KYOWA

INSTRUCTION MANUAL
WGA-910A
INSTRUMENTATION AMPLIFIER

Thank you for purchasing KYOWA's product WGA-910A 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.

CONTENTS

STANDARD ACCESSORIES

The WGA-910A 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
Product Warranty	1
Software License Agreement	1

*1. Including a PC software and a setting file for wave comparison mode.

OPTIONS

	Model	Manufacture
AC power cable(AC:100V)	P-23	KYOWA ELECTORONIC INSTRUMENTS CO., LTD.
AC power cable(AC:200V)	P-28	KYOWA ELECTORONIC 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

SAFETY PRECAUTIONS

The WGA-910A is designed in accordance with the "11 SPECIFICATIONS."

Do not use the WGA-910A in an environment exceeding the specifications.

Or, failure of the WGA-910A may result.

PRIOR TO USE

This Instruction Manual describes detailed instructions for operating the WGA-910A Instrumentation Amplifier (hereinafter referred to as the WGA-910A).

For safe use of the WGA-910A, 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-910A, the following symbol mark is attached to the WGA-910A.

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

SAFETY SYMBOLS

For safety operation of the WGA-910A, 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

●**Warning**

Be sure to observe the safety precautions described in the WGA-910A Instruction Manual.

●**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-910A.

The power supply voltage is described in following.

100 to 240 VAC 50/60 Hz Power consumption：20 VA or less

●**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-910A 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-910A. If any abnormal matters are found in the protective ground function, fuse holder, etc., do not operate the WGA-910A.

●**External Connection**

To prevent an electric shock hazard, ensure the safe protective ground of all concerned instrument and then, connect the WGA-910A 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-910A 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-910A, immediately disconnect the AC adaptor from the receptacle and stop using the WGA-910A.

●**Maximum Input Voltage Range**

The WGA-910A 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.

●**About built-in lithium battery**

Do not short-circuit the battery terminals after disassembling. 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

●**Caution**

Be sure to observe the safety precautions described in the WGA-910A Instruction Manual.

●**Do not use the product outdoors.**

Or, it may cause electric shock, fire hazard, lower the performance and cause troubles.

●**Do not turn ON the power switch immediately after turning it OFF.**

After turning OFF the power switch, wait (5 seconds) until the power supply is shut OFF before turning ON the power switch again.

If the power is repeatedly turned ON and OFF within 5 seconds, rush current generated by switching the power ON may damage the product.

●**Use the product within temperature ranging from -10 to +40 ℃.**

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.

●**Use the product in the specified operating humidity of 20 to 85 %.**

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

●**Do not use the product immediately after the change in the environment.**

Leave the product as it is until it becomes adaptable to the environment.

Abrupt change in ambient temperature due to transportation, etc. may cause dew condensation, which may result in lower performance and troubles.

●**Use the product under environment without excessive vibration or high impact.**

Vibration Registance: 19.6 m/s^2 (2 G), 10 to 200 Hz (when in operation)

Use the product in an area where vibration and impact can be kept within the scope of specifications.

Continuous vibration or severe impact may cause deteriorated performance and system failure.

●**Do not use the product in strong electromagnetic field.**

Use the product in a magnetic field environment where the PC may be used.

Performance may be lowered and erroneous operation and troubles may result if it is used near a telemetry system, microwave oven, electronic furnace or any other equipment generating a strong magnetic field.

●**Do not use the product under poor conditions.**

Use a power source that is free from momentary power outages and noise.

Make sure that fluctuations in the power supply to the device do not exceed ±10% of the nominal voltage.

Operate the product within the range 50/60 Hz.

●**Do not pull cords and cables.**

Lay cords and cables with a certain allowance so that unreasonable force is not applied to the connections.

Or, it may interrupt the measurements, break the cables, and damage the connectors.

●**Avoid installing sensors and products near a welding machine.**

Failure to do so will pose the risk of erroneous data, malfunction and failure.

●**Do not disassemble or remodel the product.**

Or, it may cause electric shock hazards or damage the product. This warranty does not cover any damaged or defective parts that results from disassembling or remodeling.

●**Do not use or strage the product under dusty or fine particles or corrosive gas environment.**

Use or strage under these environment, may result in lower performance and troubles.

●**Do not expose the product to the air if it is used and stored nearby sea.**

Air exposure nearby sea may cause lower performance and products failure.

●**Take care when handling the CD-R.**

Do not expose the CD-R to direct sun light, high temperature, or high humidity.

Do not apply pressure to the CD-R by laying object or bending.

Dust, scratches, and fingerprints on either side of the CD-R can cause write errors.

●**Preheat the product before use.**

After the power ON, always preheat the product for approximately 30 minutes.

●**Cleaning.**

When the product gets dirty, clean the product with a dry soft cloth. When dust exists inside the WGA-910A, clean it by using an air blow gun. Do not touch electronic parts.

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⚠ **CAUTION**

SD cards

●**The capacity of the SDHC card, compatible to the product, is up to 32 GB.**

   The product does not support the SDXC cards 64 GB or more.

   Never insert the SDXC cards 64 GB or more.

●**About the setting file for wave comparison mode.**

   This file is for which the saved comparison waveform data is saved.

   If you delete "WGA 910 _ SET _ WAVE. KS" in the SD card or overwrite it with another file of the same name, you can not read the registered comparison waveform data.

   Please copy "WGA 910 _ SET_WAVE.KS" and back it up after registration to prevent data loss.

   For details, refer to chapter 6-3-8.

</div>

PRECAUTIONS ON CE MARKING

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NOTE

● Be sure to mount the product on the control panel, etc. Before turning ON the power, make sure the product is covered to avoid contact with hands.

● The product connection should be executed by experts in electrical work.

● To immediately turn OFF the product, place switches or circuit breakers inside the building and near the product and display the functions as well.
   Use switches and circuit breakers conforming to the IEC60947-1 and IEC60947-3.

● Use the product in area where elevation is 2000 m or below.

● When mounting the product in your system, approaches to satisfy the CE marking requirements vary with the configuration of the control panel to be used, the other devices to be connected, and wirings. Therefore, customers are required to check whether the CE marking requirements on the product are satisfied or not.

● Use shielded cables as input cables, output cables and control cables.
   Wiring should be 30 m or less.

● Before connecting the analog monitor and RS-232C communication cables, be sure to mount ferrite core near the terminal.
   Recommended ferrite core   GRFC-5 (KITAGAWA INDUSTRIES CO., LTD.)

● Be sure to connect the protective grounding terminal to the ground by using the optional ground wire.

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NOTATIONS USED IN THE INSTRUCTION MANUAL

The following notations are used in the Instruction Manual for convenience.

● Names described on the panel surface
Names described on the panel surface are expressed in double quotation mark " ".

● Informational notes
Certain notations are used as necessary to attract your attention to information that requires special care when handing the product, and to information provided for reference purposes.

