom) value after the lapse of the delay time.

After the lapse of the detecting block (detecting time), the peak value (bottom value) before then appears.

Press the **Hold** key for the second time to cancel the holding value.



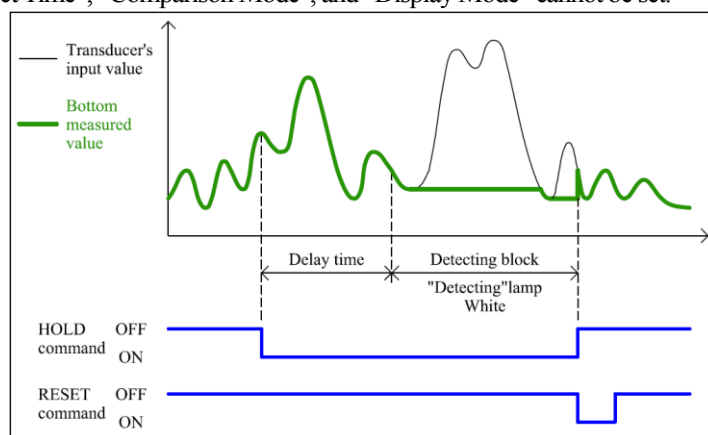
6-3-4-5. Bottom Hold

Capable of setting the "Delay Time." However, the "Detect Time", "Comparison Mode", and "Display Mode" cannot be set.

(A) Behavior with control input signal

When the HOLD command is turned ON and after the lapse of delay time, the bottom value is detected and indicated until the HOLD command is turned OFF.

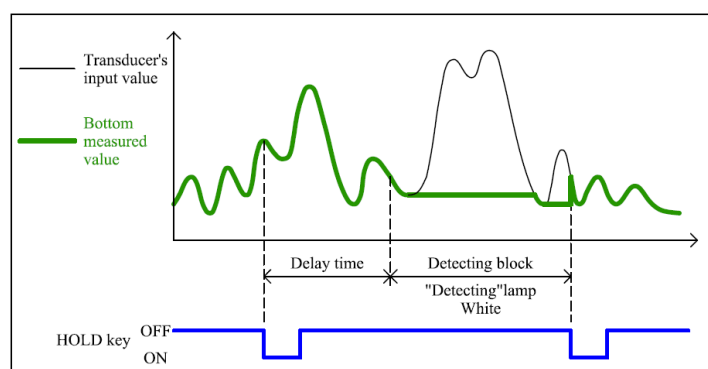
The detection of the bottom value and hold display are released when the HOLD command is turned OFF or RESET command is turned ON.



(B) Behavior with key operation

When the **Hold** key is pressed and after the lapse of delay time, the detecting block is started and the bottom value is displayed until the HOLD key is pressed for the second time.

Press the **Hold** key for the second time and the detecting block ends.



6-3-4-6. Arbitrary Point Hold

Capable of setting the "Delay Time." However, the "Detect Time", "Comparison Mode", and "Display Mode" cannot be set.

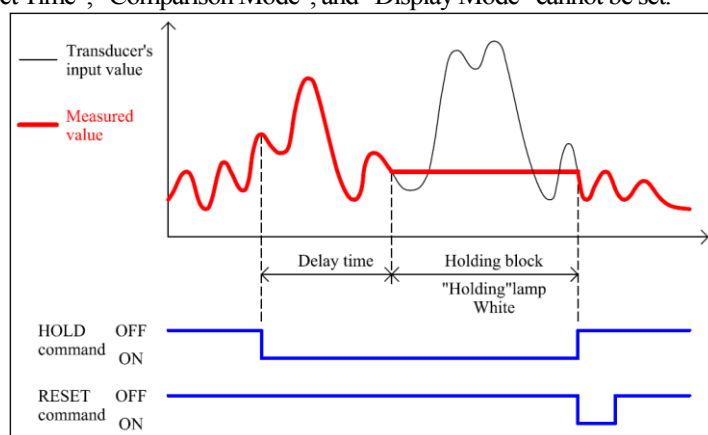
(A) Behavior with control input signal

Holds the measured value of the arbitrary point.

The detecting point is the time when the HOLD command is turned ON and after the lapse of delay time.

The measured value is kept hold until the command is turned OFF.

The kept hold measured value is cancelled when the HOLD command is turned OFF or RESET command is turned ON.

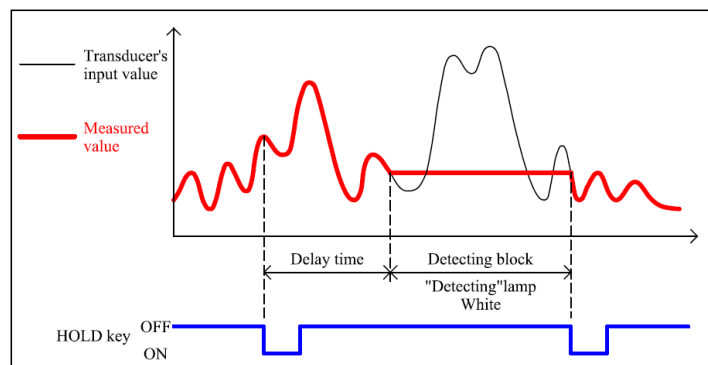


(B) Behavior with key operation

When the **Hold** key is pressed and after the lapse of delay time, the holding block is started and the displayed value at the end of the delay time is kept hold.

Press the **Hold** key for the second time and the detecting block ends.

(It means cancelling the holding value.)



6-3-4-7. Block Peak-Bottom and Time Peak-Bottom

1) Block Peak-Bottom/Normal display mode

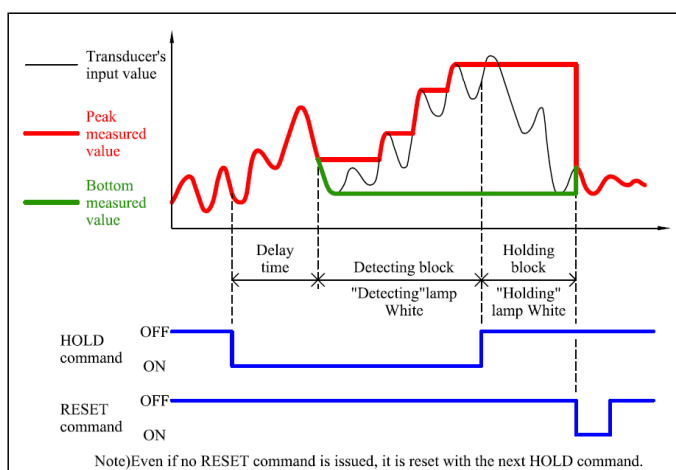
“Detect Time”, “Delay Time”, “Comparison Mode”, “Display Mode” can be set. However, the “Detect Time” cannot be set.

(A) Behavior with control input signal

When the HOLD command is turned ON and after the lapse of delay time, the peak value and bottom value are detected and indicated until the HOLD command is turned OFF.

When the hold command is turned OFF, the peak value and bottom value are kept hold.

When the RESET command is turned ON, the hold mode is canceled.

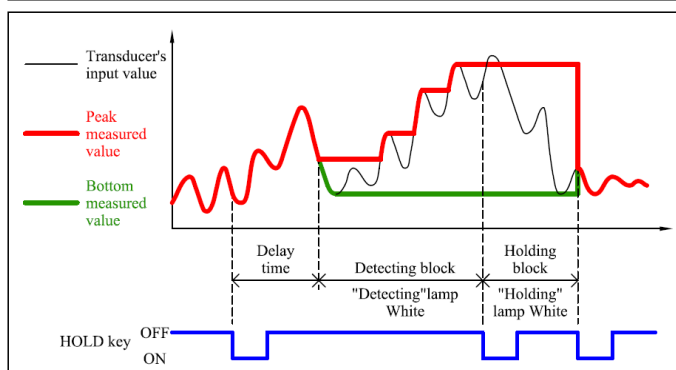


(B) Behavior with key operation

When the **Hold** key is pressed for the first time and after the lapse of the delay time, the peak value and bottom value are detected and displayed.

Press the **Hold** key for the second time to hold the displayed value.

Press the **Hold** key for the third time to cancel the holding value.



(2) Time Peak-Bottom/Hold display mode

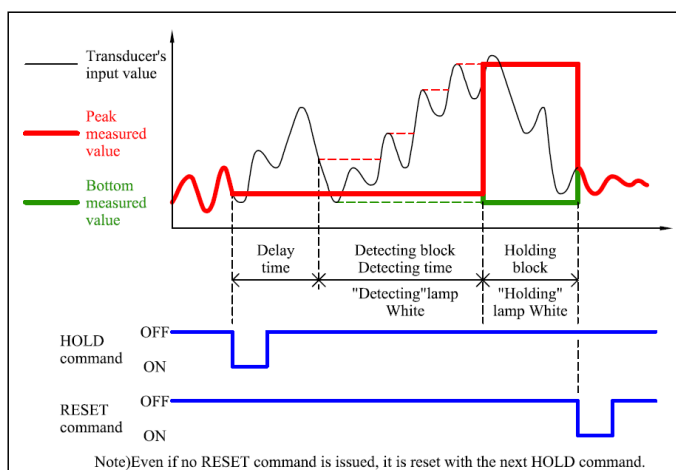
“Detect Time”, “Delay Time”, “Comparison Mode”, and “Display Mode” can be set.

(A) Behavior with control input signal

When the HOLD command is turned ON and after the lapse of delay time, the peak value and bottom value are detected. However, during the delay time and detecting block, the measured value that is detected immediately after turning ON the Hold command is displayed.

After the lapse of preset detecting time, the indicated peak value and bottom value are kept hold.

When the RESET command is turned ON, the hold mode is canceled.



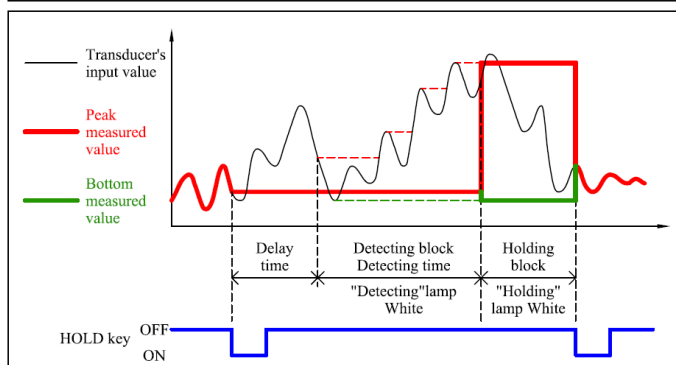
(B) Behavior with key operation

Press the **Hold** key for the first time to hold the display value at the time.

Though you cannot see, the WGA-900A is detecting the peak and bottom values after the lapse of the delay time.

Press the **Hold** key for the second time to hold the peak value and bottom value.

Press the **Hold** key for the third time to cancel the holding value.



6-3-4-8. Block Averaging and Time Averaging

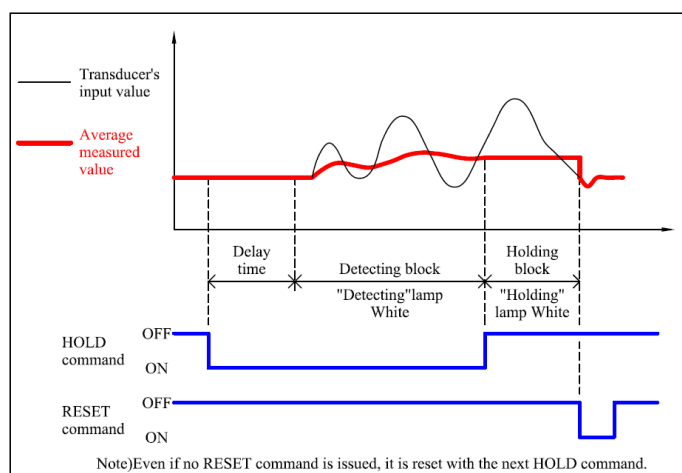
(1) Block averaging/Normal display mode

“Delay Time”, “Comparison Mode”, and “Display Mode” can be set. However, the “Detect Time” cannot be set.

(A) Behavior with control input signal

When the HOLD command is turned ON and after the lapse of delay time, the average value is detected and indicated until the Hold command is turned OFF. When the Hold command is turned OFF, the average value is kept hold.

When the RESET command is turned ON, the hold mode is canceled.



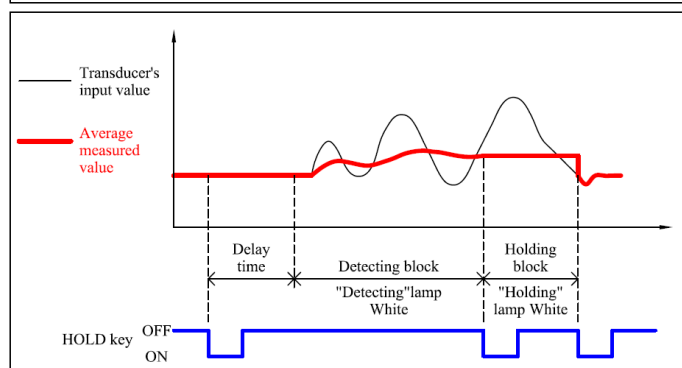
(B) Behavior with key operation

Press the **Hold** key for the first time to hold the display value at the time.

Though you cannot see, the WGA-900A is detecting the average value after the lapse of the delay time.

Press the **Hold** key for the second time to hold the average value.

Press the **Hold** key for the third time to cancel the holding value.

**NOTE**

If the Hold command is turned ON for 9.99 sec or longer, the measured average value will be reset (it is called the "Auto Reset").

After the "Auto Reset" is performed and if the Hold command is still turned ON, the WGA-900A will detect a new average value again.



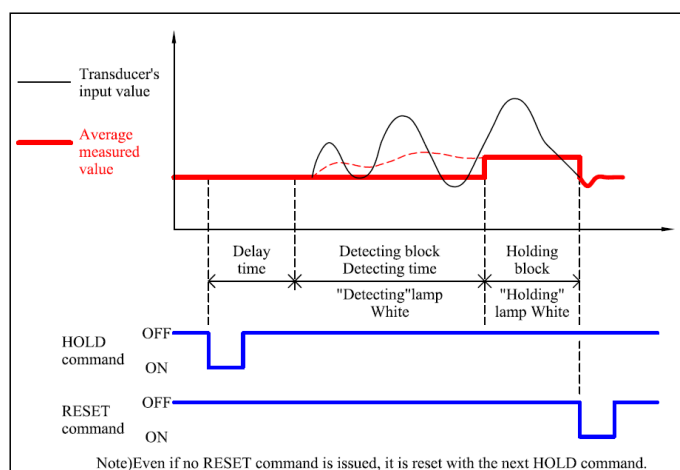
(2) Time averaging/Hold display mode

“Detect Time”, “Delay Time”, and “Comparison Mode” can be set.

(A) Behavior with control input signal

When the HOLD command is turned ON and after the lapse of delay time, the average value is detected. However, during the delay time and detecting block, the measured value that is detected immediately after turning ON the Hold command is displayed.

After the lapse of preset detecting time, the indicated average value during the detecting block is kept hold. When the RESET command is turned ON, the hold mode is canceled.



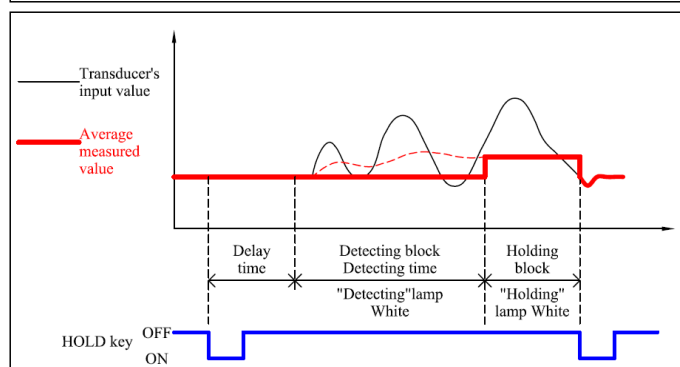
(B) Behavior with key operation

Press the **Hold** key for the first time to hold the display value at the time.

Though you cannot see, the WGA-900A is detecting the average value after the lapse of the delay time.

After the lapse of the detecting block (detecting time), the average value is kept hold.

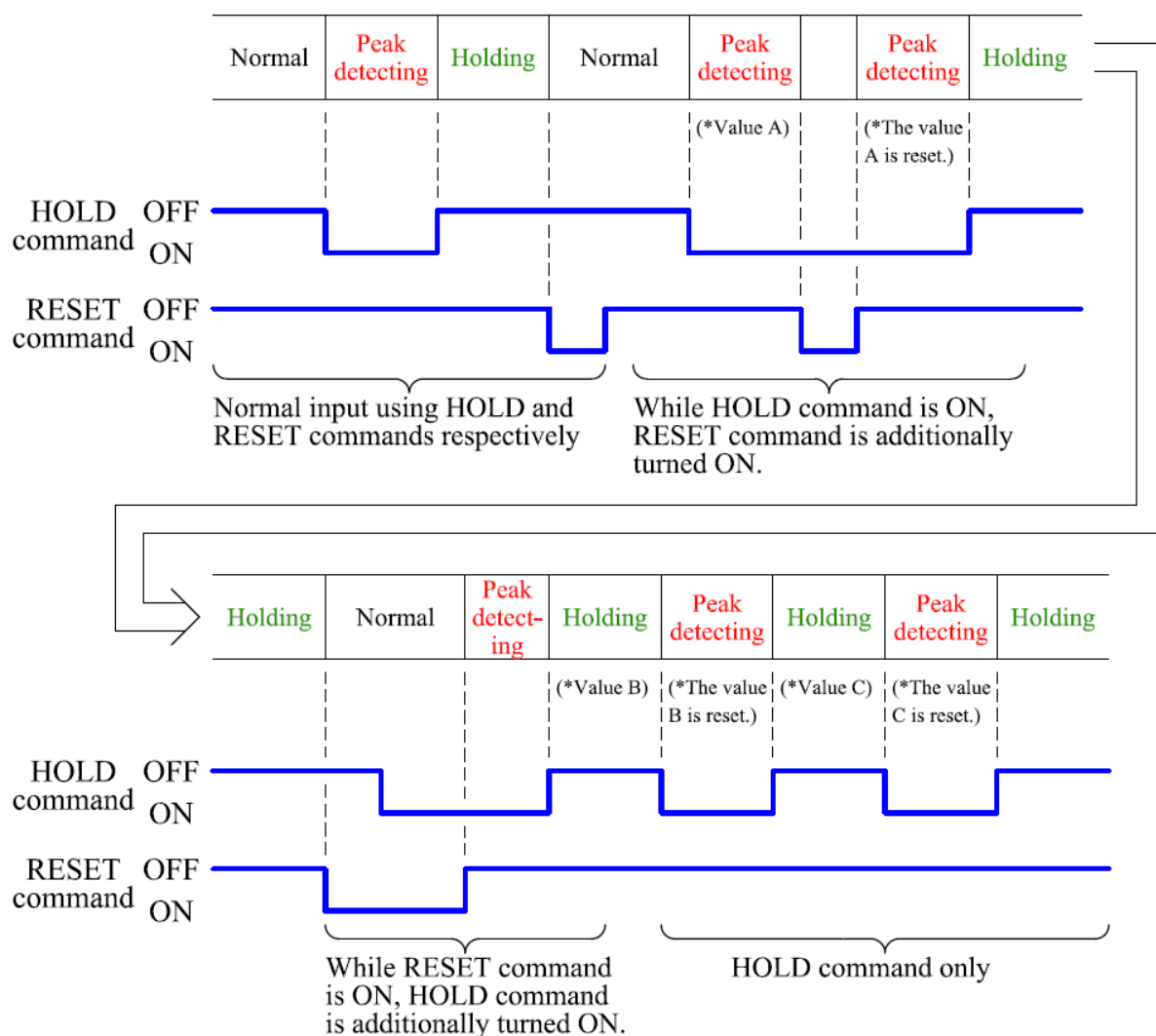
Press the **Hold** key for the second time to cancel the holding value.



6-3-5. How WGA-900A works with HOLD and RESET commands

The WGA-900A works as follow during detecting, holding, and normal blocks by turning ON/OFF the “HOLD command” and “RESET command.”

[Example] Block-specified peak

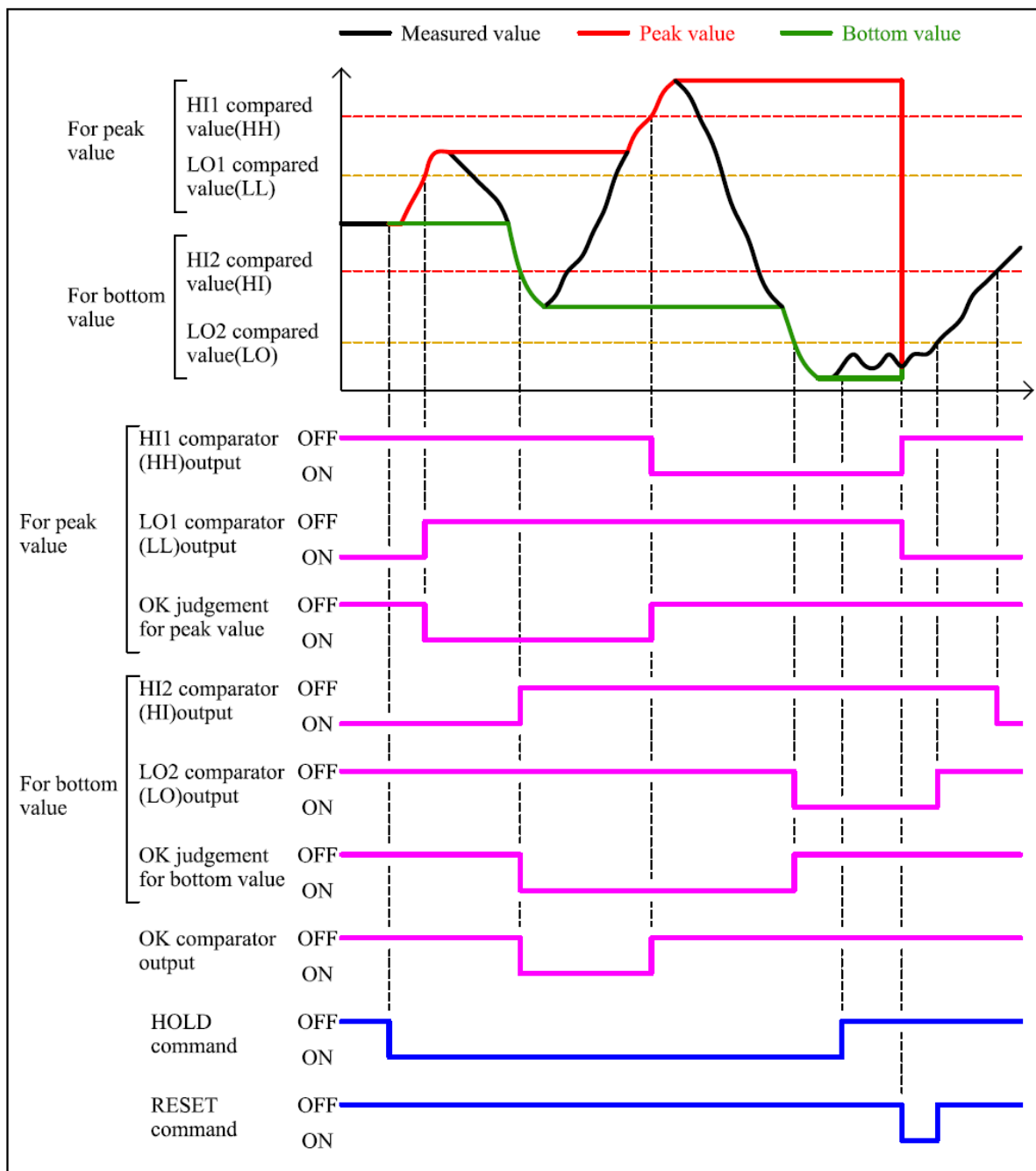


NOTE

* Version 1.13A or later can reset the holding value automatically by turning ON the HOLD command.



6-3-6 Relations Between Control Inputs, Comparator Outputs, and Operation Statuses for [Block Peak-Bottom] and [Time Peak-Bottom] (Example) [Block Peak-Bottom]



NOTE

For the [Block Peak-Bottom] and [Time Peak-Bottom]: When the measured value is within the **HI-1** and **LO-1** of the Peak Value or within the **HI-2** and **LO-2** of the Bottom Value, the **OK** lamp on the target window lights up in white.

When the both <OK> lamps on the dual windows light up in white, the OK comparator output is turned ON.



6-4. WAVE DISPLAY SETTING (SETTING WAVEFORM DISPLAY)

6-4-1. Setting X-axis

Sets the end point of the time axis (= X-axis of the waveform).

Displays the waveform from the start (press the **Start** key on the “Waveform” window) to the preset time of the X-axis end point as one window.

Press the **X-axis** key on the “Waveform” window. The “X-axis Setting” window appears directly.

<Setting Range>

End point: 0.5, 1.0, 2.0, 5.0, 10.0 (sec)

<How to operate>

1) Press the **Set** key on the “Measuring” window.

2) Press the **Wave Display Setting** key on the “Setting (1/2)” window.

3) Press the **X-axis** key on the “Wave Display Setting (1/2)” window.

4) Press the **▲** **▼** key to display the target value.

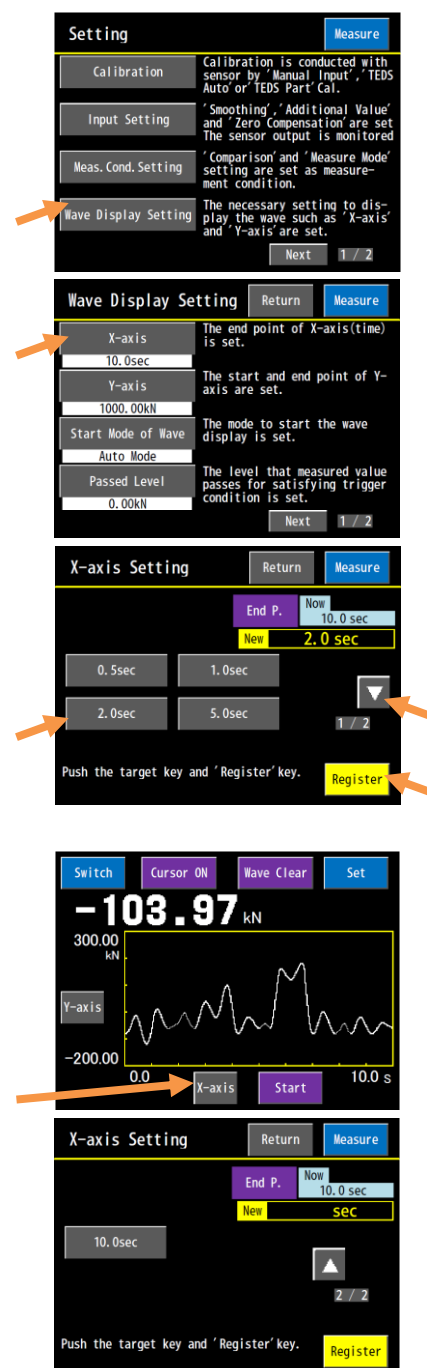
Press the target key and **Register** key for registering.

<How to operate the X-axis directly from the “Measuring” window>

1) Press the **X-axis** key on the “Waveform” window.

2) The “Y-axis Setting” window appears.

Conduct setting as the above.



NOTE

The **X-axis** key is displayed in gray and the X-axis setting cannot be changed when displaying the waveform.
For changing the X-axis setting, press the **Wave Clear** key and clear the waveform on the “Waveform” window.



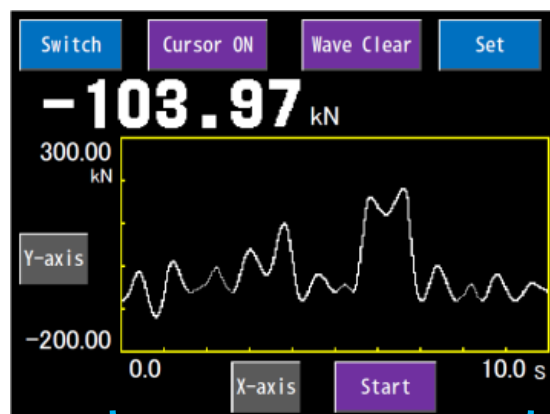
<The number of the waveform data in one window>

MEMO

The number of the waveform data in one window is 2001 data (including the data at the 0.0 sec.).

The averaging value data that is sampled during the interval in the following table is loaded as a waveform data when the X-axis is set other than "0.5 sec."

However, the peak/bottom value is loaded without thinning or averaging.



2001 data (Including the data at 0.0 sec.)

X-axis (sec)	Thinning Interval
0.5	250 μ s
1.0	500 μ s
2.0	1ms
5.0	2.5ms
10.0	5ms

→* Same with the sampling speed 4000 times/sec → 250 μ s

* However, the peak and bottom values are not thinned.

NOTE

The peak value or bottom value is detected with the digital process only when displaying the waveform during detecting the peak value or bottom value.

(The peak value or bottom value is not detected with the analog circuit.)



6-4-2. Setting Y-axis

Sets the start point and end point of the measured value (= Y-axis of the waveform).

Press the **Y-axis** key on the “**Waveform**” window. The “**Y-axis Setting**” window appears directly.

<Setting Range>

Start point: -99999 to 99999 (count, Decimal point and unit should be considered.)

End point: 250, 500, 1000, 2000, 5000, 10000, 20000, 50000, 100000, 200000
(count, Decimal point and unit should be considered.)

<Operations for the start point of the Y-axis>

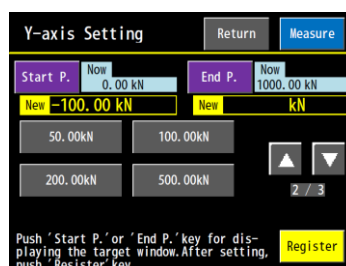
1) Press the **Y-axis** key on the “**Wave Display Setting (1/2)**” window.

2) After pressing the **Start P.** key, input a setting value with the numerical keyboard.

Press the **Register** key for the registration.

3) After pressing the **End P.** key, press the **▲▼** key to display the target value.

Press the target key and **Register** key for registration.

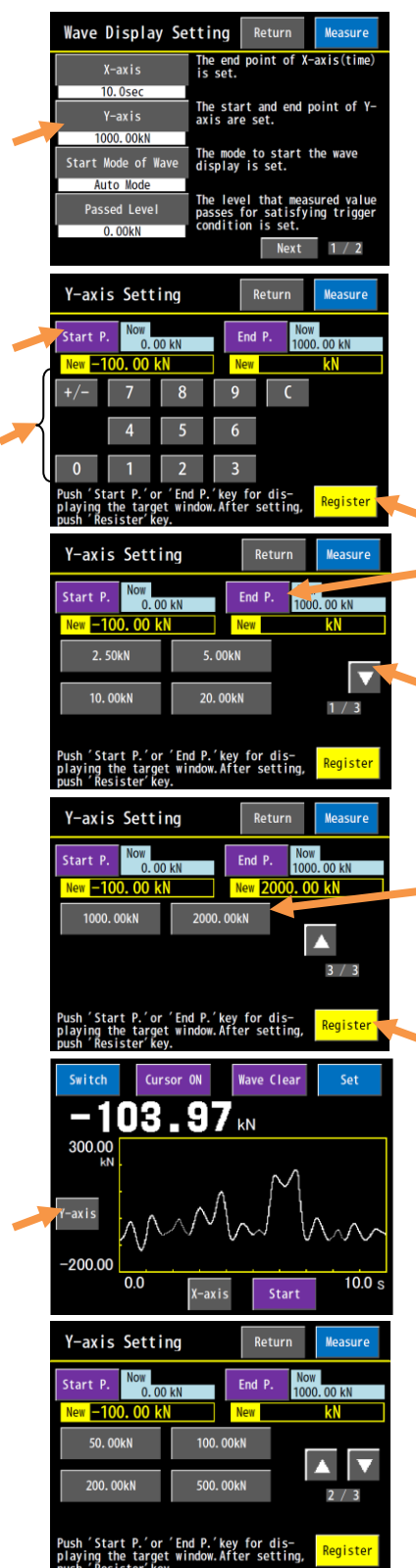


<How to operate the Y-axis directly from the “**Measuring**” window>

1) Press the **Y-axis** key on the “**Waveform**” window.

2) The “**Y-axis Setting**” window appears.

Conduct setting as the above.



6-4-3. Start Mode of Wave (Trigger Mode)

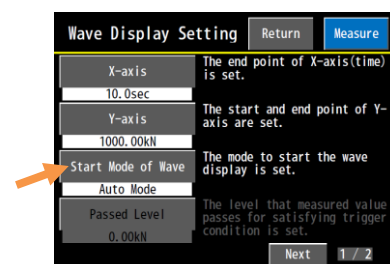
Sets a start mode (trigger mode) for displaying the waveform. Operations of modes are described as follows.

<Setting Range>

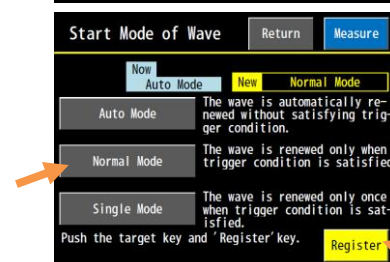
Auto Mode, Normal Mode, Single Mode

<How to operate>

1) Press the **Start Mode of Wave** key on the “Wave Display Setting (1/2)” window.



2) Press the target key and **Register** key for registration.



(1) Auto Mode

Starts displaying the waveform and automatically updates it even if the trigger conditions are not satisfied.

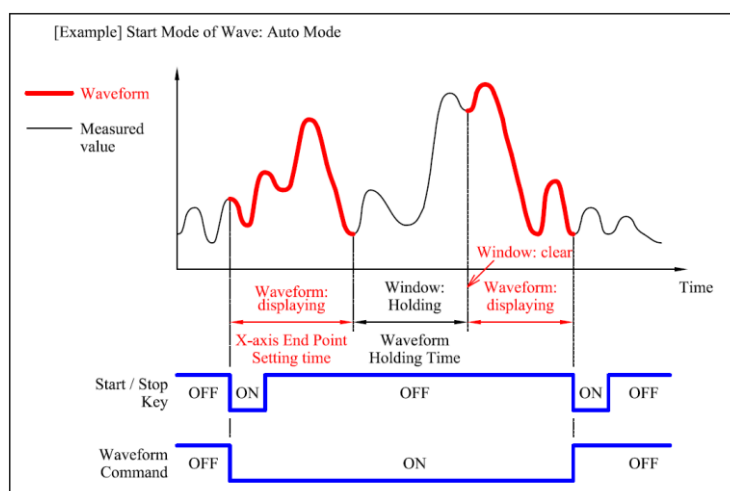
Press the **Start** key or turn ON the “Waveform Command” of the control input for starting the waveform display.

After displaying the waveform of one window to the end point of the X-axis, the waveform is held in the “Waveform Holding Time” and then the next waveform is displayed repeatedly.

Press the **Stop** key or turn OFF the “Waveform Command” for stop loading.

MEMO

Satisfying trigger condition means starts displaying the waveform when the measured value passed the preset level in the **Passed Level** and the measured value passed as presetting in the **Level Passed Way**.

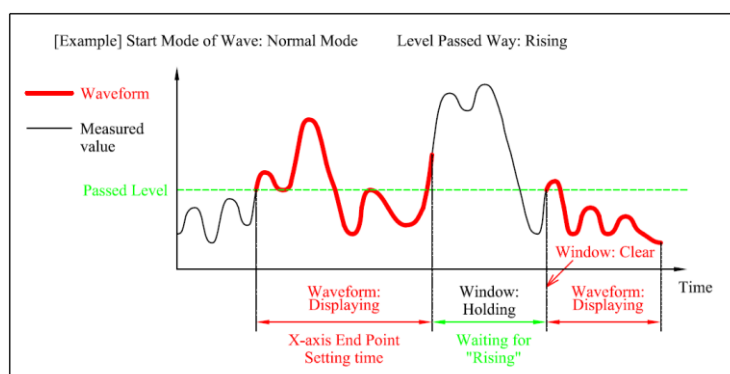


(2) Normal Mode

Press the **Start** key or turn ON the “Waveform Command.”

The WGA-900A becomes trigger condition waiting mode (see the above MEMO) and starts displaying the waveform only when the measured value satisfies the trigger condition.

After displaying the waveform of one window until the end point of the X-axis, the WGA-900A becomes trigger condition waiting mode and holds the waveform without updating it.



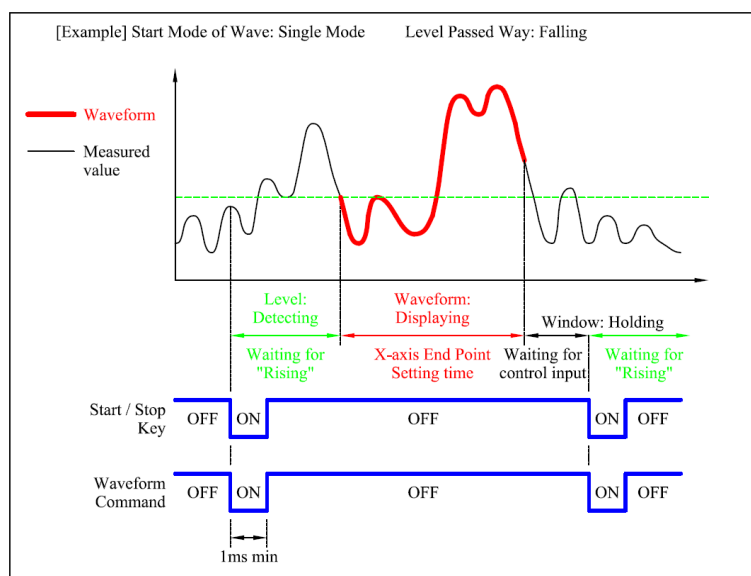
(3) Single Mode

Press the **Start** key or turn ON and OFF (MIN interval: 1 ms) the “Waveform Command” to set the WGA-900A in the trigger condition waiting mode.

After that, the WGA-900A starts displaying the waveform when the measured value satisfies the trigger condition.

After displaying the waveform to the end of the X- axis for one time, the WGA-900A stops loading the waveform and holds it.

Press the **Start** key again or turn ON and OFF the “Waveform Command” to set the WGA-900A in the trigger condition waiting mode.



6-4-4. Passed Level

Sets a passed level of the measured value as the trigger condition.

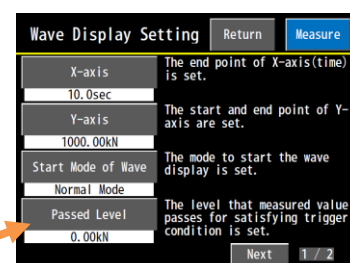
The **Passed Level** key is invalid and displayed in gray if the “**Auto Mode**” is selected.

<Setting Range>

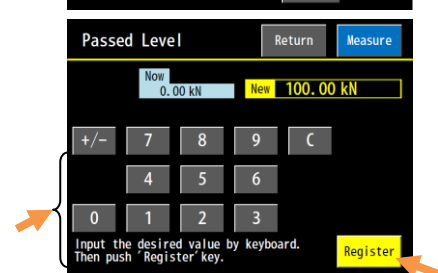
-99999 to 99999 (count)

<How to operate>

1) Press the **Passed Level** key on the “**Wave Display Setting (1/2)**” window.



2) Input a setting value with the numeric keyboard and press the **Register** key for registering.



6-4-5. Level Passed Way (Trigger Slope)

Sets the way that the measured value passes the “Passed Level” as a trigger condition.

- Rising: Passes from the lower level of the Passed Level to higher level.
- Falling: Passes from the higher level of the Passed Level to lower level.
- Both: Passes from the higher level of the Passed Level to lower level and from the lower level of the Passed Level to higher level.

The **Level Passed Way** key is invalid and displayed in gray when selecting the “Auto Mode.”

<Setting Range>

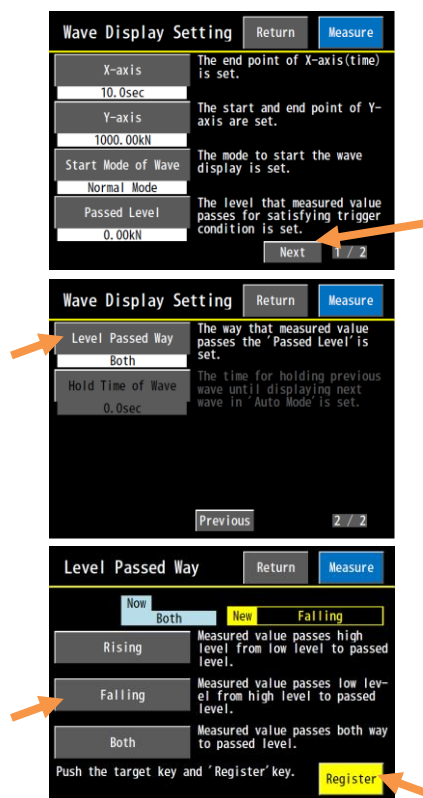
Rising, Falling, Both

<How to operate>

1) Press the **Next** key on the “Wave Display Setting (1/2)” window.

2) Press the **Level Passed Way** key on the “Wave Display Setting (2/2)” window.

3) Press the target key and **Register** key for registration.



6-4-6. Hold Time of Wave

Sets a time that holds the previous waveform (time for clearing the previous waveform to complete) from the end of one window to display the next waveform when selecting the “Auto Mode” in the “Start Mode of Wave” window.

The **Hold Time of Wave** key is invalid and displayed in gray when selecting the “Normal Mode” and “Single Mode.”

<Setting Range>

0.0~99.9(sec)

<How to operate>

1) Press the **Hold Time of Wave** key on the “Wave Display Setting (2/2)” window.

2) Input a setting value with the numeric keyboard and press the **Register** key for registration.



6-5. INITIAL SETTING

6-5-1. Meas. Select Signal (Measuring Condition Selecting Signal)

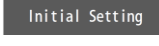
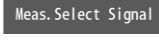
Sets a signal for selecting a measuring condition number.

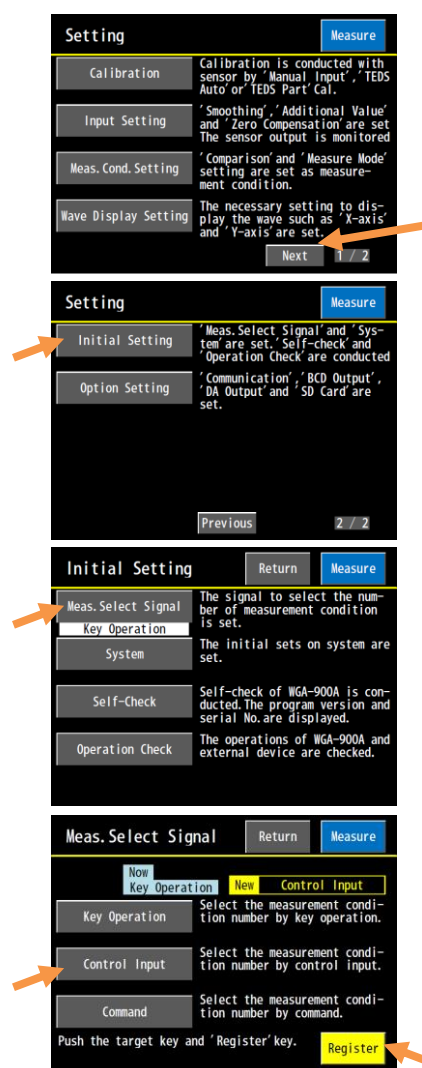
- For key operation: Sets the measuring condition No. by pressing   key on the “**Meas. Cond. Setting**” window.
- For control input: Sets the measuring condition No. with the combination of ON/OFF setting from the “Measuring condition select 0” to “Measuring condition select 3.”
- For communication: Sets the measuring condition No. with the RS command.

<Setting Range>

Key operation, Control input, Command

<How to operate>

- 1) Press the  key on the “**Measuring**” window.
- 2) Press the  key on the “**Setting (1/2)**” window.
- 3) Press the  key on the “**Setting (2/2)**” window.
- 4) Press the  key on the “**Initial Setting**” window.
- 5) Press the target key and  key for the registration.



NOTE

The measuring condition No. cannot be changed when other than selected signals are input.



6-5-2. System

(1) Key Lock

Select lock (inhibit changing) or release.

The **Return** key is invalid and displayed in gray in locked state.

The **Set** key changes to the **Lock** key after the window gets back to the “Measuring” window.

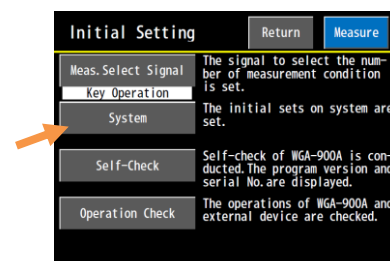
Press the **Lock** key with the locked state. The window changes to the “Key Lock” window to release the locked state.

<Setting Range>

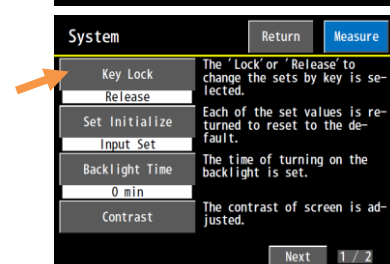
Lock or Release

<Operations for key lock>

1) Press the **System** key on the “Initial Setting” window.



2) Press the **Key Lock** key on the “System (1/2)” window.



3) Press the **Lock** key and then **Register** key to be locked.

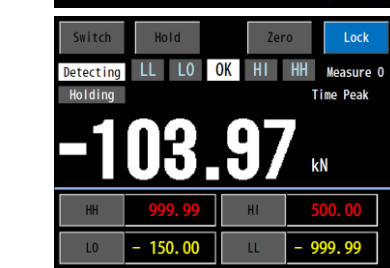
In addition, the **Return** key is invalid and displayed in gray.



4) Press the **Lock** key to get back to the “Measuring” window.

The **Measure** key changes to the **Set** key.

In addition, other keys are invalid and displayed in gray.

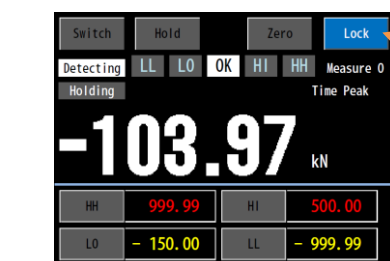


NOTE

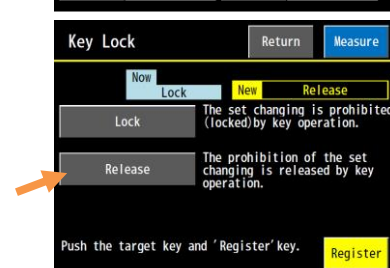
It is not possible to shift to other “setting window” while locking the key operation.

<How to release the lock>

1) Press the **Lock** key on the “Measuring” window.



2) Press the **Release** key and then **Register** key for releasing.



(2) Set Initialize

Initializes the saved setting value to the default value.

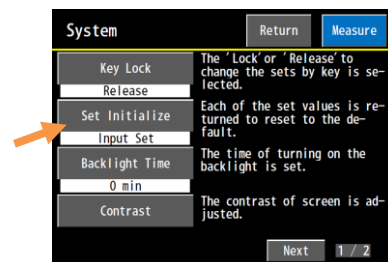
However, the calibration value is not initialized.

<Setting Range>

- Input Set: Initializes setting values of the input setting.
- Meas. Cond. Set: Initializes setting values of the measuring condition setting.
- Wave Disp. Set: Initializes setting values of the waveform display setting.
- Initial Set: Initializes setting values of the initial setting.
- Option Set: Initializes setting values of the optional setting.
- All Set: Initializes all setting values excluding the calibration value.

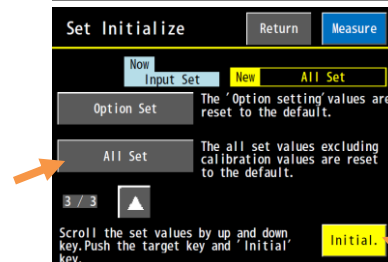
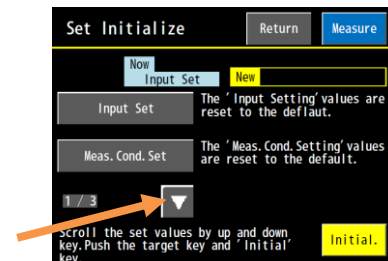
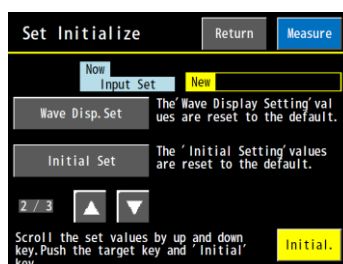
<How to operate>

1) Press the **Set Initialize** key on the “**System (1/2)**” window.



2) Press the **▲▼** key to display the target setting key.

Select and press the target key and **Initial.** key.

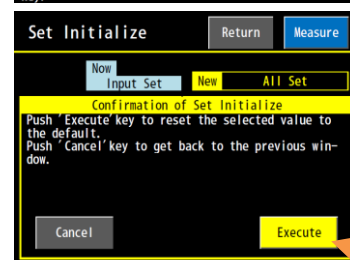


3) The “**Confirmation of Set Initialize**” window appears.

Press the **Execute** key for initializing.

Press the **Cancel** key to get back to the previous window without initialization.

The **Return** and **Measure** keys are invalid and displayed in gray.



(3) Backlight Time

Sets a lighting time of the backlight. The backlight goes off if you don't touch the panel for the preset time.

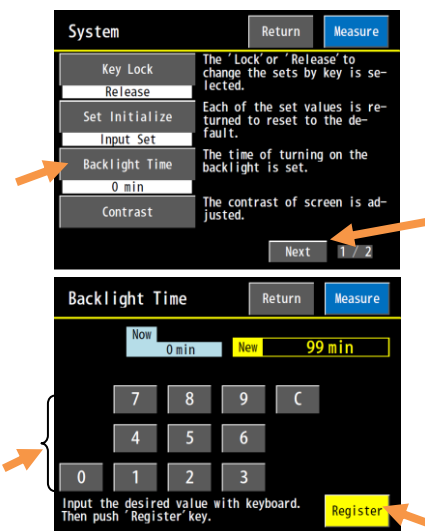
Touch the panel for lighting up.

<Setting Range>

0 to 99 (minute)

<How to operate>

1) Press the **Backlight Time** key on the “System (1/2)” window.



2) Input a setting value with the numerical keyboard and press the **Register** key for registration.

MEMO

The backlight does not go off and keeps ON when setting 0 minute.

(4) Contrast

Adjusts the display contrast.

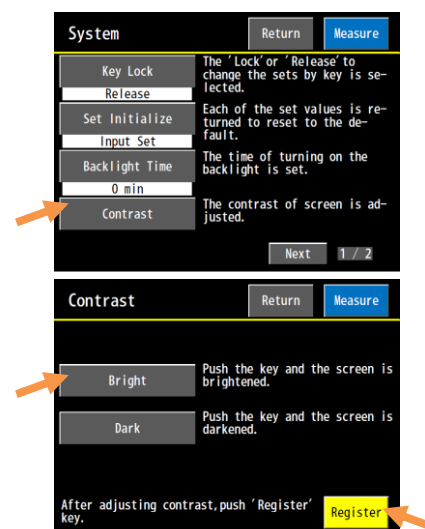
The window gets brighter or darker every time the keys are pressed.

<Setting Range>

Bright or Dark

<How to operate>

1) Press the **Contrast** key on the “System (1/2)” window.



2) Every time the **Bright** key is pressed, the window gets brighter; the **Dark** key is pressed, darker.

Adjust the contrast to the level desired.

After adjusting, press the **Register** key for registration.



(5) Language

Sets the display language.

<Setting Range>

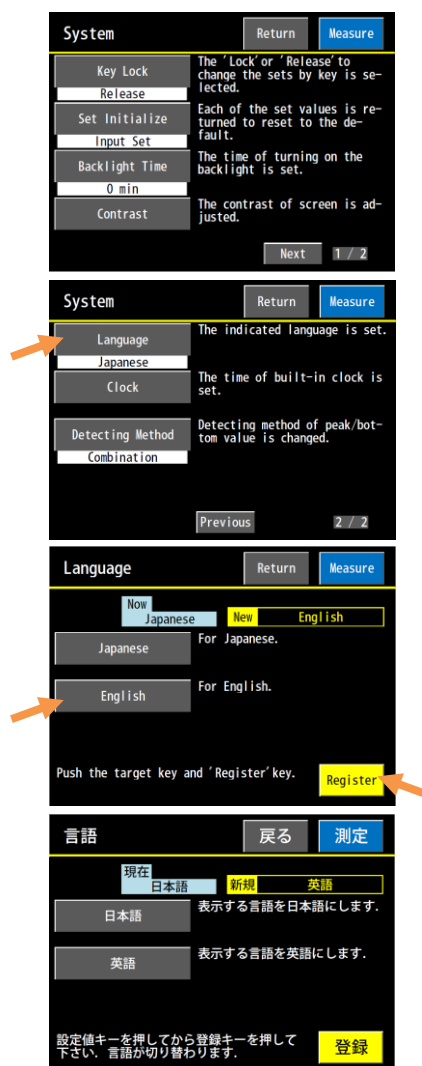
English or Japanese

<How to operate>

1) Press the **Next** key on the “**System (1/2)**” window.

2) Press the **Language** key on the “**System (2/2)**” window.

3) Select the target key and **Register** key for changing.



(6) Clock

Adjusts date and time of the built-in clock.

<Setting Range>

Year, Month, Day, Hour, Minute, Second (2000/01/01 00:00:00~2099/12/31 23:59:59)

<How to operate>

1) Press the  key on the “System (2/2)” window.

2) Press the   key on the window to blink the target place.

2000 / 01 / 01 00 : 00 : 00

Year, Month, Day, Hour, Minute, Second

3) Input a value with numbers on the window and press the  key for registration.

Year: 00 to 99 (Last digit of the year.)

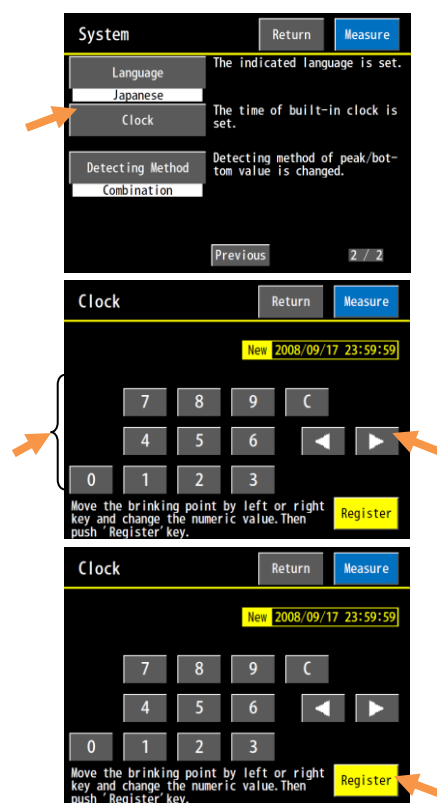
Month: 01 to 12

Day: 01 to 31 (The last day varies with the month.)

Hour: 00 to 23

Minute: 00 to 59

Second: 00 to 59



(7) Detecting method

Changes the detecting method of peak / bottom value.

<Setting Range>

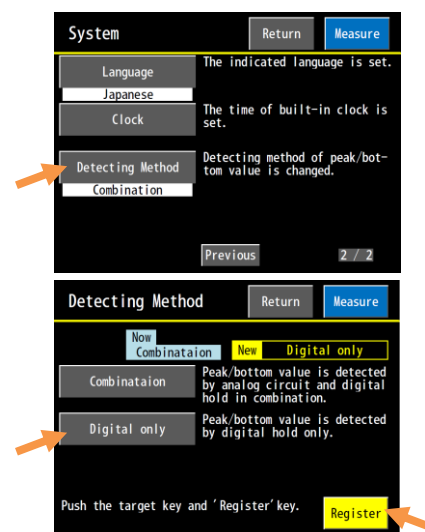
Combination: Peak / bottom value is detected by analog circuit and digital hold in combination.

Digital only: Peak / bottom value is detected by digital hold only.

<How to operate>

1) Press the **Detecting Method** key on the “**System (2/2)**” window.

2) Press the target key and **Register** key to register the target value.

**NOTE 1**

The peak / bottom value up to approximately 1 kHz in response frequency can be detected when **Combination** is set. But the amount of changing a measured value before detecting might become large.

NOTE 2

The amount of changing a measured value before detecting peak / bottom value becomes small when **Digital only** is set. But it is possible to detect the lower peak value / higher bottom value compared with actual input when peak / bottom value with large response frequency (approximately 200 Hz or more) is detected.



6-5-3. Self-Check

Self diagnosis the WGA-900A and sensor input.

In addition, the program version and serial No. can be checked on the “**Self-Check**” window.

(1) Memory Check

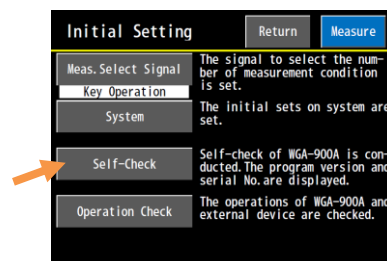
Checks that the ROM, RAM, and EEPROM have no fault.