Examples of Notations

```
┌─ NOTE ─────────────────────────────────────────────┐
│                                                      │
│  Essential precautions required when handling the product. │
│                                                      │
└──────────────────────────────────────────────────────┘
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┌─ MEMO ─────────────────────────────────────────────┐
│                                                      │
│  Reference items required when handling the product. │
│                                                      │
└──────────────────────────────────────────────────────┘
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IMPORTANT PRECAUTIONS WHEN USING WGA-910A

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┌─ NOTE ─────────────────────────────────────────────────────────────┐
│                                                                      │
│  ● The output signal (voltage/current) when the transducer cable is broken. │
│    When the transducer cable is broken, the product may output the following output signal (voltage/current). │
│    Therefore, take countermeasures to avoid the adverse effect, from the output signals, on the other measuring │
│    instruments.                                                      │
│                                                                      │
│    Analog monitor                                                    │
│    Voltage output: Approx. 5.7 V                                     │
│                                                                      │
│                                                                      │
│  ● The output signal (voltage/current) and unbalance load           │
│                                                                      │
│    Analog monitor                                                    │
│    The unbalance load should be 5k ohm or more.                     │
│                                                                      │
└──────────────────────────────────────────────────────────────────────┘
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1. OUTLINE OF PRODUCT

1-1. OUTLINE

The WGA-910A Instrumentation Amplifier (hereinafter referred to as the WGA-910A) is a high-speed and sophisticated amplifier designed to be used for displaying physical quantities (load, etc.) with strain gage transducers.

The WGA-910A is able to be operated from the front touch panel. The WGA-910A includes various functions (comparator functions, hold functions, etc.) as standard equipment.

The WGA-910A is compatible for measurements in a wide range from the high-speed measurements (high-speed sampling press fitting, high-speed sampling pressing, etc.) to high-resolution load measurements.

The WGA-910A has the optional models; BCD model, D/A model, RS-485 model, TEDS model, and CC-Link model.

The CC-Link model is able to control through the PLC.

1-2. FEATURES

- ●Easy-to-see numbers
  - ・Zoom in function enables large size numbers.
- ●High-speed sampling : 4000 times/sec.
- ●Connects up to 4 transducers (bridge Registance : 350 ohm) in parallel.
- ●Equips with comparators.
  - ・HH comparator, HI comparator, LO comparator, LL comparator
- ●Saves 32 patterns of comparator value, and switches them.
- ●Various hold functions
- ●5 calibration functions:
  Actual load calibration, Sensitivity registering calibration, Numeric value registering calibration,
  TEDS auto calibration, TEDS part calibration
- ●Various hold functions:
  BCD output model, D/A output model, RS-485 output model, BCD・D/A output model, CC-Link model
- ●Display waveform function
  - ・Capable of loading waveforms by various ways such as automatic, loading once.
  - ・Capable of saving recorded waveform in a SD card.
- ●Waveform comparison function
  - ・Capable of capturing the reference waveform and comparing the waveform by the comparator (Wave comparator HI, Wave comparator OK, Wave comparator LO).
  - ・Capable of reading and editing the reference waveform with SD software.
- ●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 converting the waveform data to the CSV format.
  - ・Capable of displaying a recorded waveform on the EXCEL graph.
  - ・Capable of reading the setting value of the WGA-910A saved in the SD card.
  - ・Capable of editing a setting value and saving it to the SD card.
- ●Updating the firmware
  - ・Capable of updating the firmware by loading the written program in the SD card after mounting the WGA-910A to a control panel.
- ●Various checking functions
  - ・Capable of checking the WGA-910A and sensor.
  - ・Capable of checking external devices such as control input/output.
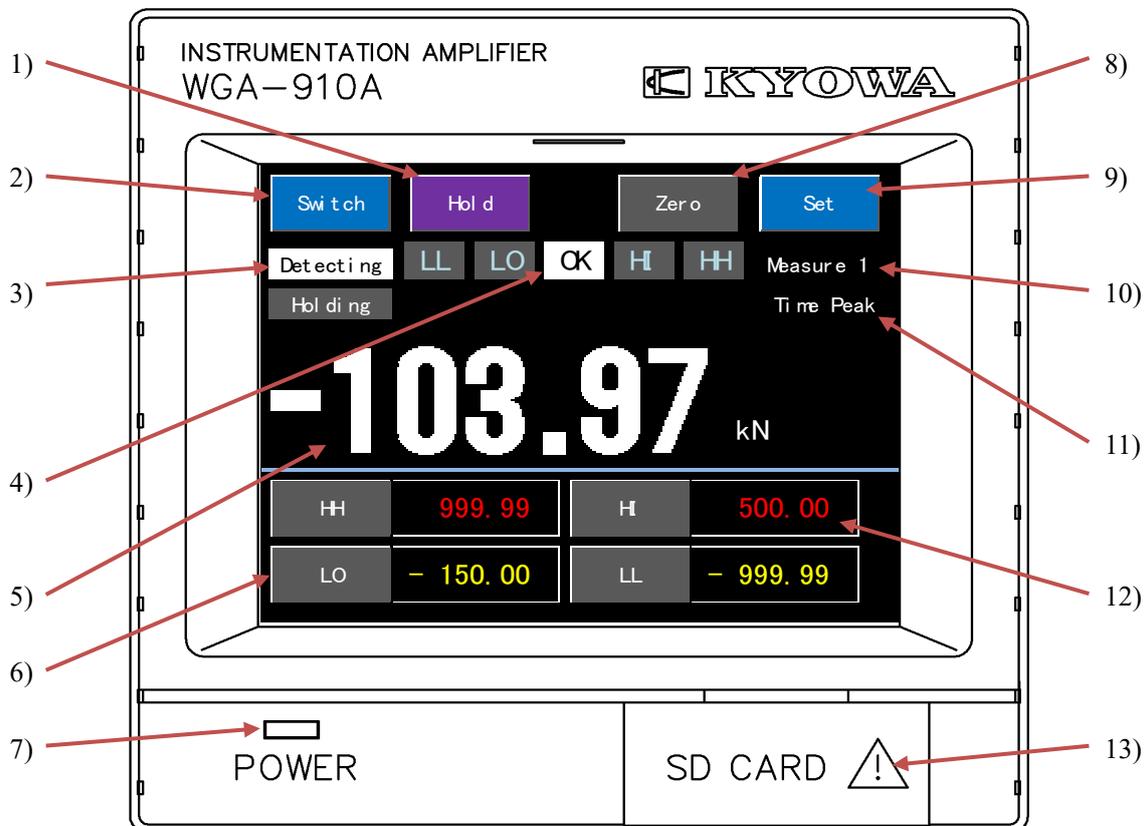
1-3. MODEL

The WGA-910A series has 6 models including the optional units.
Customers are required to purchase the products compatible to you.

Model	Option	The number of channels, input format
WGA-910A-0	None	1 Load (strain)
WGA-910A-1	BCD	
WGA-910A-2	D/A	
WGA-910A-3	RS-485	
WGA-910A-4	CC-Link	
WGA-910A-12	BCD・D/A	

2. CONTROLS AND FUNCTIONS

2-1. FRONT PANEL
2-1-1. Measuring Window (Number)

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 orange 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.

> **MEMO**
>
> "2-1-5. Measuring Window" is displayed when there are two hold values.

2-1-2. Measuring Window (Zoom In Number)

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.

MEMO

"2-1-6. Measuring Window" is displayed when there are two hold values.

2-1-3. Measuring Window (Waveform)

1)	**Cursor ON** key	The "Cursor" window appears to display a cursor.
2)	**Switch** key	Display changes in order from "Number" - "Zoom in number" - "Waveform" by pressing the Switch key.
3)	Measured value	Displays a measured value with unit.
4)	Y axis end point	Displays the end point of the Y-axis that is set in the "Y-axis setting" of the "Waveform display setting."
5)	**Y-axis** key	Opens the "**Y-axis setting**" window of the "Waveform display setting."
6)	Y axis start point	Displays the start point of the Y-axis that is set in the "Y-axis setting" of the "Waveform display setting."
7)	**REC** key	Before waveform display: Select whether or not to save the wave data.
		During waveform display: After acquiring data for one screen, save the data to the SD card.
8)	**Wave Clear** key	Clears the current displaying waveform.
9)	**Set** key	Opens the setting menu window.
10)	**Comparison Waveform**	The "Waveform comparison HI" and "Waveform comparison LO" are indicated by red lines. The comparison waveform is displayed only when "Wave Comp. *** Mode".
11)	**Start** **Stop** key	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.
12)	X axis end point	Displays the end point of the X-axis that is set in the "X-axis setting" of the "Waveform display setting."
13)	**LOCK** key	Pressing the key deactivates the Switch key. Press again to activate the Switch key.
14)	**X-axis** key	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.

MEMO

"2-1-7. Measuring Window" is displayed when there are two hold values.

2-1-4. Measuring Window (Cursor)
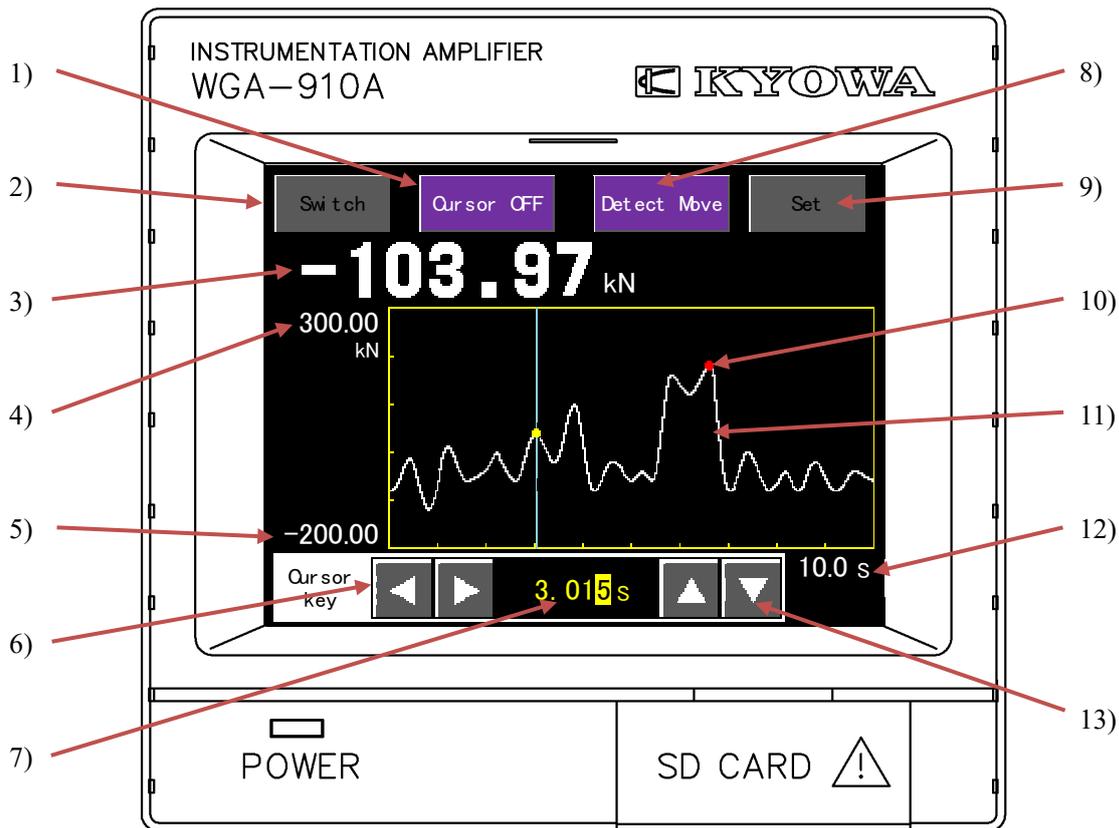
1)	**Cursor OFF** key	The cursor disappears and gets back to the "Waveform display" window.
2)	**Switch** key	The Switch key is displayed in gray and no key operation can be performed.
3)	Measured value	Displaying a measurement waveform data (value of the Y-axis) at the yellow point on the cursor.
4)	Y axis end point	Displays the end point of the Y-axis that is set in the "Y-axis setting" of the "Waveform display setting."
5)	Y axis start point	Displays the start point of the Y-axis that is set in the "Y-axis setting" of the "Waveform display setting."
6)	←/→ keys	Moves the target digit (highlight) of the cursor position time.
7)	Cursor position time	Displays time (X-axis) of the cursor position.
8)	**Detect Move** key	Immediately moves the cursor to the **Detecting point** of the item 10).
9)	**Set** key	The Set key is displayed in gray and no key operation can be performed.
10)	Detecting point	Displays a detecting point (peak point) with a red point when conducting a measurement other than normal.
11)	Measuring waveform	Displays a measuring waveform when the Cursor OFF key is pressed.
12)	X axis end point	Displays the end point of the X-axis that is set in the "X-axis setting" of the "Waveform display setting."
13)	↑/↓ keys	Increases or decreases the number of the time setting digit for moving the cursor to right or left.

2-1-5. Measuring Window (Number)

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 hold value1	Based on the detecting hold value1, 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)	Hold value1	Displays the hold value1 with the unit.
6)	Comparator status lamp for hold value2	Based on the detecting hold value2, 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)	Hold value2	Displays the hold value2 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 hold value1	Displays the "HI-1" or "LO-1" window of the hold value1.
13)	Compared value of the hold value1	Displays the "HI-1" or "LO-1" value of the hold value1.
14)	Compared value setting key of the hold value2	Displays the "HI-2" or "LO-2" window of the hold value2.
15)	Compared value of the hold value2	Displays the "HI-2" or "LO-2" value of the hold value2.

> **MEMO**
>
> The notation "peak value" and "bottom value" in the figure varies depending on the operation mode. For the display, see "6-3-3 (1) Operation mode".

2-1-6. Measuring Window (Zoom In Number)

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 hold value1	Based on the detecting hold value1, 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)	Hold value1	Displays a hold value1 with the unit.
4)	Comparator status lamp for hold value2	Based on the detecting hold value2, 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)	Hold value2	Displays the hold value2 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)
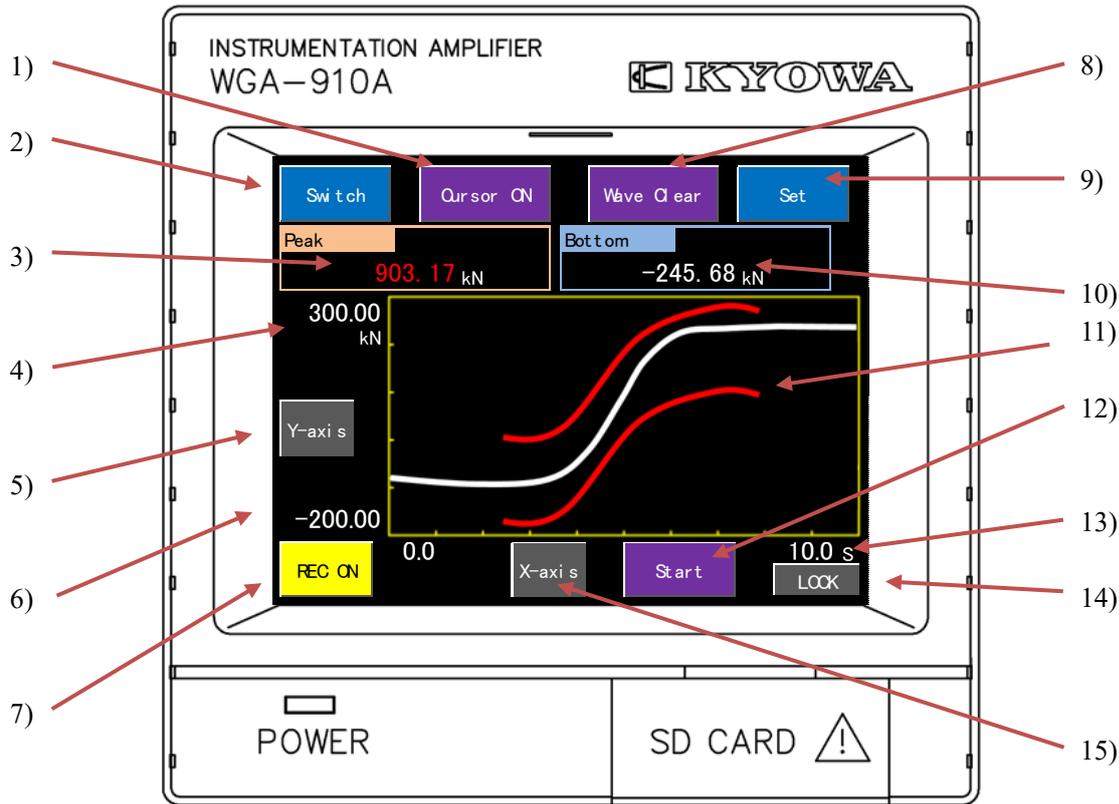
|		
1)	**Cursor ON** key	The "Cursor" window appears to display a cursor.
2)	**Switch** key	Display changes in order from "Number View Dual Display" - "Zoom In Number View Dual Display" - "Waveform View Dual Display" by pressing the Switch key.
3)	Hold value1	Displays the hold value1 with the unit.
4)	Y-axis end point	Displays the end point of the Y-axis that is set in the "Y-axis setting" of the "Waveform display setting."
5)	**Y-axis** key	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.
6)	Y-axis start point	Displays the start point of the Y-axis that is set in the "Y-axis setting" of the "Waveform display setting."
7)	**REC** key	Before waveform display: Select whether or not to save the wave data. During waveform display: After acquiring data for one screen, save the data to the SD card.
8)	**Wave Clear** key	Clears the current displaying waveform.
9)	**Set** key	Displays the setting window.
10)	Hold value2	Displays the bottom value hold value2 with the unit.
11)	**Comparison Waveform**	The "Waveform comparison HI" and "Waveform comparison LO" are indicated by red lines. The comparison waveform is displayed only when "Wave Comp. *** Mode".
12)	**Start** **Stop** key	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.
13)	X-axis end point	Displays the end point of the X-axis that is set in the "X-axis setting" of the "Waveform display setting."
14)	**LOCK** key	Pressing the key deactivates the Switch key. Press again to activate the Switch key.
15)	**X-axis** key	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
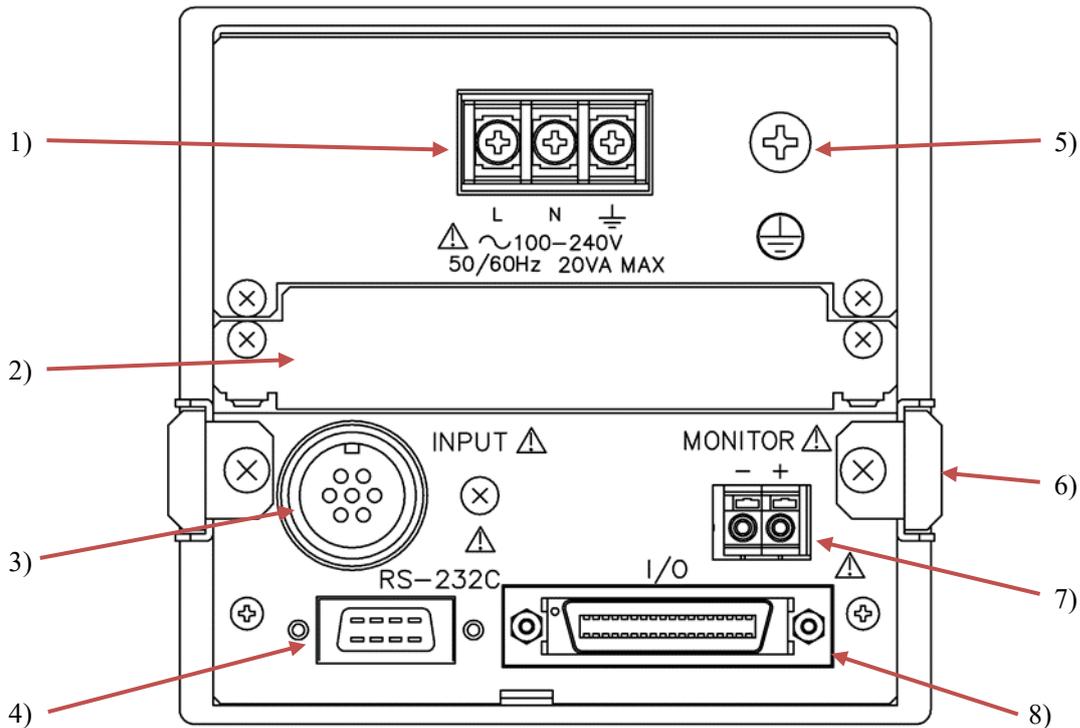
1)	Terminal block for AC power	Connects AC power.
		Voltage range: 100 VAC to 240 VAC
2)	Blank panel	Blank panel is for WGA-910A-0.
		In the case of optional model, the panel is the slot of optional model. For details, see separate volume of "INSTRUCTION MANUAL (FOR OPTIONS)".

3)	Sensor connector	For connecting the strain gage transducer.
	Compatible 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)
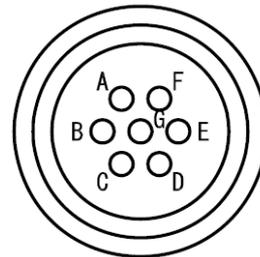
Connector pin assignment of the WGA-910A

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

4)	Connector for RS-232C	Sends and receives data such as measuring data, setting value, etc. with the RS-232C.

        Compatible connector	Jack:	FCN-361J008-AU	FUJITSU COMPONENT LINITED
        	Cover:	FCN-360C008-B	FUJITSU COMPONENT LINITED

Pin No.	Signal Name
A1	DCD
B1	RXD
A2	TXD
B2	DTR
A3	GND
B3	DSR
A4	CTS
B4	RTS
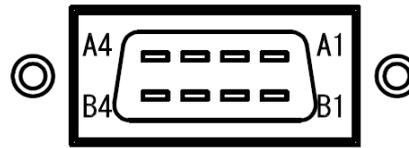
Connector pin assignment of the WGA-910A

5)	Protective grounding terminal	To prevent an electronic shock hazard, be sure to ground the terminal.
6)	Fitting metal	For mounting a panel.
7)	Terminal board for monitor	Monitors a voltage output to the transducer output.

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.
　Compatible 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	Reserve
11	Output	SD Error	29	Input	Reserve
12	Output	Wave comparator HI output	30	Input	Reserve
13	Output	Wave comparator OK output	31	Input	Reserve
14	Output	Wave comparator LO output	32	Input	Reserve
15	Output	Motion Detect output	33	Input	Reserve
16	Output	Inflection point/Extreme value	34	Input	Reserve
17	Output	Output COM	35	Input	Input COM
18	Output	Output COM	36	Input	Input COM

Connector pin assignment of the WGA-910A

NOTE

・Never connect the signals to reserve pin.

MEMO

　　The pin No. 9 [Healthy] is for checking the power (ON) of the WGA-910A. The open collector output becomes ON when turning ON the WGA-910A and becomes OFF when turning OFF the WGA-910A. (*1)
　　The pin No. 9 [Healthy] is also for checking that the WGA-910A is working correctly. The [Healthy] becomes OFF when it corresponds to any one of abnormal channel, abnormal memory, and Communication error. Futhermore, it turns OFF also in case of various error. (Refer to 9-2)
　　(However, only SD Error, [Healthy] will not be turned OFF.)

*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. PROCEDURES FOR MEASUREMENTS

This section describes necessary operations to be conducted prior to the actual measurements.

Section 3-2	To mount the WGA-910A on the panel	Mount the WGA-910A on the panel.
	↓	
Section 3-3-1	To connect transducers	Connect various transducers to the WGA-910A.
	↓	
Section 3-3-2	To connect [INPUT] terminals	Connect cables to the [INPUT] terminals.
	↓	
Section 3-3-3	To connect [OUTPUT] terminals	Connect cables to the [OUTPUT] terminals.
	↓	
Section 3-3-4	To connect the RS-232C interface	Connect the RS-232C interface for communication
	↓	
Section 3-3-5	To monitor the analog outputs	Connect the MONITOR connectors to monitor the voltage outputs, proportional to the transducer outputs connected in 3-3.
	↓	
Section 3-3-6	To connect the power supply	Connect the AC power supply and ground the GND terminal.
	↓	
Section 3-4	SD card	Insert the SD card to save/load the setting values and to record the waveforms.
	↓	
Chapter 4	BASIC OPERATION PROCEDURES	Operate the WGA-910A and measure data. For details, see "4. BASIC OPERATION PROCEDURES".

3-2. INSTALLATION ONTO A PANEL

To install the WGA-910A to a panel, prepare the panel according to the specified panel cut dimensions shown at the right.

Then, install the WGA-910A by referring to the following instructions.

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

92^{+1}_{-0}

92^{+1}_{-0}

Plate thickness: 1 to 3mm
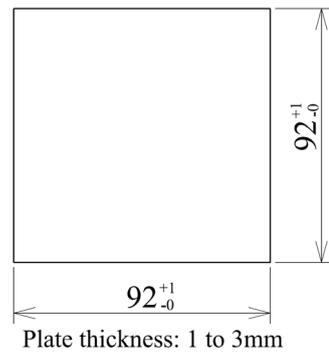
2) Remove screws of the fitting metals attached on both sides of the WGA-910A and then, pull out the fitting metals.

Back

Fitting metal   Screw
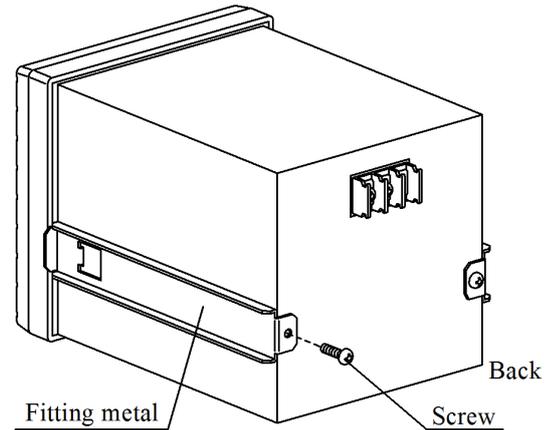
3) Set the WGA-910A into the cut out panel frame.

INSTRUMENTATION AMPLIFIER
WGA-910A   KYOWA

POWER   SD CARD ⚠
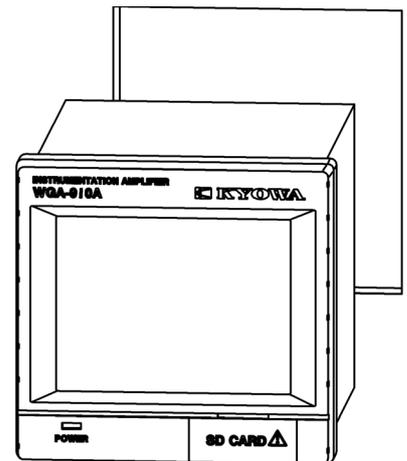
4) Set the fitting metals on both sides of the WGA-910A.

5) Tighten the screws and firmly fix the WGA-910A into the panel.
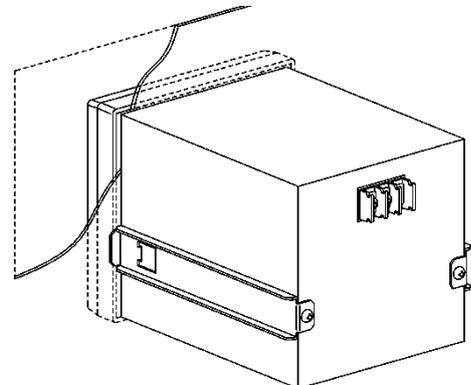
3-3. WIRING

3-3-1. Connecting transducer
・Input connector is NDIS one-touch connector.
・When using a KYOWA's transducer 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.

Compatible 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)
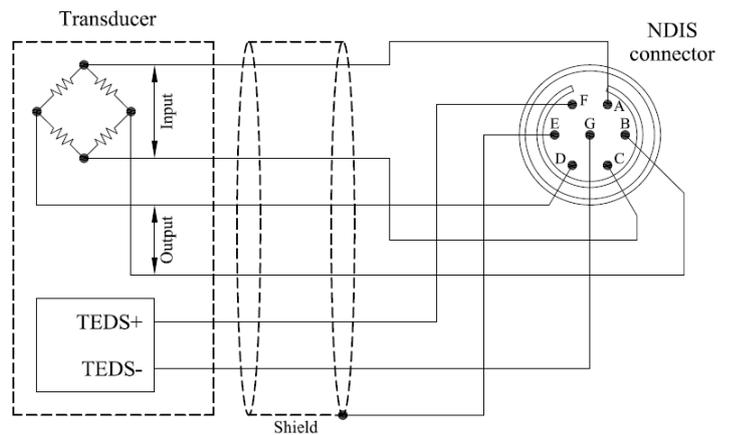
MEMO

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.

Strain Gage Transducer

When disconnecting, pull the plug toward you.
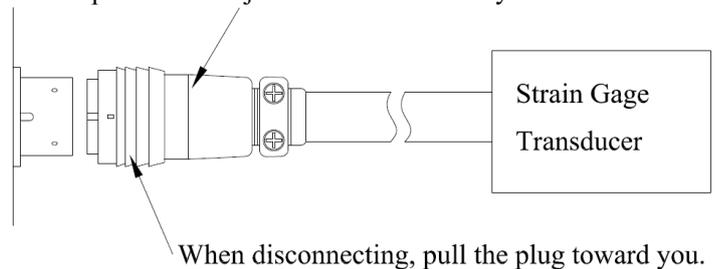
NOTE 1

・For transducer wiring, use shortest possible 4-conductor or 6-conductotor 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).
For details, see "5-3-2. Manual Input Calibration"

NOTE 2

・Never connect a 6-wire system remote sensing sensor.
Or, the WGA-910A 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.

3-3-2. Connecting Control Input

・Compatible 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	Reserve
20	HOLD command	29	Reserve
21	RESET command	30	Reserve
22	TEDS command	31	Reserve
23	Waveform command	32	Reserve
24	Measuring condition select 0	33	Reserve
25	Measuring condition select 1	34	Reserve
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.
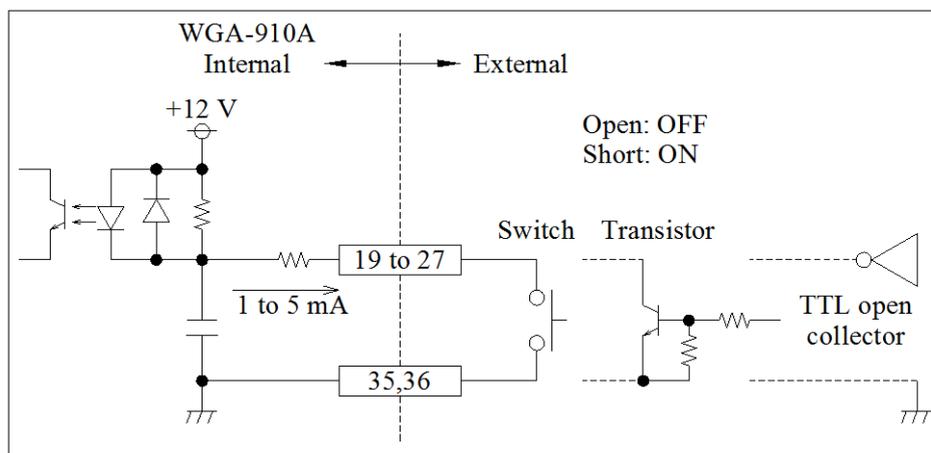
NOTE

・Never connect the signals to reserve pin.
・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 uA.
・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.

3-3-3. Connecting Control Output

・The control output signal is open collector output and sink type.
・Compatible 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	SD Error
3	OK comparator output	12	Wave comparator HI output
4	LO comparator output	13	Wave comparator OK output
5	LL comparator output	14	Wave comparator LO output
6	Abnormal channel	15	Motion detect output
7	Abnormal memory	16	Inflection point/Extreme value
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.

WGA-910A Internal ← → External
Relay
Withstanding voltage
30 V max
20 mA max
1 to 10
17,18
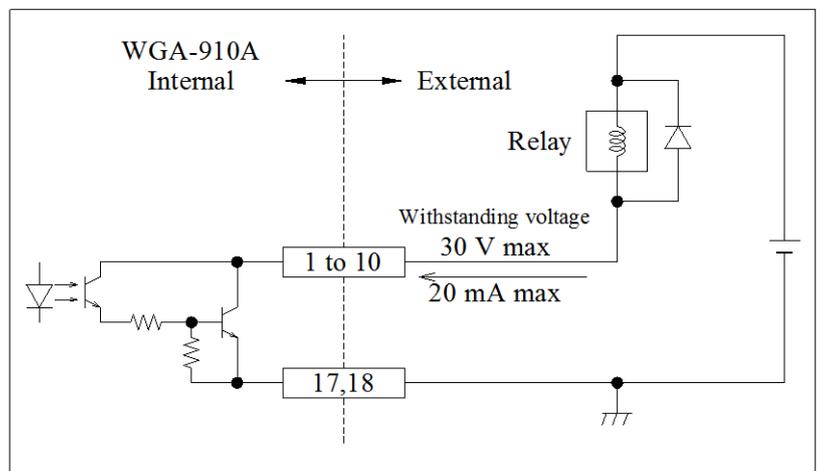
・Capacity of the open collector is 30 VDC, 20 mA or less.

> **NOTE**
>
> ・Never connect the signals to reserve pin.
> ・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.

3-3-4. Connecting RS-232C Interface

・Compatible 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.

WGA-910A			PC side: D-sub 9 pin	
DCD	A1		1	DCD
RXD	B1		2	RXD
TXD	A2		3	TXD
DTR	B2		4	DTR
GND	A3		5	GND
DSR	B3		6	DSR
CTS	A4		7	CTS
RTS	B4		8	RTS
			9	F.G

NOTE

Do not forget to turn OFF both WGA-910A and the external device before connection.
Or, correct operation may not be obtained or may cause damage.

3-3-5. Monitor Output

・A voltage output is available on the terminal board provided on the amplifier's rear.
・Outputs approx. ±5 V / ±3.2 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>
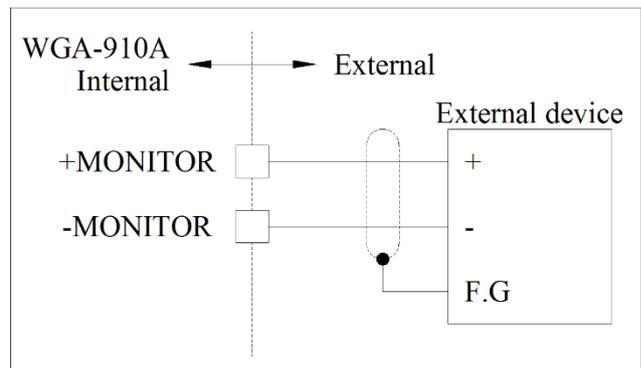
1) Peel off a jacket of a connecting wire approx. 10 to 11 mm and twist the tip of the wire for not to loosen.
   Available wire range is
   Single wire: φ0.4 mm (AWG24) to φ1.2 mm (AWG16), Twist wire: 0.2 mm^2 (AWG24) to 1.25 mm^2 (AWG16).

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.
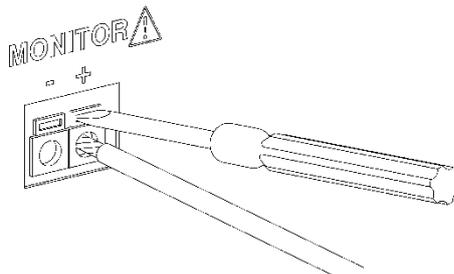
NOTE 1

・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.
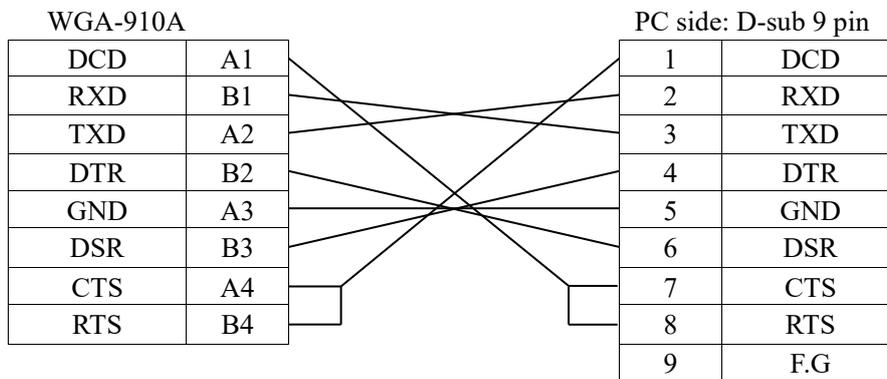・Do not solder the wire or mount the press-fit terminal.
・Be sure to turn OFF the WGA-910A before connecting cables.

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 analog 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-910A may be damaged.
・Do not input voltage from external.

3-3-6. Connecting AC Power

■Connecting terminal block for AC power

・It is recommended to attach insulating coated press-fit terminals to the connecting wires.

・Remove a cover from the terminal board.

・Before connecting the solderless terminals and power cable, remove screws as described in the right figure.

・After completing terminal block wirings, do not forget to cover the terminal block.
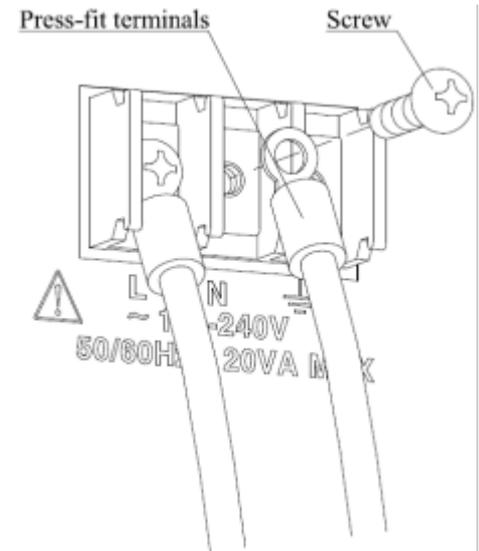
⚠ WARNING

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

To prevent short circuit of the power supply, use crimp terminal with insulation coating (equivalent to JIS C 2805 Crimp-type terminal lugs for copper conductors 1.25-3).

NOTE

When the power cable interferes with the other cables or connectors, wire the power cable from the top.

■ Checking power voltage

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 100 to 240VAC.

AC power outlet

Tester   Within 100 to 240 VAC
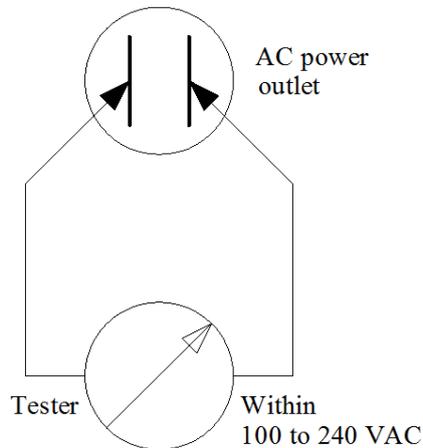
(2) Measure the voltage between the ground and each end of the AC power receptacle with a tester. Confirm one end has 0 V and the other, 100 to 240 VAC.

AC power outlet

Tester   Tester

0V   Within 100 to 240 VAC

Ground
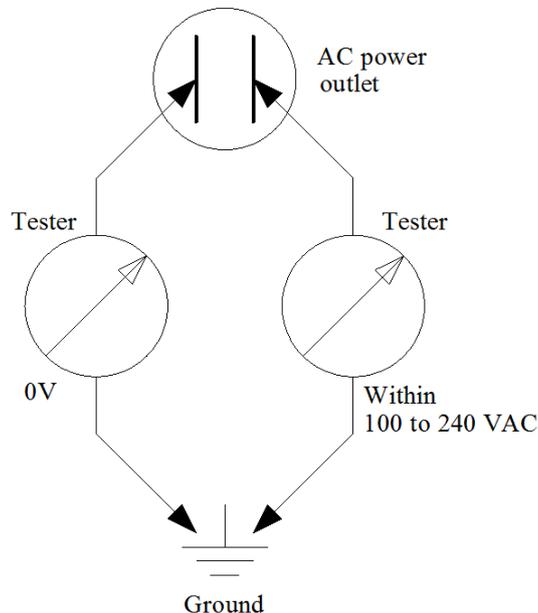
(3) If the WGA-910A is used at site using apparatuses generating interfering noise, for example, induction motor, electric welding machine, etc., power supply condition may be deteriorated due to excessive noise. Take appropriate countermeasures against the noise by using an insulation transformer or commercially available noise-cut transformer.

3-4. SD Card

・Capable of updating a setting value of the WGA-910A by reading the setting value that is saved in the SD card.

・Capable of saving the setting value of the WGA-910A 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 SDHC card corresponding to the WGA-910A is up to "32 GB."

Note that the WGA-910A is does not support the SDXC standard SD card 64 GB or more.

Never insert the SDXC card 64 GB or more.

NOTE 2

Due to the SD speed class or various files saved in the SD card, the loading/writing speed of the SD card may decrease.

The SD card may take a longer time to write the waveform data.

The recommended SD card is as follows.

        Model: TS32GSDHC10 (Class10)

        Capacity: 32 GB

        Manufacture: Transcend

■ 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.

SD cap

Cutting lack of SD card
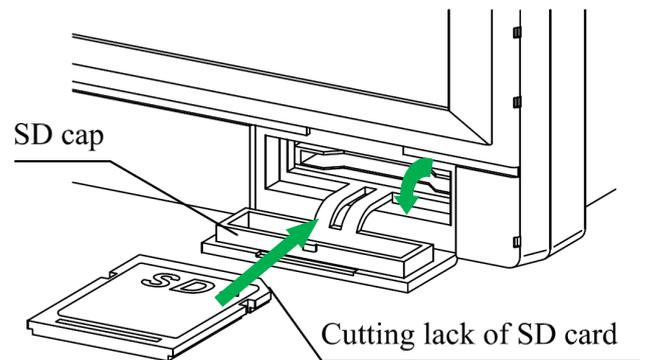
NOTE

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. (During access, the control output "SD" turns ON.)

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.
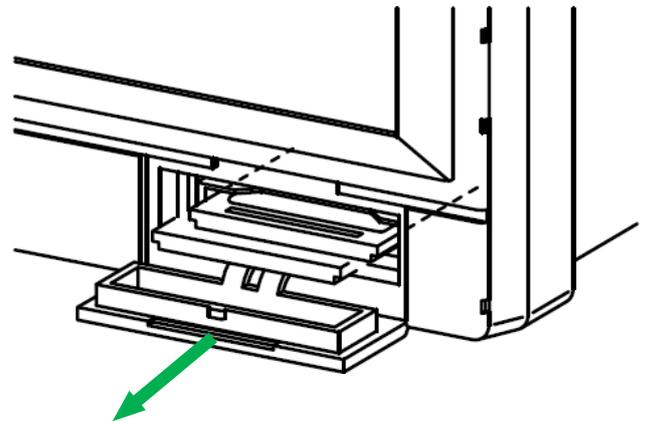
4. BASIC OPERATION PROCEDURES

4-1. SETTING TREE

```
Measuring Window ── Setting ──┬── Calibration ──┬── Manual Input Cal. ──┬── Bridge voltage
                              │                  │                      ├── No-load Zero
                              │                  │                      ├── Sens. Regist. Cal.
                              │                  │                      ├── Actual Load Cal.
                              │                  │                      └── Unit
                              │                  ├── TEDS Auto Cal.
                              │                  ├── TEDS Part Cal.
                              │                  ├── TEDS Ope. Setting ──┬── TEDS Reading Ope.
                              │                  │                       ├── ZERO during TEDS
                              │                  └── Numeric Reg. Cal.   └── TEDS Info. Display
                              │
                              ├── Input Setting ──┬── Smoothing ──┬── Analog Filter
                              │                   │               ├── Minimum Scale
                              │                   │               └── Moving Average
                              │                   ├── ZERO Compensation ──┬── ZERO every Comp.Time
                              │                   │                       └── Min. Scale Zero Fix
                              │                   ├── Additional Value
                              │                   └── Sensor Output Value
                              │
                              └── Meas. Cond. Setting ──┬── Measuring Condition
                                                        ├── Comparison Setting ──┬── HH compared value
                                                        │                        ├── HI compared value
                                                        │                        ├── LO compared value
                                                        │                        ├── LL compared value
                                                        │                        ├── Hysteresis Width
                                                        │                        ├── Comparator Out Logic
                                                        │                        ├── Comparator Out.
                                                        │                        ├── Motion Detect Function
                                                        │                        ├── Motion Detect Width
                                                        │                        ├── Motion Detect Time
                                                        │                        └── M.D. Logic
                                                        ├── Measure Mode Setting ──┬── Operation Mode
                                                        │                          ├── Detect Time
                                                        │                          ├── Delay Time
                                                        │                          ├── Comparison Mode
                                                        │                          ├── Display Mode
                                                        │                          ├── Detection Trigger Level
                                                        │                          ├── Detection Trigger Way
                                                        │                          ├── Inf.Disc.Time
                                                        │                          ├── Inf.Disc.Value
                                                        │                          ├── Extreme Disc.
                                                        │                          └── Pre.Comp.Ini.Value
                                                        └── Waveform Comp.Set. ──┬── Set Ref.Waveform
                                                                                 ├── Waveform Comp.HI
                                                                                 ├── Waveform Comp.LO
                                                                                 ├── Move Waveform
                                                                                 ├── Comparison Area
                                                                                 ├── Register Waveform
                                                                                 └── Waveform Comp.Logic
```
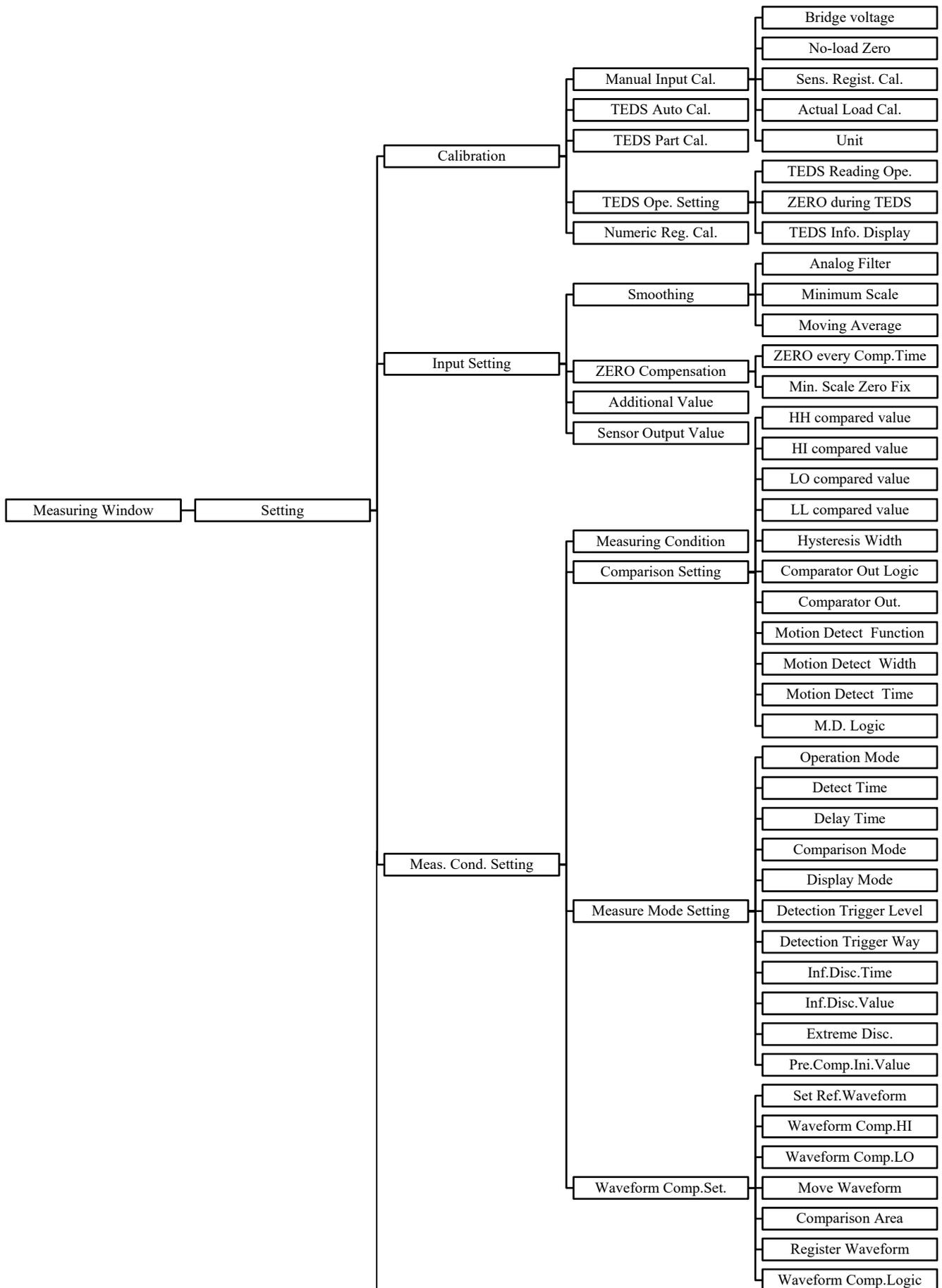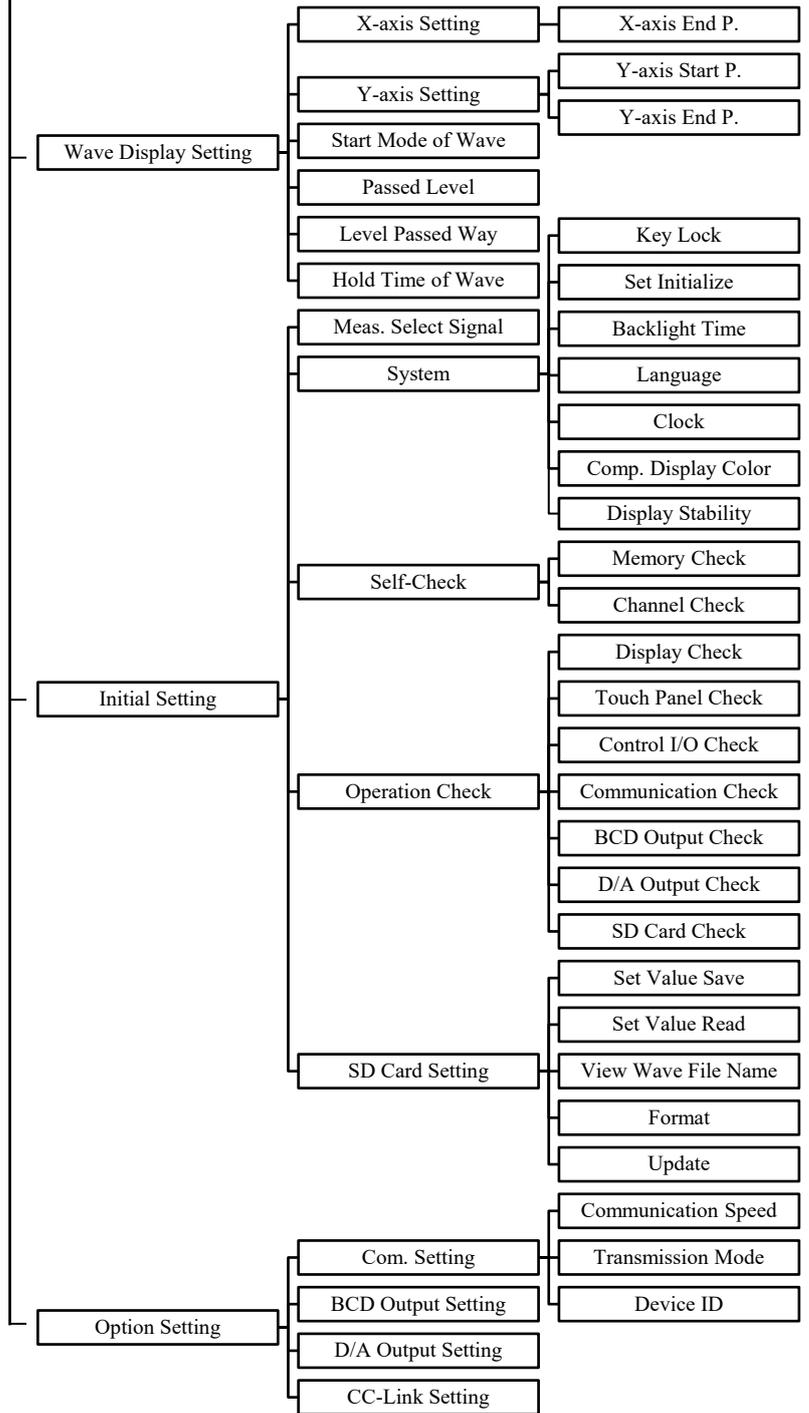
```
                                          ┌──────────────────┐
                            ┌─────────────│  X-axis End P.   │
                            │             └──────────────────┘
              ┌──────────────────┐        ┌──────────────────┐
              │  X-axis Setting  │────────│  Y-axis Start P. │
              └──────────────────┘        └──────────────────┘
              ┌──────────────────┐        ┌──────────────────┐
              │  Y-axis Setting  │────────│  Y-axis End P.   │
              └──────────────────┘        └──────────────────┘
              ┌──────────────────┐
      ┌───────│ Start Mode of Wave│
      │       └──────────────────┘
      │       ┌──────────────────┐
┌──────────────────────┐│  Passed Level    │
│ Wave Display Setting  ││└──────────────────┘
└──────────────────────┘│┌──────────────────┐        ┌──────────────────┐
              │ Level Passed Way │────────│     Key Lock     │
              └──────────────────┘        └──────────────────┘
              ┌──────────────────┐        ┌──────────────────┐
              │ Hold Time of Wave│        │  Set Initialize  │
              └──────────────────┘        └──────────────────┘
              ┌──────────────────┐        ┌──────────────────┐
              │ Meas. Select Signal│      │  Backlight Time  │
              └──────────────────┘        └──────────────────┘
              ┌──────────────────┐        ┌──────────────────┐
              │      System      │────────│     Language     │
              └──────────────────┘        └──────────────────┘
                                          ┌──────────────────┐
                                          │      Clock       │
                                          └──────────────────┘
                                          ┌──────────────────┐
                                          │Comp. Display Color│
                                          └──────────────────┘
                                          ┌──────────────────┐
                                          │ Display Stability │
                                          └──────────────────┘
                                          ┌──────────────────┐
                            ┌─────────────│  Memory Check    │
              ┌──────────────────┐        └──────────────────┘
              │    Self-Check    │────────┌──────────────────┐
              └──────────────────┘        │  Channel Check   │
                                          └──────────────────┘
                                          ┌──────────────────┐
                                          │  Display Check   │
                                          └──────────────────┘
                                          ┌──────────────────┐
                                          │ Touch Panel Check│
                                          └──────────────────┘
┌──────────────┐                          ┌──────────────────┐
│Initial Setting│                         │ Control I/O Check│
└──────────────┘                          └──────────────────┘
              ┌──────────────────┐        ┌──────────────────┐
              │ Operation Check  │────────│Communication Check│
              └──────────────────┘        └──────────────────┘
                                          ┌──────────────────┐
                                          │ BCD Output Check │
                                          └──────────────────┘
                                          ┌──────────────────┐
                                          │ D/A Output Check │
                                          └──────────────────┘
                                          ┌──────────────────┐
                                          │  SD Card Check   │
                                          └──────────────────┘
                                          ┌──────────────────┐
                                          │  Set Value Save  │
                                          └──────────────────┘
                                          ┌──────────────────┐
                                          │  Set Value Read  │
                                          └──────────────────┘
              ┌──────────────────┐        ┌──────────────────┐
              │  SD Card Setting │────────│ View Wave File Name│
              └──────────────────┘        └──────────────────┘
                                          ┌──────────────────┐
                                          │      Format      │
                                          └──────────────────┘
                                          ┌──────────────────┐
                                          │      Update      │
                                          └──────────────────┘
                                          ┌──────────────────┐
                                          │Communication Speed│
                                          └──────────────────┘
              ┌──────────────────┐        ┌──────────────────┐
              │   Com. Setting   │────────│ Transmission Mode│
              └──────────────────┘        └──────────────────┘
              ┌──────────────────┐        ┌──────────────────┐
┌──────────────┐│ BCD Output Setting│     │    Device ID     │
│ Option Setting│└──────────────────┘     └──────────────────┘
└──────────────┘┌──────────────────┐
              │ D/A Output Setting│
              └──────────────────┘
              ┌──────────────────┐
              │  CC-Link Setting │
              └──────────────────┘
```

4-2. CONFIGURING WINDOWS OUTLINE

<Number>

<Zoom in Number>

<Waveform>
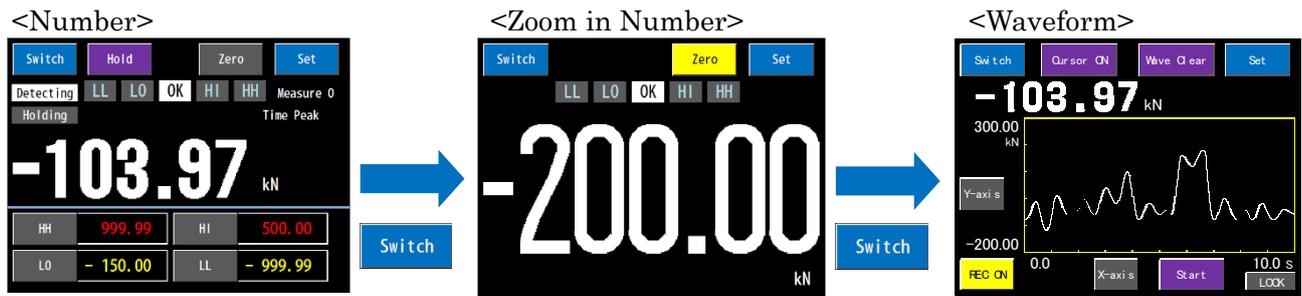
< When an operation mode with two hold values is selected >
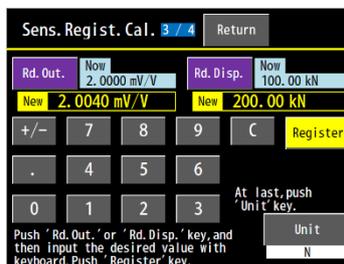

Set   Measure

<Setting>
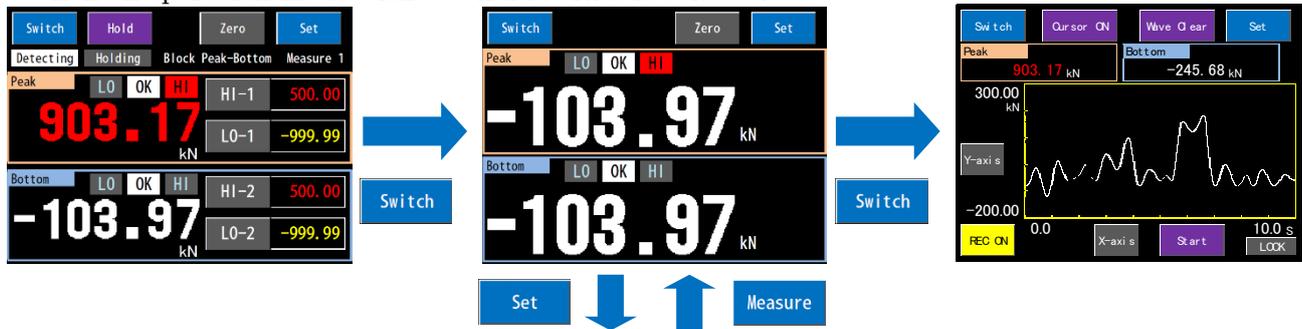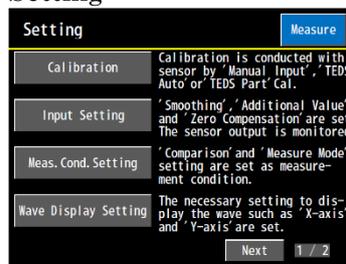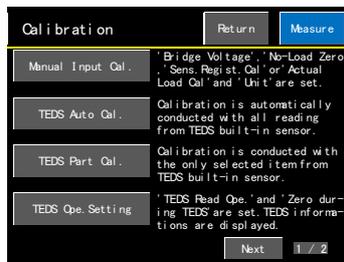
Main item keys

Item keys
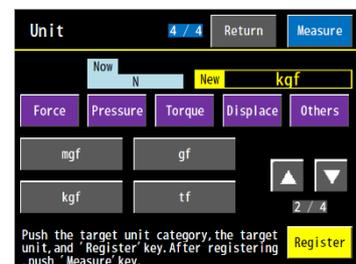
4-3. BASIC OPERATION OF SETTING

Setting windows appear as follows.

1) Reading the setting window
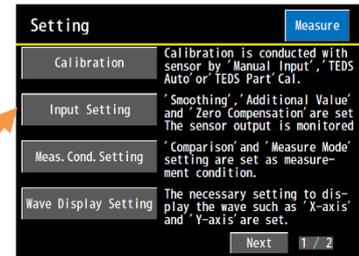   Press the Set key on the "**Measuring**" window.

Measuring Window

2) Select main item
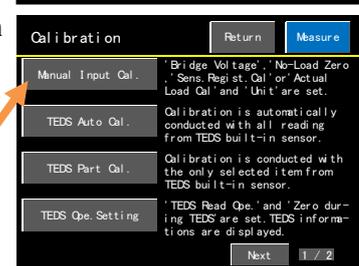   Press the target main item key on the "**Setting**" window.

Setting Window

Main item key

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

Main item Window

Item keys

4) Select setting value
   Press the target key and Register key on the item window.
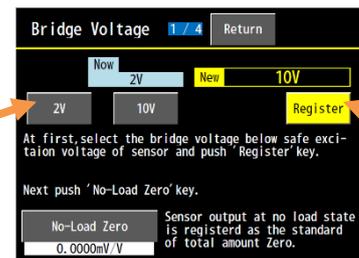
Item Window

Target key

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

Item Window
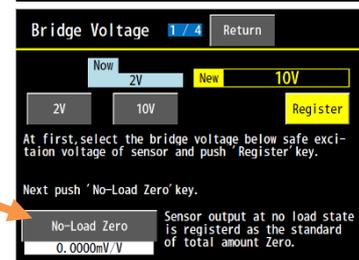
Function key

6) Select parameter
   Press the Parameter key on the parameter window.
   Then, input a setting value with the numeric keypad
   and press the Register key.

Parameter Window
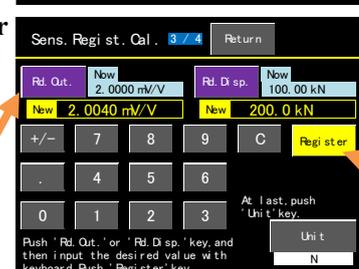
Parameter key

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

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

Wave Clear Key
Clears the current displaying

X-axis Key
The "**X-axis Setting**" window appears.
The X-axis key is displayed in gray and key operation is invalid during

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

REC Key
Select recording of waveform data ON / OFF.

LOCK Key
Pressing the key deactivates the Switch key. Press again to activate the Switch key.

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.

◁ ▷ 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

Detect Move Key
The cursor moves directly to the Detecting point.
When detecting the two hold values, as you press the key, the detecting point changes as the Hold value1 → Hold value2.

[Detecting Point]
The measured detecting point
Hold value1:   Red point
Hold value2:   Blue point

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

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5. CALIBRATION

5-1. OUTLINE OF CALIBRATION

The WGA-910A has 4 calibration methods; manual input calibration, TEDS-based automatic calibration, partial calibration based on TEDS calibration data, and numeric value registering calibration.

- Manual input calibration: Enters the calibration data manually.
  The manual input calibration includes the "Sensitivity registering calibration" that calibrates data by registering a sensitivity value written in the test data sheet of transducers and "Actual load calibration" that calibrates data by applying the already known load to transducers. You are able to calibrate data properly.
- TEDS-based automatic calibration: Compatible to the TEDS-compatible sensors.
  Calibrates the data automatically by loading all the necessary information from the TEDS information.
- Partial calibration based on TEDS calibration data:
  Selects and calibrates the target calibration data only when loading the TEDS information.
- Numeric value registering calibration:
  Registers the input value for indicating "0" as the initial value manually.

5-2. PROCEDURES OF CALIBRATION