Press the **Execute** key to start the memory check. The result is displayed after a short time.

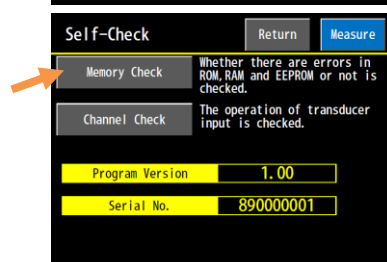
The “Abnormal Memory” of the control output is turned ON and “Healthy” of the control output is turned OFF at the same time when any fault is detected.

<How to operate>

1) Press the **Self-Check** key on the “**Initial Setting**” window.



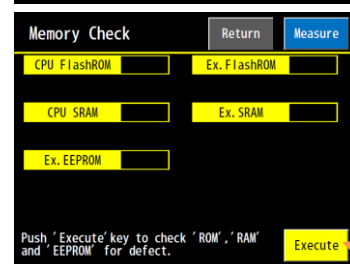
2) Press the **Memory Check** key on the “**Self-Check**” window.



MEMO

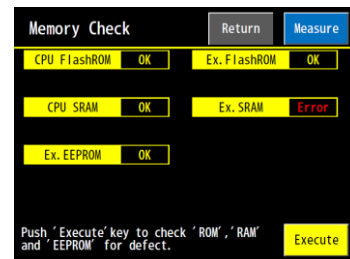
The program version and serial No. of the WGA-900A can be checked.

3) Press the **Execute** key to start the memory check.



4) The result is displayed after a short time.

Only the “**Ex. SRAM**” is displaying **Error** in the right window.



(2) Channel Check

Checks the operation related to the sensor input.

Press the **Execute** key to start the channel check. The result is displayed after a short time.

The “**Abnormal channel**” of the control output signal is turned ON and “**Healthy**” of the control output signal is turned OFF at the same time when any error is detected.

<Setting Range>

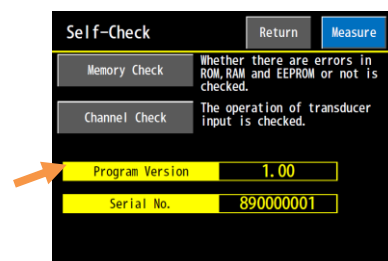
Bridge Volt.: Checks that the measured value of the excitation voltage (bridge voltage) is within $\pm 10\%$ of 10 V or 2V.

Input Over: Checks that the sensor output is within the input range.

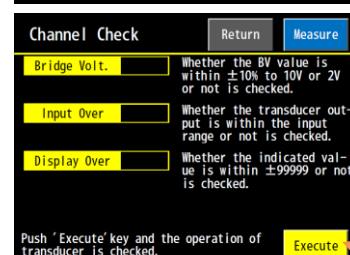
Display Over: Checks that the measured value is within ± 99999 .

<How to operate>

1) Press the **Channel Check** key on the “**Self-Check**” window.

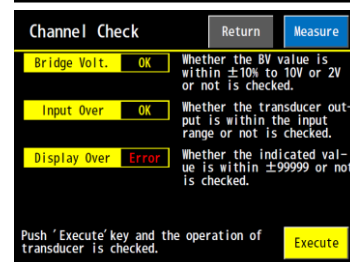


2) Press the **Execute** key to start the channel check.



3) The result is displayed after a short time.

Only the “**Display Over**” is displaying **Error** in the right window.

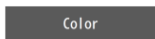
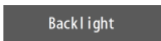
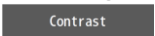


6-5-4. Operation Check

(1) Display Check

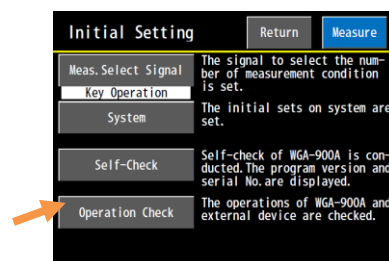
Checks the display operation. Check items are moved as follows.

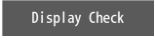
<Setting Range>

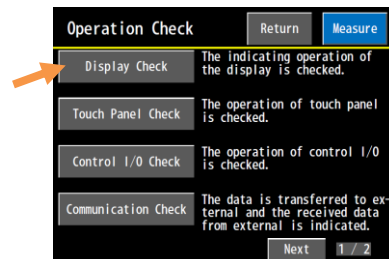
- Color: Window color automatically changes from Red - Green - Blue - Yellow - Red by pressing the  key.
- Backlight: Press the  key to go off the backlight. Touch the window to light up the backlight.
- Contrast: Contrast automatically changes from White - Gray - Black - White by pressing the  key.

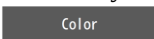
<How to operate>

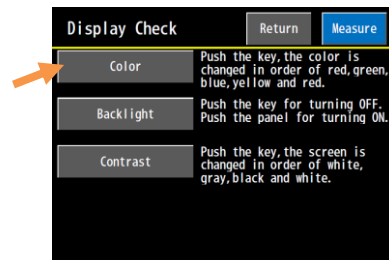
- 1) Press the  key on the “Initial Setting” window.



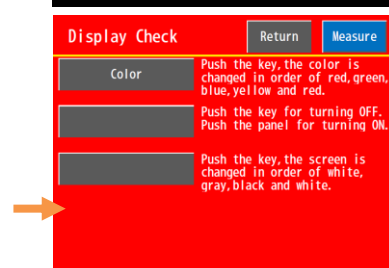
- 2) Press the  key on the “Operation Check (1/2)” window.

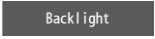


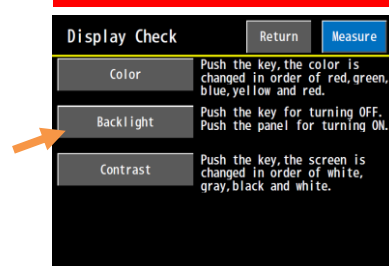
- 3) Window color automatically changes from Red - Green - Blue - Yellow - Red by pressing the  key.
- At this time, other than  keys are invalid and displayed in gray.
- Press the  key again to get back to the standard window (background color is black).



Window color changes in order.



- 4) Press the  key to go off the backlight.
- After that, touch the window to light up.



Touch the window again to light up.

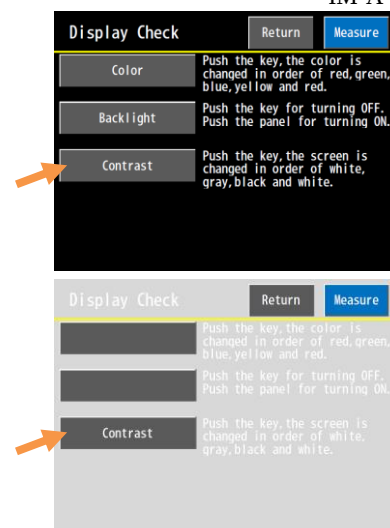


5) Contrast automatically changes from White - Gray - Black - White by pressing the

Contrast key.

At this time, other than **Contrast** keys are invalid and displayed in gray.

Press the **Contrast** key again to get back to the standard window (background color is black).

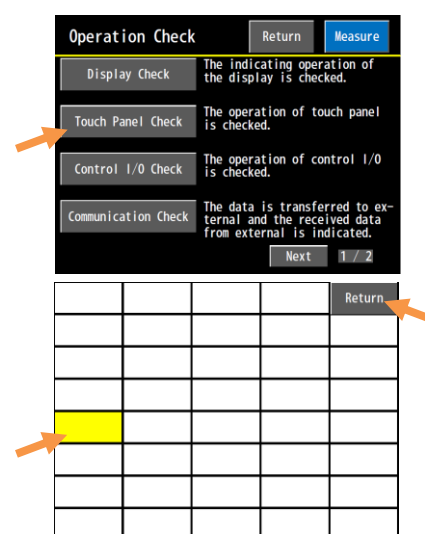


(2) Touch Panel Check

For checking the touch panel operation.

<How to operate>

1) Press the **Touch Panel Check** key on the “**Operation Check (1/2)**” window.



2) Press a white key on the window to change in yellow.

Press the yellow key again to get back to white.

Press the **Return** key to get back to the “**Operation Check**” window.



(3) Control I/O Check

Checks operations of the control input/output signals.

White square of the target pin No. lights up in blue while the control input signal is turned ON.

Press the key of the target pin No. The display color becomes yellow and the control output signal is turned ON.

Press the same pin No. again to get back to the standard color and the control output signal is turned OFF.

<Setting Range>

Input: 19 to 27 (Pin No. 19 to 27)

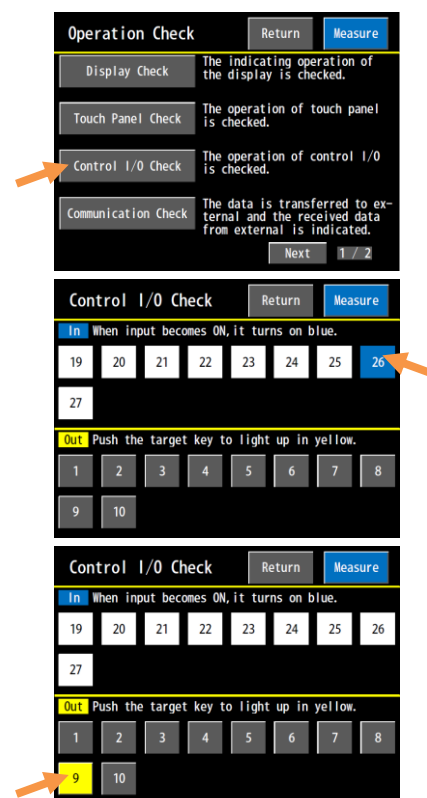
Output: 1 to 10 (Pin No. 1 to 10)

<How to operate>

1) Press the **Control I/O Check** key on the “**Operation Check (1/2)**” window.

2) White square of the target pin No. lights up in blue while the control input signal is turned ON.

3) Press the target output signal key of the pin No. The display color becomes yellow and the open collector output signal is turned ON.



(4) Communication Check

Checks that RS-232C and RS-485 correctly sends and receives information.

The “**Communication Error**” of the control output is turned ON when any error is detected and “**Error**” is also displayed. The “**Healthy**” of the control output is turned OFF at the same time.

Press the **Transfer** key to transfer data “WGA-900A” that is displayed on the transferring data column.

The transferred data from the external device is displayed on the received data column.

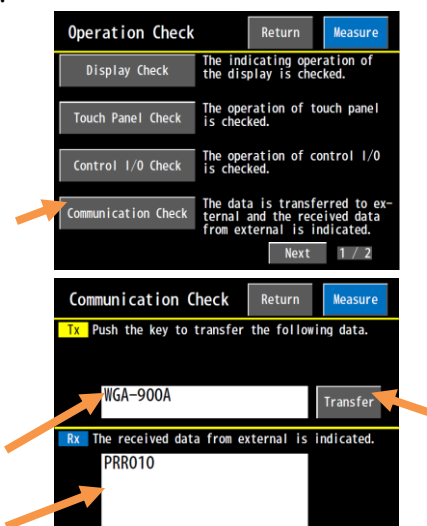
<How to operate>

1) Press the **Communication Check** key on the “**Operation Check (1/2)**” window.

2) Press the **Transfer** key to transfer data “WGA-900A” that is displayed on the transferring data column to external.

The transferred data from the external device is displayed on the received data column.

Transferring Data Column



(5) BCD Output Check

Valid for equipping the optional BCD output only.

Capable of checking the operations of the connected external device by outputting an arbitrary BCD data.

The **BCD Output Check** key is displayed in gray when the optional BCD output board is not connected.

<Setting Range>

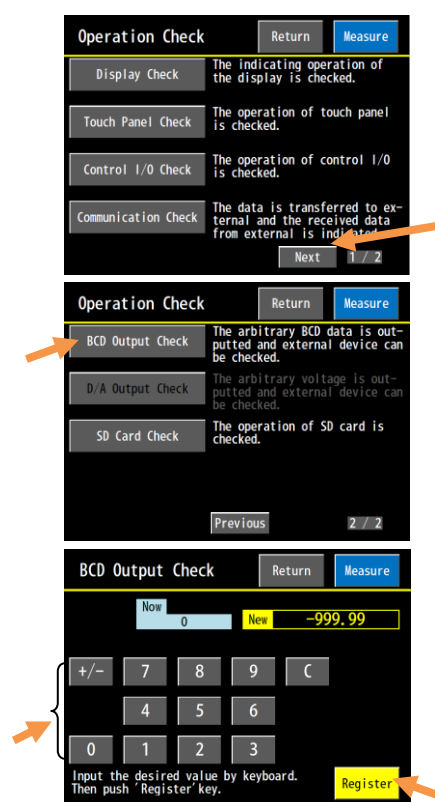
-99999 to 99999 (count)

<How to operate>

1) Press the **Next** key on the “**Operation Check (1/2)**” window.

2) Press the **BCD Output Check** key on the “**Operation Check (2/2)**” window.

3) Input a setting value with the numeric keyboard and press the **Register** key to output the set BCD data to the external.



(6) D/A Output Check

Valid for equipping the optional D/A output only.

Capable of checking the operation of the connecting external device by outputting an arbitrary D/A converted voltage.

The **D/A Output Check** key is displayed in gray when the optional D/A output board is not connected.

<Setting Range>

-10V: Outputs -10 V.

0V: Outputs 0 V.

10V: Outputs 10 V.

<How to operate>

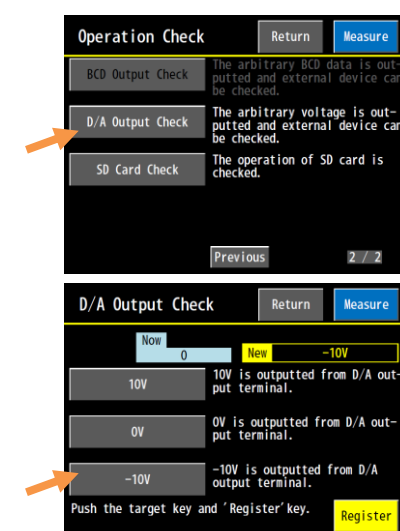
1) Press the **D/A Output Check** key on the “**Operation Check**” window.

2) Press the target key and **Register** key to output the target voltage.

MEMO

The current output is 4 mA when 0 V is set.

The current output is 20 mA when 10 V is set.



(7) SD Card Check

Checks the SD card operation and displays it if any error is detected.

MEMO

The control output [SD] is turned ON while accessing to the SD card.

<How to operate>

1) Press the **SD Card Check** key on the “**Operation Check (1/2)**” window.

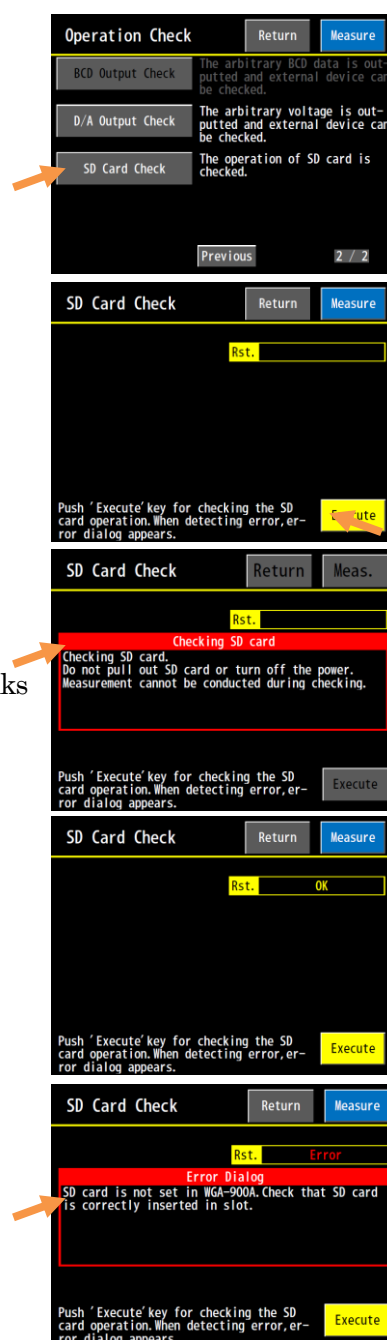
2) Press the **Execute** key to start the SD card operation and the “**Checking SD card**” window blinks.

The **Return** **Measure** **Execute** keys are displayed in gray.

The result is displayed in a short moment.

3) “**OK**” is displayed in the “**Rst.**” column when the operations of the SD card are correct.

4) “**Error**” is displayed in the “**Rst.**” column when any error is detected and the following error is displayed in the **Error Dialog** window.



Blinks

Error

<Error of the SD card check>

	Display
1	SD card is not set in WGA-900A. Confirm that SD card is correctly inserted in slot.
2	SD card has no enough the empty capacity. The data cannot be saved no more.
3	SD card is state of write protect.
4	The set value file is not existed in SD card.
5	The writing to SD card can not be confirmed.
6	The reading to SD card can not be confirmed.



NOTE 1

Do not remove the SD card until you have received a result during checking.
Or, it may cause damage or may disrupt the WGA-900A operation.

NOTE 2

If the SD Card Check is conducted with many files or large capacity file saved in the SD card, the “**Checking SD card**” stops blinking and it seems that the WGA-900A stops.

This is because it takes time to check the free capacity of the SD card.

Wait for a while and the “**Checking SD card**” window blinks again.

Do not remove the SD card until you have received the result.

NOTE 3

About error message of the “**SD card is not set in WGA-900A. Confirm that SD card is correctly inserted in slot.**”

The above error message also appears when the SD card is not correctly formatted.

Format the SD card with the PC or check that the reading and writing the file are available before the SD card check.



7. OPTION

7-1. COMMUNICATION (RS-232C/RS-485)

Various functions can be set as well as measured values can be read from external devices.

NOTE

The RS-232C of the standard equipment is invalid and the RS-485 is valid when equipping the optional RS-485. Other than above, the RS-232C is functioned.

7-1-1. RS-232C Interface

(1) Signal Specifications

	Specifications	Initial Value
Signaling System	Full Duplex	
Data Rate	2400, 4800, 9600, 19200 bps	9600 bps
Data Bit	7 bit	
Parity Bit	Odd parity	
Stop Bit	1 bit	
Delimiter	Reception : CR, Send : CR+LF	
Output Code	ASCII	

NOTE

The WGA-900A does not cope with XON/XOFF control and Send Break Signal.

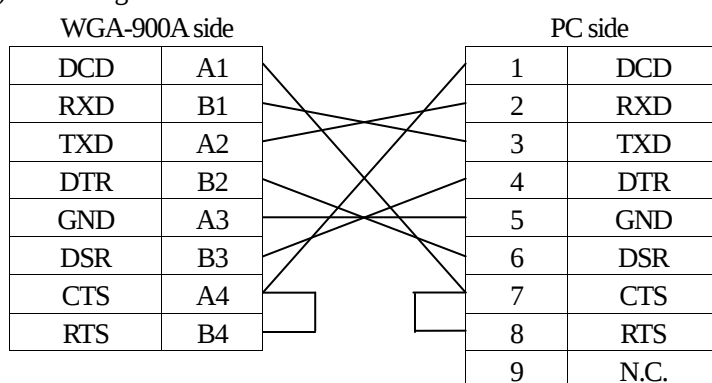
(2) Connector pin numbers and signal names

Pin No.	Signal Name
A1	DCD
B1	RXD
A2	TXD
B2	DTR

Pin No.	Signal Name
A3	GND
B3	DSR
A4	CTS
B4	RTS

(3) Connecting to external device

1) Connecting the PC



NOTE

Connection example of the DTE-DTE terminal.
May varies with the connecting device.

NOTE

Turn OFF the both WGA-900A and external device before connecting a cable.
Or, the WGA-900A may not function correctly or cause damage

2) Setting external devices

Set external devices by confirming to WGA-900A signal specifications of 1).



7-1-2. RS-485 Interface

(1) Signal Specifications

	Specifications	Initial Value
Signaling System	2-wire Half Duplex	
Data Rate	2400, 4800, 9600, 19200 bps	9600 bps
Data Bit	7 bit	
Parity Bit	Odd parity	
Stop Bit	1 bit	
Delimiter	Receive : CR, Transmit : CR+LF	
Output Code	ASCII	

(2) Connector pin numbers and signal names

Pin No.	Signal Name
1	+(Noninverting)
2	+(Noninverting)
3	-(Noninverting)
4	-(Noninverting)
5	SG
6	TERMINATOR
7	N.C.
8	N.C.
9	TERMINATOR

Use the following applicable connector (D-sub 9-pin) of the cable side for connecting the external device.

Connector: Model: XM2D-0901 (socket)

Manufacture: OMRON Corporation or equivalent

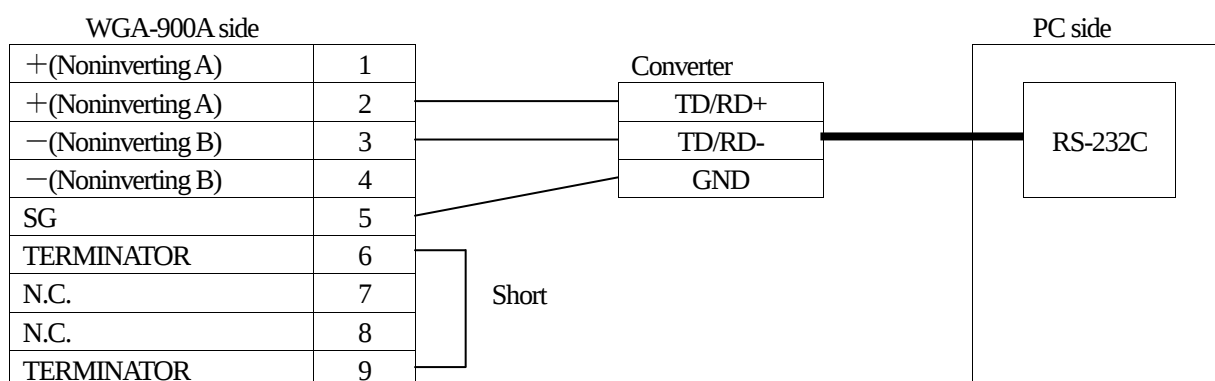
Cover: Model: XM2S-0913 (unified screw thread #4-40UNC)

Manufacture: OMRON Corporation or equivalent

(3) Connecting to external device

1) Connection Cable

- For connecting external devices to the PC, use the RS-485 ↔ RS-232C converter.
- Pin No. 1 and 2 as well as pin No. 3 and 4 are provided with the same functions to be used for bys wiring.
- It is required to attach a terminating resistor to a device connected at the end of the transmission line. Short-circuit connector pin No. 6 and 9. Then, terminating resistor (200 ohm) attached state is obtained.
- Set the converter switch of the RS-485 ↔ RS-232C to DTE.



NOTE

Turn OFF the both WGA-900A and external device before connecting a cable.
Or, the WGA-900A may not function correctly or cause damage



2) Setting the external device

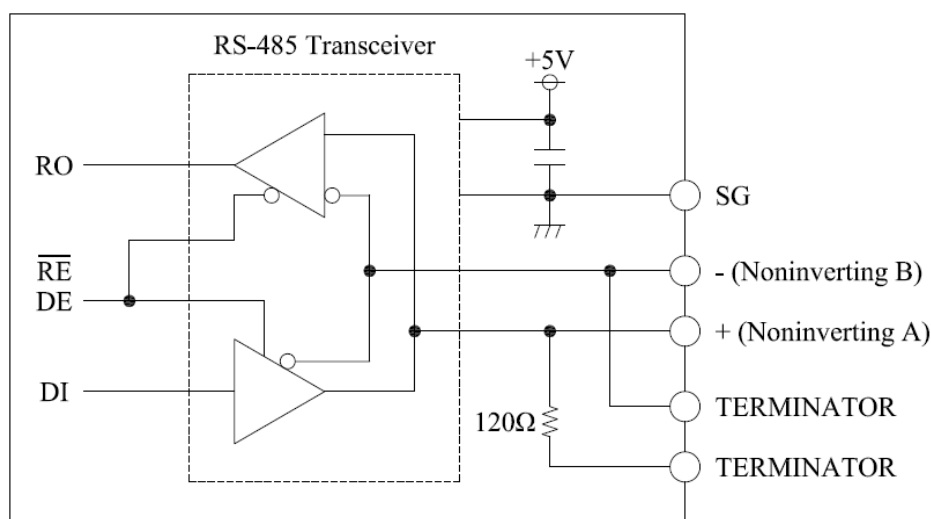
Set external devices by conforming to signal specifications of the WGA-900A.

RS-485 transceiver of the WGA-900A is provided with fail safe function that is designed to have the CPU output (RO) becomes 1 (Hi) when signal is received and when between [+ (noninverting A)] and [- (noninverting B)] is short-circuited or in float state.

In addition, when the WGA-900A is waiting to receive the signal, between A and B becomes nearly short-circuited. And if transceiver of the external device does not have fail safe function, the output of the CPU side may not become (Hi).

As a result, data transmitted from the WGA-900A may not be properly received. Therefore, it is recommended to use the transceiver with the fail safe function.

The WGA-900A side: RS-485 circuit



Logical Table

[Sending]

INPUT			OUTPUT	
/RE	DE	/RE	DE	/RE
0	1	0	1	0
0	1	0	1	0
X	0	X	0	X

[Receiving]

INPUT		A-B	OUTPUT
/RE	DE		/RE
0	0	$\geq 300\text{mV}$	0
0	0	$\leq -300\text{mV}$	0
0	0	OPEN	0
0	0	SHORT	0



(4) Communication procedures

1) Establishing communication

Since the RS-485 is in a “one-to n” communication system, the RS-485 communication is established by specifying the ID. Use binary code available software and input the following command.

Communication establishing command

<ENQ>01<CR>
 └── Device ID (Specified with 2 digits.)

After establishing the communication, the following response is received.

<ACK>01<CR><LF>
 └── Device ID

MEMO

No response is received with different device ID.

2) Entering command

After establishing the communication, input the required command by referring to “Table of Control Commands.”

3) End of transmission

Input the following command to end the communication.

<EOT><CR>

MEMO

No response is received to this end command.

If a different ID is specified without opening the communication, the new communication is established with the newly specified ID.

4) Command interval

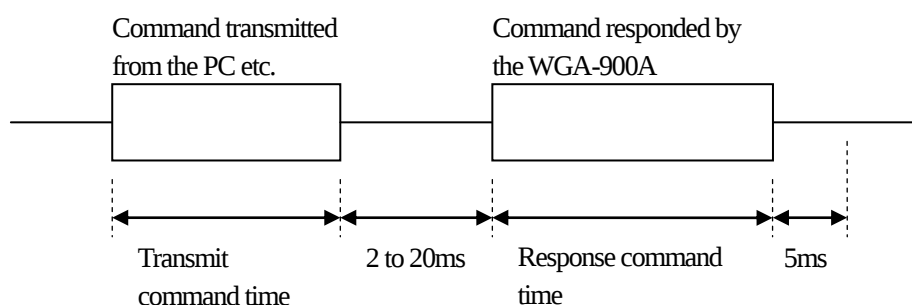
When a command is transmitted from the PC, PLC, etc., set command transmit interval to a time more than that obtained by the following expression. (Excluding calibration and setting commands.)

Command Interval = Transmit command time + 20 ms + Response command time + 5ms

where: Transmit command time: Send character transmit time with the preset baud rate.

Response command time: Response character transmit time with the preset baud rate.

Initial value of the baud rate: The recommended command interval of the measured value output command [GDT1] is 50 ms or more in 9600 bps.



7-1-3. Setting HyperTerminal

This section describes an example of using HyperTerminal that is included Windows accessory as a communication tools.

(1) Setup HyperTerminal

<For the WindowsXP>

[Start] - [All Programs] - [Accessories] - [Communications] - [HyperTerminal]

(2) Sets the communication port according to the WGA-900A signal specifications.

Bit/sec: 9600
 Data bit: 7
 Parity: Odd number
 Stop bit: 1
 Flow control: Not compatible

(3) For RS-232C

Communication is established with the above setting.
 Check the communication state by referring to item 5).

NOTE

No response is received with different device ID.

(4) For RS-485

Communication is established with the following setting.
 Transmit the communication establish command.

<ENQ>01<CR>
 _____ Device ID (Specified with 2 digits.)

Input **Ctrl** + **F01** keys for actually entering from the keyboard.
 After establishing the communication, the device ID returns as "01."

(5) Checking communication state

To check whether or not communication is established, input RS line test command.

Press the **RS** <CR> keys. (Press the **Enter** key to function as same as the <CR>.)

If the following response [RS-232C<CR><LF>] is received, the communication is correctly established.

When using the RS-232C, [RS-232C<CR><LF>] appears.

(<CR>: Return to line head. <LF>: Leave 1 blank line.)



7-1-4. Control Command

The following is an explanation of the formats and kinds of control commands which are output to the WGA-900A from external equipment such as PC.