```
                          ┌─────────────────────┐
                          │   Measuring Window  │
                          └─────────────────────┘
                                     │
                          ┌─────────────────────┐
                          │   Setting Window    │
                          └─────────────────────┘
                                     │
┌─────────────────────────────────────────────────────────────────────────────┐
│ Calibration Window                                                            │
│         │                  │                  │                  │            │
│  ┌────────────┐     ┌────────────┐    ┌────────────────┐  ┌──────────────────┐│
│  │Manual Input│     │ TEDS-based │    │Partial Calibr. │  │Numeric Regist Cal││
│  │Calibration │     │ Automatic  │    │based on TEDS   │  └──────────────────┘│
│  └────────────┘     │Calibration │    │Calibration Data│                      │
│                     └────────────┘    └────────────────┘                      │
└─────────────────────────────────────────────────────────────────────────────┘
```

Manual Input Cal.

- Bridge Voltage
- No-load ZERO
- Sens. Regist.Cal.
- Actual Load Cal.
- Unit

TEDS Auto Cal

- TEDS Auto Cal.

TEDS Part Cal

- TEDS Part Cal.
- TEDS Cal. Item

Numeric Regist Cal.

- Numeric Regist Cal.

5-3. HOW TO CALIBRATE

5-3-1. Calibration Window
<How to operate>
1) Press the Set key on the "**Measuring**" window.
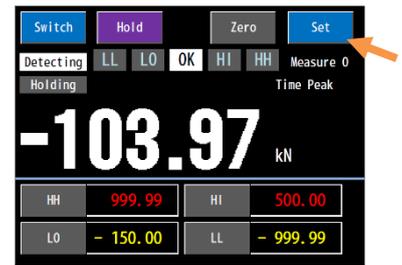
2) Press the Calibration key on the "**Setting**" window.
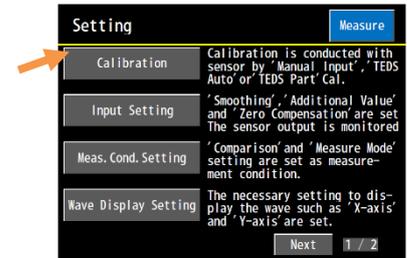
5-3-2. Manual Input Calibration
Conducts calibration by manual setting in order of excitation voltage, no-load zero, Sensitivity registering calibration or in order of actual load calibration and unit.

(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.
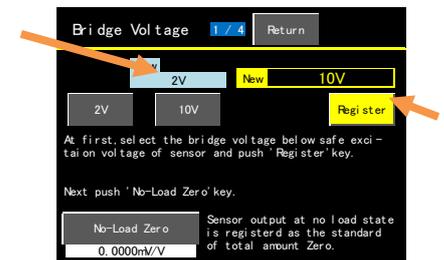
3) After the registration, press the No-Load Zero key to move to the "**No-load Zero**" window.
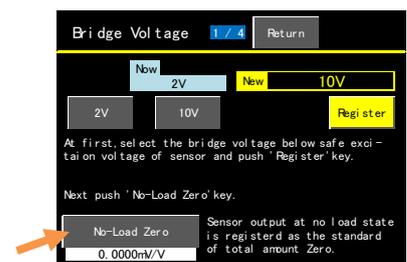
(2) No-Load ZERO

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.
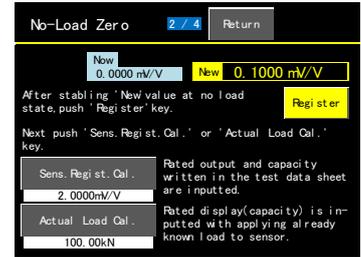
2) After stabilizing the value in the "**New**" column, press the Register key.

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.

Blinks
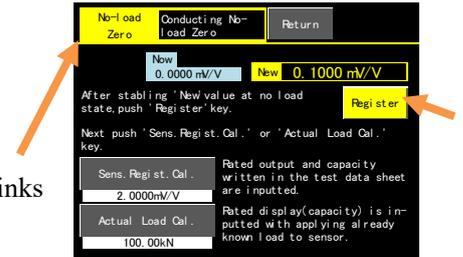
3) After the registration, press either Sens.Regist.Cal or Actual Load Cal. key to move to the target calibration window.。
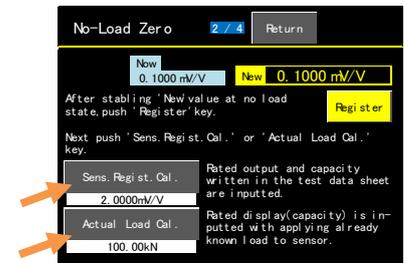
┌─ **MEMO**

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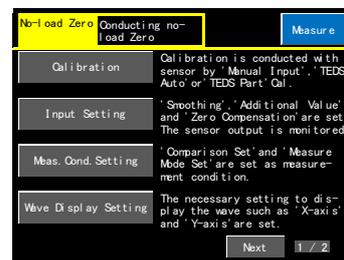
(3-a) Sensitivity Regist. Cal. (Sensitivity Registering Calibration)

 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 "200.0" 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 (excluding 0)

  Rated Display: -99999 to 99999 (excluding 0)

  (For details, refer to the notes below)

 <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 "200.0" is input, "200.0 kN" is displayed in the "**New**" column.
   In addition, the Rd.Disp. key blinks during the setting.
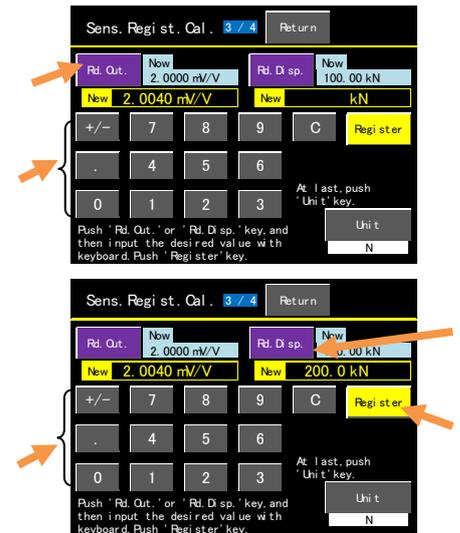
NOTE

(1) The set upper limit value is the Rated Display: 10000 counts per Rated Output: 0.1mV/V

   [Example] Rated Output: 0.5 mV/V   Rated Display: 50000 counts ···Configurable

        Rated Output: 0.5 mV/V   Rated Display: 50001 counts ···Sens. Registering Error

(2) If the Rated Output value (Red) to be newly registered and the current Rated Display value (Blue) exceeds the upper limit of (1), Sens. Registering Error will be displayed.
   Next, when setting the Rated Display (Green) not exceeding the upper limit value of (1), the error disappears and Rated Output and Rated Display can be set.

   [Example] <Now> Rated Output: 2.0 mV/V   Rated Display: 10001 counts

       <New> Rated Output: 0.1 mV/V   Rated Display: 200 counts

(3) When you move the screen at the time of the Sens. Registering Error, the value will return to the value before setting.

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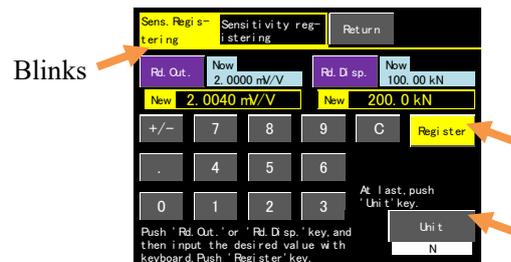
Blinks

4) After the registration, press the Unit key to move to the "**Unit**" window.

MEMO

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

40
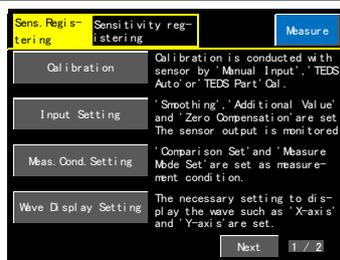
(3-b) Actual Load Cal. (Actual Load Calibration)

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 "200.0" 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)

(For details, refer to the notes of (3-a) Sensitivity Regist. Cal.)

<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 stabled.
[2.0040 mV/V] is displayed in the right figure.
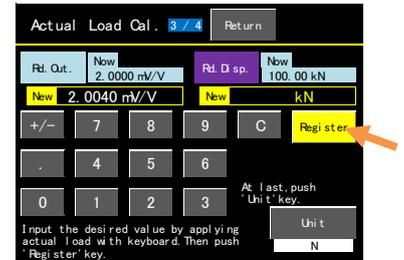
2) Input a setting value of the "Rated Output" with the numeric keyboard.
Suppose "200.00" is input, "200.00 kN" is displayed in the "**New**" column.
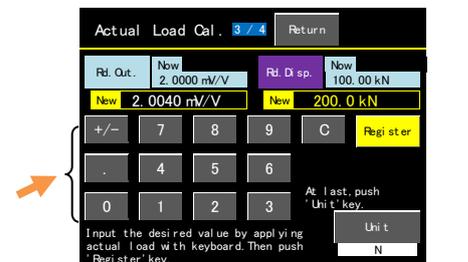
3) Press the Register key. The "**Sens. Registering**" window on the upper left blinks and the "Rated Output" and "Rated Display" are registered.
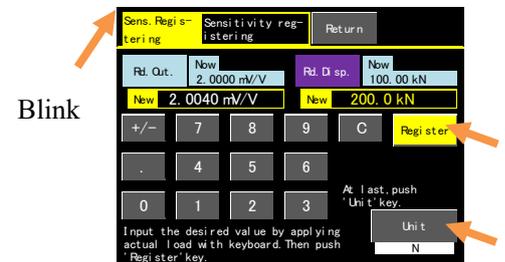
Blink

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.

41
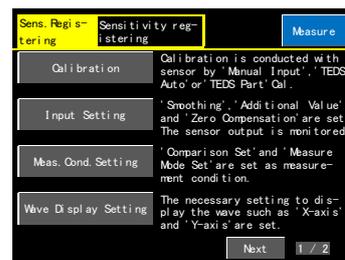
(4) Unit

    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.
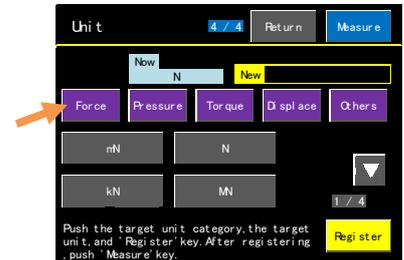
    2) Units of the selected type appear below. Press the target key.
       Press △ ▽ key when the target unit is not displaying on the window.
       Press the kgf key to display the [kgf] on the "**New"** column as an example.
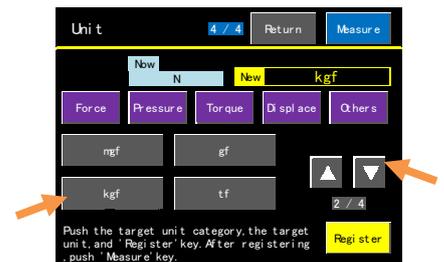
    3) Press the Register key to register the setting value.
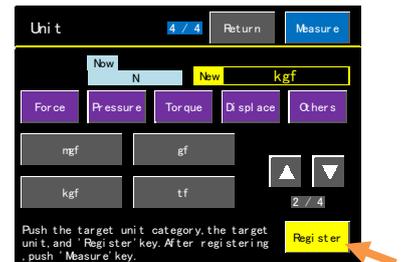
    4) Calibration finishes.
       Press the Measure key at last to move to the "**Measuring**" window.
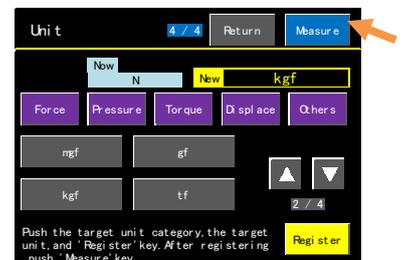
5-3-3. TEDS Auto Cal. (TEDS-based Automatic Calibration)

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.

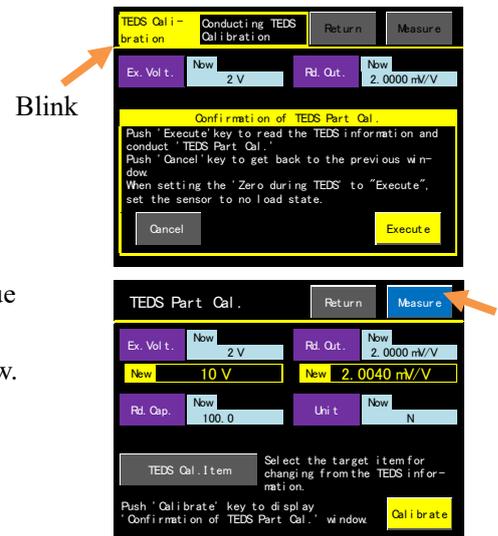3) Press the Execute key. The TEDS information is read and the calibration is started.
   Press the Cancel key to cancel the calibration and gets back to the previous window.

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

Blink

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.

Blinks

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** C**alibration 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.
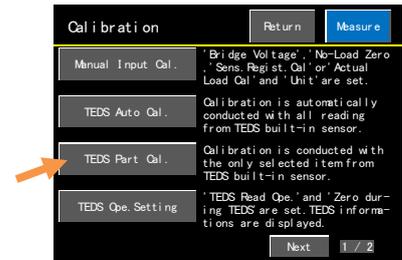
   2) Press the TEDS Cal. Item key on the "**TEDS Part Cal.**" window.
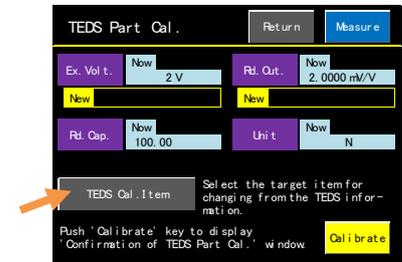
   3) Every time the right key of the calibration item is pressed, Execute or Prohibit changes.
      After the setting, press the Register key.
      After the registration, press the Return key.
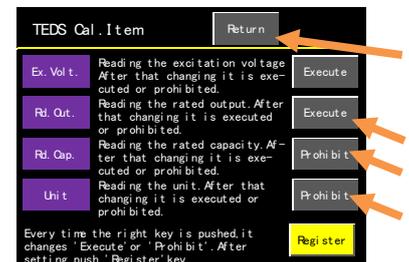
   4) Press the Calibrate key to display the "**Confirmation of TEDS Part Cal.**" window.

> ┌─ **MEMO** ─────────────────────────────
>
> Calibration item with the "**Prohibit**" selected in the "**TEDS Cal. Item**" window, "**New**" column is not displayed in the "**TEDS Part Cal.**" Window.
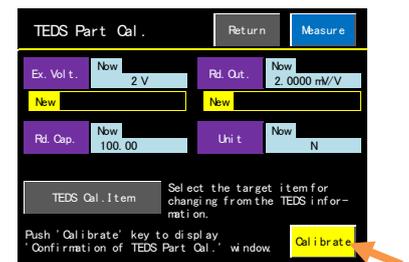
   5) Press the Execute key. The TEDS information is read and the calibration starts.
      Press the Cancel key to cancel the calibration and gets back to the previous window without conducting the calibration.
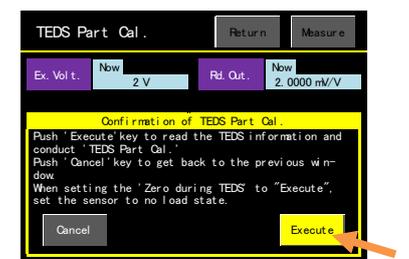
45

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

Blink

| TEDS Cali-bration | Conducting TEDS Calibration | Return | Measure |

| Ex. Volt. | Now 2 V | Rd. Out. | Now 2.0000 mV/V |

Confirmation of TEDS Part Cal.
Push 'Execute' key to read the TEDS information and conduct 'TEDS Part Cal.'
Push 'Cancel' key to get back to the previous window.
When setting the 'Zero during TEDS' to "Execute", set the sensor to no load state.

| Cancel | Execute |

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.

| TEDS Part Cal. | Return | Measure |

Ex. Volt.	Now 2 V	Rd. Out.	Now 2.0000 mV/V
New	10 V	New	2.0040 mV/V
Rd. Cap.	Now 100.0	Unit	Now N

| TEDS Cal.Item | Select the target item for changing from the TEDS information. |

Push 'Calibrate' key to display 'Confirmation of TEDS Part Cal.' window. | Calibrate |

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.

5-3-5. Numeric Value Registering Calibration

The numeric value registering calibration calibrates data by changing the initial value.

Execute the numeric value registering calibration after the actual load calibration and sensitivity registering calibration.

The numeric value registering calibration is used for pressure transducers for absolute pressure measurement or when already load is applied and unable to obtain the actual load state. By registering the initial value of the transducer written in the Test Data Sheet or registering an already measured initial value, a reference point equivalent to unload state can be registered.

<Setting Range>

      -3.2000 to +3.2000 mV/V

<How to operate>

1) Press the Next key on the "Calibration (1/2)" window.
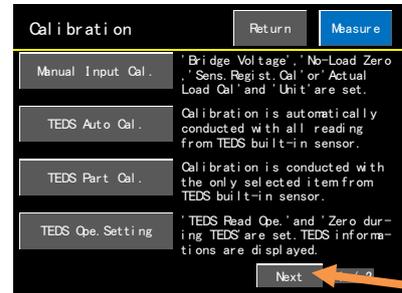
2) Press the Nurmeric Regist Cal. key on the "Calibration (2/2)" window.
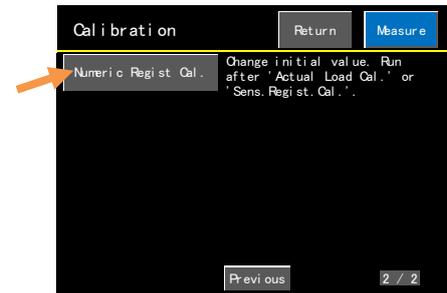
3) The initial value, registered during the no-load zero, appears.
In the case of this example, the "0.1000 mV/V" appears.
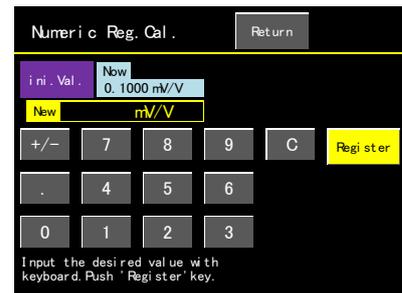
4) Enter the new initial value with the numeric keyboard.
In the case of this example, as you enter "-0.5432", the "-0.5432mV/V" appears.
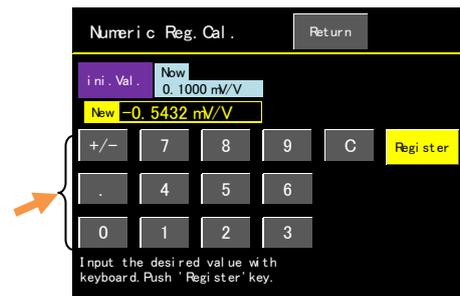
5) Press the Register key.
The "**Registering　ini. Val.**" window blinks on the top left for registering the new initial value.

Blinks

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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.
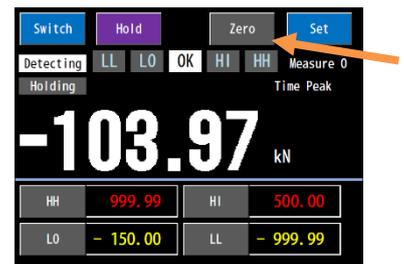
  2) The "**Confirmation of Digital Zero**" window appears.

    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.
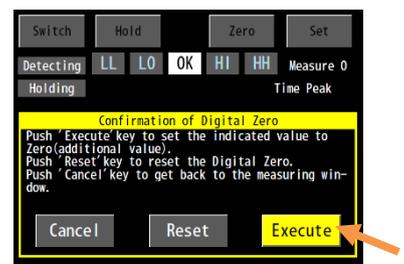
> **NOTE**
>
> The zero point value that is obtained by the key operation is maintained even if the WGA-910A is turned OFF.

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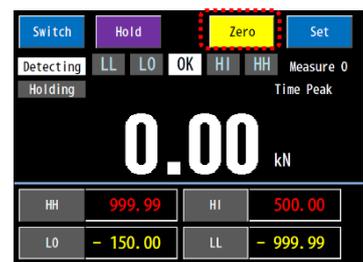
(2) By the control input operation from the rear panel

　1) To execute the digital zero once, short-circuit the 35 (or 36, input COM) and 19 (ZERO command) on the control I/O connector located on the back panel.

　2) Capable of conducting while the setting is locked.

　3) To execute the digital zero again, open the 35 (or 36, input COM) and 19 (ZERO command) on the control I/O connector located on the back panel and short-circuit them again.

> **NOTE**
>
> After turning OFF the WGA-910A, 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-910A.

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

The TEDS function of the WGA-910A 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-910A 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-910A 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>
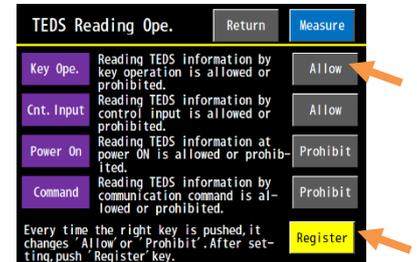
　1) Press the Set key on the "**Measuring**" window.

　2) Press the Calibration key on the "**Setting**" window.

　3) Press the TEDS Ope. Setting key on the "**Calibration**" window.
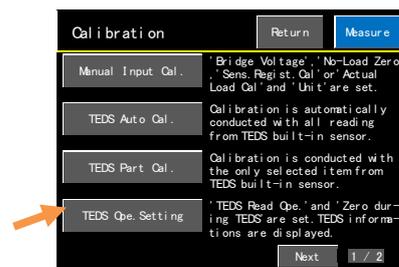
4) Press the TEDS Reading Ope. key on the "**TEDS Ope. Setting**" window.
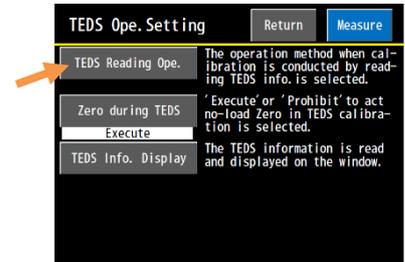
5) Every time the right key of the target item is pressed, Prohibit or Allow key appears alternately.
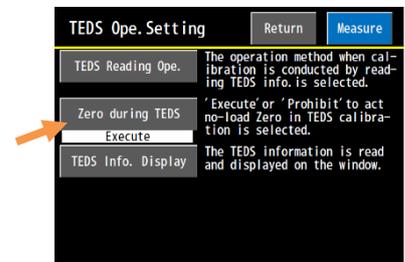After setting every reading operation item, press the Register key.

(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.
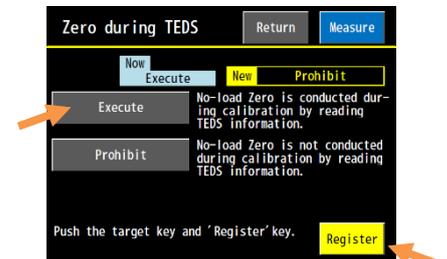<Setting Range>
Execute or Prohibit
<How to operate>
1) Press the Zero during TEDS key on the "**TEDS Ope. Setting**" window.

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.
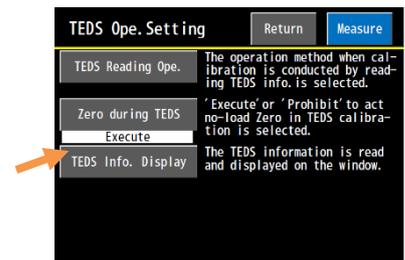
2) After pressing the Read key, the WGA-910A starts reading the TEDS information and the information is displayed on the window.

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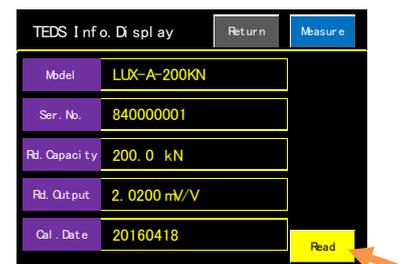
(4) Supplemental explanations of the TEDS function
  (1) Executing the TEDS calibration at the initial value.
    Set the sensor in no-load state and conduct the calibration with the TEDS. The no-load zero is automatically conducted and the display value is set to "0 (or additional value)" when the **Execute** 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
    Select the Bridge Voltage whose absolute value of the difference from the "applied voltage at calibration" is the smallest within "the minimum value of the recommended applied voltage" to "the maximum value of the recommended applied voltage".
      [Example]   "the maximum value of the recommended applied voltage" : 10V
                     "the minimum value of the recommended applied voltage" : 1V
                     "applied voltage at calibration" : 5V
                     In the case of these conditions, Set the Bridge Voltage is 2 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 4.
      [Example]   0.5 N = 500.0 mN, 5 N = 5.000 N, 50 N = 50.00 N, 500 N = 500.0 N,
                     5 kN = 5000 N, 50kN = 50.00kN

    When 4-digits display is supported, if there is a carry-up or carry-down does not found in the 12-2. UNIT LIST, set it "None".
      [Example]   0.1 Pa = 100.0 (Unit: None), 10000 G = 10.00 (Unit: None)

  (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 compatible. 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-910A 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.
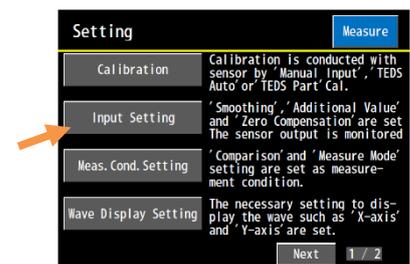
3) Press the Smoothing key on the "**Input Setting**" window.
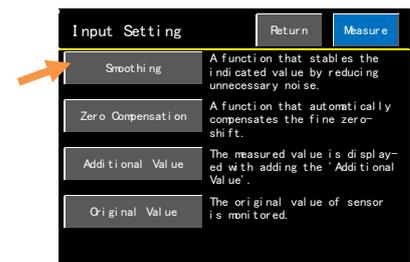
4) Press the Analog Filter key on the "**Smoothing**" window.
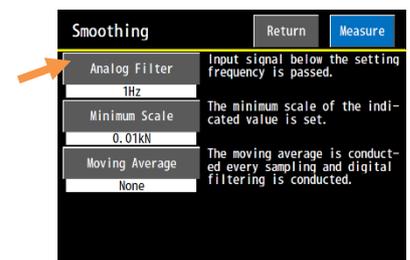
5) After pressing the target key, press the Register key to register the setting value.
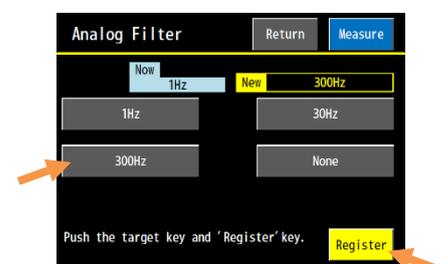
NOTE

Set the Analog Filter before calibration.

---

(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 "**Smoothing**" window.
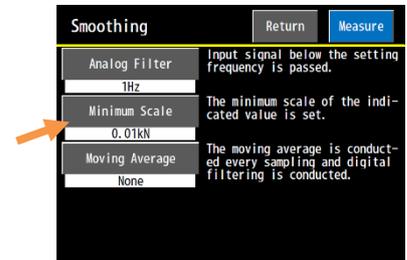
2) Press the [△] [▽] key to change pages until the target value is displayed.
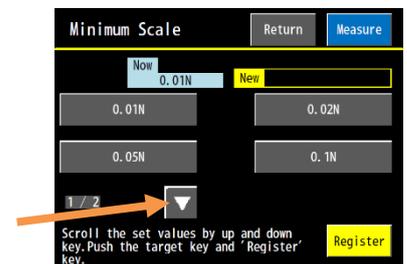
3) Select and press the target key and press the [Register] key to register the setting value.

┌─ 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 Moving Average key on the "**Smoothing**" window.
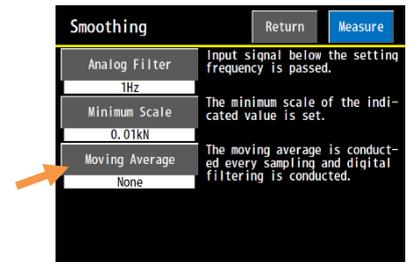
2) Press the △ ▽ key to change pages until the target value is displayed.

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

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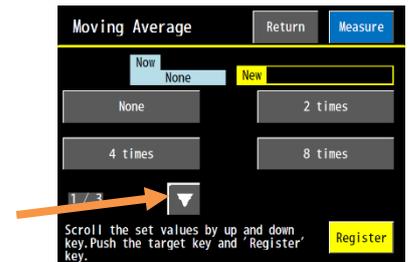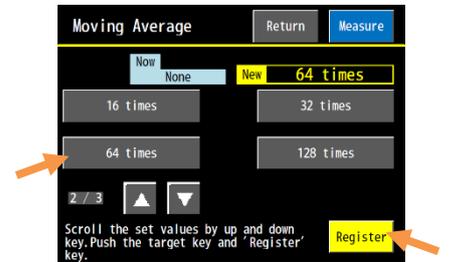
6-2-2. Zero Compensation

Automatically corrects subtle zero point drifts.

It effectively reduces measurement error inducible to zero drifts on a sensor or on the WGA-910A as well as zero drifts caused by deposits on a measuring object.

(1) 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 Set key on the "**Measuring**" window.

2) Press the Input Setting key on the "**Setting**" window.

3) Press the Zero Compensation key on the "**Input Setting**" window.
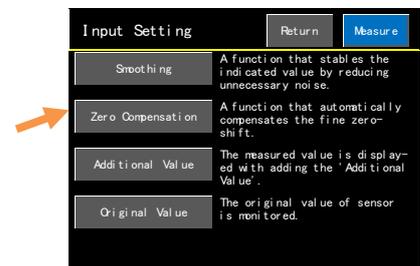
4) Press the Zero every Comp. Time key on the "**Zero Compensation**" window.
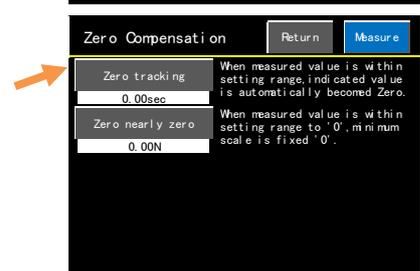
5) After pressing the J.Time key, input a setting value with the numeric keyboard and press the Register key to register the setting value.
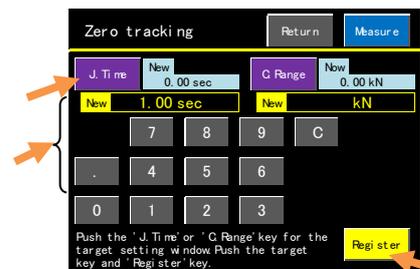
6) After pressing the C.Range key, input a setting value with the numeric keyboard and press the Register key to register the setting value.
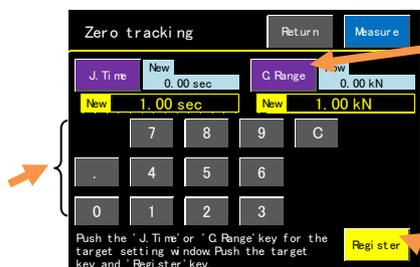
> **MEMO**
>
> When the power is turned off, the value of zero is discarded and it is not saved.
>
> The compensation range is + and - sides of 0.
>
> The "**ZERO every Comp. Time**" is not conducted when the "**J. Time**" is set to 0.00 sec.

(2) Zero nearly 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.
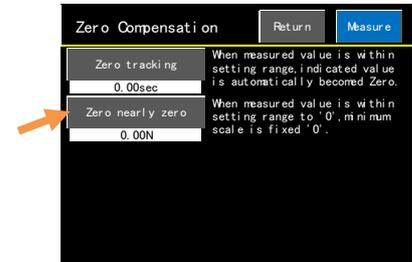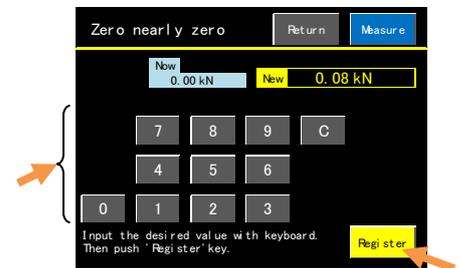
     The additional value is displayed when it is set.

    \<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)
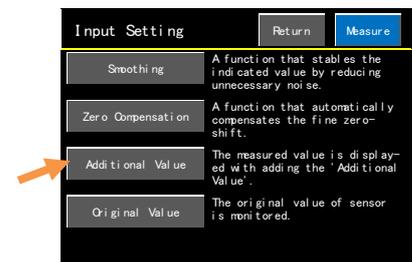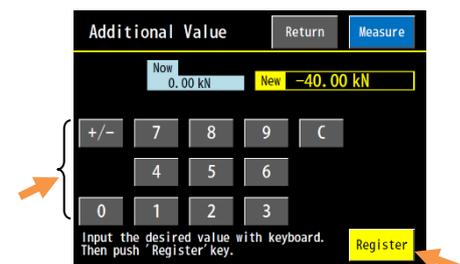
    \<Setting Range\>

     -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. Original Value (Sensor Output Value)

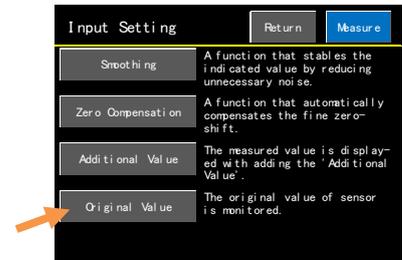Displays the current output value of the sensor on the monitor.
After pressing the ⬚Display⬚ key, the output value is measured for every 0.5 second and displayed in both units "mV/V" and "με."

<Setting Range>

-3.2000 to 3.2000 (mV/V)   (-6400.0 to 6400.0 με)

<How to operate>

1) Press the ⬚Set⬚ key on the "**Measuring**" window.

2) Press the ⬚Input Setting⬚ key on the "**Setting**" key.

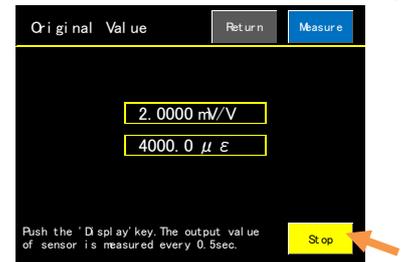3) Press the ⬚Original Value⬚ key on the "**Input Setting**" key.

4) After pressing the ⬚Display⬚ key, the Original value is continuously
   measured and displayed for every 0.5 second.

> **MEMO**
>
> The Original value is displayed in "--.---- mV/V" and "--.----με"
> before starting the measurement.
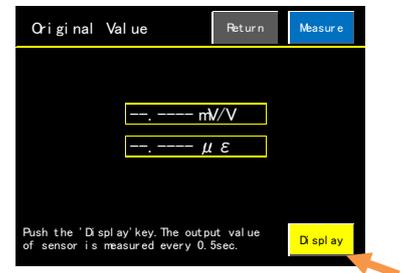
5) Press the ⬚Stop⬚ key to stop the measurement of the Original value.

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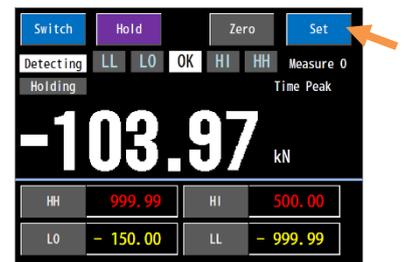
Capable of selecting the No. with the combination of the ON/OFF of the control input "Measurement condition select 0 to 3" when selecting the "**Control Input**" in the "**Meas. Select Signal**."

The No. of the measuring condition on the window also changes at the same time.
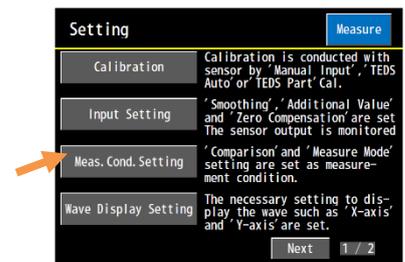
<How to operate>

For the "**Key Operation**" in the "Meas. Select Signal" of the "**Initial Set** window only.
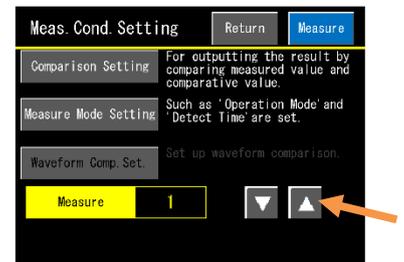
1) Press the ‭Set‭ key on the "**Measuring**" window.

2) Press the ‭Meas.Cond.Setting‭ key on the setting window.

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

MEMO

△ ▽ 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**".

During operating "Measuring condition setting", Cahnging the measuring condition No. with the commands or the control Inputs is not available.

■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	●	●	●	●
2	○	●	●	●
3	●	○	●	●
4	○	○	●	●
5	●	●	○	●
6	○	●	○	●
7	●	○	○	●
8	○	○	○	●
9	●	●	●	○
10	○	●	●	○
11	●	○	●	○
12	○	○	●	○
13	●	●	○	○
14	○	●	○	○
15	●	○	○	○
16	○	○	○	○

○：ON (Short circuit of external switch)　●：OFF (Release of external switch)

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.
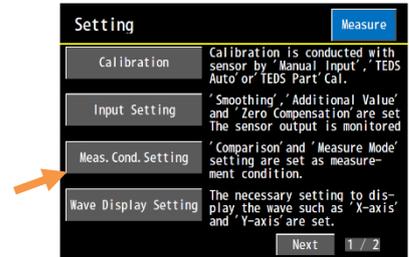
      2) Press the Comparison Setting key on the "**Meas. Cond. Setting**" window.
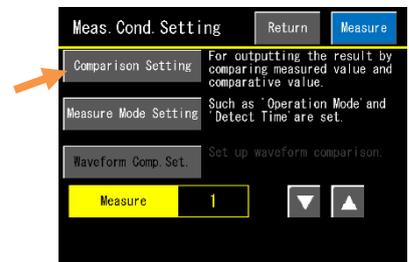
      3) Press any of the HH Compared Value HI Compared Value LO Compared Value LL Compared Value key on the "**Comparison Setting (1/3)**" window.
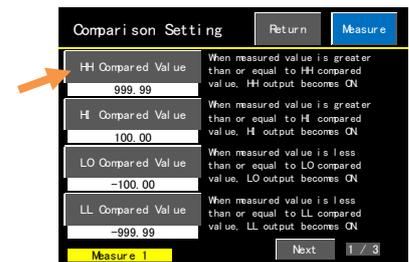
      4) Input a setting value with the numeric keyboard and press the Register key to register the setting value.
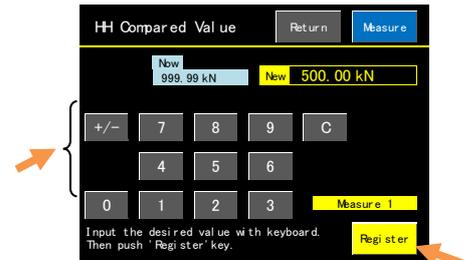
<Direct operations from the "**Measuring**" window>
   1) Press any of the HH HI LO LL key on the "**Measuring**" window.

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.
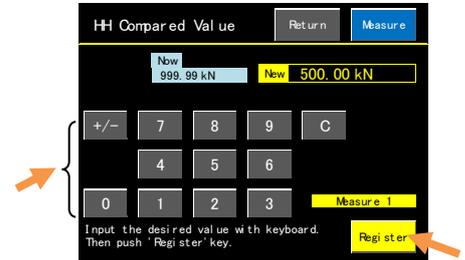
<Classifications of comparators when the hold value selects two operation modes]>
When the hold value selects two operation modes, control outputs and setting values of every comparator are
classified as follows.

Classification	Control Output	Keys and setting values
Upper limit of the Hold value1	HH comparator	HI1 Compared Value
Lower limit of the Hold value1	LL comparator	LO1 Compared Value
Upper limit of the Hold value2	HI comparator	HI2 Compared Value
Lower limit of the Hold value2	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 (1/3)**" window.
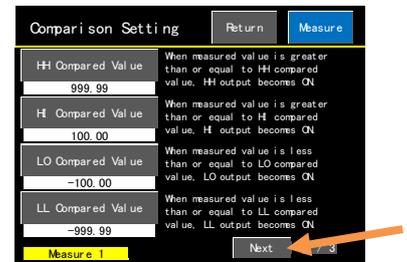
    2) Press the Hysteresis Width key on the "**Comparison Setting (2/3)**"
       window.
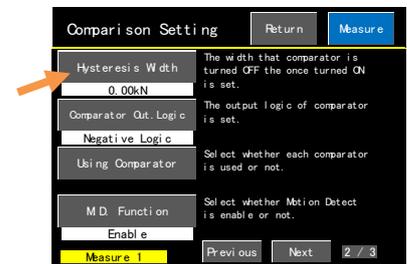
    3) Input a setting value with the numeric keyboard and press the
       Register key for registering.

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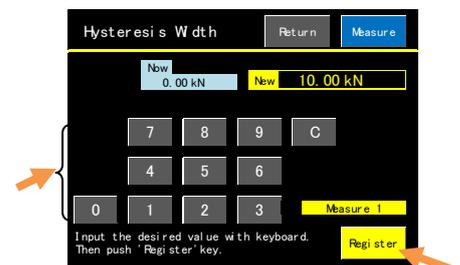
(3) Comparator Out. Logic

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 (2/3)**" window.
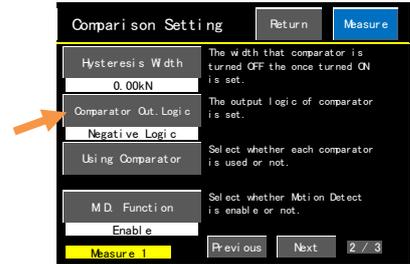
2) Input a setting value with the numeric keyboard and press the Register key for registration.
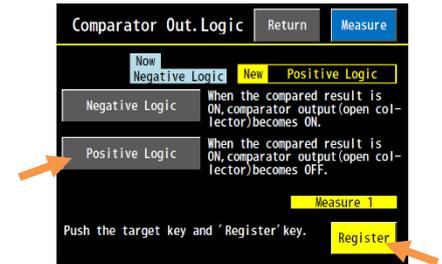
(4) Using Comparator

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 (2/3)**" window.
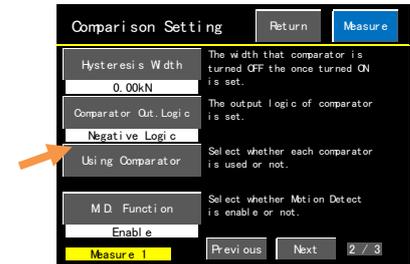
2) Use or Not use key changes by pressing the right key of the target comparator.

Press the Register key for registering.
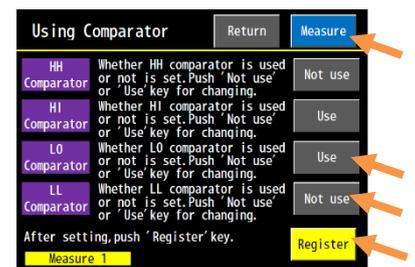
The comparator with selecting "**Not use**" in the "**Using Comparator**" window, compared value keys on the "**Comparison Setting**" and "**Measuring**" windows are invalid.

For example, when selecting the HH and LL comparators to Unused,
the HH Compared Value and LLCompared 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 HI keys, LO and LL lamps are in valid and HH and HI keys are displayed in gray.

Displayed in gray

Displayed in gray

65
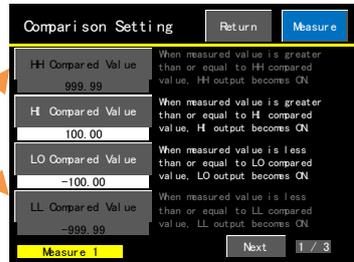
(5) Relation between the comparator outputs and hysteresis width and behaviors of comparator status lamps.

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).
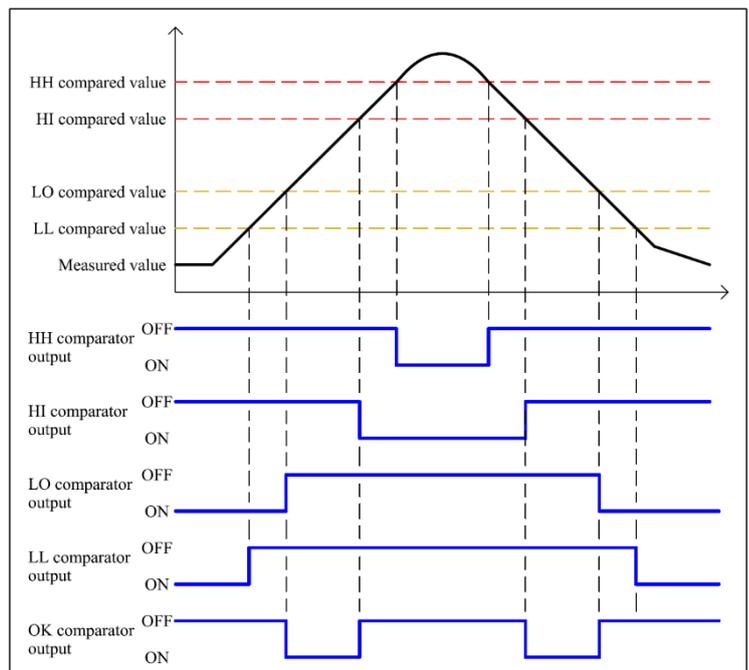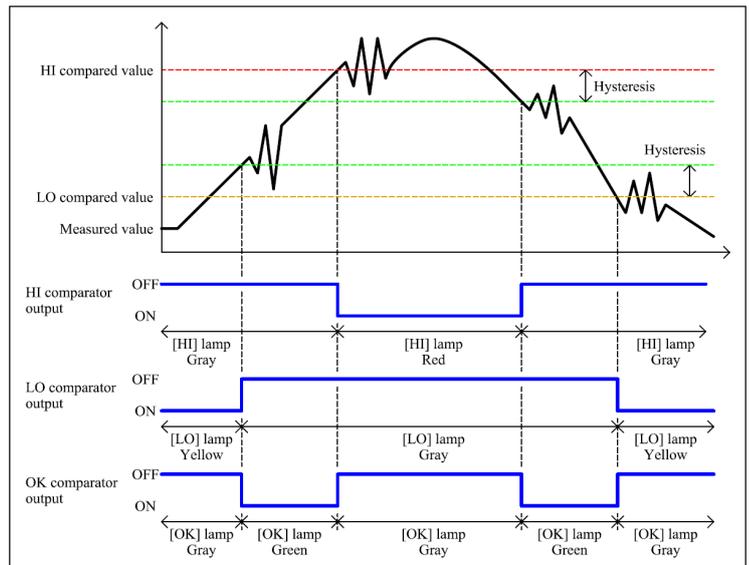
NOTE

When there are two hold values according to the operation mode setting, the normal comparator (OK) turns ON when all comparator outputs of upper limit 1, lower limit 1, upper limit 2, and lower limit 2 are OFF.

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.)

        Hold key: Blinks in white.

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

    Holding Block (Holding the displaying value.)

        Hold key: Blinks in white.

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

(1) Operation Mode

    Select the operation mode from the table.

    The display value and hold value change depending on the operation mode.

    Hold value1 or Hold value2 in each operation mode is held by digital hold.

    For details of each operation mode, refer to "6-3-4" onward.

Mode name	Notation of setting screen	Hold Value 1	Hold Value 2	Remarks
Normal	Normal	—	—	No Hold value
Peak hold	Peak Hold	Peak	—	—
Block Peak hold	Block Peak	Peak	—	—
Time Peak hold	Time Peak	Peak	—	—
Bottom Hold	Bottom Hold	Bottom	—	—
Block Bottom Hold	Block Bottom	Bottom	—	—
Time Bottom Hold	Time Bottom	Bottom	—	—
Arbitrary Hold	Arbitrary Hold	Arbitrary	—	—
Block Peak Bottom Hold	Block Peak Bottom	Peak	Bottom	—
Time Peak Bottom Hold	Time Peak Bottom	Peak	Bottom	—
Block Average Measurement	Block Average	Average		—
Time Average Measurement	Time Average	Average	—	—
Block Inflection Hold	Block Inflection	Inflection	—	—
Time Inflection Hold	Time Inflection	Inflection	—	—
Block Maximal / minimal Hold	Block Max/min	Maximal	minimal	—
Time Maximal / minimal Hold	Time Max/min	Maximal	minimal	—
Block Peak / Average Hold	Block Peak/Avg.	Peak	Average	Two point hold mode
Time Peak / Average Hold	Time Peak/Avg.	Peak	Average	Two point hold mode
Block Bottom / Average Hold	Block Peak/Avg.	Bottom	Average	Two point hold mode
Time Bottom / Average Hold	Time Peak/Avg.	Bottom	Average	Two point hold mode
Block Peak / Arbitrary Hold	Block Peak/Arb.	Peak	Arbitrary	Two point hold mode
Time Peak / Arbitrary Hold	Time Peak/Arb.	Peak	Arbitrary	Two point hold mode
Block bottom / Arbitrary Hold	Block Bottom/Arb.	Bottom	Arbitrary	Two point hold mode
Time bottom / Arbitrary Hold	Time Bottom/Arb.	Bottom	Arbitrary	Two point hold mode
Previous Value Comparison Peak Hold	Pre.Comp.Peak	Peak	Difference from previous value	Previous Value Comparison hold mode