Sets the control command that is output from the external device to WGA-900A.

(1) Outline of the control command

1) Control command code

- Control command conforms to ASCII code (3 capital letters).
- According to the command characteristic, some control commands are suffixed by parameters.
- A termination code is added to the end of a control command.

Different termination codes are used as follows.

<CR>: Command output to the WGA-900A.

<CR><LF>: Data output from the WGA-900A.

- If an unrecognizable command or number is input and if the decimal point position of the calibration value is incorrectly input, the character string of that command is returned in the following format.

W□□□□□□? <CR><LF>

- If an error happened when writing the setting value to the EEPROM, the following format is returned.
ng<CR><LF>

2) About delimiters

- Added to the end of the control command.
 - Different delimiters are used as follows.
- <CR>: Command output from the external equipment to the WGA-900A.
- <CR><LF>: Data output from the WGA-900A to the external equipment.



(2) Table of Control Commands

Kinds	Contents	Command	Page
Read	(1) Output the measured value.	GDT	102
	(2) Output the status.	GST	102
	(3) Output various setting values.	PRR	103
	(4) Display the sensor output value.	GOD	107
Measure/ Self Test	(5) HOLD command	HLD	107
	(6) RESET command	RST	107
	(7) ZERO command	ZON	107
	(8) Memory check	CK1	107
	(9) Channel check	CK2	107
Set	(10) Set the excitation voltage.	SBV*	108
	(11) Conduct the no-load zero.	ZAD*	108
	(12) Conduct the actual load calibration.	VCL	108
	(13) Conduct the sensitivity registering calibration.	EIC	108
	(14) Smoothing function setting	SSM*	109
	(15) Additional value setting.	SZM*	109
	(16) ZERO compensation setting.	SZT*	109
	(17) Conduct the TEDS-based automatic calibration.	EID	109
	(18) Measuring condition setting (No.)	SOP*	110
	(19) Comparison setting.	SCF*	110
	(20) Compared value setting.	SCV*	110
	(21) Measuring mode setting	SMF*	111
	(22) Waveform display setting 1 (X-axis/Y-axis)	SG1*	111
	(23) Waveform display setting 2 (Start Mode of Wave/Passed Level/Level Passed Way/Hold Time of Wave)	SG2*	112
	(24) Key lock setting	LCK	112
	(25) Meas. Select signal setting	SPN*	112
	(26) Backlight lightning time and contrast settings	SBC*	112
	(27) Language	SLG*	112
	(28) Clock setting	STM*	113
	(29) Detecting method	SDM*	113
	(30) Communication setting (RS-232C/RS-485)	OP1*	113
	(31) BCD output setting	OP2*	113
	(32) D/A output setting	OP3*	114
Other	(33) Initialize the setting value.	RES	114
	(34) RS line test	RS-	114
	(35) Reading model, etc.	SYS	114
	(36) Transmission mode setting (RS-232C only)	MOD	115
	(37) Command of saving the setting (saving the setting value to the internal memory)	/M	115
	(38) Replying of the undefined command	ng	115
	(39) Communication error	Error X	116
Binary Code (RS-485 only)	[1] Establishing the communication.	<ENQ>	116
	[2] Ending the communication.	<EOT>	116

Commands with asterisk mark (*) correspond to "Setting save command [/M]."

For details, refer to "Setting save command [/M]" on page 109.



7-1-5. Details of Control Commands

This section describes various control commands and parameters following after the commands.

<CR> and <CR><LF> denote termination code.

7-1-5-1. Reading

(1) [GDT]

Content	: Output the measured value.
Format	: GDT x <CR>
Parameter	: x For the [Block Peak-Bottom] and [Time Peak-Bottom] 0: Peak value (measured value 1) and bottom value (measured value 2) in order. 1: Peak value (measured value 1) 2: Bottom value (measured value 2) For the other operation modes 1: Current measuring value (measured value 1)
Return value format	: Dx±yyyyyy, zz<CR><LF> Unit: 01 to 79 79 types Refer to "11-2 UNIT LIST." Measured value: -99999 to 99999(count) Return value is an indicated value with a decimal point. If the indicated value has no decimal point, it is filled with "0s" from the head. Measured value 1 or measured value 2
Description and others	: For the [Block Peak-Bottom] and [Time Peak-Bottom] D1±yyyyyy, zz D2±yyyyyy, zz For the other operation modes D1±yyyyyy, zz Example) [Block Peak-Bottom] Return value when the peak value (measured value 1): +999.99, bottom value (measured value 2): -125.56, unit: kN (03) D1+999.99, 03<CR><LF> D2-123.56, 03<CR><LF> [Block-specified Bottom] Return value when the bottom value (measured value 1): -99 D1-000099, 03<CR><LF> [Normal Mode] Return value when the current measured value (measured value 1): Larger (+OVER) than +999.99 D1+ OFL, 03<CR><LF>

NOTE

The outputted measured value with the [GDT] command is different from the displayed value of the WGA-900A according to the sensor output variation or setting value of the input setting

(2)[GST]

Content:	Read the status.
Format:	GST<CR>
Parameter	None
Return value format:	Sabcdefghi<CR><LF>
Description and others:	Return value abcdefghi denotes the status with '1' or '0.' Numeric '1' is output in the following state. a: HH comparator is ON. b: HI comparator is ON. c: OK comparator is ON. d: LO comparator is ON. e: LL comparator is ON. f: During measurement. g: Detecting. h: During holding. i: Error



(3)[PRR]

Content: Read the setting value.

Format: PRRppp<CR>

Parameter

ppp

010: Sensitivity registering value	020: Smoothing function
030: Additional value	041: Comparison setting
051: Compared value of the HH comparator	
052: Compared value of the HI comparator	
053: Compared value of the LO comparator	
054: Compared value of the LL comparator	
058: Measuring condition No.	070: Setting measuring mode
090: ZERO compensation function	100: Option
130: Waveform display setting 1	131: Waveform display setting 2
150: Measuring condition selection signal	151: Backlight lightning time and contrast
152: Language	153: Clock
154: Detecting method	

Description and others: This command becomes disabled with the power OFF.
Power ON and it is in Mode 10 operation mode.

Return value format:

1) Return value of the sensitivity registering value

±x.xxxx, ±yyyyyy, zz<CR><LF>

Unit: 01 to 79 79 types Refer to "11-2 UNIT LIST."

Rated display value: -99999 to 99999 (count)

Return value is an indicated value with a decimal point. If the indicated value has no decimal point, it is filled with "0s" from the head.

Rated output value: -3.2000 to 3.2000 (mV/V)

2) Return value of the smoothing function

aa, b, c<CR><LF>

Analog filter

0: 1 Hz 1: 30 Hz 2: 300 Hz 3: None (1 kHz or more)

Minimum scale

0: 1 1: 2 2: 5 3: 10 4: 20 5: 50 6: 100

Moving Average

00: None 01: 2 times 03: 8 times 04: 16 times 05: 32 times

06: 64 times 07: 128 times 08: 256 times 09: 512 times 10: 1024times

11: 2048 times

3) Return value of the additional value

±xxxxxx<CR><LF>

-99999 to 99999 (count)

Return value is an indicated value with a decimal point. If the indicated value has no decimal point, it is filled with "0s" from the head.

4) Return value of the comparison setting

a, xxxxx<CR><LF>

Hysteresis width: 0 to 9999 (count)

Return value is an indicated value with a decimal point. If the indicated value has no decimal point, it is filled with "0s" from the head.

Comparison output logic

0: Negative logic 1: Positive logic



5) Return value of the compared value of the HH comparator (Same with other comparators.)

±xxxxxx<CR><LF>

-99999 to 99999 (count)

Return value is an indicated value with a decimal point.

If the indicated value has no decimal point, it is filled with "0s" from the head.

6) Return value of the measuring condition No.

aa<CR><LF>

01: Meas.condition 1	02: Meas.condition 2	03: Meas.condition 3	04: Meas.condition 4
05: Meas.condition 5	06: Meas.condition 6	07: Meas.condition 7	08: Meas.condition 8
09: Meas.condition 9	10: Meas.condition 10	11: Meas.condition 11	12: Meas.condition 12
13: Meas.condition 13	14: Meas.condition 14	15: Meas.condition 15	16: Meas.condition 16
17: Meas.condition 17	18: Meas.condition 18	19: Meas.condition 19	20: Meas.condition 20
21: Meas.condition 21	22: Meas.condition 22	23: Meas.condition 23	24: Meas.condition 24
25: Meas.condition 25	26: Meas.condition 26	27: Meas.condition 27	28: Meas.condition 28
29: Meas.condition 29	30: Meas.condition 30	31: Meas.condition 31	32: Meas.condition 32

7) Return value of the measuring mode setting

aa, b, c, x.xx, y.yy<CR><LF>

Detect time:	0.00 to 9.99 (sec)
Delay time:	0.00 to 9.99 (sec)
Comparison mode:	
0: Normal Comp.	1: Hold Disp.
Comparison mode:	
0: Normal Comp.	1: Hold Disp.
Operation mode:	
00: Normal	01: Peak hold
02: Block-specified peak	03: Time-specified peak
04: Bottom hold	05: Block-specified bottom
06: Time-specified bottom	07: Arbitrary point hold
08: Block Peak-Bottom	09: Time Peak-Bottom
10: Block average	11: Time average

8) Return value of the zero compensation function

xxxxxx, y.yy, z<CR><LF>

Least significant digit fixed at zero range: 0 to 9 (count)

ZERO at every preset compensation time

Determination time: 0.00 to 9.99 (sec)

ZERO at every preset compensation time

Compensation range: 0 to 99999 (count)

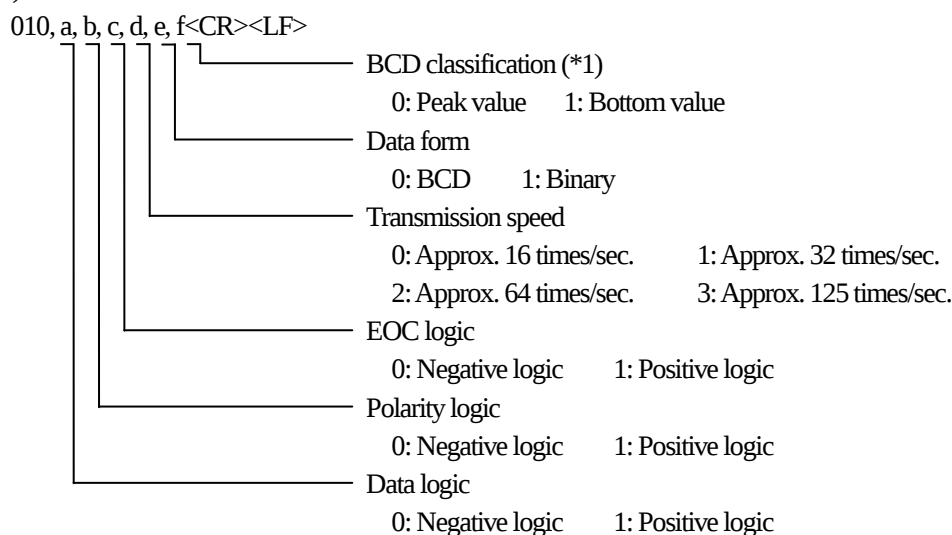
Return value is an indicated value with a decimal point. If the indicated value has no decimal point, it is filled with "0s" from the head.



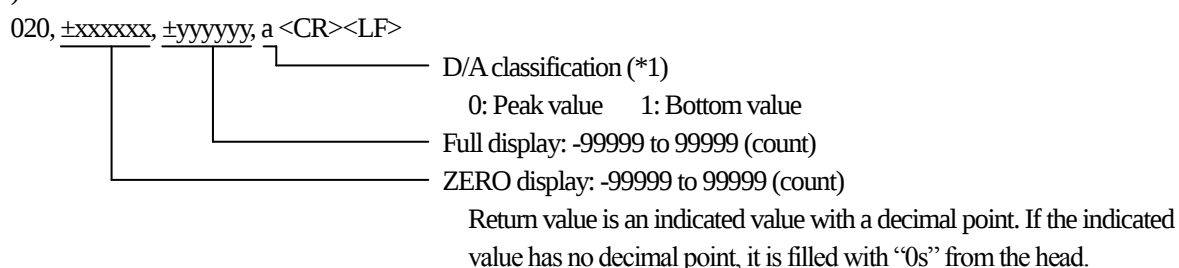
9) Return value of the option

The return value is output as follows according to the mounting option.

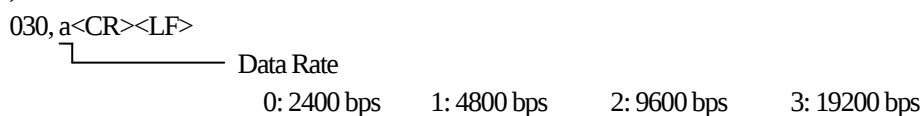
(A) With the BCD



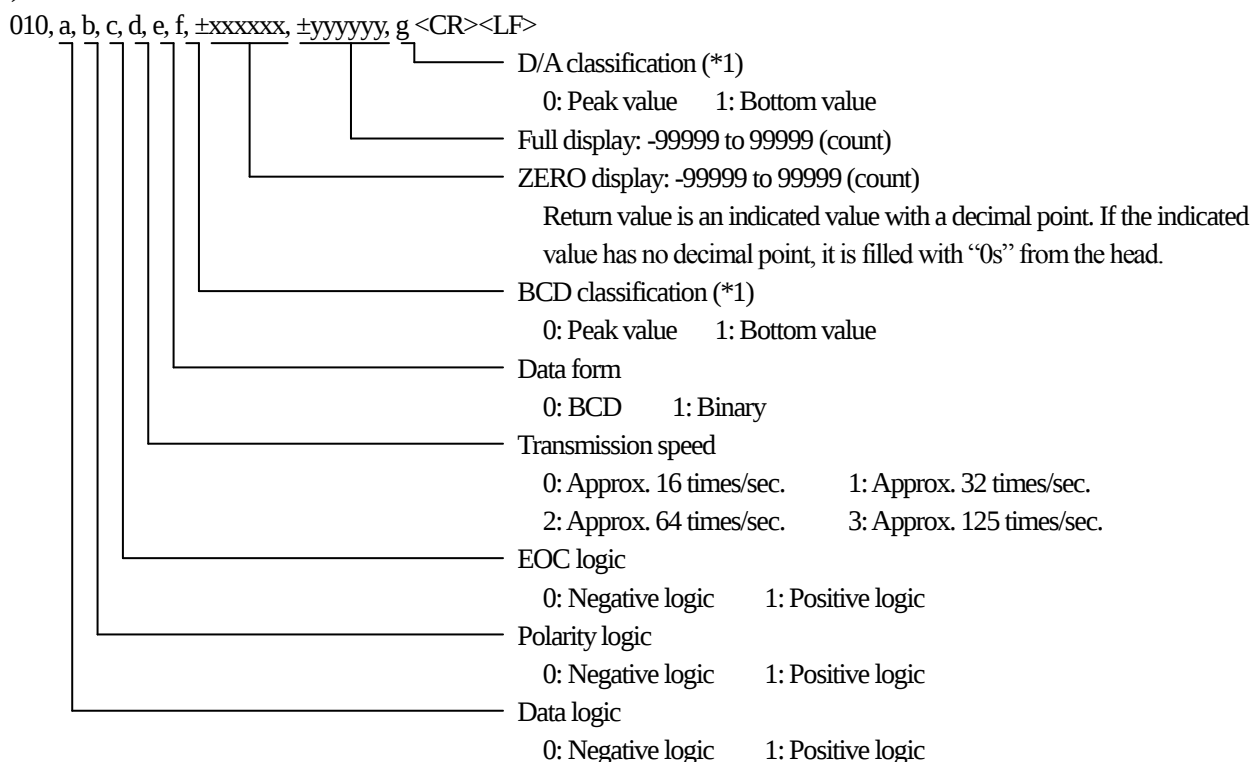
(B) With the D/A



(C) With the RS-485



(D) With the BCD and D/A



(E) With no option

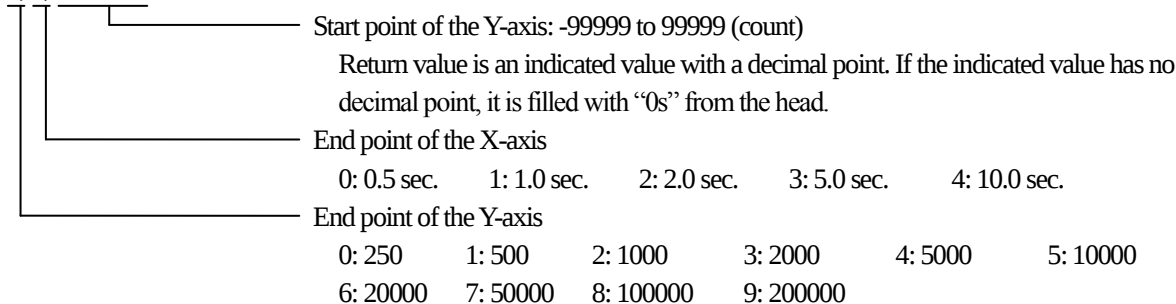
000 <CR><LF>



*1 For the [Block Peak-Bottom] and [Time Peak-Bottom] only. Or, you will not get the D/A classification value.

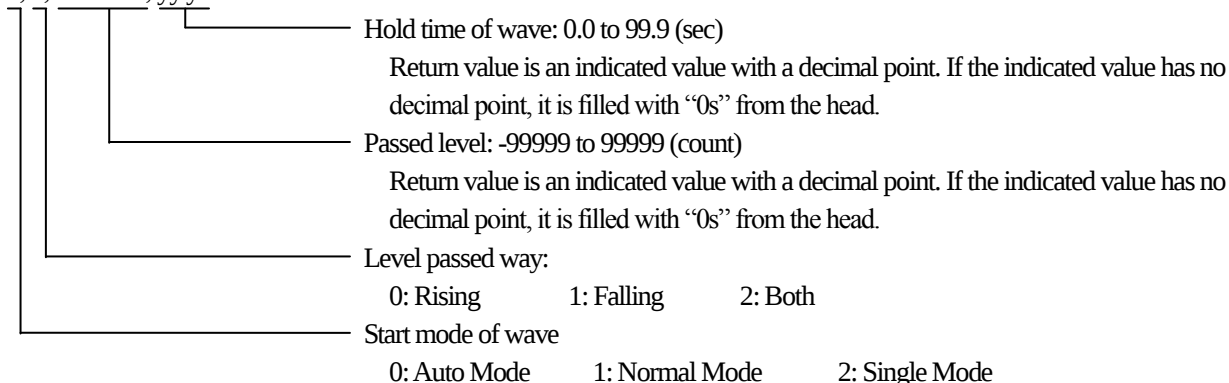
10) Return value of the wave display setting 1 (setting X-axis and Y-axis)

a, b, ±xxxxxx<CR><LF>



11) Return value of the wave display setting 2 (Start mode of wave, passed level, level passing way, hold time of wave)

a, b, ±xxxxxx, yy.y<CR><LF>



12) Return value of the measuring condition selection signal

a<CR><LF>



13) Return value of the backlight time and contrast setting

xx, yy<CR><LF>



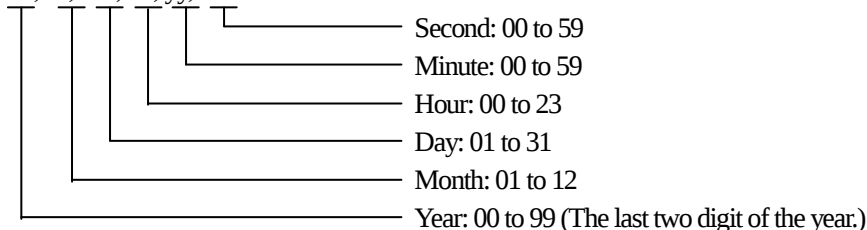
14) Return value of the language

a<CR><LF>



15) Return value of the clock

uu, vv, ww, xx, yy, zz<CR><LF>



16) Return value of the detecting method

a<CR><LF>



Content:	Display the sensor output value.
Format:	GOD<CR>
Parameter:	None
Return value format:	DO±x.xxxx<CR><LF>
	Sensor output value: -3.2000 to 3.2000 (mV/V)

7-1-5-2. Measurement and Self Check

(5)[HLD]

Content:	Hold command
Format:	HLD<CR>
Parameter:	None
Return value format:	ok<CR><LF>
Description and others	Relevant to the Hold key operation on the touch panel.

(6)[RST]

Content:	Reset command
Format:	RST<CR>
Parameter:	None
Return value format:	ok<CR><LF>

(7)[ZON]

Content:	ZERO command
Format:	ZON<CR>
Parameter:	None
Return value format:	ok<CR><LF>
Description and others	Conducts the digital ZERO. The additional value is displayed when the additional value is set to other than 0. Relevant to the Hold key operation on the touch panel.

(8)[CK1]

Content:	Hold command
Format:	HLD<CR>
Parameter:	None
Return value format:	ok<CR><LF> (when in normal) The CPU FlashROM is error: E-01<CR><LF> The external FlashROM is error: E-02<CR><LF> The CPU SRAM is error: E-03<CR><LF> The external SRAM is error: E-04<CR><LF> The external EEPROM is error: E-05<CR><LF>

(9)[CK2]

Content:	Conduct channel check.
Format:	CK2<CR>
Parameter:	None
Return value format:	ok<CR><LF> (when in normal) The excitation voltage is error: E-06<CR><LF> The input over is error: E-07<CR><LF> The display over is error: E-08<CR><LF>



7-1-5-3. Setting

(10)[SBV]

Content:	Set the excitation voltage.
Format:	SBVa<CR>
Parameter:	a └── 0: 2V 1: 10V
Return value format:	ok<CR><LF>
Description and others	Corresponding to the [/M] command.

(11)[ZAD]

Content:	Conduct no-load zero.
Format:	ZAD<CR>
Parameter:	None
Return value format:	ok<CR><LF>
Description and others	Corresponding to the [/M] command.

(12)[VCL]

Content:	Conduct actual load calibration.
Format:	VCL ± yyyyyy, zz<CR>
Parameter:	±yyyyyy, zz └── Unit: 01 to 79 79 types Refer to “11-2 UNIT LIST.” └── Rated display value: -99999 to 99999 (count) Indicated value with a decimal point. If the indicated value has no decimal point, it is filled with ‘0s’ from the head.
Return value format:	ok<CR><LF>
Description and others	Corresponding to the [/M] command.

(13)[EIC]

Content:	Conduct sensitivity registering calibration.
Format:	EIC ±x.xxxx, ±yyyyy, zz<CR>
Parameter:	±x.xxxx, ±yyyyy, zz └── Unit: 01 to 79 79 types Refer to “11-2 UNIT LIST.” └── Rated display value: -99999 to 99999 (count) Indicated value with a decimal point. If the indicated value has no decimal point, it is filled with ‘0s’ from the head. Rated output value: -3.2000 to 3.2000 (mV/V)
Return value format:	ok<CR><LF>
Description and others	Corresponding to the [/M] command.



(14)[SSM]

Content:	Set the smoothing function.
Format:	SSMaa, b, c<CR>
Parameter:	aa, b, c └─ Analog filter 0: 1 Hz 1: 30Hz 2: 300Hz 3: None (1kHz or more) └─ Minimum scale 0: 1 1: 2 2: 5 3: 10 4: 20 5: 50 6: 100 └─ Moving average 00: None 01: 2 times 02: 4 times 03: 8 times 04: 16 times 05: 32 times 06: 64 times 07: 128 times 08: 256 times 09: 512times 10: 1024 times 11: 2048 times
Return value format:	ok<CR><LF>
Description and others	Corresponding to the [/M] command.

(15)[SZM]

Content:	Set the additional value.
Format:	SZM1, ±xxxxxx<CR>
Parameter:	±xxxxxx └─ -99999 to 99999 (count) - Indicated value with a decimal point. If the indicated value has no decimal point, it is filled with '0s' from the head.
Return value format:	ok<CR><LF>
Description and others	Corresponding to the [/M] command.

(16)[SZT]

Content:	Set the ZERO compensation.
Format:	SZTxxxxxx, y,y, z<CR>
Parameter:	±x.xxxx, ±yyyyy, zz └─ Least significant digit fixed at zero range: 0 to 9 (count) └─ ZERO at every preset compensation time - Determination time: 0.00 to 9.99 (sec) └─ ZERO at every preset compensation time - Compensation range: 0 to 99999 (count) - Indicated value with a decimal point. If the indicated value has no decimal point, it is filled with '0s' from the head.
Return value format:	ok<CR><LF>
Description and others	Corresponding to the [/M] command.

(17)[EID]

Content:	Conduct TEDS-based automatic calibration.
Format:	EID<CR>
Parameter:	None
Return value format:	ok<CR><LF> (when in normal) E-13<CR><LF> (Sensitivity registering error)
Description and others	Result of this command is overwritten. Sets the excitation voltage and sensitivity registering calibration with the rated capacity value, rated output value, recommended excitation voltage value, and unit of the TEDS information. Corresponding to the [/M] command.



(18)[SOP]

Content:	Set measuring condition (No.).
Format:	SOPaa<CR>
Parameter:	aa
	01: Meas.condition 1 02: Meas.condition 2 03: Meas.condition 3 04: Meas.condition 4 05: Meas.condition 5 06: Meas.condition 6 07: Meas.condition 7 08: Meas.condition 8 09: Meas.condition 9 10: Meas.condition 10 11: Meas.condition 11 12: Meas.condition 12 13: Meas.condition 13 14: Meas.condition 14 15: Meas.condition 15 16: Meas.condition 16 17: Meas.condition 17 18: Meas.condition 18 19: Meas.condition 19 20: Meas.condition 20 21: Meas.condition 21 22: Meas.condition 22 23: Meas.condition 23 24: Meas.condition 24 25: Meas.condition 25 26: Meas.condition 26 27: Meas.condition 27 28: Meas.condition 28 29: Meas.condition 29 30: Meas.condition 30 31: Meas.condition 31 32: Meas.condition 32
Return value format:	ok<CR><LF> (For the communication command only.)
Description and others	ng<CR><LF> (For the key operation and control input.)

(19)[SCF]

Content:	Set the comparison setting.
Format:	SCFa, b, c, d, e, xxxxxx<CR>
Parameter:	a, b, c, d, e, xxxxx
	Hysteresis width: 0 to 9999 (count) Including a decimal point. Comparator output logic 0: Negative logic 1: Positive logic Using comparator LL 0: Use 1: Not use Using comparator LO 0: Use 1: Not use Using comparator HI 0: Use 1: Not use Using comparator HH 0: Use 1: Not use
Return value format:	ok<CR><LF>
Description and others	Corresponding to the [/M] command.

(20)[SCV]

Content:	Set the compared value.
Format:	SCVa, ±xxxxxx<CR>
Parameter:	a, ±xxxxxx
	Compared value: -99999 to 99999 (count) Indicated value with a decimal point. If the indicated value has no decimal point, it is filled with '0s' from the head. Comparator selection 0: HH 1: HI 2: LO 3: LL
Return value format:	ok<CR><LF>
Description and others	Corresponding to the [/M] command.



(21)[SMF]

Content:	Set the measuring mode setting.
Format:	SMFaa, b, c, x. xx, yy. yy<CR>
Parameter:	aa, b, c, x. xx, yy. yy — Detect time: 0.00 to 9.99 (sec.) — Delay time: 0.00 to 9.99 (sec) — Comparison mode 0: Normal Comp. 1: Hold Comp. — Display mode 0: Normal Disp. 1: Hold Disp. — Operation mode 00: Normal 01: Peak hold 02: Block-specified peak 03: Time-specified peak 04: Bottom hold 05: Block-specified bottom 06: Time-specified bottom 07: Arbitrary point hold 08: Block Peak-Bottom 09: Time Peak-Bottom 10: Block average 11: Time average
Return value format:	ok<CR><LF>
Description and others	Corresponding to the [/M] command.

(22)[SG1]

Content:	Set the waveform display setting 1 (X-axis and Y-axis settings)
Format:	SG1a, b, ±xxxxxx<CR><LF>
Parameter:	a, b, ±xxxxxx — Start point of Y-axis: -99999 to 99999 (count) Indicated value with a decimal point. If the indicated value has no decimal point, it is filled with '0s' from the head. — End point of X- axis 0: 0.5 sec. 1: 1.0 sec 2: 2.0 sec 3: 5.0 sec 4: 10.0 sec. — End point of Y-axis 0: 250 1: 500 2: 1000 3: 2000 4: 5000 5: 10000 6: 20000 7: 50000 8: 100000 9: 200000
Return value format:	ok<CR><LF>
Description and others	Corresponding to the [/M] command.



Content:	Set the waveform display setting 1 (start mode of wave, passed level, level passing way, hold time of wave)
Format:	SG2a, b, ±xxxxxx, yy. y <CR><LF>
Parameter:	a, b, ±xxxxxx, yy. y
	Hold time of wave: 0.0 to 99.9 (sec) Indicated value with a decimal point. If the indicated value has no decimal point, it is filled with '0s' from the head. Passed level: -99999 to 99999 (count) Indicated value with a decimal point. If the indicated value has no decimal point, it is filled with '0s' from the head. Level passing way 0: Rising 1: Falling 2: Both Start mode of wave 0: Auto Mode 1: Normal Mode 2: Single Mode
Return value format:	ok<CR><LF>
Description and others	Corresponding to the [/M] command.

(24)[LCK]

Content:	Set the key lock function.
Format:	LCKa<CR>
Parameter:	a
	0: Release 1: Lock
Return value format:	ok<CR><LF>
Description and others	This command becomes disabled with the power OFF.

(25)[SPN]

Content:	Set the measuring condition selecting signal.
Format:	SPNa<CR>
Parameter:	a
	0: key operation 1: Control input 2: Command
Return value format:	ok<CR><LF>
Description and others	Corresponding to the [/M] command.

(26)[SBC]

Content:	Set the backlight time and contrast setting
Format:	SBC, xx, yy <CR>
Parameter:	xx, yy
	Contrast: 0 (bright) to 63 (dark) Backlight time: 0 to 99 (min.)
Return value format:	ok<CR><LF>
Description and others	Corresponding to the [/M] command.

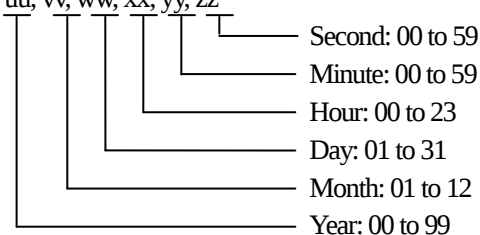
(27)[SLG]

Content:	Set the language
Format:	SLGa <CR>
Parameter:	a
	0: Japanese 1: English
Return value format:	ok<CR><LF>
Description and others	Corresponding to the [/M] command.



(28)[STM]

Content: Set clock.
 Format: STM, uu, vv, ww, xx, yy, zz <CR>
 Parameter: uu, vv, ww, xx, yy, zz



Second: 00 to 59
 Minute: 00 to 59
 Hour: 00 to 23
 Day: 01 to 31
 Month: 01 to 12
 Year: 00 to 99

Return value format: ok<CR><LF>
 Description and others: Corresponding to the [/M] command.

(29)[SDM]

Content: Set the detecting method
 Format: SDM a <CR>
 Parameter: a



0: Combination 1: Digital only

Return value format: ok<CR><LF>
 Description and others: Corresponding to the [/M] command.

(30)[OP1]

Content: Set communication (RS-232C and RS-485)
 Format: OP1, a <CR>
 Parameter: a

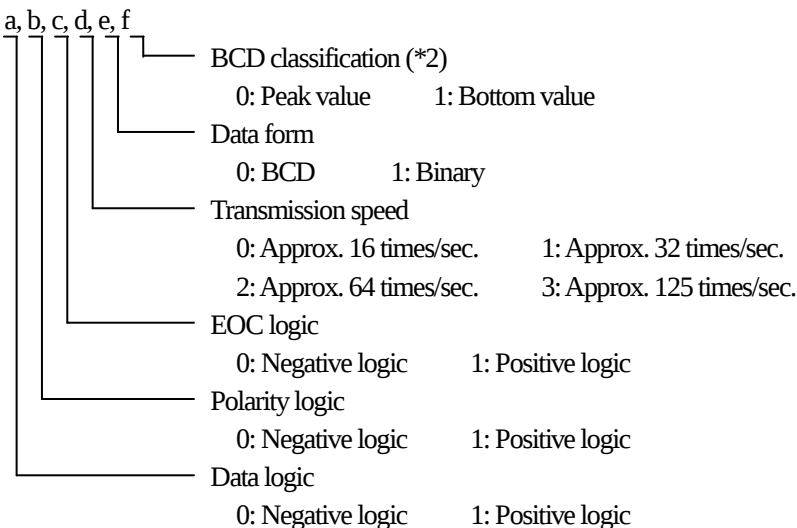


Data Rate
 0: 2400 bps 1: 4800 bps 2: 9600 bps 3: 19200 bps

Return value format: ok<CR><LF>
 Description and others: Corresponding to the [/M] command.

(31)[OP2]

Content: Set the BCD output
 Format: OP2, a, b, c, d, e, f<CR>
 Parameter: a, b, c, d, e, f



BCD classification (*2)
 0: Peak value 1: Bottom value
 Data form
 0: BCD 1: Binary
 Transmission speed
 0: Approx. 16 times/sec. 1: Approx. 32 times/sec.
 2: Approx. 64 times/sec. 3: Approx. 125 times/sec.
 EOC logic
 0: Negative logic 1: Positive logic
 Polarity logic
 0: Negative logic 1: Positive logic
 Data logic
 0: Negative logic 1: Positive logic

Return value format: ok<CR><LF>
 Description and others: Corresponding to the [/M] command.



(32)[OP3]

Content:	Set the D/A output.
Format:	OP3, ±xxxxxx, ±yyyyyy, a<CR>
Parameter:	D/A classification (*2) 0: Peak value 1: Bottom value Full display: -99999 to 99999 (count) ZERO display: -99999 to 99999 (count) Both values include a decimal point. If the indicated value has no decimal point, it is filled with '0s' from the head.
Return value format:	ok<CR><LF>
Description and others	Corresponding to the [/M] command.
	*2 For the [Block Peak-Bottom] and [Time Peak-Bottom] only. Or, you will not get the BCD or D/A classification value.

7-1-5-4. Others

(33)[RES]

Content:	Initialize the setting value.
Format:	RESp<CR>
Parameter:	p 0: Input setting 1: Measuring condition setting 2: Waveform display setting 3: Initial setting 4: Optional setting 5: All settings
Return value format:	ok<CR><LF>
Description and others	This command is available even if the power is turned OFF.

(34)[RS-]

Content:	RS line test
Format:	RS-<CR>
Parameter:	None
Return value format:	ok<CR><LF>
Description and others	RS-232C<CR><LF> (For the RS-232C) or RS-485<CR><LF> (For the RS-485) (when the data is received correctly)

(35)[SYS]

Content:	Output model, etc.
Format:	SYS<CR>
Parameter:	None
Return value format:	WGA-900A-aa, xx. xx, yyyyyyyy <CR><LF> Serial No. (9-digit) Character string of 0 to 9, A, B, C Program version If the indicated value has no 10th digit, it is filled with '0'. Optional model The model
Description and others	Contents of the return value is as follows. 00: Without option. 01: With the BCD output. 02: With the D/A output. 03: With the RS-485. 12: With the BCD and D/A output.



(36)[MOD]

Content:	Set the transmission mode.										
Format:	MODpp<CR>										
Parameter:	pp 00: Continuously outputs the measured value and status. 02: Outputs the display value and status only 1 time while holding. 10: Operation with the control command.										
Description and others	This command becomes disabled with the power OFF. Power ON and it is in Mode 10 operation mode.										
Return value format:	(1) Return value format of the mode 00 D1±xxxxxx<CR><LF> Sabcdefghi<CR><LF> - The mode 00 repeatedly outputs the measured value and status in order. - The ±xxxxxx is a measured value (-99999 to 99999) with a decimal point included. If the indicated value has no decimal point, it is filled with '0s' from the head. - Return value abcdefghi represents status with '1' or '0'. Following is the status for outputting "1." <table border="0"> <tr> <td>a: HH comparator is ON.</td> <td>b: HI comparator is ON.</td> </tr> <tr> <td>c: OK comparator is ON.</td> <td>d: LO comparator is ON.</td> </tr> <tr> <td>e: LL comparator is ON.</td> <td>f: Measuring</td> </tr> <tr> <td>g: Detecting</td> <td>h: holding</td> </tr> <tr> <td>i: Errors</td> <td></td> </tr> </table> - Set the mode 10 to stop the outputting. - When you cannot set the mode. Turn OFF the WGA-900A once and turn ON again to set it to mode 10. (2) Return value of the mode 02 D1±xxxxxx<CR><LF> Sabcdefghi<CR><LF> - The mode 02 outputs the measured value and status once during the holding time. - After the data is output, the WGA-900A is automatically set to the mode 10. - The contents of the measured value and status are the same with the mode 00. - When the mode 02 is specified while the WGA-900A is moving with the mode 00, the ng<CR><LF> is replied. (3) Return value format of the mode 10 ok<CR><LF> - The WGA-900A is controlled with commands. - The WGA-900A is controlled with the contents of the control commands.	a: HH comparator is ON.	b: HI comparator is ON.	c: OK comparator is ON.	d: LO comparator is ON.	e: LL comparator is ON.	f: Measuring	g: Detecting	h: holding	i: Errors	
a: HH comparator is ON.	b: HI comparator is ON.										
c: OK comparator is ON.	d: LO comparator is ON.										
e: LL comparator is ON.	f: Measuring										
g: Detecting	h: holding										
i: Errors											

(37)[/M]

Content:	Setting saving command (Saves the setting value to the internal memory.)
Format:	*****/M<CR> _____ Corresponding command
Return value format:	Add 'M<CR>' at the end of the determined command. Then, it is stored in the internal memory. If the power is turned OFF, the contents determined without this command shall return to the original setting. (Only commands with asterisk mark (*).)

(38) [Undefined command response]

Content:	Response responses to undefined command.
Format:	ng<CR><LF>



(39) [Communication error]

Content: Communication error response is described in the following table.

Reply	Flaming Error	Parity Error	Over-Run Error
Error A			○
Error B		○	
Error C		○	○
Error D	○		
Error E	○		○
Error F	○	○	
Error G	○	○	○

7-1-5-5. Binary Code (For the RS-485 only)

[1] Establishing the communication

Format: <ENQ>xx<CR>
 Device ID (Specified with 2-digit)

Return value format: `<ACK>xx<CR>`
 └── Device ID (No response is received with different device IDs.)

[2] End of transmission

Format: <EOT><CR>

Return value format: None



(1) Communication Speed

Sets the communication speed (baud rate) of the RS-232C and RS-485.

<Setting Range>

2400, 4800, 9600, 19200(bps)

<How to operate>

1) Press the **Set** key on the “Measuring” window.

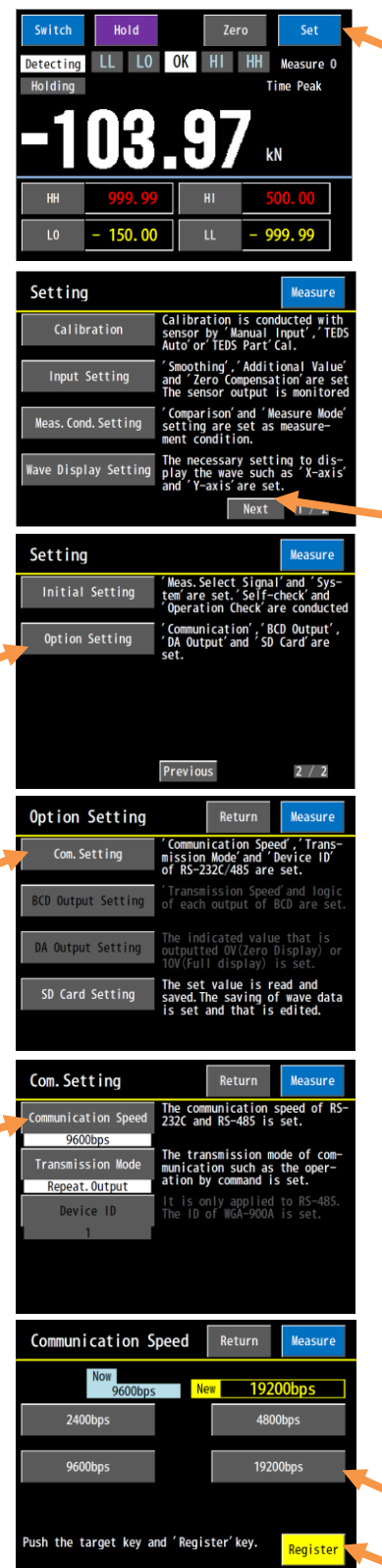
2) Press the **Next** key on the “Setting (1/2)” window.

3) Press the **Option Setting** key on the “Setting (2/2)” window.

4) Press the **Com. Setting** key on the “Option Setting” window.

5) Press the **Communication Speed** key on the “Com. Setting” window.

6) Press the target key and **Register** key to register the target value.



(2) Transmission Mode

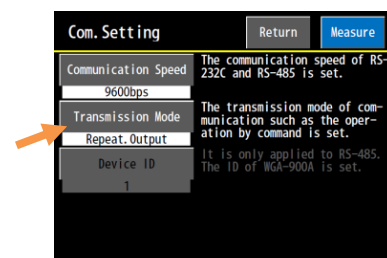
Sets the transmission mode of the communication such as the measured value, sending method of the status, operation by the command, etc.

<Setting Range>

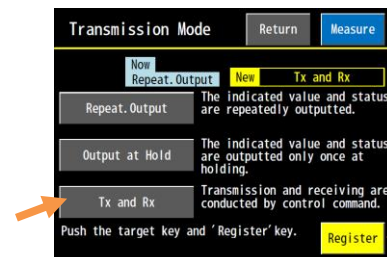
Repeat Output	Continuously outputs the measured value and status (such as the HH comparator is ON, etc).
Output at Hold	Outputs the measured value and status once during the holding time.
Tx and Rx	Sends and receives the data with the control command.

<How to operate>

- 1) Press the **Transmission Mode** key on the “**Com. Setting**” window.



- 2) Press the target key and **Register** key to register the target value.



(3) Device ID

Valid for the RS-485 only. Sets the ID of the WGA-900A.

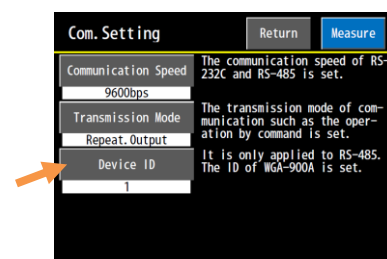
The **Device ID** key is displayed in gray when the optional RS-485 is not equipped.

<Setting Range>

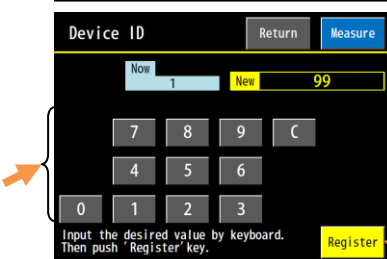
1 to 99

<How to operate>

- 1) Press the **Device ID** key on the “**Com. Setting**” window.



- 2) Input a setting value with the numeric keyboard and press the **Register** key to register the setting value.



7-2. BCD OUTPUT SETTING

7-2-1. Outline

The measured values can be acquired as BCD or Binary coded data.

Convenient for processing such as controlling, recording, etc. by connecting the PLC, printer, etc.

In addition, the input/output circuit is insulated from the WGA-900A circuit.

NOTE

Logic cannot be changed since the holding input and output prohibit input are fixed to the negative logic.

7-2-2. Pin Numbers and Signal Names

Pin assignments of the BCD output are as follows.

Pin No.	Signal Name	Pin No.	Signal Name
A1	Data 1 Output	B1	Data 2 Output
A2	Data 4 Output	B2	Data 8 Output
A3	Data 10 Output	B3	Data 20 Output
A4	Data 40 Output	B4	Data 80 Output
A5	Data 100 Output	B5	Data 200 Output
A6	Data 400 Output	B6	Data 800 Output
A7	Data 1000 Output	B7	Data 2000 Output
A8	Data 4000 Output	B8	Data 8000 Output
A9	Data 10000 Output	B9	Data 20000 Output
A10	Data 40000 Output	B10	Data 80000 Output
A11	Minus (polarity) Output	B11	OVER
A12	EOC(End Of Conversion) Output	B12	Holding Block Output
A13	Detecting Block Output	B13	N.C
A14	N.C	B14	N.C
A15	N.C	B15	N.C
A16	N.C	B16	N.C
A17	BCD Holding Input	B17	BCD Output Prohibited Input
A18	COM	B18	COM
A19	N.C	B19	N.C
A20	N.C	B20	N.C

(Note 1): Holding Block Output (Pin No. B12)

When in holding block: Open collector output is ON (Low).

(Note 2): Detecting Block Output (Pin No. A13)

When in detecting block: Open collector output is ON (Low).

7-2-3. Connecting BCD Output

Applicable connectors of the cable side are as follows when connecting the external device.

Applicable connector

Connector	Model: FCN-361J040-AU	Manufacture:	FUJITSU COMPONENT LIMITED
Cover	Model: FCN-360C040-B	Manufacture:	FUJITSU COMPONENT LIMITED

NOTE

The model and manufacture of connectors in BCD option is different from that of BCD connectors in BCD and D/A option (Model: WGA-900A-12).



7-2-4. Setting BCD Output

(1) Transmission Speed

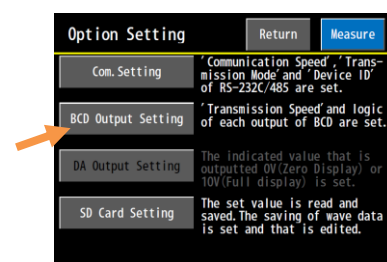
Sets the transmission speed of the BCD data output.

<Setting Range>

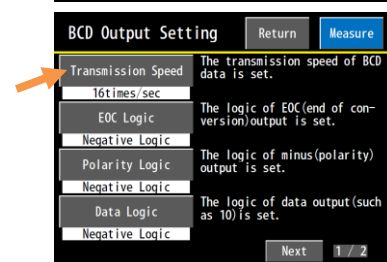
Approx. 16, 32, 64, 125 times/sec.

<How to operate>

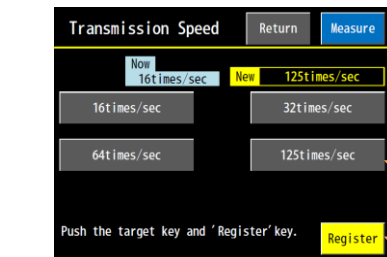
1) Press the **BCD Output Setting** key on the “Option Setting” window.



2) Press the **Transmission Speed** key on the “BCD Output Setting(1/2)” window.



3) Press the target key and **Register** key to register the target value.



(2) EOC Logic

Sets the logic of the EOC (end of conversion) output.

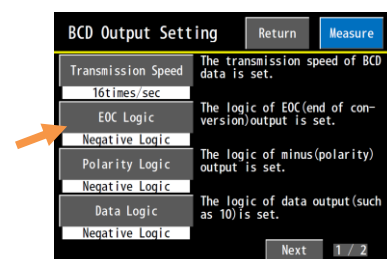
For the negative logic, the open collector output of the BCD output terminal is ON, for the positive logic, the output is OFF.

<Setting Range>

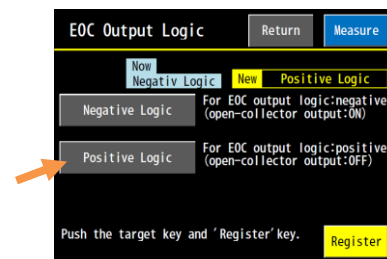
Negative logic / Positive logic

<How to operate>

1) Press the **EOC Logic** key on the “BCD Output Setting(1/2)” window.



2) Press the target key and **Register** key to register the target value.



(3) Polarity Logic

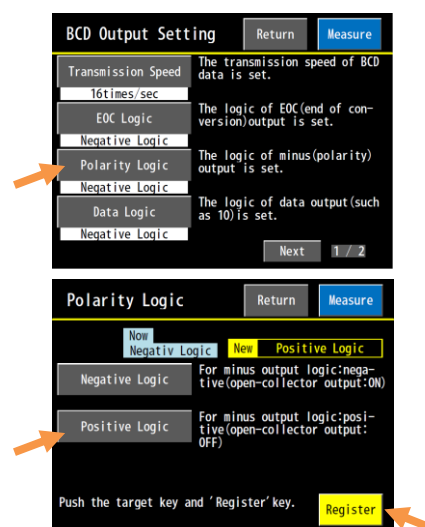
Sets the logic of the minus (polarity) output.

<Setting Range>

Negative logic / Positive logic

<How to operate>

1) Press the **Polarity Logic** key on the “BCD Output Setting(1/2)” window.



2) Press the target key and **Register** key to register the target value.

(4) Data Logic

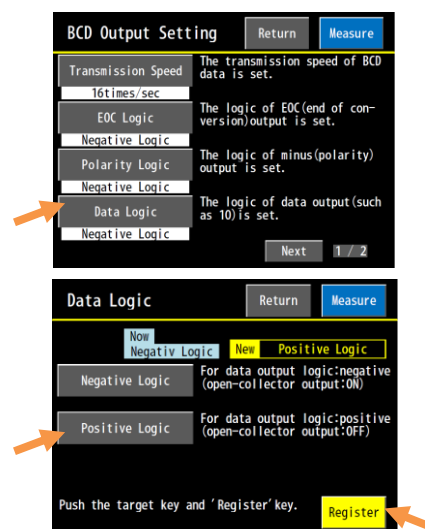
Sets the logic of the data output (10 etc).

<Setting Range>

Negative logic / Positive logic

<How to operate>

1) Press the **Data Logic** key on the “BCD Output Setting(1/2)” window.



2) Press the target key and **Register** key to register the target value.



(5) Data Form

Sets to change BCD or binary for the type of outputted data.

<Setting Range>

BCD / Binary

<How to operate>

1) Press the **Next** key on the "BCD Output Setting (1/2)" window.

2) Press the **Data Form** key on the "BCD Output Setting(2/2)" window.

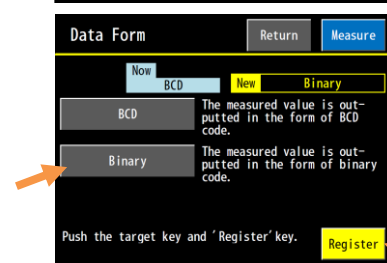
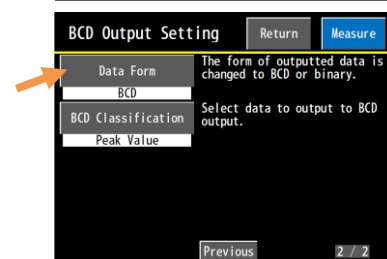
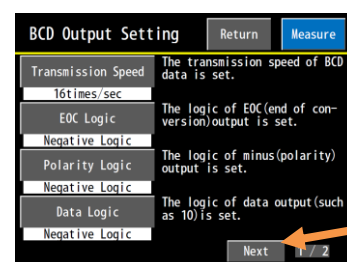
2) Press the target key and **Register** key to register the target value.

NOTE

The type of outputted binary data is offset binary.

Measured value	Binary data				
	18	16	12	8	4
99999	01	1000	0110	1001	1111
1	00	0000	0000	0000	0001
0	00	0000	0000	0000	0000
-1	11	1111	1111	1111	1111
-99999	10	0111	1001	0110	0001

←The left number shows the bit position.



(6) BCD Classification

For the [Block Peak-Bottom] and [Time Peak-Bottom] only. Outputs the target data to the BCD output.

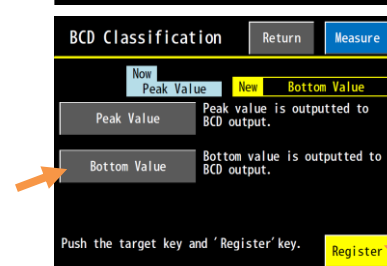
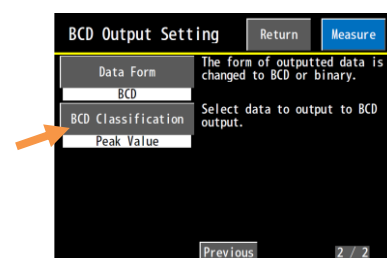
<Setting Range>

Peak value or bottom value

<How to operate>

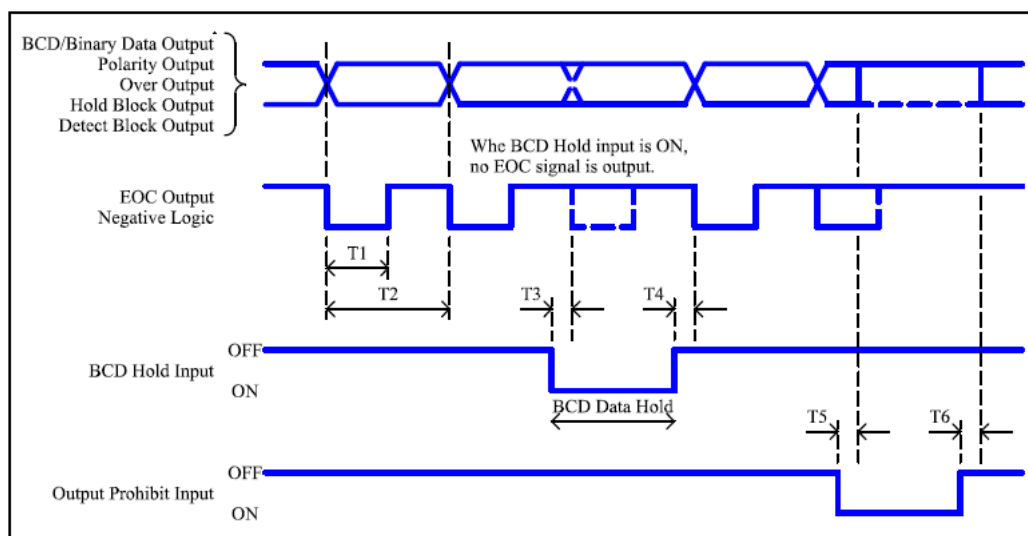
1) Press the **BCD Classification** key on the "BCD Output Setting (2/2)" window.

2) Press the **Register** key to register the target value.



7-2-5. Signal Timing

The operation timing is as follows.



T1, T2 : BCD data output time and EOC output time

Transmission Speed (rotate/sec.)	T1	T2
Approx. 125	4ms	8ms
Approx. 64		16ms
Approx. 32		32ms
Approx. 16		64ms

The EOC output time T1 is 4 ms fixed.

T3, T4 : 1ms(min) ••• Relation of the EOC output and BCD holding input

The hold signal is read when the EOC signal output is turned ON.

At this time, the output of the BCD data is not updated and EOC output is not output when the BCD hold input signal is ON.

T5, T6 : 1ms(min) ••• Relation of the EOC output and BCD output prohibited input

The output prohibited input is read when the EOC output is turned ON.

At this time, the transistors of the data output are all turned OFF if the output prohibited input is ON.

In addition, EOC output is not conducted.

NOTE

- For reading the data by the EOC (end of conversion) output with the negative logic.
After turning ON the EOC output for approx. 4 ms, read the BCD data, polarity data, OVER data, holding block output, and detecting block output within the block from the rising edge (when data changed to "H" from "L") to (T2 - T1) ms.
- For reading the data by the BCD holding input.
Set the BCD holding input to "L" and read the BCD data after 5 ms.
The BCD data does not change while the hold input is set to "L."
- The display value is not held when turning ON the BCD holding input.
- The BCD data does not output a decimal point.
- Set the output prohibited input to "L" to set all output transistors to OFF and invalid state.
- The "Minimum Scale" of the "Smoothing" does not function with the BCD data.

MEMO

- While setting the various conditions, a value just before the measurement is held as the BCD data output.
- Capable of reading the BCD data in order by controlling the BCD output prohibited input when connecting multiple BCD Output in parallel.
- The COM of the BCD data output is connected with the COM of the control input of the WGA-900A.
- The detecting block output or holding block output is turned ON as well as the BCD data output when the display value is within the detecting block or holding block.



7-3. D/A OUTPUT SETTING

7-3-1. Outline

Capable of taking out the output that was converted the measured value to the analog signal by the optional D/A output.

Convenient for processing such as recording, etc. by connecting the oscilloscope or AD board for the PC, etc.

Set the measured value (zero display) of 0 V or 4 mA output and measured value (full display) of 10 V or 20 mA output for the analog (D/A) output to work with the measured value.

In addition, the output circuit is insulated from the WGA-900A main circuit and the resolution is 14-bit or equivalent to -10 to +10 V and 4 to 20 mA.

Conversion speed is 4000 times/sec.

NOTE

The current output 4 to 20 mA is fixed to the voltage output 0 to 10 V.

7-3-2. Terminal Names and Signal Names

Terminal names (the following terminal names are described in order from left to right seeing from the back) and signal names of the D/A output terminals are as follows.

Terminal Name	Signal Name
Vo+	+ side of the voltage output (± 10 V)
Vo-	- side of the voltage output
Io+	+ side of the current output (4 to 20 mA)
Io-	- side of the current output

7-3-3. Connecting the D/A Output

Load resistance should be set as follows for connecting the external device.