Block Previous Value Comparison Peak Hold	Block Pre.Comp.P.	Peak	Difference from previous value	Previous Value Comparison hold mode
Time Previous Value Comparison Peak Hold	Time Pre.Comp.P.	Peak	Difference from previous value	Previous Value Comparison hold mode
Previous Value Comparison Bottom Hold	Pre.Comp.Bottom	Bottom	Difference from previous value	Previous Value Comparison hold mode
Block Previous Value Comparison Bottom Hold	Block Pre.Comp.B.	Bottom	Difference from previous value	Previous Value Comparison hold mode
Time Previous Value Comparison Bottom Hold	Time Pre.Comp.B.	Bottom	Difference from previous value	Previous Value Comparison hold mode

    For details on displaying the hold value, refer to "2-1 Front Panel".

    When there are two hold values, hold value 1 and hold value 2 are displayed on the measurement screen respectively.

Outline of each operation mode

The outline of each operation mode is shown below. For detailed operation, refer to "6-3-4" onward.

MEMO

"Block *** Hold" is an operation to designate the detection block of hold value by control command or key operation.
"Time *** Hold" is an operation to designate the detection block of hold value by setting value.

Normal
   It is a normal measurement that always measures and displays.

Peak Hold
   In the detection block, the peak value is detected and displayed.
   After the detection block ends, cancel the peak value detection and hold display.

Block Peak Hold
   Specify the detection block with the control command or the like.
   In the detection block, the peak value is detected.
   After the end of the detection block, the peak value is held and displayed.

Time Peak Hold
   In the detection block, the peak value is detected.
   After the end of the detection block, the peak value is held and displayed.

Bottom Hold
   In the detection block, the bottom value is detected and displayed.
   After the detection interval ends, cancel the bottom value detection and hold display.

Block Bottom Hold
   Specify the detection block with the control command or the like.
   In the detection block, the bottom value is detected.
   After the end of the detection block, the bottom value is held and displayed.

Time Bottom Hold
   Specify the detection block with the setting value.
   In the detection block, the bottom value is detected.
   After the end of the detection block, the bottom value is held and displayed.

Arbitrary Hold
   The measured value (arbitrary point) at the moment when the hold command is turned ON and the delay time has elapsed is held. Hold the display until the hold command turns OFF.

Block Peak Bottom Hold
   Specify the detection block with the control command or the like.
   In the detection block, the peak value and the bottom value are detected.
   After the end of the detection block, the peak value and the bottom value are held and displayed.

Time Peak Bottom Hold
   Specify the detection block with the setting value.
   In the detection block, the peak value and the bottom value are detected.
   After the end of the detection block, the peak value and the bottom value are held and displayed.

Block Average Hold
   Specify the detection block with the control command or the like.
   In the detection block, measure the average value.
   Hold display of the average value of the detection block is displayed after the detection block is finished.

Time Average Hold
   Specify the detection block with the setting value. In the detection block, measure the average value.
   Hold display of the average value of the detection block is displayed after the detection block is finished.

Block Inflection Hold
Specify the detection block with the control command or the like.
In the detection block, the measuring value that suddenly changed is detected.
Hold displays the point (inflection point) where the input suddenly changed in the detection block.

Time Inflection Hold
Specify the detection block with the setting value.
In the detection block, the measuring value that suddenly changed is detected.
Hold displays the point (inflection point) where the input suddenly changed in the detection block.

Block Maximal/minimal Hold
Specify the detection block with the control command or the like.
In the detection block, the maximal value and the minimal value are detected.
After the end of the detection block, the maximal value and the minimal value are held and displayed.

Time Maximal/minimal Hold
Specify the detection block with the setting value.
In the detection block, the maximal value and the minimal value are detected.
After the end of the detection block, the maximal value and the minimal value are held and displayed.

Block Peak/Average Hold
Perform "Block Peak Hold" and "Block Average Measurement "at the same time.

Time Peak/Average Hold
Perform "Time Peak Hold" and "Time Average Measurement "at the same time.

Block Bottom/Average Hold
Perform "Block Bottom Hold" and "Block Average Measurement "at the same time.

Time Bottom/Average Hold
Perform "Time Bottom Hold" and "Time Average Measurement "at the same time.

Block Peak / Arbitrary Hold
Perform "Block Peak Hold" and "Arbitrary Hold "at the same time.

Time Peak / Arbitrary Hold
Perform "Time Peak Hold" and "Arbitrary Hold "at the same time.

Block Bottom / Arbitrary Hold
Perform "Block Bottom Hold" and "Arbitrary Hold "at the same time.

Time bottom / Arbitrary Hold
Perform "Time Peak Hold" and "Arbitrary Hold "at the same time.

Previous Value Comparison Peak Hold
Perform "Peak Hold". Also measure the difference from the peak value held last time.

Block Previous Value Comparison Peak Hold
Perform "Block Peak Hold". Also measure the difference from the peak value held last time.

Time Previous Value Comparison Peak Hold
Perform "Time Peak Hold". Also measure the difference from the peak value held last time.

Previous Value Comparison Bottom Hold
Perform "Bottom Hold". Also measure the difference from the bottom value held last time.

Block Previous Value Comparison Bottom Hold
Perform "Block Bottom Hold". Also measure the difference from the bottom value held last time.

Time Previous Value Comparison Bottom Hold
Perform "Time Bottom Hold". Also measure the difference from the bottom value held last time.

<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 (1/3)**" window.
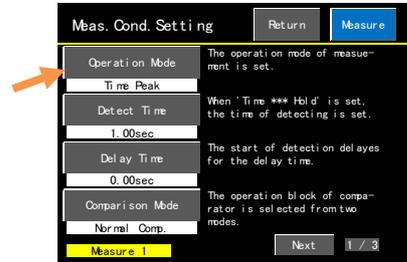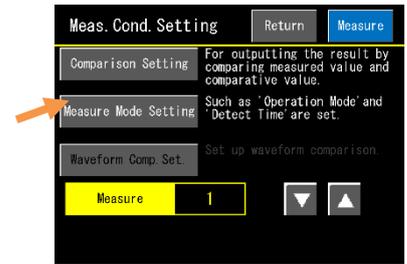
5) Press the △ ▽ key to display the target mode. Press the target key and Register key for registering.
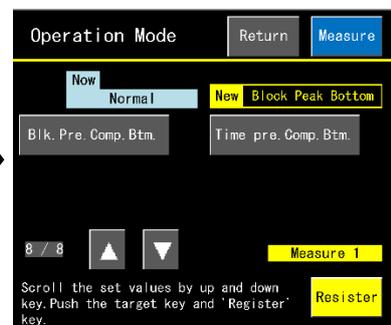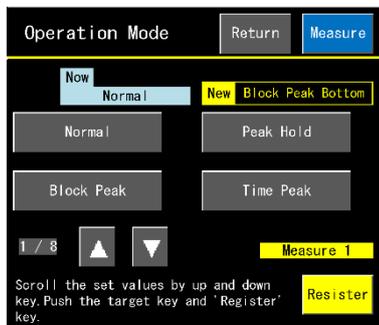
6) If the Return key is pressed on the above "**Operation Mode**" window and gets back to the "**Measure Mode Setting**" window, some non-target functions are displayed in gray according to the selected mode.
The figure below shows an example that "**Arbitrary Hold"** is selected.
The Detect Time Comparison Mode Display Mode keys, the current setting value, and the descriptions are displayed in gray.
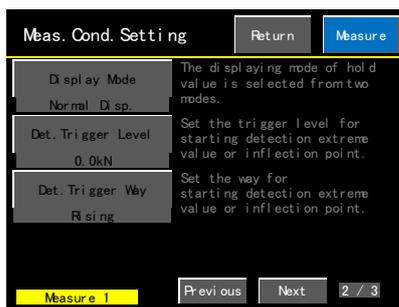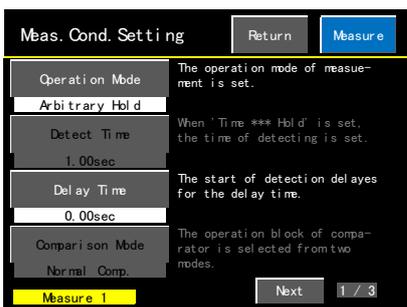
NOTE

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

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(2) Detect Time

Sets the Detect Time is the width of the detection block when set to Time *** Hold.

<Setting Range>

0.00 to 9.99 (sec)

<How to operate>

1) Press the Detect Time key on the "**Measure Mode Setting (1/3)**" window.
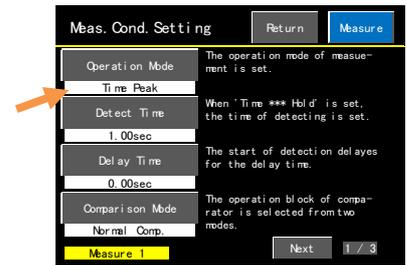
2) Input a setting value with the numeric keyboard and press the Register key for registering.
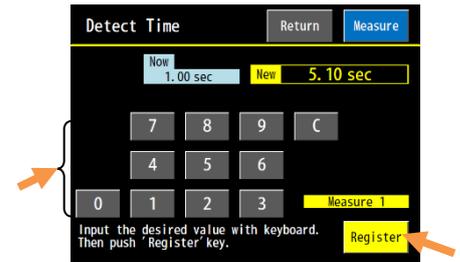
(3) Delay Time

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

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

<Setting Range>

0.00 to 9.99 (sec)

<How to operate>

1) Press the Delay Time key on the "**Measure Mode Setting (1/3)**" window.
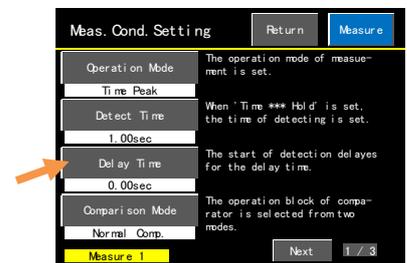
2) Input a setting value with the numeric keyboard and press the Register key for registering.
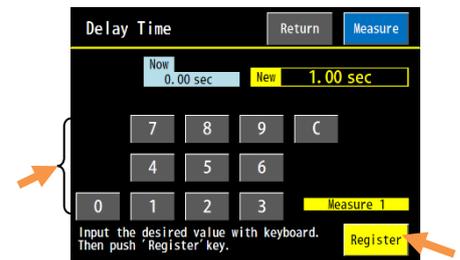
(4) Comparison Mode

Selects the operation block of the comparators from the two modes (Normal Comp. or Hold Comp.).
When "Normal", "Peak Hold", "Bottom Hold", "Arbitrary Hold", "Pre.Comp.Peak" , "Pre.Comp.Bottom" are set in "Operation mode", "Comparison mode" setting is invalid.

<Setting Range>

Normal Comp.   When Display mode is in Normal Disp., always compares the measured value and compared value during detecting and holding block.

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-910A 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 (1/3)**" window.
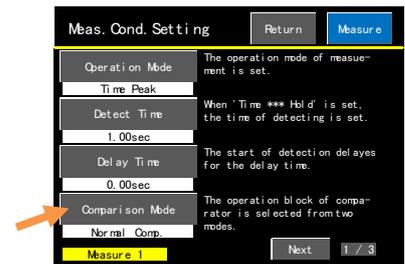
2) Select and press the target key and press the Register key to register the setting value.

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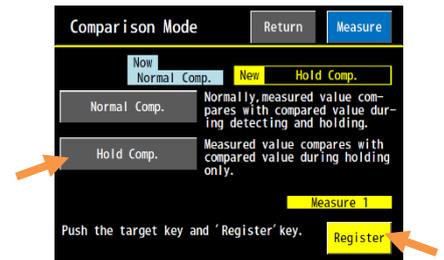
(5) Display Mode

Selects the display operation of the hold value from the two modes.

When "Normal", "Peak hold", "Bottom hold", "Arbitrary hold", "Pre.Comp.Peak" , "Pre.Comp.Bottom"   are set in "Operation mode", "Display mode" setting is invalid.

<Setting Range>

Normal Disp.   The hold value is always updated and displayed in response to changes of the input in the detecting block. The hold 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 hold 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 (1/3)**" window.
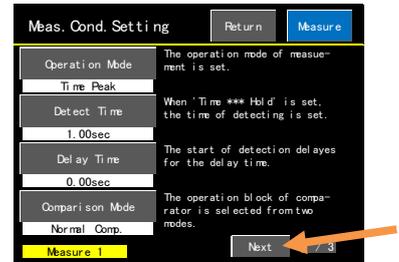
2) Press the Display Mode key on the "**Measure Mode Setting (2/3)**" window.
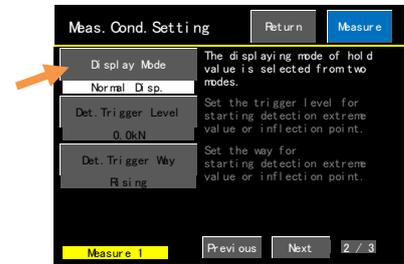
3) Select and press the target key and press the Register key to register the setting value.
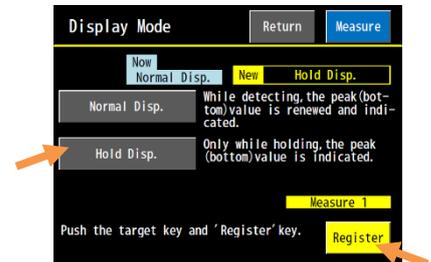
(6) Detection Trigger Level
Sets the level for the trigger applied in "Inflection Hold" and "Maximal/minimal Hold".

＜Setting Range＞
-99999 to 99999 (count)

＜How to operate＞
1) Press the Next key on "Meas.Cond.Setting (1/3)" window.

2) Press the Det.Trigger Level key on "Meas.Cond.Setting (2/3)" window.

3) Press the target key and Register key for registration.
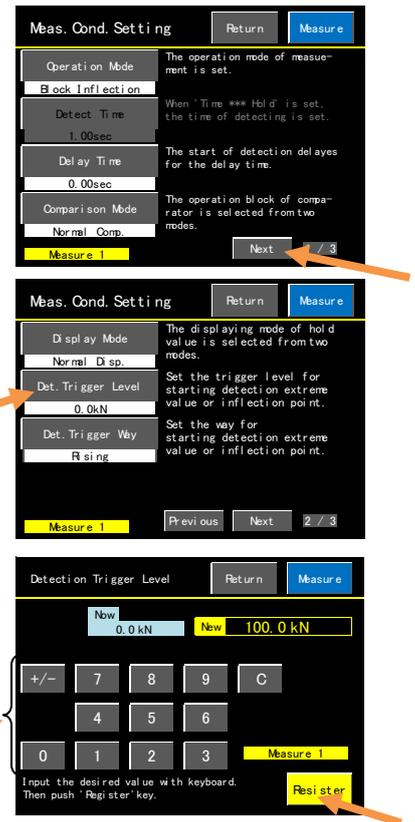
(7) Detection Trigger Way
Sets the way for the trigger applied in "Inflection Hold" and "Maximal/minimal Hold".

＜Setting Range＞
Rising, Falling, Both
・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.

＜How to operate＞
1) Press the Next key on"Meas.Cond.Setting (1/3)" window.

2) Press the Det.Trigger Way key on "Meas.Cond.Setting (2/3)" window.

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

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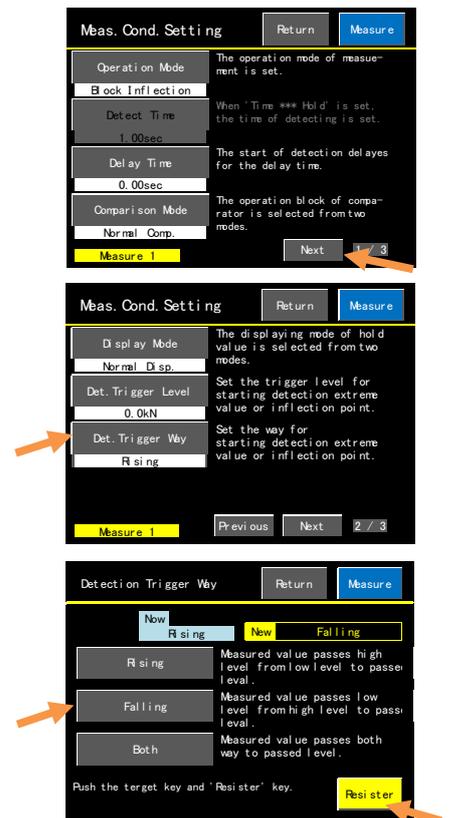
(8) Inflection point discrimination time
   Sets the time to discriminate the inflection point of the measured value.

   ＜Setting Range＞
      Time1 :   0.01 to 1.00 (sec)
      Time2 :   0.01 to 1.00 (sec)

   ＜How to operate＞
   1) Press the Next key on"Meas.Cond.Setting"window and
      display "Meas.Cond.Setting (3/3)".

   2) Press the Inf.Disc.Time key on "Meas.Cond.Setting (3/3)"window.

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

      After press the Time1 key, then input the set value with the numeric
      keys. The Time1 key flashes during setting.
      When you press the register key, the discrimination time 1 is registered.

      After press the Time2 key, then input the set value with the numeric
      keys. The Time2 key flashes during setting.
      When you press the register key, the discrimination time 2 is registered.
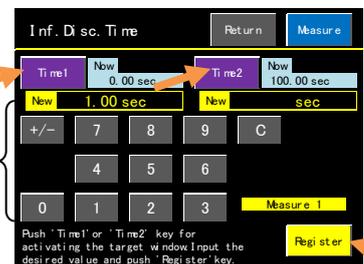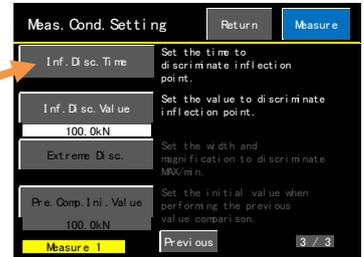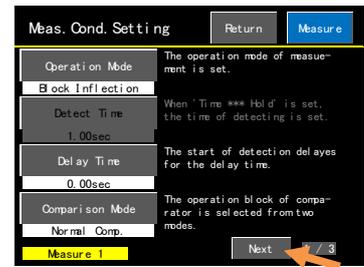
(9) Inflection point discrimination value
   Sets the value to discriminate the inflection point.

   ＜Setting Range＞
      1 to 99999 (count)

   ＜How to operate＞
   1) Press the Next key on"Meas.Cond.Setting"window and
      display "Meas.Cond.Setting (3/3)".

   2) Press the Inf.Disc.Value key on "Meas.Cond.Setting (3/3)"window.

   3) Press the target key and Register key for registration.