Voltage Output: 2 kohm or more

Current Output: 500 ohm or less

<How to connect>

1) Peel off a jacket of a connecting wire approx. 10 mm and twist the tip of the wire for not to loosen.

Available wire range is

Single wire: ϕ 0.4 mm (AWG26) to ϕ 1.0 mm (AWG18), Twist wire: 0.3 mm² (AWG22) to 0.75 mm² (AWG20).

2) Press the upper button hard with a slotted screwdriver.

Use the slotted screwdriver with blade diameter 3 mm and width of blade edge 2.6 mm (precision screwdriver, etc).

3) Carefully insert the twisted wire to the lower hole.

4) Release the slotted screwdriver from the upper button and lightly pull the cable to check that the cable is securely clamped.

NOTE

- For connecting more than 1-m long cable, use a twisted cable.
- For connecting more than 3-m long cable, use a 2-conductor shielded cable and always ground the shielded cable to the ground terminal.
- In addition, for connecting more than 30-m long cable or using outdoors, take special countermeasures against noise.



7-3-4. D/A Output Set

(1) D/A Display

Sets the measured value (zero display) of 0 V or 4 mA output and the measured value (full display) of 10 V or 20 mA output.

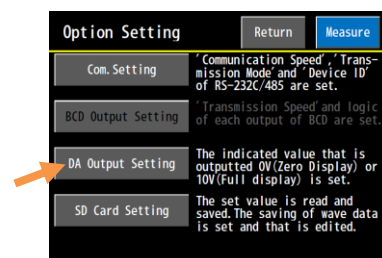
<Setting Range>

Zero Dsp. (Zero Display): -99999 to 99999

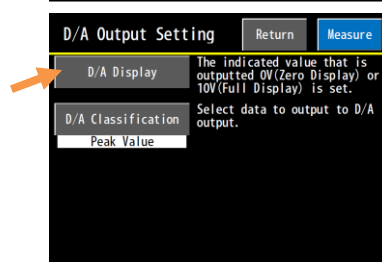
Full Dsp. (Full Display): -99999 to 99999

<How to operate>

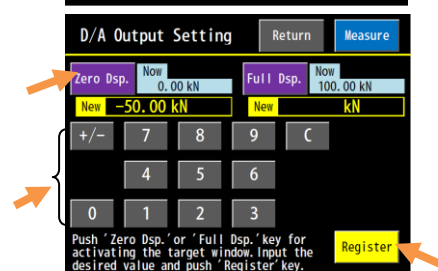
1) Press the **DA Output Setting** key on the “**Option Setting**” window.



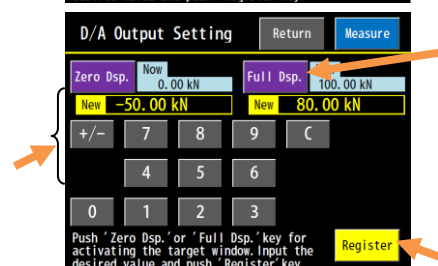
2) Press the **D/A Display** key on the “**D/A Output Setting**” window.



3) After pressing the **Zero Dsp.** key, input a setting value with the numerical keyboard.
Press the **Register** key for registering.



4) After pressing the **Full Dsp.** key, input a setting value with the numerical keyboard.
Press the **Register** key for registering.



NOTE

Be sure to set the ZERO display < Full display.
Or, the correct voltage and correct output are not output.



(2) D/A Classification

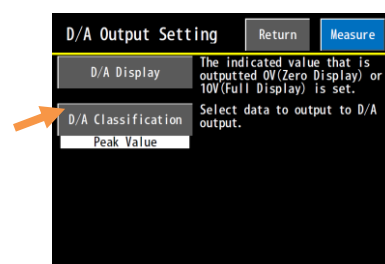
For the [Block Peak-Bottom] and [Time Peak-Bottom] only. Outputs the target data to the D/A output.

<Setting Range>

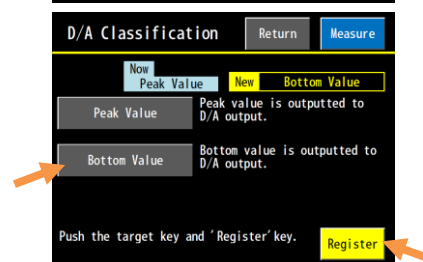
Peak value or bottom value

<How to operate>

1) Press the **D/A Classification** key on the "D/A Output Setting" window.



2) Press the **Register** key to register the target value.



7-4. SD CARD SETTING

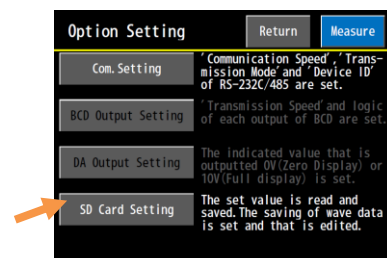
7-4-1. Set Value Save (Saving Setting Value)

Capable of saving the all setting values of the WGA-900A to the SD card and capable of checking them with the PC software for the SD card.

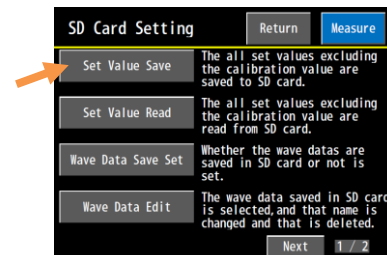
The control output [SD] is turned ON while saving the setting values.

<How to operate>

1) Press the **SD Card Setting** key on the “**Option Setting**” window.



2) Press the **Set Value Save** key on the “**SD Card Setting (1/2)**” window.



3) Press the **Execute** key on the “**Confirmation of saving the set values**” window to start saving the setting values to the SD card.

Press the **Cancel** key to get back to the previous window without saving.

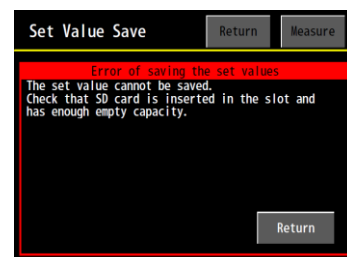
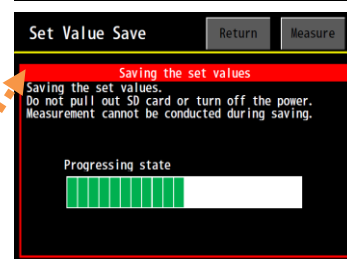


4) After starting the saving of the setting values, the “**Saving the set values**” window appears.

The red flame blinks and the progress condition is displayed on the progress bar while saving the setting value.

After the saving, the “**SD Card Set**” window appears again.

Blinks



NOTE 1

Do not remove the SD card or do not turn OFF the WGA-900A.

Or, it may cause trouble.

In addition, the measurement cannot be conducted during saving.

NOTE 2

The “**Error of saving the set values**” window appears when no SD card is inserted or the SD card does not have enough free space.

Press the **Return** key to get back to the “**Confirmation of saving the set values**” window.



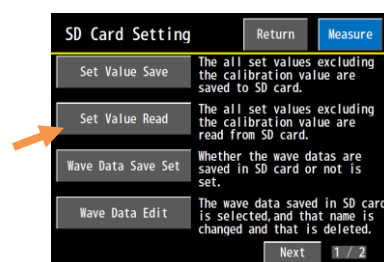
7-4-2. Set Value Read (Reading Setting Value)

After writing the edited setting value with the PC software for the SD card to the SD card, insert the SD card to the WGA-900A for reading. And the setting values of the WGA-900A are rewritten.

The control output [SD] is turned ON during reading the setting values.

<How to operate>

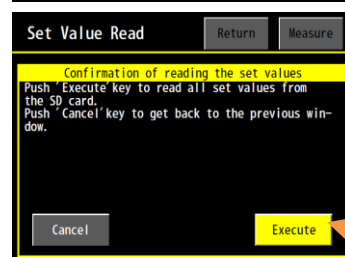
- 1) Press the **Set Value Read** key on the “SD Card Setting (1/2)” window.



- 2) Press the **Execute** key on the “Confirmation of reading the set values” window.

The setting values are read from the SD card and setting values of the WGA-900A are rewritten.

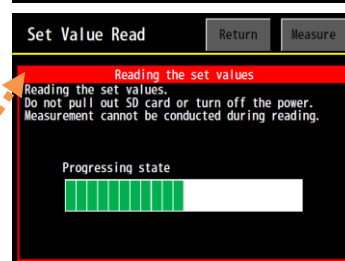
Press the **Cancel** key to get back to the previous window without reading the setting values.



- 3) Starts reading the setting values and “Reading the set values” window appears.

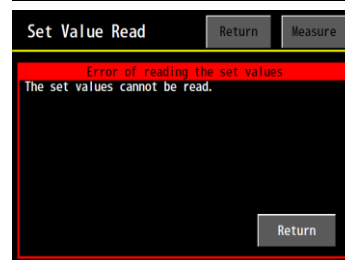
The red flame blinks and the progress condition is displayed on the progress bar while saving the setting value.

After the saving, the “SD Card Setting” window appears again.



NOTE 1

Do not remove the SD card or do not turn OFF the WGA-900A.
Or, it may cause trouble.
In addition, the measurement cannot be conducted during reading.



NOTE 2

The “Error of reading the set values” window appears when no SD card is inserted or the SD card does not have enough free space.

Press the **Return** key to get back to the “Confirmation of reading the set values” window.

■About setting value file.

File name of the setting value is as follows and the file format is dedicated to the WGA-900A.

WGA900A_SET.KS

Including all setting values (excluding the calibration value). Also includes the measuring condition setting values from No. 1 to 32.

NOTE

- Never change the file name.
Or, the setting values cannot be read.
- Save the setting value file in the root directory (ex. ¥E Drive) of the SD card.
Or, the setting values cannot be read from the WGA-900A.



7-4-3. Wave Data Save Set (Saving Waveform Data)

Sets whether to save or not save the waveform data to the SD card every time the waveform data of 1 window is loaded.

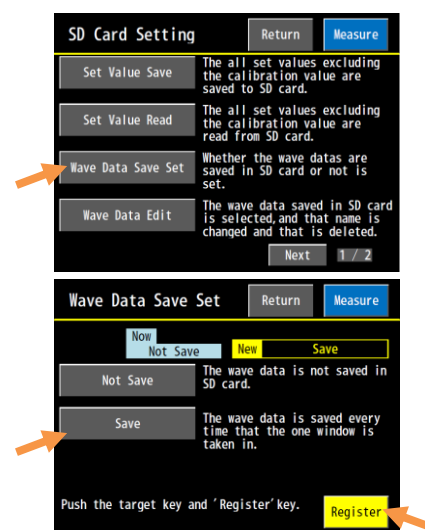
<Setting Range>

Save / Not Save

<How to operate>

1) Press the **Wave Data Save Set** key on the “SD Card Setting (1/2)” window.

2) Press the target key and **Register** key for registering.



■How to save the waveform data.

- 1) It takes approx. 2.5 sec on average (when using the recommended RSDC-S2GC4) for writing the waveform data of one window to the SD card.
However, the requiring time varies with the using SD card or measuring conditions.
- 2) The waveform data is saved with the following file name and the newly created file is KYOWA original format.
WGA_900A_Dxxx.KS (xxx : 001~100)
- 3) New waveform file is not created when the all waveform files (No. 001 to No. 100) saved in the SD card is already filled.
(Does not overwrite the waveform file No. 001.)
- 4) Capable of measuring the data with saving the waveform to the SD card.
However, the next measurement cannot be started for approx. 1.5 sec. to complete the saving of the downloaded waveform data.
- 5) The control output [SD] is turned ON while saving the waveform data in the SD card.
The next measurement cannot be started even if the control input [waveform command] is turned ON while turning ON the control output [SD].
- 6) The number of the waveform data of one window is 2001. The capacity including the detection point data is approx. 8 KB.
- 7) Suppose the **Start** key is pressed to start the waveform display and the **Stop** key is pressed before the end point of the X-axis.
The waveform data and detecting point data up to that point are saved.
- 8) Varies with the downloading mode. Saves multiple waveforms (by pressing the **Start** key and **Stop** key) in order to one waveform file.
- 9) Max. 1000 windows waveform data and detecting point data are saved in one waveform file when saving the multiple waveform data in series. In that case, the capacity is approx. 8 MB.
- 10) The waveform data is saved in the waveform file from small No. to large No. when there is empty waveform file.

[Example]

Suppose the waveform file No. 001, No. 003 and No. 005 already have waveform data.

The next target waveform data is saved in the waveform file No. 002.

- 11) The waveform data is saved in the empty waveform file having the smallest No. after one waveform file saves the waveform data 1000 windows.

[Example]

Suppose the waveform file No. 001, No. 003 and No. 005 already have waveform data.

The next target waveform data is saved in the waveform file No. 002.



NOTE

If the SD Card Check is conducted with many files or large capacity file saved in the SD card, the “**Checking SD card**” stops blinking and it seems that the WGA-900A stops.

In addition, the WGA-900A may not immediately get back to the state before displaying the waveform unless the  key is pressed.

This is because it takes time to check the free capacity of the SD card.

Wait for a while and the “**Checking SD card**” window blinks again.

Do not remove the SD card until you have received the result.

It is recommended to save the waveform data in the SD card with no file saved in the SD card.

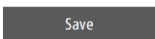
■ About writing/reading the setting value to the SD card and reading the waveform data

Capable of writing the setting value to the SD card and capable of reading the setting value and waveform data from the SD card with the PC software for the SD card.

Capable of converting the waveform data to the CSV file and displaying the waveform.

The PC software for the SD card Instruction Manual are included in the accessory CD-R.

NOTE

After selecting the  key and if the following conditions happen, an error window appears. To close the error windows, operate as follows.

- 1) The SD card is not inserted to the slot or the SD card is still write-protected even if the  key is pressed on the “**Waveform**” window.

To close the error window, press the  key to get back to the “**Waveform**” window.

Insert the SD card or release the write-protected mode.

- 2) After pressing the  key on the “**Waveform**” window or while saving the waveform data after starting the waveform display, the waveform files from No. 001 to No. 100 are all filled with data.

To close the error window, press the   key to change the window or remove the SD card from the slot.

- 3) The SD card is removed from the slot after starting the waveform display.

To close the error window, press the  key and stop the updating of the waveform display.

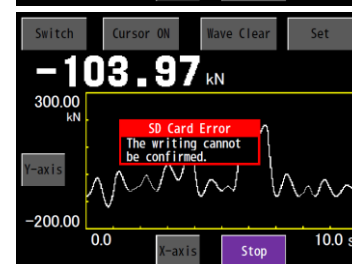
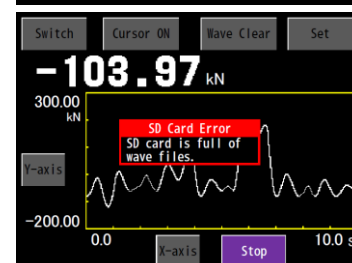
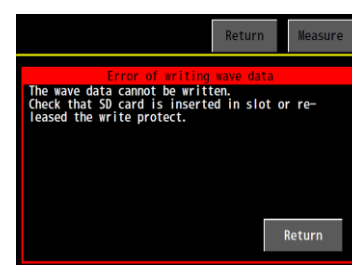
Then press the   key to change the window.

Insert the SD card to the slot again.

- 4) The free capacity of the SD card is not enough after pressing the key on the waveform display window.

To close the error window, press the  key to get back to the waveform display window.

Then remove the SD card from the slot and increase the free capacity by erasing the extra file, etc.

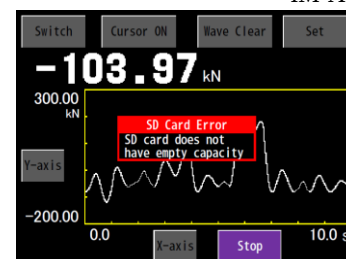


- 5) The free capacity of the SD card is not enough while saving the waveform data.

Press the **Start** key and stop updating the waveform display to close the error window.

To close the error window, press the **Set** **Switch** key to change the window or remove the SD card from the slot.

Then remove the SD card from the slot and increase the free capacity by erasing the extra file, etc.



7-4-4. Wave Data Edit (Editing Waveform Data File)

Capable of displaying the saved waveform data file in the SD card as a list and capable of changing/deleting the name of the selected waveform data file.

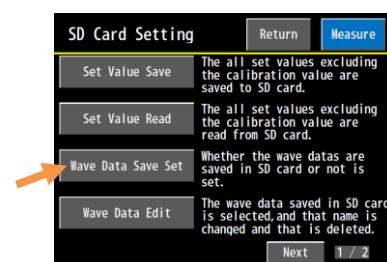
Capable of changing/deleting names by selecting not only 1 data but also multiple or all data.

For selecting multiple or all data, data names are sequentially changed from the smallest data name No. in order.

The control output [SD] is ON while reading the waveform data file, changing and deleting the name.

<To browse the waveform data file>

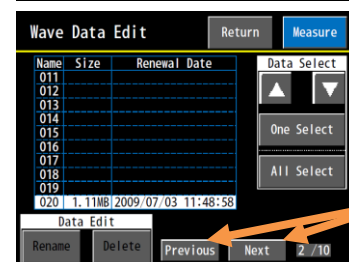
- 1) Press the **Wave Data Edit** key on the “SD Card Setting (1/2)” window.



- 2) Capable of browsing the “Name”, “Size”, and “Renewal Data” for 10 data on 1 page.

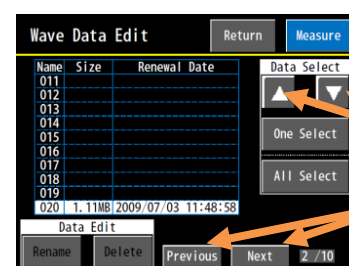
Press the **Next** key to display the data of “001” to “020” (2/10 pages).

Capable of browsing 10 pages (100 data) in all.



<To select or release 1 data name or multiple data file names>

- 1) After changing pages by pressing the **Previous** **Next** key, press the **▲▼** key of the “Data Select” column to highlight (white base and black characters) the target data.

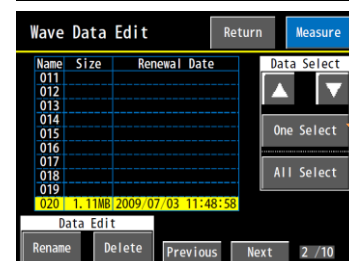


- 2) Press the **One Select** key.

The “Name, Size, and Renewal Data” of the selected data file changes to yellow base and black character.

[020] data is selected in the right figure.

To cancel the selection, press the **One Select** key again to get back to the normal highlight display.



<To select or release all data files>

1) For selecting all data files.

Press the **All Select** key to change the all data to highlight (yellow base and black character).

However, No. with no data is displayed as-is.

2) For releasing all data files.

Press the **All Select** key again.

The window gets back to the previous window.

NOTE

Do not remove the SD card or do not turn OFF the WGA-900A.

Or, it may cause trouble.

In addition, the measurement cannot be conducted during editing.

<To rename the waveform data file name>

■ For changing 1 data file name or multiple data file names.

1) Follow the <To select or release 1 data file name or multiple data file names> or <To select or release all data files> in the previous page and select the target data.

Data files from [005] and [020] are selected in the right figure.

2) After selecting the data files, press the **Rename** key.

3) The “**Confirmation of renaming the wave data**” window appears.

Use the **◀▶** key in the “**New Data Name**” column to move the digit, **▲▼** key to change the number and input the new data file name.

4) After inputting, press the **Execute** key to change the waveform data file name.

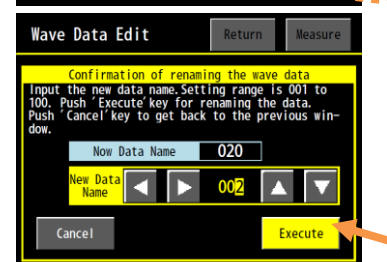
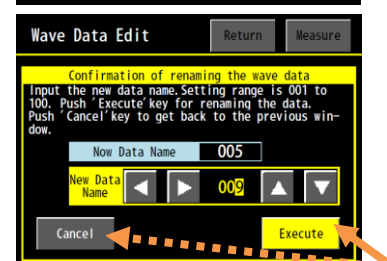
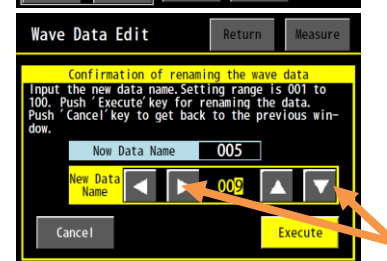
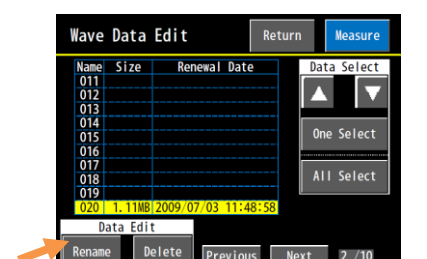
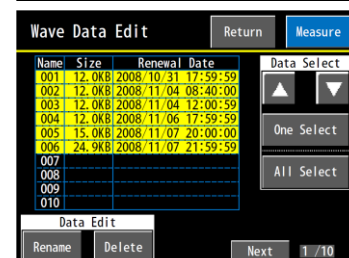
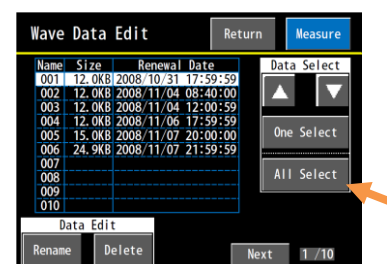
Note that the SD card does not have the data file name [009].

Press the **Cancel** key to get back to the previous window without changing the data name.

5) The data file name of the 2nd smallest number is displayed as the current data file name if multiple data files are selected.

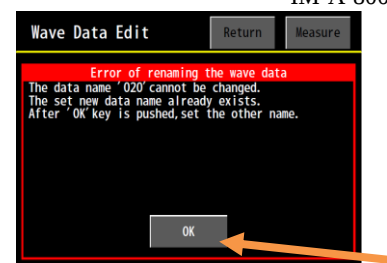
Input the new data file name and press the **Execute** key.

The current data name [020] is changed to the new data file name [002] in the right figure.



- 6) The right error message appears when the data file name [002] already exists in the SD card.

Press the **OK** key to get back to the previous 5) window.
Input another file name (not using number) again.



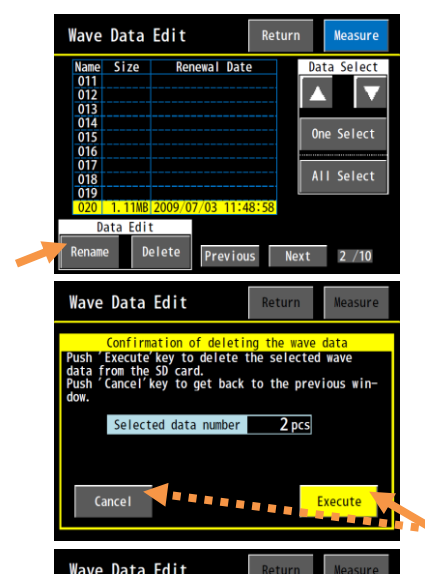
- 7) After changing the file name, the window gets back to the “Wave Data Edit” window.

<To delete waveform data file name>

- 1) Follow the <To select or release 1 data file name or multiple data file names> or <To select or release all data files > in the previous page and select the target data file.

Data files [005] and [020] are selected in the right figure.

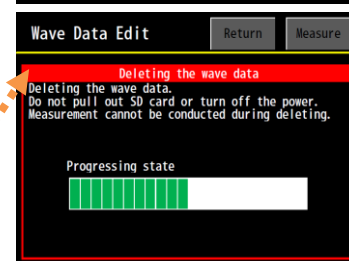
- 2) After selecting the data file, press the **Delete** key.



- 3) After checking the “Selected data number”, press the **Execute** key for deleting.
Press the **Cancel** key to get back to the previous window without deleting.

- 4) “Deleting the wave data” window appears while deleting the data file.
The red flame blinks and the progress condition is displayed on the progress bar while saving the setting value.
After the saving, the “Wave Data Edit” window appears again.

Blinks



7-4-5. Format

Erases (quick format) the all data saved in the SD card.

<How to operate>

1) Press the **Next** key on the “SD Card Setting (1/2)” window.

2) Press the **Format** key on the “SD Card Setting (2/2)” window.

3) Press the **Execute** key on the “Confirmation of Format” window to format the SD card.

Press the **Cancel** key to get back to the previous window without formatting.

4) Format starts and the “**Formatting**” window appears.

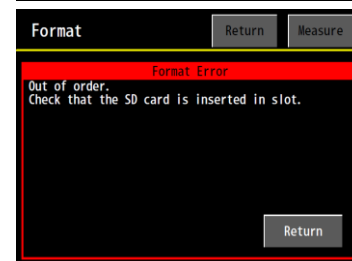
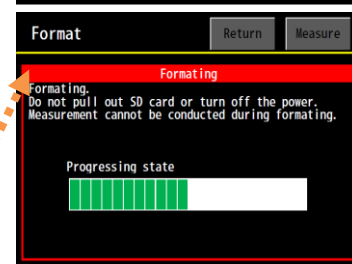
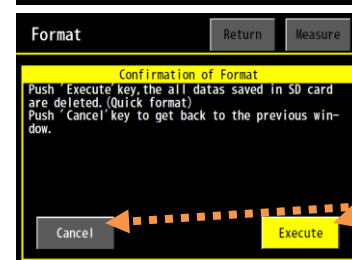
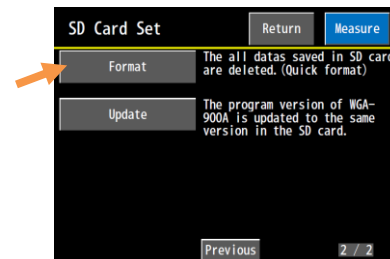
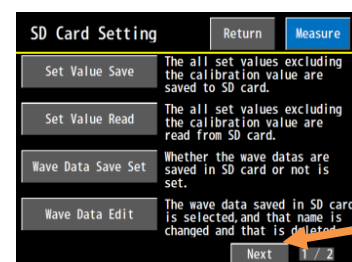
The red flame blinks and the progress condition is displayed on the progress bar during formatting.

After completing the formatting, the “SD Card Set (2/2)” window appears again.

NOTE

The “**Format Error**” window appears if the **Execute** key is pressed with no SD card inserted or with write-protected mode.

Press the **Return** key to get back to the “**Confirmation of Format**” window.

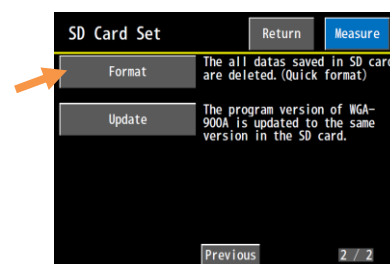


7-4-6. Update

Capable of updating the program version of the WGA-900A to the target version in the SD card.

<How to operate>

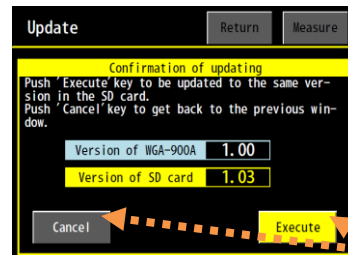
- 1) Press the **Update** key on the “SD Card Setting (2/2)” window.



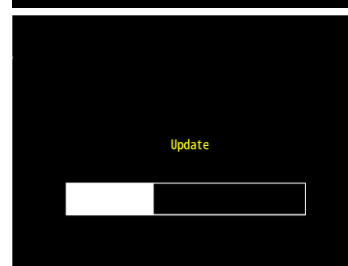
- 2) Check the program version of the WGA-900A and that of in the SD card on the “Confirmation of update” window.

Press the **Execute** key to rewrite the program version of the WGA-900A to that in the SD card.

Press the **Cancel** key to get back to the previous window without updating.



- 3) After starting the updating, the progress condition is displayed with the progress bar. The “POWER” LED lights up in red during updating. After finishing the updating, the “POWER” LED lights up in green.

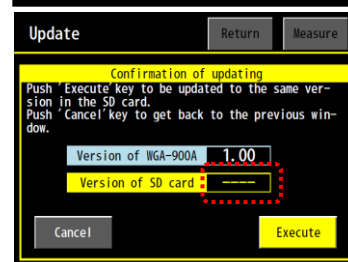


NOTE 1

Do not remove the SD card or turn OFF the WGA-900A during updating. Or, it may cause trouble such as a window does not start again.

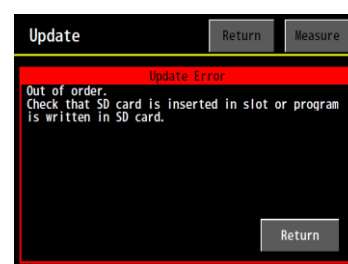
MEMO

The version of the SD card is displayed as “-” with no SD card inserted or no updating program written in the SD card.