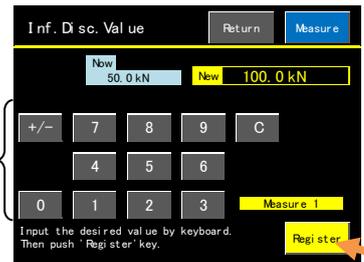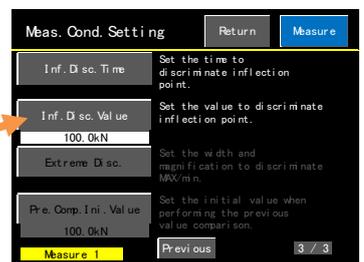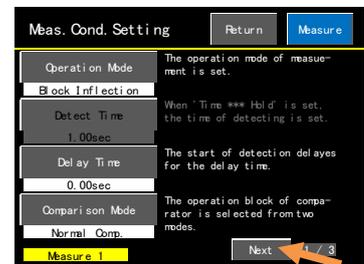
(10) Extreme value discrimination setting

Sets the width and magnitude to discriminate the Maximal value and minimal value.
The setting is available in "Time MAX/min Hold"and "Block MAX/min Hold".

＜Setting Range＞
Width ： 1 to 99999 (count)
Magnitude ： 0.1 to 5.0 (times)

＜How to operate＞
1) Press the Next key on"Meas.Cond.Setting"window and
display "Meas.Cond.Setting (3/3)".
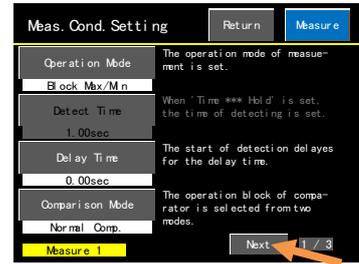
2) Press the Extreme Disc. key on "Meas.Cond.Setting (3/3)"window.
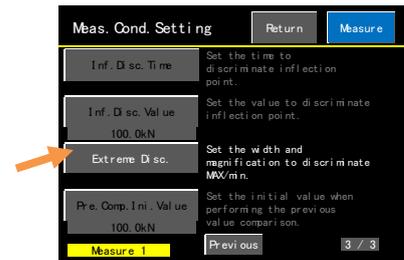
3) Press the target key and Register key for registration.

After press the Width key, then input the set value with the
numeric keys. The Width key flashes during setting.
When you press the Register key, the discrimination width is
registered.

After press the MAG key, then input the set value with the
numeric keys. The MAG key flashes during setting.
When you press the Register key, the discrimination magnitude is
registered.

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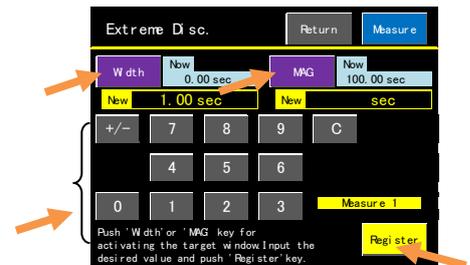
(11) Initial value for compare with measuring value in previous value comparing mode

Sets the initial value to compare with measuring value in "Block/Time Previous Value Comparison *** Hold".

＜Setting range＞

-99999 to 99999 (count)

＜How to operate＞

1) Press the Next key on"Meas.Cond.Setting"window and display "Meas.Cond.Setting (3/3)".
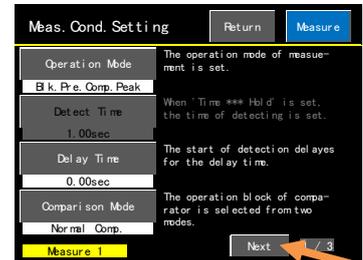
2) Press the Pre.Comp.Ini.Value key on "Meas.Cond.Setting (3/3)"window.
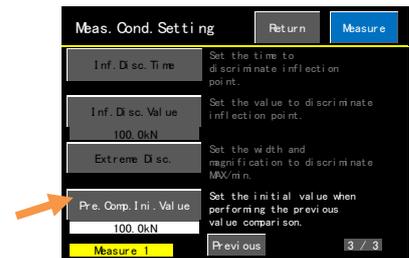
3) Press the target key and Register key for registration.
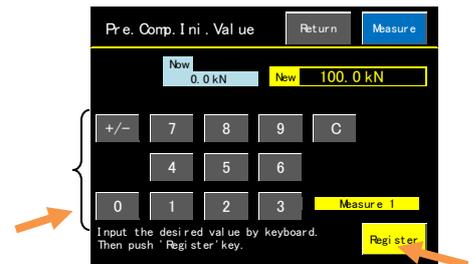
6-3-4. Descriptions of the operation mode

(1) Normal

Normal measurement that always measures and displays value.

(2) Peak Hold

In the detection block, the Peak value is detected and displayed.

●Settable items: "Delay time"

(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.
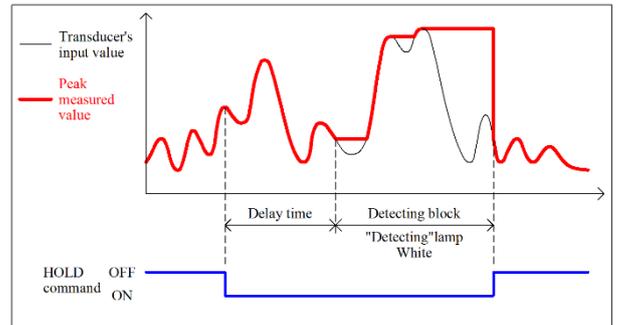
MEMO

・ 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-910A 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 is 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).
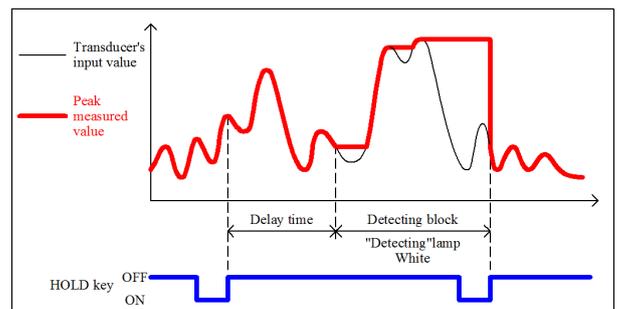
(3) Block-specified peak and block-specified bottom
　　Detect Peak value or Bottom value by block-specified.
　　●Settable items: "Delay time", "Comparison Mode", "Display Mode.

(α) 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.
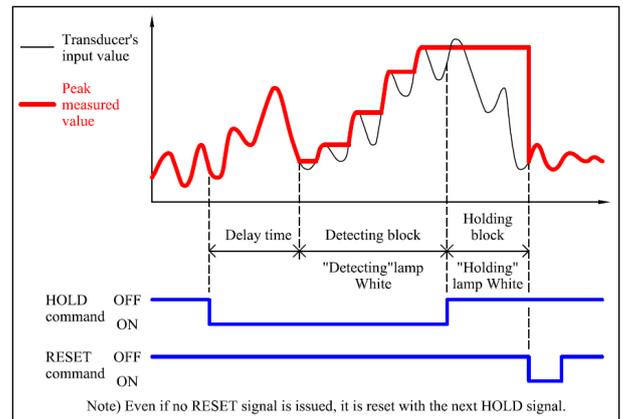
　(B) Behavior with key operation
　　　When the Hold key is pressed the first time and after the lapse of the delay time, the peak (bottom) value is detected and displayed.
　　　Press the Hold key for the second time to hold the display value.
　　　Press the Hold key for the third time to cancel the holding value.
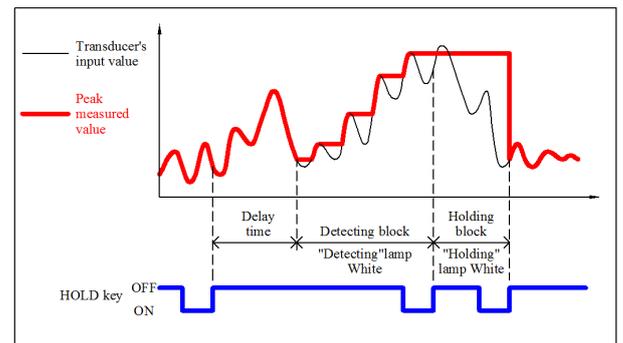
(β) Hold Display Mode
　(A) Behavior with control input signal
　　　When the HOLD command is turned ON and after the lapse of delay time, the peak (bottom) value is detected. The measured value immediately after turning ON the HOLD command is kept hold during the detecting block.
　　　When the HOLD command 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.
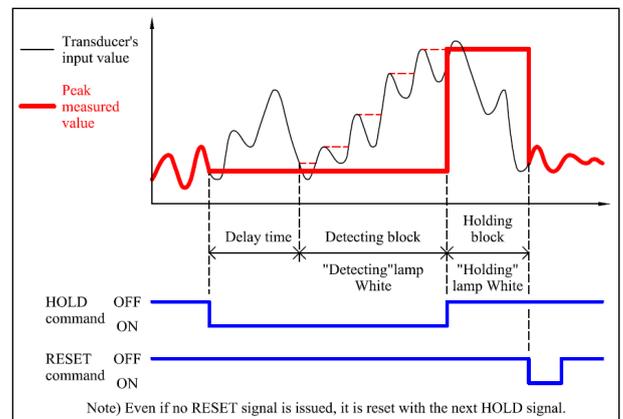
　(B) Behavior with key operation
　　　Press the Hold key the first time to hold the display value at the time.
　　　Though you cannot see, the WGA-910A is detecting the peak (bottom) value after the lapse of the delay time.
　　　Press the Hold key for the second time to display the peak (bottom) value until that moment.
　　　Press the Hold key for the third time to cancel the holding value.

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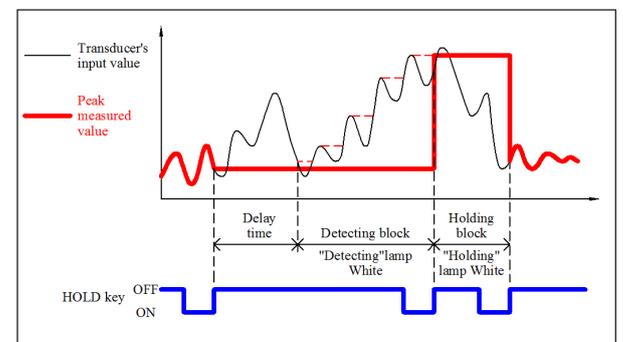
(4) Time-specified peak and time-specified bottom

Detect Peak value or Bottom value by time-specified.

●Settable items: "Detect Time", "Delay time", "Comparison Mode", "Display Mode."

(α) 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 peal value (bottom value) is detected for the period of the detecting block (detecting time) and the value is kept hold.
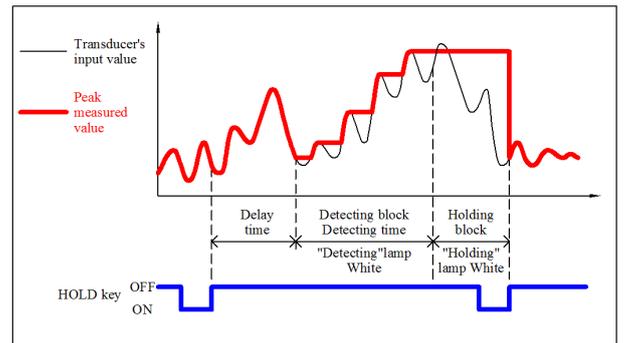
Press the Hold key for the second time to cancel the holding value.

(β) 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.
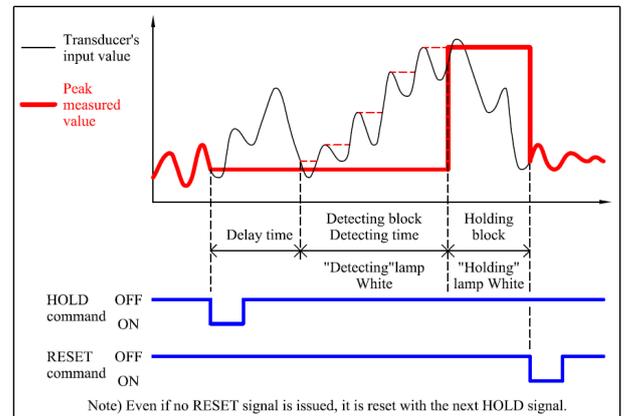
(B) Behavior with key operation

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

Though you cannot see, the WGA-910A 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.
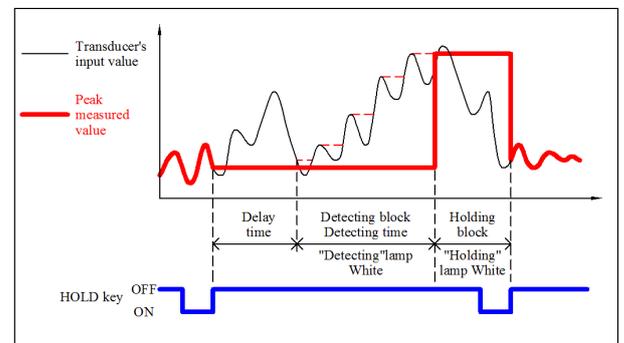
(5) Bottom Hold

In the detection block, the Bottom value is detected and displayed.
●Settable items: "Delay time"

(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.
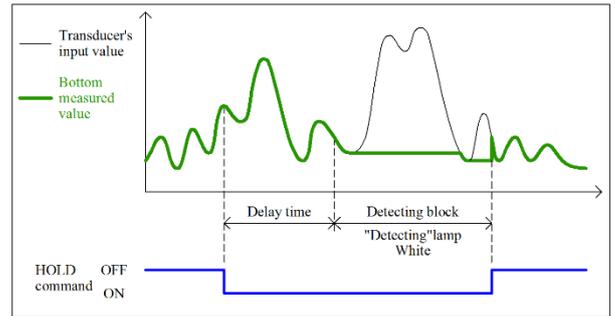
Transducer's input value
Bottom measured value
Delay time　Detecting block
"Detecting"lamp White
HOLD command　OFF　ON

(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.

Transducer's input value
Bottom measured value
Delay time　Detecting block
"Detecting"lamp White
HOLD key　OFF　ON
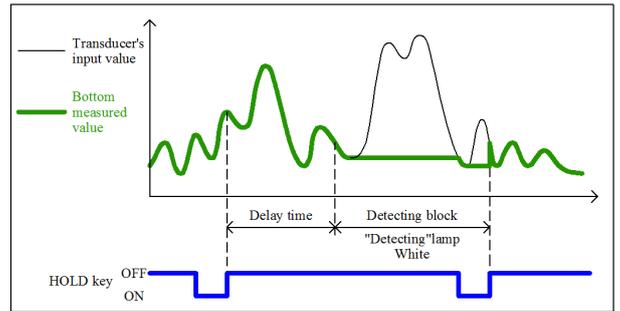
(6) Arbitrary Hold

It holds the instantaneous value (Arbitrary point).
●Settable items: "Delay time"

(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.
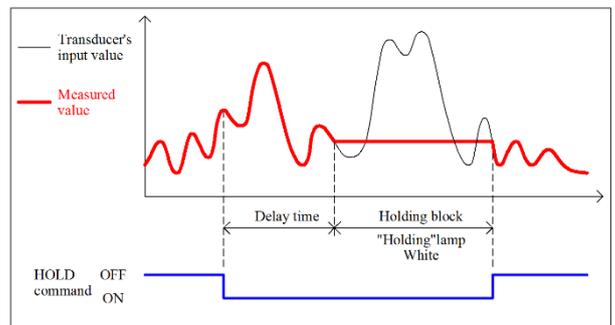
Transducer's input value
Measured value
Delay time　Holding block
"Holding"lamp White
HOLD command　OFF　ON

(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 f 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.)

Transducer's input value
Measured value
Delay time　Detecting block
"Detecting"lamp White
HOLD key　OFF　ON
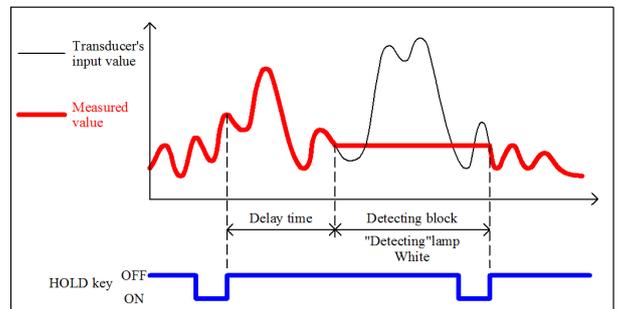
(7) Block Peak-Bottom and Time Peak-Bottom

　　Both Peak value and Bottom value are detected by block / time specification.

　　(α) Normal Display Mode (Block Peak-Bottom)

　　　　●Settable items: "Detect Time", "Delay Time", "Comparison Mode", "Display Mode"

　　(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.
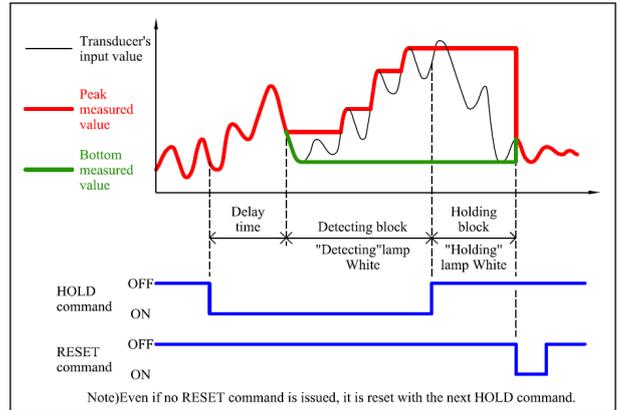
　　(B) Behavior with key operation

　　　　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.

　　(β) Hold Display Mode (Time Peak-Bottom)

　　　　●Settable items: "Detect Time", "Delay Time", "Comparison Mode", "Display Mode"

　　(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.
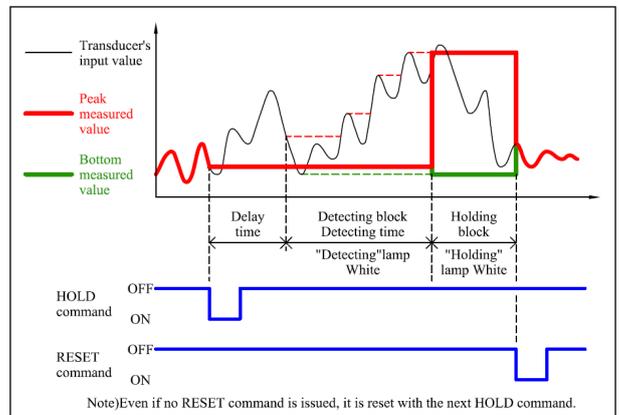
　　(B) Behavior with key operation

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

　　　　Though you cannot see, the WGA-910A is detecting the peak value and bottom value after the lapse of the delay time.

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

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

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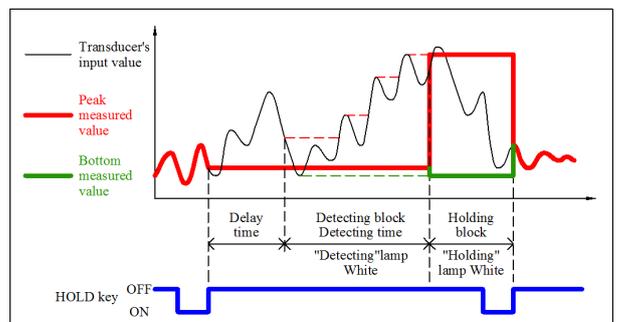
(8) Block Average and Time Average

Detects the Average value by block / time specification.

(α) Normal Display Mode (Block Average)

●Settable items: "Delay Time", "Comparison Mode", "Display Mode"

(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.

Transducer's input value
Average measured value
Delay time
Detecting block
"Detecting"lamp White
Holding block
"Holding" lamp White
HOLD command   OFF / ON
RESET command   OFF / ON
Note)Even if no RESET command is issued, it is reset with the next HOLD command.
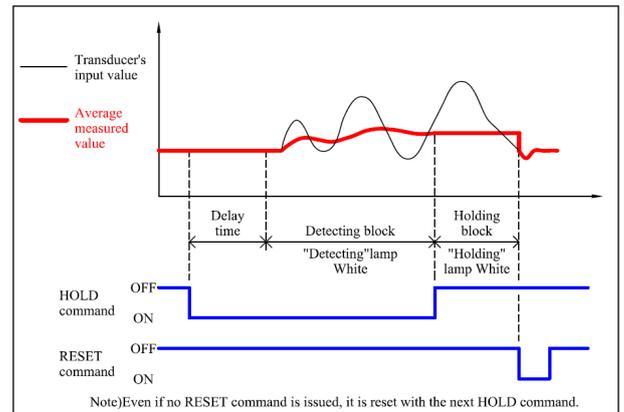
(B) Behavior with key operation

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

Though you cannot see, the WGA-910A 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.

* The upper limit of the detection block is 60 seconds. The time in detection block exceed 60 seconds, the average value is reset.

Transducer's input value
Average measured value
Delay time
Detecting block
"Detecting"lamp White
Holding block
"Holding" lamp White
HOLD key   OFF / ON

(β) Hold Display Mode (Time Average)

●Settable items: "Detect Time", "Delay Time", "Comparison Mode", "Display Mode"

(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.

Transducer's input value
Average measured value
Delay time
Detecting block Detecting time
"Detecting"lamp White
Holding block
"Holding" lamp White
HOLD command   OFF / ON
RESET command   OFF / ON
Note)Even if no RESET command is issued, it is reset with the next HOLD command.
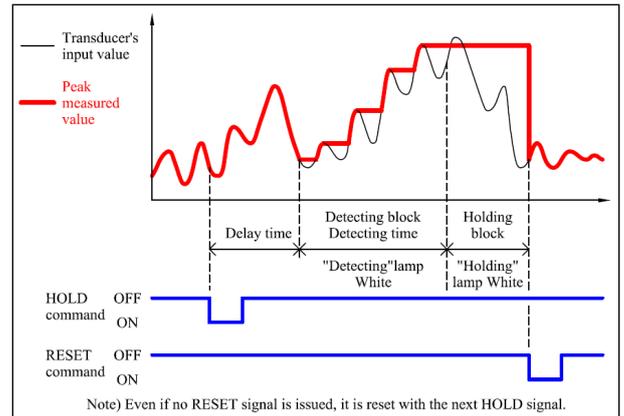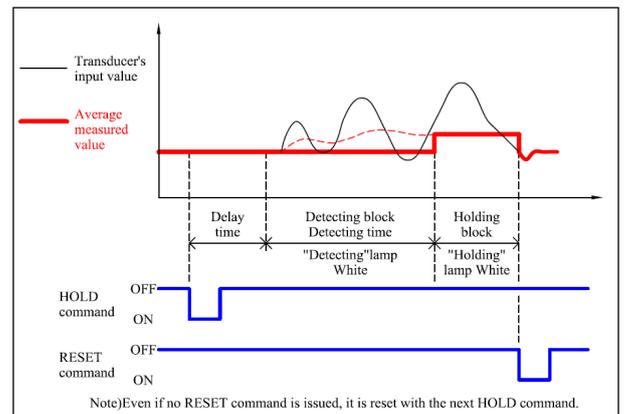
(B) Behavior with key operation

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

Though you cannot see, the WGA-910A 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.

Transducer's input value
Average measured value
Delay time
Detecting block Detecting time
"Detecting"lamp White
Holding block
"Holding" lamp White
HOLD key   OFF / ON
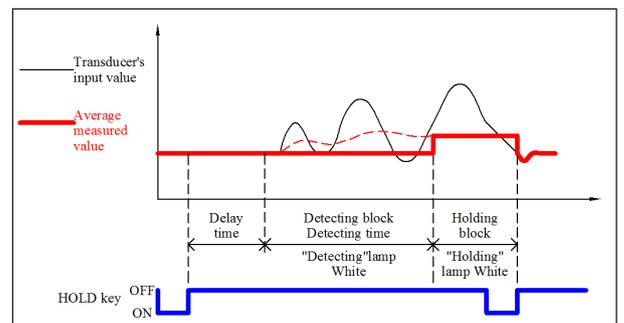
(9) Block Inflection Hold/ Time Inflection Hold

   <Behavior>

      When the delay time elapses after the hold command is turned on, the trigger wait state is entered. The measured value crosses the trigger level, it becomes the detection block.

      Measure the difference between "change in measured value at discrimination time t1" and "change in measured value at discrimination time t2" in the detection block. If the difference is larger than the inflection point discrimination value, the measured value at that time is held.

      When the inflection point is detected, the output of "Inflection point / Extreme value" of the control output turns ON. When the hold block ends, "Inflection point / Extreme value" turns OFF.
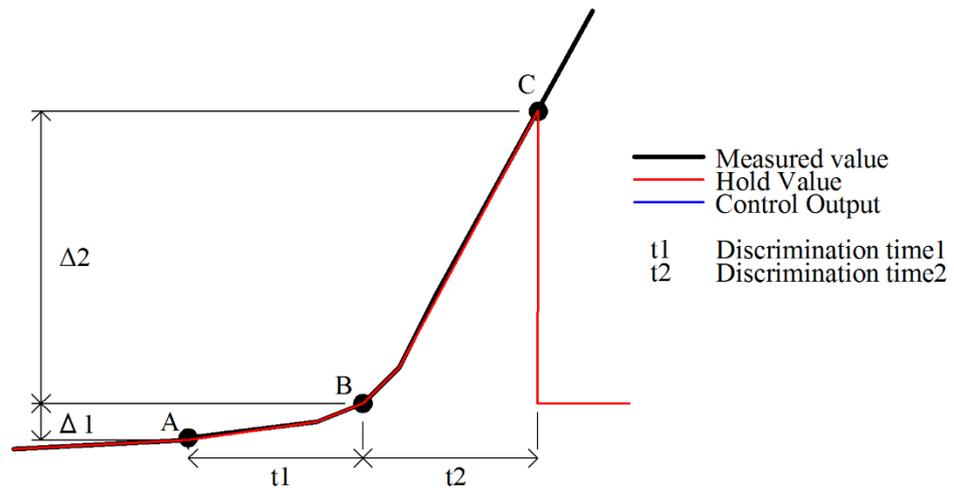
MEMO

- When multiple inflection points are detected in the detection block, the hold value is updated to the measured value of the part where the larger change occurred.
- The measured value is displayed until it measures the inflection point.
- The "Inflection point / Extreme value" output is available only for "Inflection point Holding" and "Maximum value / minimum value Hold".
- Using the absolute value of the value obtained in the following equation to calculate the inflection point. It holds the point where this value exceeds the discrimination value.

$$\frac{(ValueC-ValueB)}{t2} - \frac{(ValueB-ValueA)}{t1}$$

(α) Normal Display Mode (Block Inflection Hold)

●Settable items: "Delay Time", "Comparison Mode", "Display Mode", "Detection trigger level,
"Detection trigger way", "Inflection point discrimination time", "Inflection point discrimination value"

(A) Behavior with control input signal

Wait for the trigger after the delay time has elapsed since the hold command was turned ON. When the measured value crosses the trigger level, it becomes the detection block. The inflection point is detected until the hold command is turned off.

When the hold command turns off, it enters the hold block and holds the display value. When the reset command turns ON, release hold.

Transducer's input value
Inflection point
Inflection point
Trigger point
Deley time
Detecting block
Holding block
"Detecting" lamp White
"Holding" lamp White
Trigger Waiting
HOLD command   OFF / ON
RESET command   OFF / ON
Inflection point/ Extreme value   OFF / ON

(B) Behavior with key operation

When the hold key is pressed for the first time and after the lapse of the delay time, the trigger is waiting state. When the measured value exceeds the trigger level, it becomes the detection block. 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.

Transducer's input value
Inflection point
Inflection point
Trigger point
Deley time
Detecting block
Holding block
"Detecting" lamp White
"Holding" lamp White
Trigger Waiting
HOLD key   OFF / ON
Inflection point/ Extreme value   OFF / ON
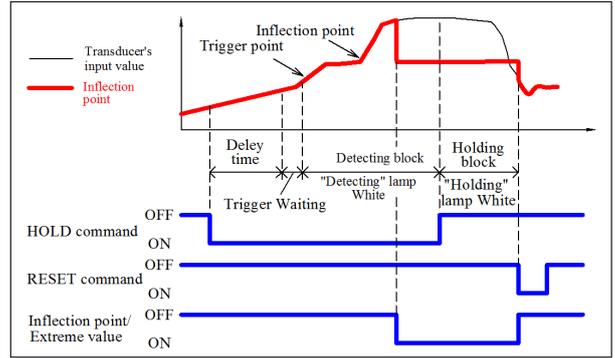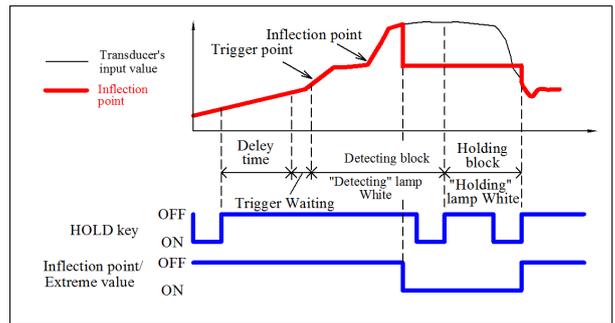
(β) Hold Display Mode (Time Inflection Hold)

●Settable items: "Detect Time", "Delay Time", "Comparison Mode", "Display Mode", "Detection trigger level,
"Detection trigger way", "Inflection point discrimination time", "Inflection point discrimination value"

(A) Behavior with control input signal