NOTE 2

The “Update Error” window appears if the **Execute** key is pressed with no SD card inserted or with no updating program written in the SD card. Press the **Return** key to get back to the “Confirmation of update” window.



- 4) Turn OFF the WGA-900A and turn ON it again.

The new version is displayed on the right side of the opening window.

Check that the version is changed to the new one.

In addition, check that the version of the WGA-900A is updated on the “Self-check” window.



■ About program for updating

4 program names are as follows.

PVER.h

WGA900_A.BIN

WGA900_B.BIN

WGA900_C.BIN

The file format is dedicated to the WGA-900A.

NOTE

- Never change the file name.
Or, you cannot update the program.
- Save the all 4 programs in the root directory (ex. ¥E Drive) of the SD card.
Or, you cannot update the program.



7-5. BCD and D/A OUTPUT SETTING

7-5-1. Outline

The measured value can be acquired as BCD or binary coded data, and the measured value output converted to the analog signal can be taken out simultaneously by the optional BCD and D/A output.

7-5-2. Outline of BCD / Binary Output

The setting contents of BCD / binary output by the optional BCD and D/A output is the same as that of the optional BCD output. (Refer to “7-2-4. BCD Output Set.”)

7-5-3. Pin Numbers and Signal Names of the BCD Output Terminal

Pin assignments of the BCD output are as follows.

Pin No.	Signal Name		Pin No.	Signal Name	
	BCD Output	Binary Output		BCD Output	Binary Output
1	Data 1 Output	Data 2 ⁰ (1) Output	19	Data 2 Output	Data 2 ¹ (2) Output
2	Data 4 Output	Data 2 ² (3) Output	20	Data 8 Output	Data 2 ³ (4) Output
3	Data 10 Output	Data 2 ⁴ (5) Output	21	Data 20 Output	Data 2 ⁵ (6) Output
4	Data 40 Output	Data 2 ⁶ (7) Output	22	Data 80 Output	Data 2 ⁷ (8) Output
5	Data 100 Output	Data 2 ⁸ (9) Output	23	Data 200 Output	Data 2 ⁹ (10) Output
6	Data 400 Output	Data 2 ¹⁰ (11) Output	24	Data 800 Output	Data 2 ¹¹ (12) Output
7	Data 1000 Output	Data 2 ¹² (13) Output	25	Data 2000 Output	Data 2 ¹³ (14) Output
8	Data 4000 Output	Data 2 ¹⁴ (15) Output	26	Data 8000 Output	Data 2 ¹⁵ (16) Output
9	Data 10000 Output	Data 2 ¹⁶ (17) Output	27	Data 20000 Output	Data 2 ¹⁷ (18) Output
10	Data 40000 Output	Always OFF	28	Data 80000 Output	Always OFF
11	Minus (polarity) Output	Always OFF	29	OVER	
12	EOC (End Of Conversion) Output		30	Holding Block Output	
13	Detecting Block Output		31	N.C	
14	N.C		32	N.C	
15	N.C		33	N.C	
16	N.C		34	N.C	
17	BCD Holding Input		35	BCD Output Prohibited Input	
18	COM		36	COM	

(Note 1): Holding Block Output (Pin No. 30)

When in holding block: Open collector output is ON (Low).

(Note 2): Detecting Block Output (Pin No. 13)

When in detecting block: Open collector output is ON (Low).

7-5-4. Connecting BCD Output

Applicable connectors of the cable side are as follows when connecting the external device.

Applicable connector

Connector	Model: 10136-3000PE	Manufacture: Sumitomo 3M Limited
Cover	Model: 10336-52F0-008	Manufacture: Sumitomo 3M Limited

NOTE

The model and manufacture of connectors in BCD and D/A option is different from that of connectors in BCD option (Model: WGA-900A-1).



7-5-5. Outline of D/A Output

The setting contents of D/A output of the optional BCD and D/A output is the same as that of the optional D/A output. (Refer to “7-3-4. D/A Output Set.”)

In addition, the output circuit is insulated from the WGA-900A main circuit and the resolution is 14 bits equivalent.

(Output range: -10 to +10 V, 4 to 20 mA)

Conversion speed is 2000 times/sec.

NOTE

Coversion speed of the optional BCD and D/A is half as much as that of the optional D/A (model: WGA-900A-2).

7-5-6. Terminal Names and Signal Names of the D/A Output Terminal

Terminal names (the following terminal names are described in order from left to right seeing from the back) and signal names of the D/A output terminals are as follows.

Terminal Name	Signal Name
Vo+	+ side of the voltage output (± 10 V)
Vo-	- side of the voltage output
Io+	+ side of the current output (4 to 20 mA)
Io-	- side of the current output

7-5-7. Connecting the D/A Output

Load resistance should be set as follows for connecting the external device.

Voltage Output: 2 kohm or more

Current Output: 500 ohm or less

<How to connect>

1) Peel off a jacket of a connecting wire approx. 10 mm and twist the tip of the wire for not to loosen.

Available wire range is

Single wire: ϕ 0.4 mm (AWG26) to ϕ 1.2 mm (AWG16), Twist wire: 0.2 mm² (AWG24) to 1.25 mm² (AWG16).

2) Press the upper button hard with a slotted screwdriver.

Use the slotted screwdriver with blade diameter 3 mm and width of blade edge 2.6 mm (precision screwdriver, etc).

3) Carefully insert the twisted wire to the lower hole.

4) Release the slotted screwdriver from the upper button and lightly pull the cable to check that the cable is securely clamped.

NOTE

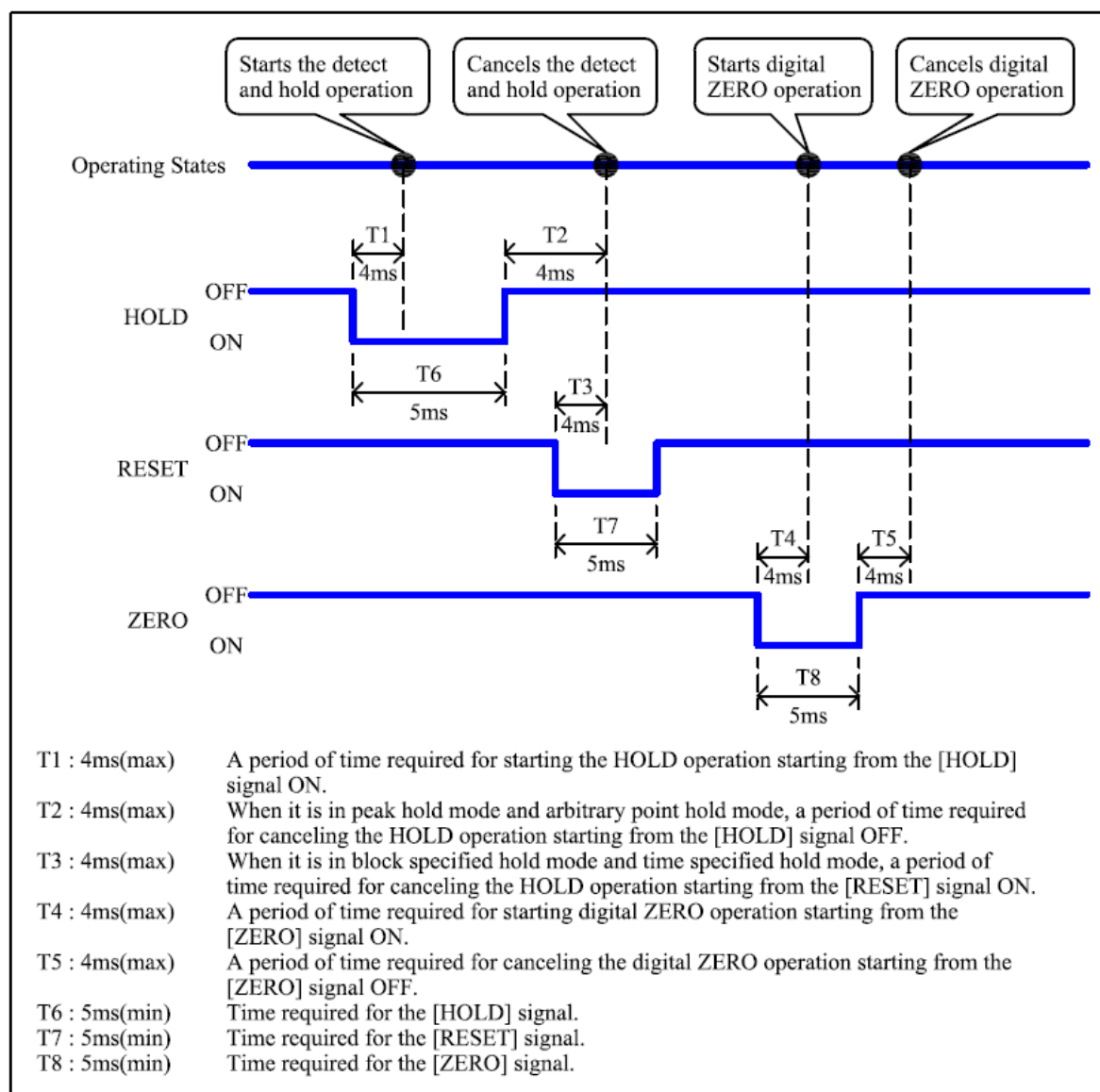
- For connecting more than 1-m long cable, use a twisted cable.
- For connecting more than 3-m long cable, use a 2-conductor shielded cable and always ground the shielded cable to the ground terminal.
- In addition, for connecting more than 30-m long cable or using outdoors, take special countermeasures against noise.
- Do not solder the wire or mount the press-fit terminal.
- Be sure to turn OFF the WGA-900A before connecting cables.
- For connecting multiple wires, twist them in advance. Check that the twisted wires are within the above range.



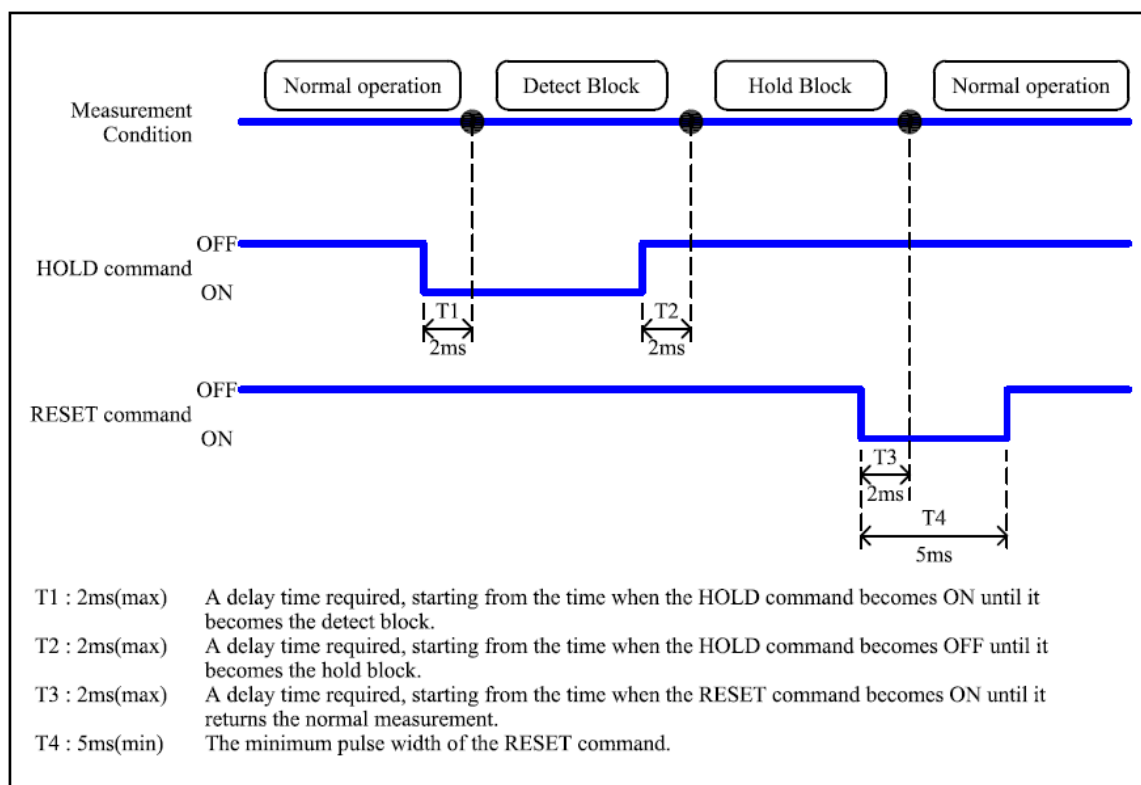
8. OPERATION TIMING

8-1. CONTROL INPUT (HOLD COMMAND, RESET COMMAND, ZERO COMMAND)

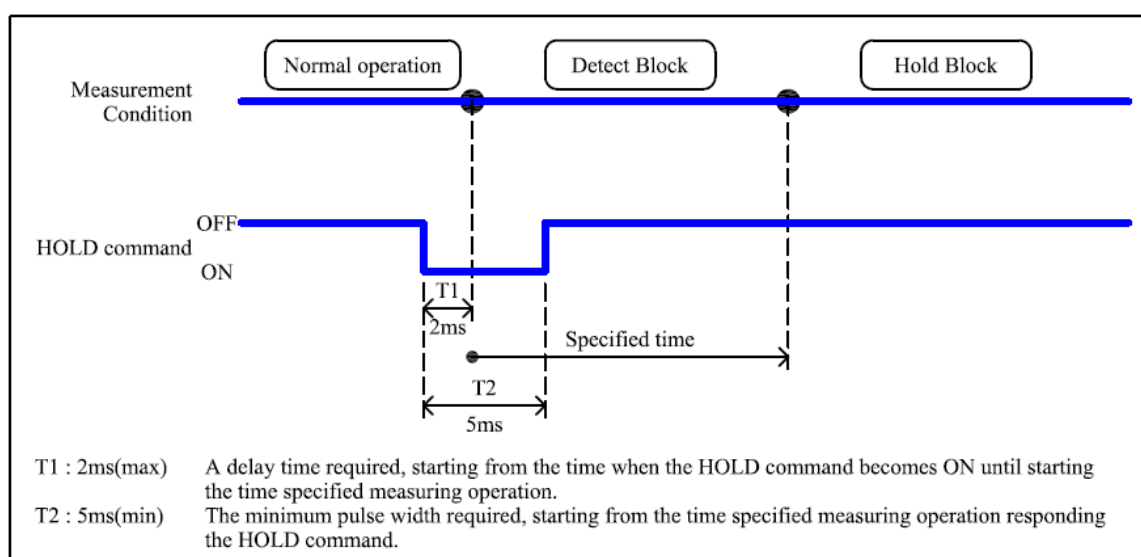
8-1-1. Control Input



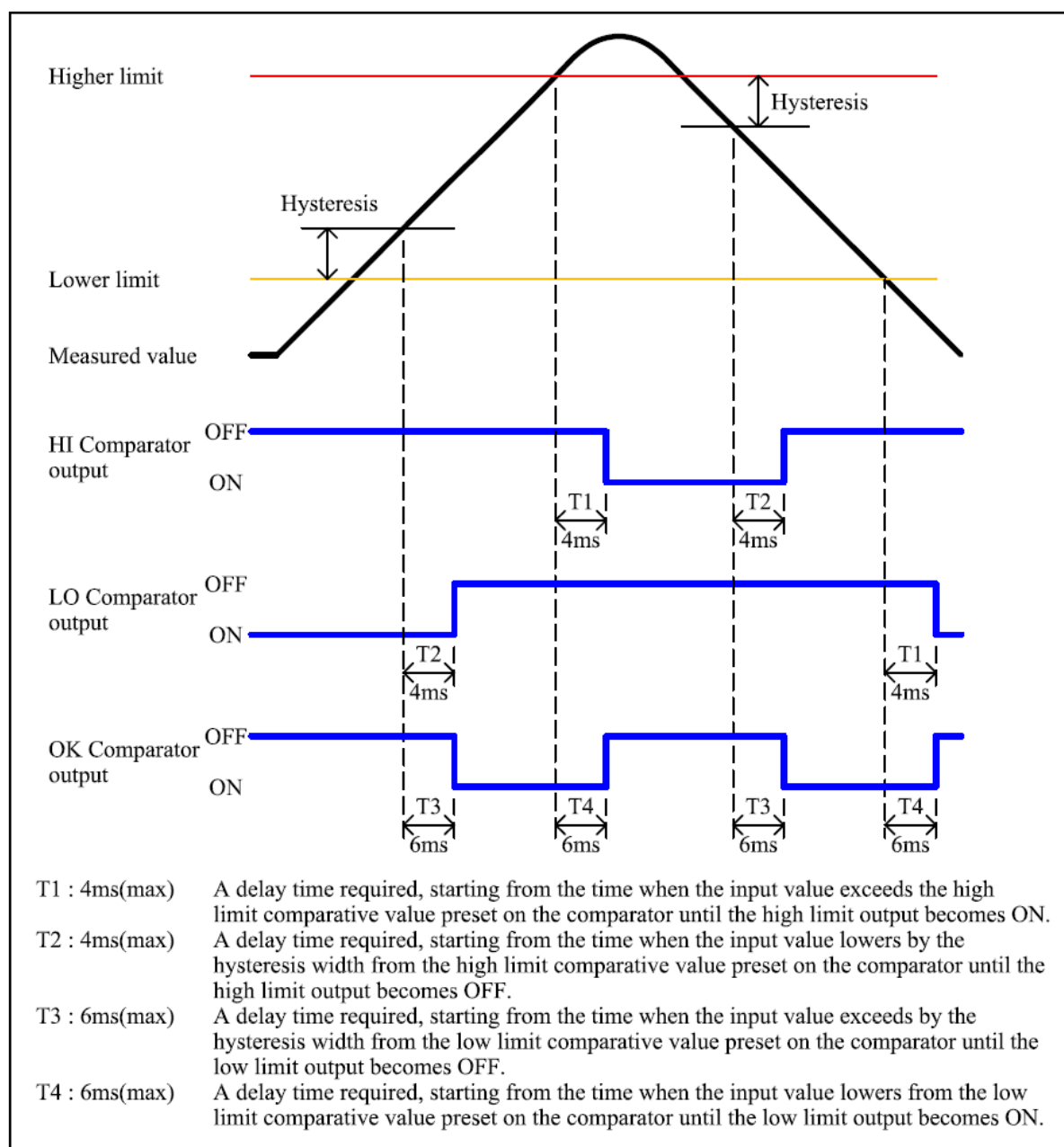
8-1-2. Block-specified



8-1-3. Time-specified



8-2. COMPARATOR OUTPUT



8-3. DELAY TIME BETWEEN INPUT AND OUTPUT

Delay time between input - BCD output:	MAX 4 ms (For the transmission speed: Approx. 125 times / sec.)
Delay time between input - RS output:	MAX 30 ms
Delay time between input - D/A output:	MAX 3 ms



8-4. DISPLAYING WAVEFORMS AND OUTPUTTING SD SIGNAL WITH WAVEFORM

COMMAND (CONTROL INPUT)

<Conditions>

Measuring condition setting

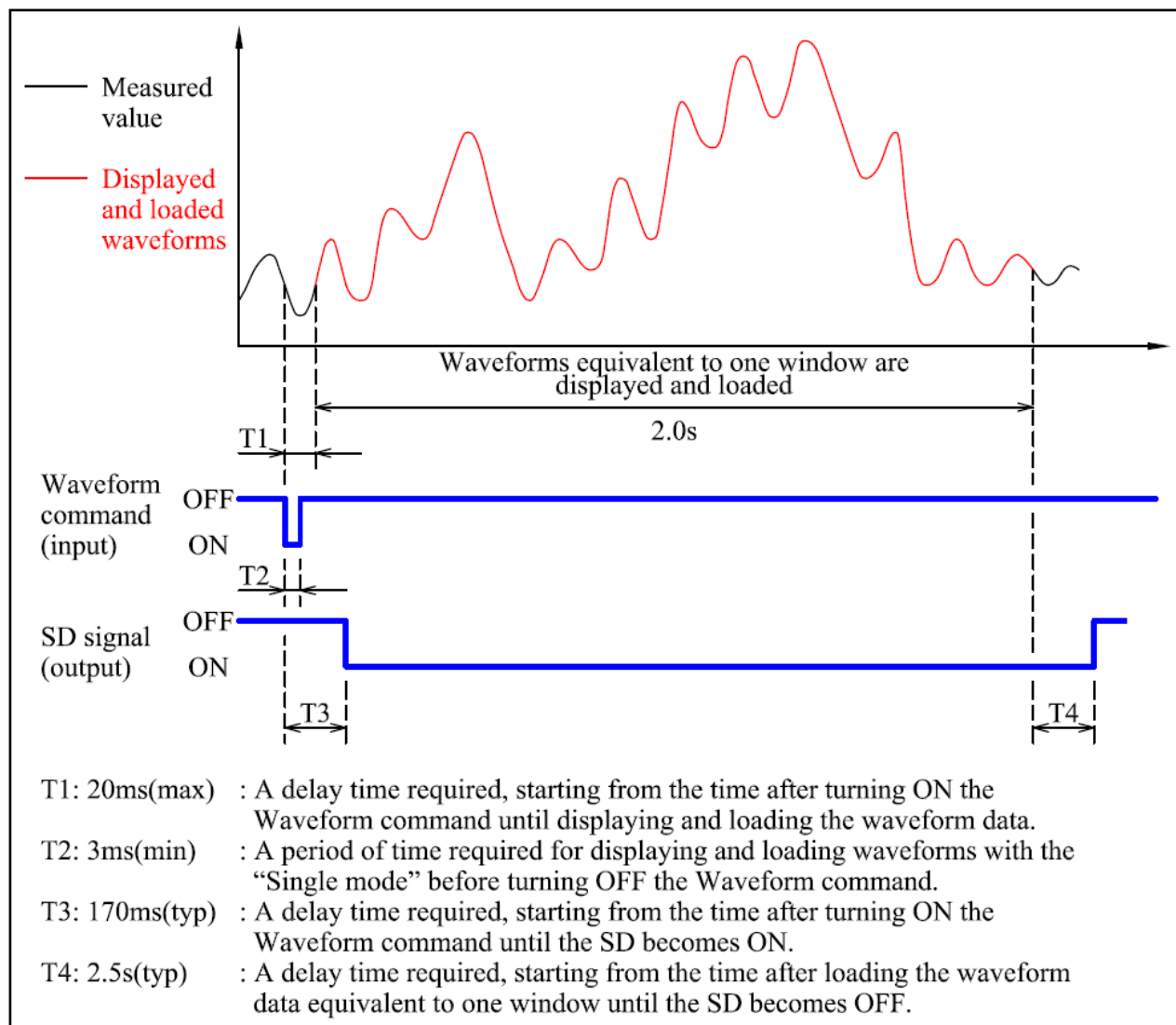
Operation mode: Normal

Waveform display setting

X-axis setting: 2.0 sec, Start Mode of Wave: Single mode

SD card setting

Wave Data Save Set: Save



NOTE

- You can obtain the typical values with the blank recommended SD card (refer to page 26).
- According to the followings, typical values of the T3 and T4 may change with the above values.

Manufactures and types of the SD card
Speed class and capacities of the SD card
Data in the SD card
Operation modes (Block Peak-Bottom, etc.)

MEMO

- After checking that the SD signal is turned OFF, turn ON the Waveform command.
- After turning ON the Waveform command and if you want to cancel the loading of waveform data, turn OFF and ON the command. Then, turn OFF the Waveform command.



9. TROUBLE SHOOTING

If the WGA-900A does not function as expected or is found unstable, do not immediately take it that the WGA-900A has failed, but check the operating environment for possible causes.

This section describes causes of every phenomenon and checking methods.

If all this fails to recover normal operation, contact KYOWA or our representatives.

KYOWA may deny repairs when the WGA-900A has been damaged through improper usage (i.e. not confirming to guidelines described in this manual), or when the WGA-900A has been disassembled or modified by the user.

9-1. POWER SWITCH CANNOT TURN ON THE WGA-900A

The power cable may be faulty or fuse may be melted when the “POWER” LED does not light up even if the turning ON the WGA-900A or when nothing is displayed on the LCD.

First, check to be sure that the power cable is not broken.

Contact KYOWA or our representatives if a fuse may be melted.

9-2. DISPLAYING ERRORS

Check the followings if the errors are displayed.

1) No-load Zero

Displaying Content: Stops the no-load zero.

Cause: Sensor input is exceeding ± 3.2 mV/V during conducting the no-load zero.
In addition, the sensor may be faulty, cable may be disconnected or may be incorrectly connected.

How to Check: Check that the sensor is in no-load state or receiving an excessive load.
After that, conduct the channel check.

2) Sens. Registering

Displaying Content: Stops the sensitivity registering.

Cause: The setting value of the rated output and rated display may out of the specification range or may not set ± 10000 per 0.1 mV/V or less.
In addition, the actual load calibration may be conducted with the nearly same load of the no-load zero.

How to Check: Check the setting value of the sensitivity registering calibration or actual load calibration again.

3) Indicated Value + Over/Indicated Value - Over

Displaying Content: The displaying value is higher than +99999.
The displaying value is lower than -99999.

Cause: The setting value of the rated display to the rated output of the sensitivity registering calibration (actual load calibration) may excessively large.

How to Check: Check the setting value of the sensitivity registering calibration (actual load calibration) again.
Check the setting value of the rated display again.
In addition, conduct the channel check.

4) Input Value + Over/Input Value - Over

Displaying Content: The input is higher than +3.2 mV/V.
The input is lower than -3.2 mV/V.

Cause: The rated output of the sensor (including zero point float) may exceeds ± 3.2 mV/V.
In addition, the sensor may be faulty, cable may be disconnected or may be incorrectly connected.

How to Check: Conduct the channel check.



5) TEDS Error

Displaying Content:

Cause:

Stops the reading of the TEDS information.

The TEDS information may not be read correctly or the interface may not corresponding to the IEEE1451.4 Mixed Mode Transducer Interface Class 2.

In addition, the sensor may be faulty, cable may be disconnected or may be incorrectly connected.

The cable length may exceeds 30 m.

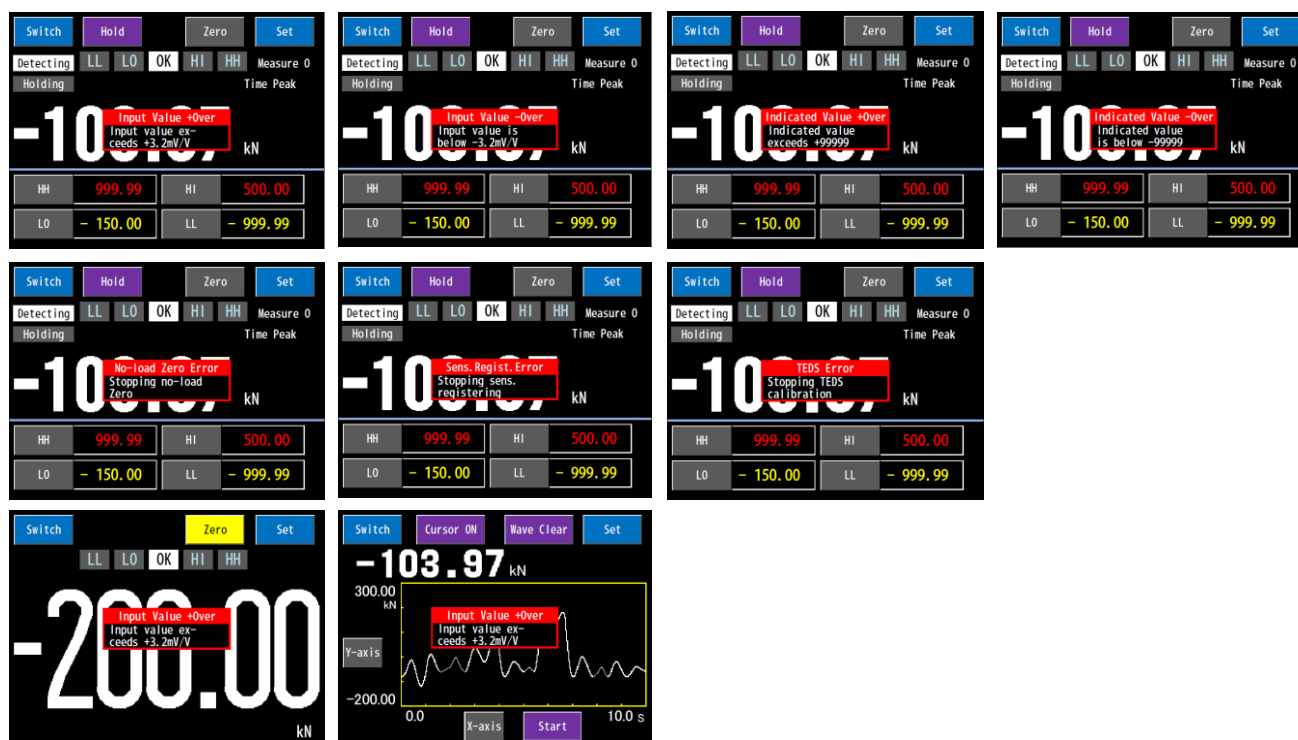
How to Check:

Check that the connecting sensor is corresponding to the TEDS.

Check that the connecting sensor has information based on the IEEE template No. 33.

Check that the cable length is 30 m or less.

■ Error during the measurement



■ Error during the setting



MEMO

The following error displays blink while occurring.

For the “No-load Zero”, “Sens. Registering”, and “TEDS Error,” after stopping the procession, the error display blinks for 3 seconds. After that, the error display disappears and gets back to the normal window.

In addition, the control output [Healthy] is OFF while the error is occurring.

■ Priority of error displays

The errors are displayed in order of priority.

- 1) Input Value + Over/Input Value - Over
- 2) Display Value + Over/Display Value - Over
- 3) No-load Zero
- 4) Sens. Registering
- 5) TEDS Error

MEMO

The error displays are as follows when multiple errors occurred.

No-load zero error occurred during the “Input Value + Over” blinking.

The “No-load Zero” blinks for 3 seconds.

After that, the “Input Value + Over” blinks again if the input value is exceeding +3.2 mV/V.

If all this fails to recover normal operation, contact KYOWA or our representatives.

9-3. DISPLAY VALUE OR MONITOR OUTPUT DOES NOT CHANGE

● **The display value does not change and monitor output does not output.**

The input cable is not correctly connected to the [INPUT] connector or is broken.

Conduct the channel check.

● **The display value changes but monitor output does not output.**

The monitor output cable is not correctly connected to the [MONITOR] terminal board or is broken.

Repair or replace the monitor output cable.

If all this fails to recover normal operation, contact KYOWA or our representatives.

9-4. ZERO POINT IS UNSTABLE

● Sufficient pre-heat is not conducted.

Preheat the WGA-900A for approx. 30 minutes.

● When the no-load output of the connecting sensor is unstable.

Repair or replace the connecting sensor.

If all this fails to recover normal operation, contact KYOWA or our representatives.



9-5. LARGE NOISE

Probable causes are as follows.

● Inductive Interference

Induction noise may be generated if an instrument having large leakage flux is near the WGA-900A.

The instrument is such as large motor, electrical transformer, ferroresonance type constant voltage device.

In addition, the induction noise may be also generated if the instrument is far from the WGA-900A.

Take countermeasures as follows.

- Set the WGA-900A away from the noise source.
- Use the shielded cable for the sensor cable and connect the shield wire to the E terminal of the [INPUT] connector.

● Interference due to electrical potential

Occurs when a measuring object has an electrical potential of DC or AC.

In this case, it is not necessarily to ground the WGA-900A but connect the measuring object and WGA-900A.

It should be noted that you cannot solve the trouble with a simple method if there is the inductive interference or if the measuring object has electrical potential.

Recently, more instruments are placed together and every instrument affects each other as the noise source.

The contents we described may not be universally applicable in all situations as site conditions and environmental factors may vary.

Please take appropriate countermeasures against the noise that matches to the situation at the site.



10. SPECIFICATIONS

10-1. WGA-900A

Number of Measuring	1
Channels	
Applicable Transducer.....	Strain gage transducer
Applicable Bridge	87.5 ohm to 1 kohm
Resistance	(Up to four 350 ohm transducers can be connected in parallel.)
TEDS Compatible	Interface: Compatible to IEEE1451.4 Mixed Mode Transducer Interface Class 2. Applicable transducer: Should have the information according to IEEE template No. 33. (Cable length: 30 m or less)
Excitation Voltage	10 or 2 VDC
Measuring Range.....	± 3.2 mV/V (including zero adjustment range)
Nonlinearity	Within $\pm(0.02\%FS + 1 \text{ digit})$
Stability.....	Zero: Within $\pm 0.25 \mu V_{RT}/^{\circ}C$ Sensitivity: Within $\pm 0.005\%/^{\circ}C$
Peak/Bottom Detection	Detecting method: Analog circuit and digital hold in combination / Digital hold only Changeable Frequency response: DC to 1 kHz (+1 dB, -2dB)
A/D Converter.....	Sampling speed: 4000 times/sec Resolution: 24 bits
Analog Monitor.....	Voltage output: $\pm(5 \text{ V} \pm 200 \text{ mV})$ (load resistance 5 kohm or more)
Indicators.....	3.5-inch STN color LCD, display area: $73.0 \times 55.2 \text{ mm}$ 320×240 dots, touch panel
Indication	± 99999 Speed: 3 times/sec
Calibration.....	Manual calibration: No-load zero calibration, sensitivity registering calibration, actual load calibration, unit TEDS-based automatic calibration Partial calibration based on TEDS calibration data: TEDS calibration item TEDS operation setting: TEDS reading operation, zero at TEDS calibration time, TEDS information display
Smoothing Function	Analog filter: 1, 30, 300 Hz and None(1 kHz or more) Roll-off characteristic: -12 dB/oct. Minimum scale: 1, 2, 5, 10, 20, 50, 100 Moving average: None, 2, 4, 8, 16, 32, 64, 128, 256, 512, 1024, and 2048 times
Zero Compensation	Zero at every preset compensation time (Conducts digital zero when the measuring value is within the compensation range at every preset compensation time.) Determination Time: 0.00 to 9.99 sec Compensation Range: 0 to 99999 Least significant digit fixed at zero (Automatically changes the least significant digit number to zero.) Setting Range: 0 to 9
Additional Value.....	Setting range: ± 99999
Sensor Output Value.....	Transducer output (± 3.2 mV/V) is measured at 0.5-second intervals.
Measurement Condition ...	32 points (16 for control input) of measurement condition file can be saved.
number	Capable of switching by the key operation, control input, and communication command.



Comparator Setting.....	The number of points: 5 Type: extra high (HH), high (HI), OK, low (LO), extra low (LL) For the [Block Peak-Bottom] and [Time Peak-Bottom] Peak value: HI-1 (HI) and LO-1 (LO) Bottom value: HI-2 (HI) and LO-2 (LO) Compared value: ± 99999 Hysteresis Width: 0 to 9999 Using comparator can be set. Comparison speed: 4000 times per second (Normal Comp. Mode)
Measurement Mode.....	Operation mode: Normal, peak hold, block-specified peak hold, time-specified peak hold, bottom hold, block-specified bottom hold, time-specified bottom hold, arbitrary point hold, block peak-bottom, time peak-bottom, block average, time average Detect times: Delay time, comparison mode and display mode can be set.
Waveform Display	X-axis setting End point: 0.5, 1.0, 2.0, 5.0, 10.0 seconds Y-axis setting Start point: -99999 to 99999 End point: 250, 500, 1000, 2000, 5000, 10000, 20000, 50000, 100000, 200000 Start mode of waveform, passed level, passed way, hold time of waveform Displays the waveform of the input variation regardless to the "Measure Mode Set" setting.
System Setting	Key lock, setting value initialize, backlight illumination time, contrast, clock, detecting method
Self-check	Memory, channel
Operation Check	Display, touch panel, control input/output, communication, BCD output, D/A output, SD card
Control Input.....	Number of points: 9 Type: Zero command, hold command, reset command, waveform command, TEDS command, measurement condition select 0 to 3 Signal format: Non-voltage contact signal or open collector signal (12 VDC voltage and 5 mA current can be applied.)
Control Output.....	Number of points: 10 Type: HH, HI, OK, LO, LL, healthy, abnormal channel, abnormal memory, communication error, SD Output format: Open collector Load capacity: 30 VDC, 20 mA
Communication.....	Signaling system: RS-232C full duplex system Transmission system: Asynchronous Communication speed: 2400, 4800, 9600, and 19200 bps Bit configuration: Data bit 7 Stop bit 1 Parity Odd number Flow control Not compatible Setting contents: Communication speed: 2400, 4800, 9600, 19200 bps Transmission mode: Repeat Output, Output at Hold, Tx and Rx
SD Card.....	Saving set value: Saves the all setting value (excluding the calibration value) to the SD card. Reading setting value: Reads the all setting value (excluding the calibration value) from the SD card and rewrite those of the WGA-900A to the read one. Waveform data editing: Browsing the waveform data, changing the name of the data, and deleting the data are available. Format: Erase all data that are saved in the SD card (Quick format) available Update: Capable of updating the program version that is saved in the SD card. SD card type: Up to 2 GB; Non-SDHC-compliant
Power Supply	85 to 264 VAC, 50/60 Hz, 20 VA or less
Dimensions	100 mm (W) $\times$ 96 mm (H) $\times$ 135 mm (D)
Weight	Approx. 1.0 kg (excluding options)
Operating Temperature.....	0 to 40 °C, 20 to 85 %RH (noncondensing)



10-2. OPTION

10-2-1. BCD Output (Model: WGA-900A-1)

Output	BCD data: 20 bits (4-bit ×5-digit)
	Binary data: 18 bits (offset binary)
	Minus code: 1 bit
	Over: 1 bit
	EOC (End Of Conversion): 1 bit
	Format: Open-collector
	Max load capacity: 30 VDC, 20 mA (load resistance)
Input	Number of points: 2
	Contents: Data hold input.Negative logic (Hold at “L”)
	Output prohibit input.Negative logic (Prohibition at “L”)
	Type: Open collector or Non-voltage contact signal
	Voltage 12 VDC and current 10 mA can be applied.
Setting Contents	Transmission speed: Approx. 16, 32, 64, and 125 times / sec.
	Porality logic, EOC logic, Data logic: Negative or positive logic
	Data form: BCD, Binary Changeable
	BCD classification: Peak value, bottom value

10-2-2. D/AOutput (Model: WGA-900A-2)

Output Voltage	±10 V (load resistance 2 kohm or more), arbitrary scaling is available.
Output Current	4 to 20 mA (load resistance 500 ohm or less)
	4 to 20 mA output is fixed when the voltage 0 to 10 V is applied.
Insulation Voltage	250 VAC for 1 minute (output voltage and output current are non-insulated)
Conversion Speed.....	2000 times/sec
Nonlinearity.....	±0.1 %FS
Setting contents	D/A display: Zero disp. (Displayed value when the voltage 0V is outputted)
	Full disp. (Displayed value when the voltage 10V is outputted)
	D/A classification: Peak value, bottom value

10-2-3. RS-485 (Model: WGA-900A-3)

Signaling System.....	RS-485 Half duplex system
Data Rate	2400, 4800, 9600, 19200 bps
Device ID.....	Setting range: 1 to 99
Bit Structure.....	Data bit: 7
	Stop bit: 1
	Parity: Odd number
Flow Control	Not compatible
Setting contents	Device ID: 1 to 99
	Communication speed: 2400, 4800, 9600, 19200 bps
	Transmission mode: Repeat Output, Output at Hold, Tx and Rx



10-2-4. BCD and D/A Output (Model: WGA-900A-12)**10-2-4-1. BCD/Binary output**

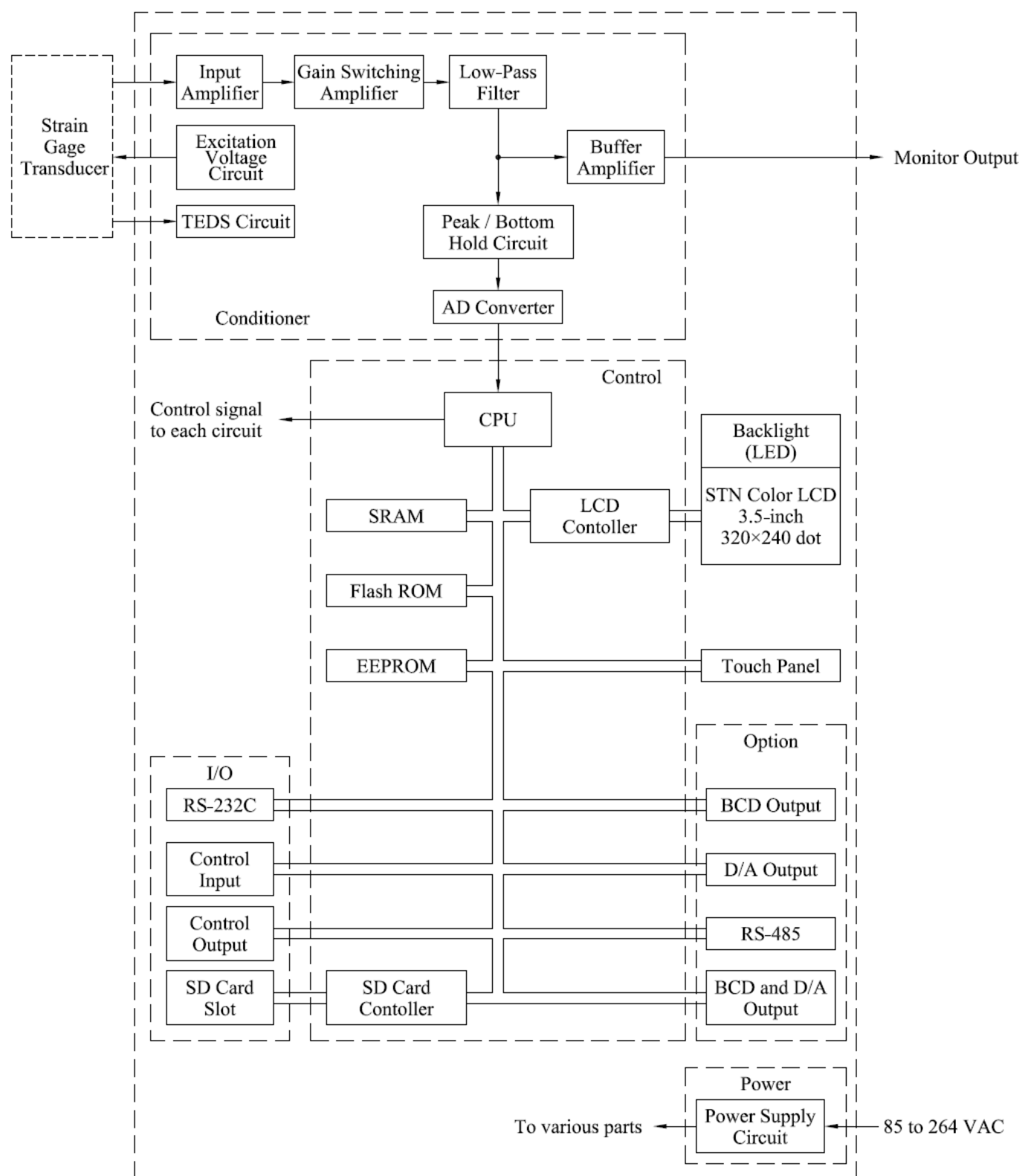
Output	BCD data: 20 bits (4-bit ×5-digit)
	Binary data: 18 bits (offset binary)
	Minus code: 1 bit
	Over: 1 bit
	EOC (End Of Conversion): 1 bit
	Format: Open-collector
	Max load capacity: 30 VDC, 20 mA (load resistance)
Input	Number of points: 2
	Contents: Data hold input. Negative logic (Hold at “L”)
	Output prohibit input. Negative logic (Prohibition at “L”)
	Type: Open collector or Non-voltage contact signal
	Voltage 12 VDC and current 10 mA can be applied.
Setting contents	Transmission speed: Approx. 16, 32, 64, and 125 times / sec.
	Polarity logic, EOC logic, Data logic: Negative or positive logic
	Data form: BCD, Binary Changeable
	BCD classification: Peak value, bottom value

10-2-4-2. D/A Output

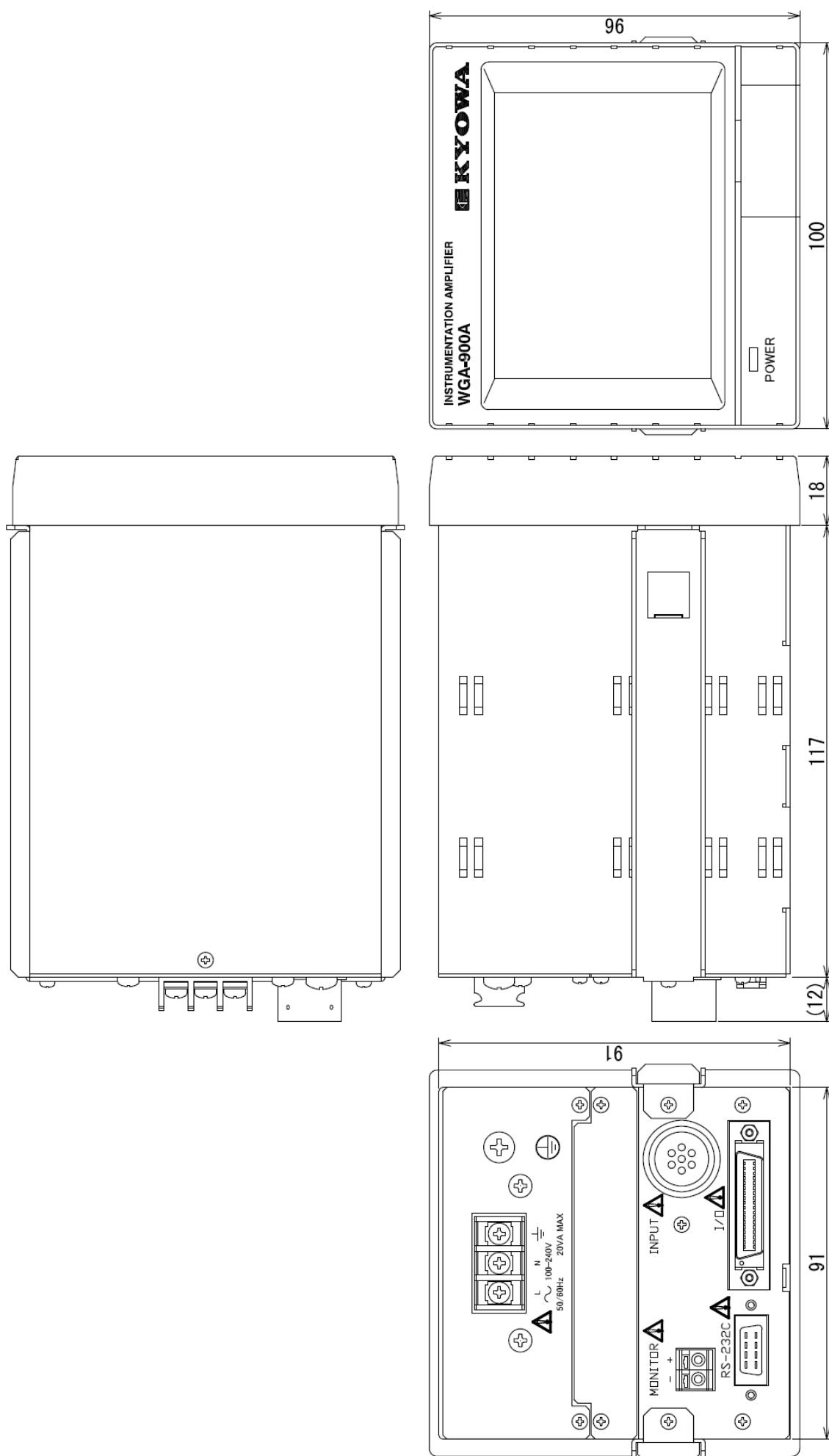
Output Voltage	±10 V (load resistance 2 kohm or more), arbitrary scaling is available.
Output Current	4 to 20 mA (load resistance 500 ohm or less)
	4 to 20 mA output is fixed when the voltage 0 to 10 V is applied.
Insulation Voltage	250 VAC for 1 minute (output voltage and output current are non-insulated)
Conversion Speed	2000 times/sec
Nonlinearity	±0.1 %FS
Setting contents	D/A display: Zero disp. (Displayed value when the voltage 0V is outputted)
	Full disp. (Displayed value when the voltage 10V is outputted)
	D/A classification: Peak value, bottom value



10-3. BLOCK DIAGRAM



10-4. DIMENSIONS



11. APPENDIX

11-1 LIST OF SETTING ITEM

11-1-1. Calibration

Item	Function Name	Parameter Name	Setting Value	Initial Value
Manual Input Cal.	Bridge Voltage		0:2 V, 1:10 V	2 V
	No-Load Zero		(-3.2000 to 3.2000 mV/V)	(0.000 mV/V)
	Sens. Regist. Cal.	Rated output	-3.2000 to 3.2000 mV/V	2.0000 mV/V
		Rated display	-99999 to 99999	10000
	Actual Load Cal.	(Rated output)	(-3.2000 to 3.2000 mV/V)	(2.000 mV/V)
		Rated display	-99999 to 99999	10000
	Unit		79 types (Refer to “11-2 UNIT LIST.”)	None
TEDS Auto Cal.				
TEDS Part Cal.	TEDS Cal. Item	Applied voltage	Execute, prohibit	Execute
		Rated output	Execute, prohibit	Execute
		Rated capacity	Execute, prohibit	Execute
		Unit	Execute, prohibit	Execute
TEDS Ope. Setting	TEDS Reading Ope.	Key operation	Allow, prohibit	Allow
		Control input	Allow, prohibit	Allow
		Power ON	Allow, prohibit	Prohibit
		Command	Allow, prohibit	Allow
	Zero during TEDS		Execute, prohibit	Execute
	TEDS Info Display			

11-1-2. Input Setting

Item	Function Name	Parameter Name	Setting Value	Initial Value
Smoothing	Analog Filter		0: 1 Hz, 1: 30 Hz, 2: 300 Hz, 3: None (1 kHz or more)	1Hz
	Minimum Scale		0: 1, 1: 2, 2: 5, 3: 10 4: 20, 5: 50, 6: 100	1
	Moving Average		00: None, 01: 2 times, 02: 4 times, 03: 8 times, 04: 16 times, 05: 32 times, 06: 64 times, 07: 128 times, 08: 256 times, 09: 512 times, 10: 1024 times, 11: 2048 times	None
ZERO Compensation	ZERO every Comp. Time	Judging time	0.00 to 9.99 sec.	0.00 sec.
		Compensation range	-99999 to 99999	0
	Min. Scale Zero Fix		0 to 9	0
Additional Value			-99999 to 99999	0
Sensor Output Value			(-3.2000 to 3.2000 mV/V)	



11-1-3. Measuring Condition Setting

Item	Function Name	Parameter Name	Setting Value	Initial Value
Meas. Cond. Setting			1 to 32	1
Comparison Setting	HH compared value		-99999 to 99999	99999
	HI compared value		-99999 to 99999	10000
	LO compared value		-99999 to 99999	-10000
	LL compared value		-99999 to 99999	-99999
	Hysteresis Width		0 to 9999	0
	Comparator Out. Logic		0: Negative Logic, 1: Positive Logic	Negative Logic
	Using Comparator.	HH Comparator	0: Use, 1: Not use	Use
		HI Comparator	0: Use, 1: Not use	Use
		LO Comparator	0: Use, 1: Not use	Use
		LL Comparator	0: Use, 1: Not use	Use
Measure Mode Setting	Operation Mode		00: Normal, 01: Peak Hold, 02: Block Peak, 03: Time Peak, 04: Bottom Hold 05: Block Bottom, 06: Time Bottom, 07: Arbitrary Hold 08: Block Peak-Bottom 09: Time Peak-Bottom 10: Block average 11: Time average	Normal
	Detect Time		0.00 to 9.99 sec.	1.00 sec
	Delay Time		0.00 to 9.99 sec.	0.00 sec
	Comparison Mode		0: Normal Comp. 1: Hold Comp.	Normal Comp.
	Display Mode		0: Normal Disp. 1: Hold Disp.	Normal Disp.

11-1-4 Waveform Display Setting

Item	Function Name	Parameter Name	Setting Value	Initial Value
X-axis		End P.	0: 0.5 sec, 1: 1.0 sec, 2: 2.0 sec, 3: 5.0 sec., 4: 10.0 sec.	10.0 sec
Y-axis		Start P.	-99999 to 99999	-99999
		End P.	0: 250, 1: 500, 2: 1000, 3: 2000, 4: 5000, 5: 10000, 6: 20000, 7: 50000, 8: 100000, 9: 200000	200000
Start Mode of Wave			0: Auto Mode 1: Normal Mode 2: Single Mode	Auto Mode
Passed Level			-99999 to 99999	0
Level Passed Way			0: Rising 1: Falling 2: Both	Both
Hold Time of Wave			0.0 to 99.9 sec.	0.0 sec.



11-1-5. Initial Setting

Item	Function Name	Parameter Name	Setting Value	Initial Value
Meas. Select Signal			0: Key Operation, 1: Control Input, 2: Command	Key Operation
System	Key Lock		0: Release, 1: Lock	Release
	Set Initialize		0: Input Set, 1: Meas. Cond. Set, 2: Wave Disp. Set, 3: Initial Set, 4: Option set, 5: All set	
	Backlight Time		0 to 99 minute	0 minute
	Contrast		0 (Bright) to 63 (Dark)	Initial value
	Language		0: Japanese, 1: English	Japanese
	Clock		2000/01/01 00:00:00 to 2099/12/31 23:59:59	Initial value
	Detecting Method		0: Combination, 1: Digital Only	Combination
Self-Check	Memory Check	CPU FlashROM	(OK, Error)	
		Ex. FlashROM	(OK, Error)	
		CPU SRAM	(OK, Error)	
		Ex. SRAM	(OK, Error)	
		Ex. EEPROM	(OK, Error)	
	Channel Check	Bridge Volt.	(OK, Error)	
		Input Over	(OK, Error)	
		Display Over	(OK, Error)	
Operation Check	Display Check	Color	(Red → Green → Blue → Yellow → Red)	
		Backlight	(ON/OFF)	
		Contrast	(White → Gray → Black → White)	
	Touch Panel Check			
	Control I/O Check	Input	19 to 27(Pin No. 19 to 27)	
		Output	1 to 10(Pin No. 1 to 10)	
	Communication Check	(Tx, Rx)		
	BCD Output Check		-99999 to 99999	0
	D/A Output Check		-10 V, 0 V, 10 V	
	SD Card Check			



11-1-6. Option Setting

Item	Function Name	Parameter Name	Setting Value	Initial Value
Com. Setting	Communication Speed		0: 2400 bps, 1: 4800 bps 2: 9600 bps, 3: 19200 bps	9600 bps
	Transmission Mode		00: Repeat. Output, 02: Output at Hold, 10: Tx and Rx	Tx and Rx
	Device ID		1 to 99	1
BCD output setting	Transmission Speed		0: Approx. 16 times/sec., 1: Approx 32 times/sec., 2: Approx 64 times/sec., 3: Approx 125 times/sec.	Approx. 16 times/sec.
	EOC Logic		0: Negative Logic, 1: Positive Logic	Negative Logic
	Polarity Logic		0: Negative Logic, 1: Positive Logic	Negative Logic
	Data Logic		0: Negative Logic, 1: Positive Logic	Negative Logic
	Data Form		0: BCD, 1: Binary	BCD
	BCD Classification		0: Peak value, 1: Bottom value	Peak value
D/A Output Setting	D/A Display	Zero Dsp.	-99999 to 99999	0
		Full Dsp.	-99999 to 99999	10000
	D/A Classification		0: Peak value, 1: Bottom value	Peak value
SD Card Setting	Set Value Save			
	Set Value Read			
	Wave Data Save Set		Save, Not Save	Not save
	Wave Data Edit		(File No.: 001 to 100) Rename, Delete	
	Format			
	Update			



11-2. UNIT LIST

The left numbers are command parameters or return value format of the communication (RE-232C/RS-485).

Force and Mass		Pressure		Torque		Displacement	
01	mN	14	Pa	30	mN · m	39	μm
02	N	15	hPa	31	N · m	40	mm
03	kN	16	kPa	32	kN · m	41	cm
04	MN	17	MPa	33	MN · m	42	m
05	mgf	18	gf/mm ²	34	gf · cm	43	km
06	gf	19	kgf/mm ²	35	kgf · cm	44	inch
07	kgf	20	tf/mm ²	36	gf · m		
08	tf	21	gf/cm ²	37	kgf · m		
09	mg	22	kgf/cm ²	38	tf · m		
10	g	23	tf/cm ²				
11	kg	24	atm				
12	t	25	mmHg				
13	ton	26	mmH ₂ O				
		27	mmAq				
		28	mbar				
		29	psi				

Others					
45	None	60	με	75	‰
46	μV	61	μm/m	76	ppm
47	mV	62	μV/V	77	/s
48	V	63	mV/V	78	/min
49	kV	64	°C	79	/h
50	μA	65	K		
51	mA	66	m/s ²		
52	A	67	G		
53	kA	68	Gal		
54	mΩ	69	No.		
55	Ω	70	m ³		
56	kΩ	71	ml		
57	W	72	l		
58	kW	73	kl		
59	VA	74	%		