Wait for the trigger after the delay time has elapsed since the hold command was turned ON. When the measured value crosses the trigger level, it becomes the detection block.
The measured value that at the point hold command turns on is displayed until holding block. After the lapse of preset detecting time, the value at inflection point is displayed and kept hold.
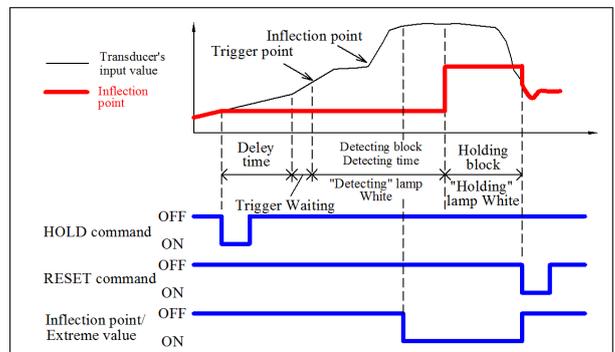
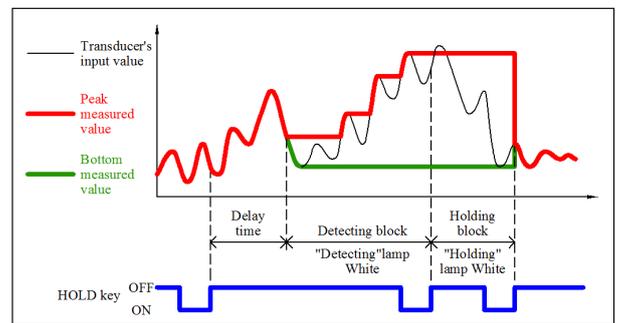When the RESET command is turned ON, the hold mode is canceled.

Transducer's input value
Inflection point
Inflection point
Trigger point
Deley time
Detecting block
Detecting time
Holding block
"Detecting" lamp White
"Holding" lamp White
Trigger Waiting
HOLD command   OFF / ON
RESET command   OFF / ON
Inflection point/ Extreme value   OFF / ON

(B) Behavior with key operation

When the hold key is pressed for the first time, the display value at that time is held and displayed, and when the delay time has elapsed, the trigger enters the standby state.
The display does not change until the detection time elapsed since the detection of the trigger, but the inflection point is being detected.
After the detection time has elapsed, the measured value of the inflection point detected so far is displayed.

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

Transducer's input value
Inflection point
Inflection point
Trigger point
Deley time
Detecting block
Holding block
"Detecting" lamp White
"Holding" lamp White
Trigger Waiting
HOLD key   OFF / ON
Inflection point/ Extreme value   OFF / ON

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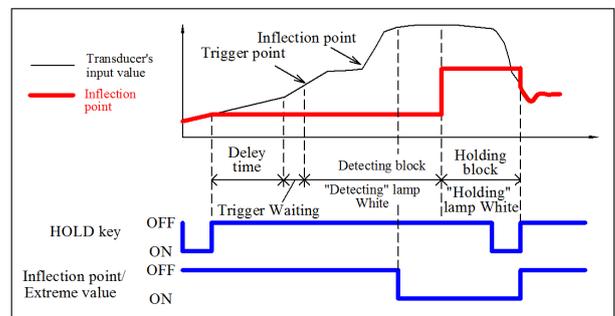
(10) Block Maximal, minimal Hold/Time Maximal, minimal Hold
    <Behavior>
     When the delay time elapses after the hold command is turned on, the trigger wait state is entered.
The measured value crosses the trigger level, it becomes the detection section.

     The point A when the difference between the peak value A point and the bottom value B point in the detection section is greater than or equal to the extreme value discrimination width is a candidate for the maximum value. The point B is a candidate for a local minimum. At this time, the extreme value is not displayed as the hold value yet.

     After, when the value increases from the point B and the measured value increases from the bottom value B by (Peak value A - Bottom value B) × extreme value discrimination magnitude, the hold points A and B are held.

     When the extreme value is detected, the output of "Inflection point / Extreme value" of the control output turns ON. When the hold block ends, "Inflection point / Extreme value" turns OFF.

(α) Normal Display Mode (Block Maximal / minimal Hold)
　●Settable items: "Delay Time", "Comparison Mode", "Display Mode", "Detection trigger level,
　　　　　　　　"Detection trigger way", "Extreme value discrimination",

(A) Behavior with control input signal
　Wait for the trigger after the delay time has
　elapsed since the hold command was turned ON.
　When the measured value crosses the trigger
　level, it becomes the detection block. The
　extreme value is detected until the hold command
　is turned off.
　When the hold command turns off, it enters the
　hold block and holds the display value. When the
　reset command turns ON, release hold.
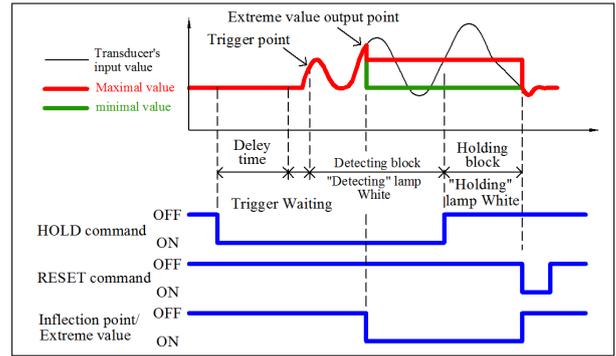
(B) Behavior with key operation
　When the Hold key is pressed for the first time
　and after the lapse of the delay time, the trigger is
　waiting state. When the measured value exceeds
　the trigger level, it becomes the detection block.
　Press the Hold key for the second time to hold
　the displayed value.
　Press the Hold key for the third time to cancel the
　holding value.
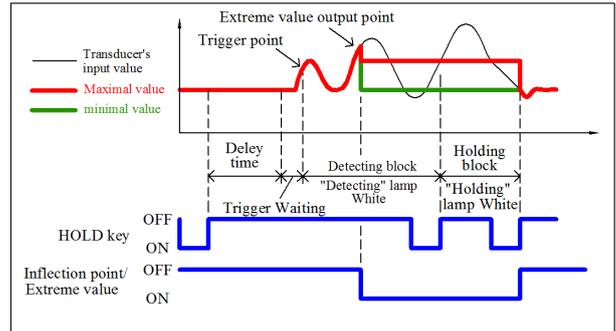
(β) Hold Display Mode (Time Maximal / minimal Hold)
　　●Settable items: "Detect Time", "Delay Time", "Comparison Mode", "Display Mode", "Detection trigger level,
　　　　　　　　　"Detection trigger way", "Extreme value discrimination",

(A) Behavior with control input signal
　Wait for the trigger after the delay time has
　elapsed since the hold command was turned ON.
　When the measured value crosses the trigger
　level, it becomes the detection block.
　The measured value that at the point hold
　command turns on is displayed until holding
　block. After the lapse of preset detecting time, the
　extreme value is displayed and kept hold.
　When the RESET command is turned ON, the
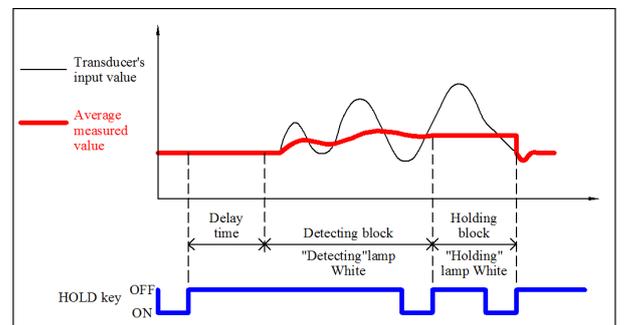　hold mode is canceled.
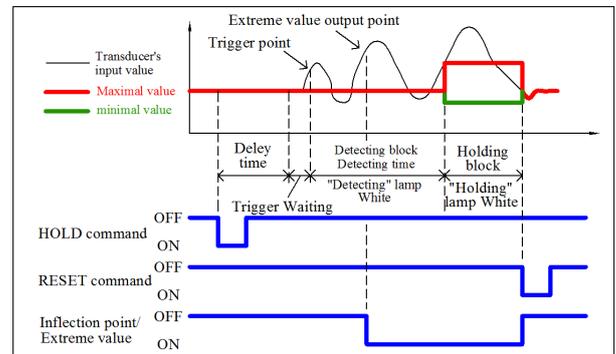
(B) Behavior with key operation
　When the Hold key is pressed for the first time,
　the display value at that time is held and
　displayed, and when the delay time has elapsed,
　the trigger enters the standby state.
　The display does not change until the detection
　time elapsed since the detection of the trigger, but
　the extreme value is being detected.
　After the detection time has elapsed, the
　measured value of the extreme value detected so
　far is displayed.
　Press the Hold key for the second time to cancel
　the holding value.

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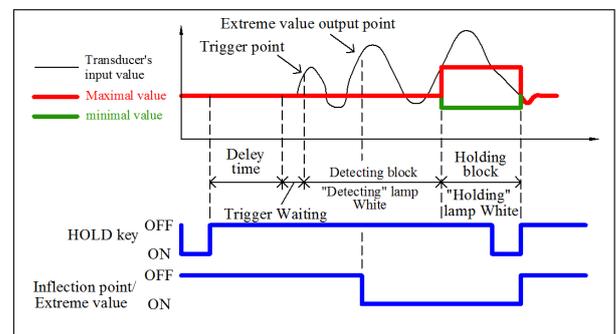
(11) Two point hold mode

<Behavior>

This mode performs a combination of Peak hold / Bottom hold and Averaging / Arbitrary point hold.
Please check "6-3-3. Measure Mode Setting (1) Operation Mode" for hold value assignment.
The function of the comparator switches as follows.
When hold value 1 and hold value 2 are OK, OK lights up.

HH comparison value: HI comparison value for Hold value 1
LL comparison value: LO comparison value for Hold value 1

HI comparison value: HI comparison value for Hold value 2
LO comparison value: LO comparison value for Hold value 2

For example, with Time Peak + Arbitrary Point Hold, time specified peak hold and arbitrary point hold are performed at the same time.

It becomes the detection section after the delay time has elapsed since the hold command was turned ON. In the detection section, the peak is detected during the set detection time. In addition, the measured value at the time of entering the detection section is held and displayed as an arbitrary point.
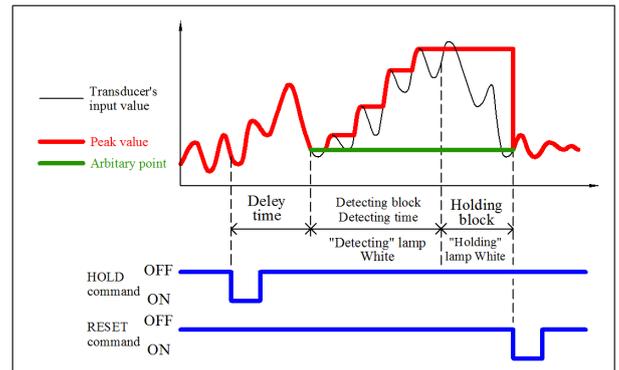
In the case of "Block Peak / Average Hold" and "Block Bottom / Average Hold", the maximum time to calculate the average value is 60 seconds. After 60 seconds, each hold value is reset.

(12) Previous Value Comparison hold mode

Previous value comparison Hold mode is a function to compare the difference between the current measured value and the previous held value. The Hold value1 indicates the value currently being measured (hold value when hold is performed) and the Hold value2 indicates the difference between the current hold value and the previous hold value. Calculation formulas are as follows.

Hold value2 (Difference) = "previous Hold value1" – "current Hold value1"

When this operation mode is selected for the first time, since there is no previous hold value, the value set in the "previous comparison initial value" is used for calculating the difference from the current input value.

When hold is canceled, the previous hold value used to calculate the difference is updated. "Pre-comparison initial value" of the setting value is not updated. An example of operation is shown below.

Ex.) Normal display mode (Block Previous Value Comparison Peak Hold)

(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.
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 value during the detecting block is kept hold.
When the RESET command is turned ON, the kept peak (bottom) value is canceled. At this time, update the hold value used for calculation.
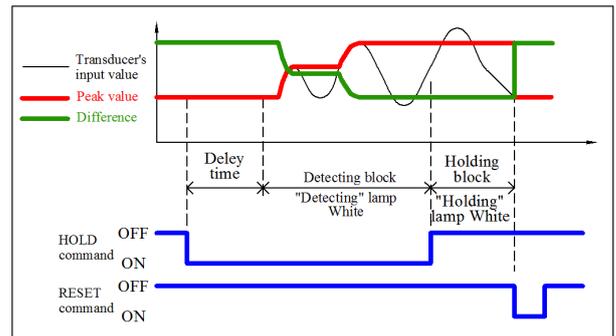
(B) Behavior with key operation

Press the Hold key the first time to hold the display value at the time.
Though you cannot see, the WGA-910A is detecting the peak value after the lapse of the delay time.
Press the Hold key for the second time to display the peak value until that moment.
Press the Hold key for the third time to cancel the holding value. At this time, update the hold value used for calculation.
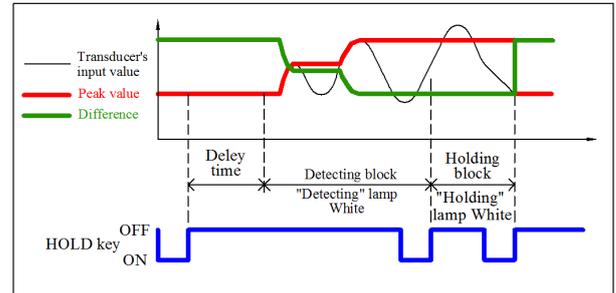
6-3-5. How WGA-910A works with HOLD and RESET commands

The WGA-910A works as follow during detecting, holding, and normal blocks by turning ON/OFF the "HOLD command" and "RESET command."

[Example] Block-specified peak
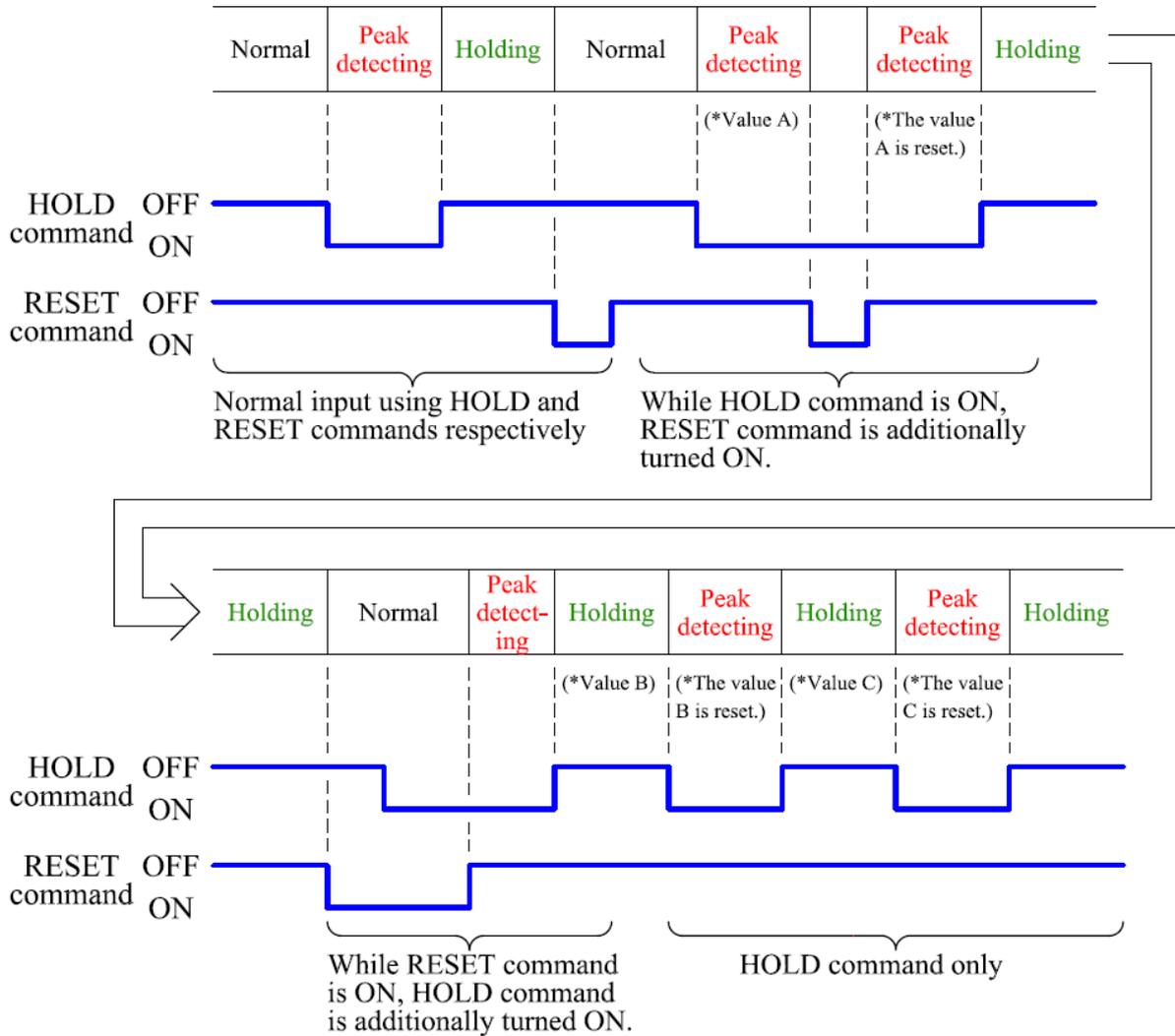
6-3-6. Relationship between control input and comparator output when the operation mode with two hold values

(Example) [Block Peak-Bottom]
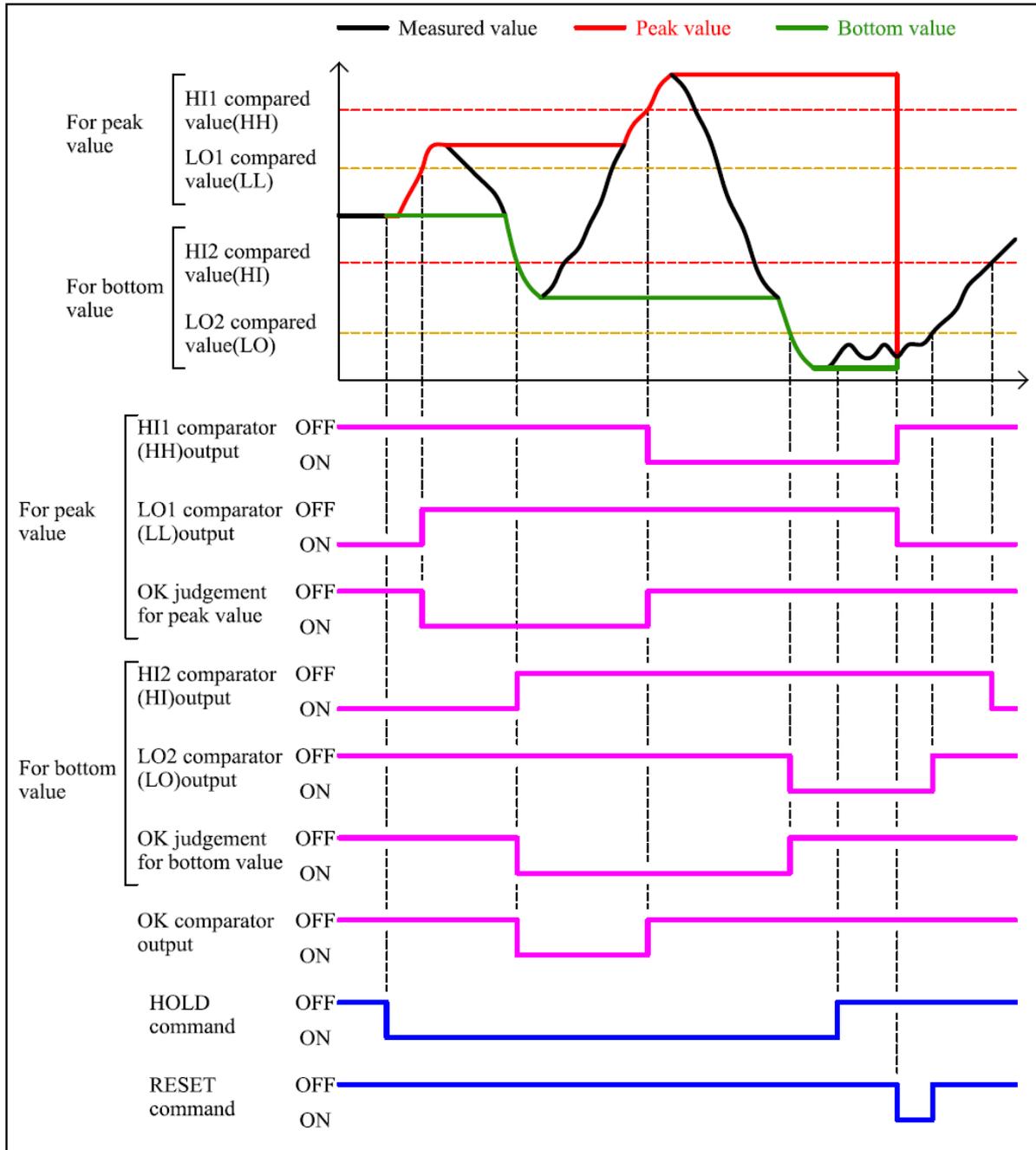
> **NOTE**
>
> For the [Block Peak-Bottom] and [Time Peak-Bottom]: When the measured value is within the HI-1 and LO-1 of the Peak Value or within the HI-2 and LO-2 of the Bottom Value, the OK lamp on the target window lights up in white.
> When the both <OK> lamps on the dual windows light up in white, the OK comparator output is turned ON.
>
> Similarly, even in the operation mode with two hold values, OK turns ON when the comparator with upper limit 1, lower limit 1, upper limit 2, and lower limit 2 is OFF.

6-3-7. Motion Detect

This function outputs the control output "Motion Detect" when input signal is determined "stable".
Compare the current measured value with the measured value of 0.25 msec ago (one sampling before). If the result falls within the stability detection range for a set time, it judges that it is "stable" and turns on the control output.

The setting related to the function is "Motion Detect Function Enable/Disable", "Motion Detect Width", "Motion Detect Time", and "Motion Detect Logic".

An example of operation is shown below.
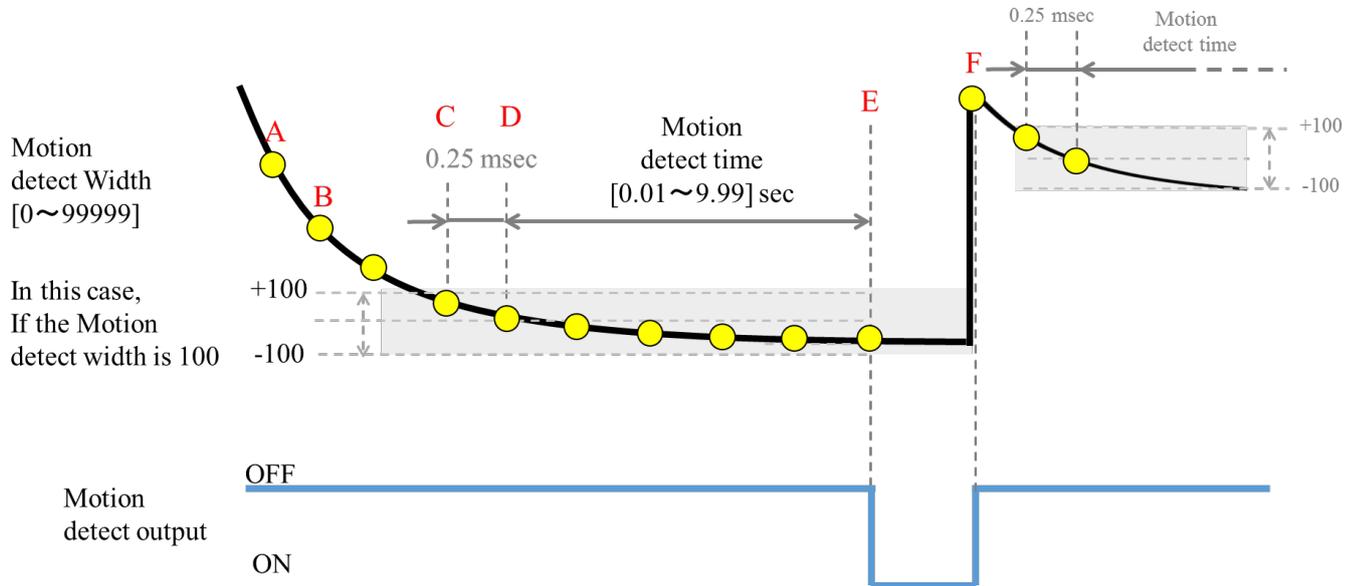
・Block A-C

When the Motion Detect Function is enabled, the absolute value of the difference between "latest measured value" and "measured value before 1 sampling" is calculated each time data is sampled. Next, it calculates whether the absolute value is within the Motion Detection Width.

For example, if point B is the latest measured value, calculate with | (point B - point A) | and calculate whether that value falls within the Motion Detect Width.

If the absolute value is within the Motion Detect Width, the time count of the Motion Detect Time is started.

・Block C-D

| (point D – point C) | is in the Motion Detect Width, so start counting the time of Motion Detect Time.

・Block D-E

Calculate | (latest measured value - point D) | every time data is sampled.

If the value deviates from the Motion Detect Width, the measurement value of the Motion Detect Time and reference value point D is reset.

・Point E

When the calculated value does not deviate from the Motion Detect Width for the Motion Detect Time, the "Motion Detect" output turns ON.

・Point F

When the measured value deviates from the Motion Detect Width, the control output turns "OFF". (The Motion Detect Time and the reference value of point D are reset.)

Setting Example）

When you want to judge that the input fluctuation is continuing for 5 seconds within ± 10 kN.
　　　・Motion Detect Function 　　　　　: Enable
　　　・Motion Detect Width 　　　　　　 : 10.00
　　　・Motion Detect Width 　　　　　　 : 5.00 s

NOTE
● 　The determination of the "Motion Detect" output is irrelevant to the hold value.

(1) Motion Detect Function Enable/Disable

To use the Motion Detect Function, enable the Motion Detect Function.

＜Setting Range＞

Enable・Disable

＜How to operate＞

1) Press the Comparison Setting key on the "**Meas. Cond. Setting**" window.
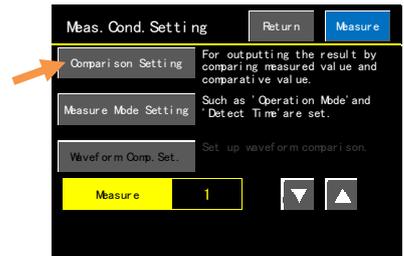
2) Press the Next key on the **"Comparison Setting (1/3)"** window.
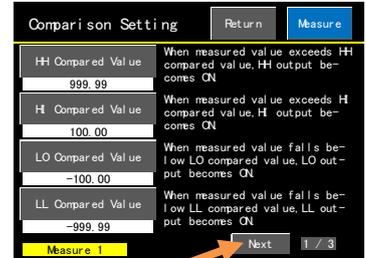
3) Press the M.D Function key on the **"Comparison Setting (2/3)"** window.

4) Press the Enable key to use the Motion Detect.
And press the Register key.
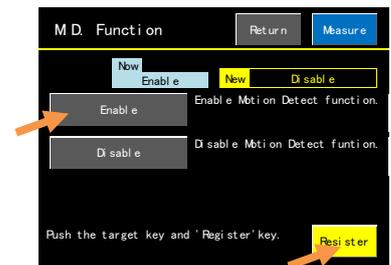
(2) Motion Detect Width

Set the Motion Detect Width.

＜Setting Range＞

0 to 99999 (count)

＜How to operate＞

1) Press the M.D.Width key on the "**Meas. Cond. Setting (3/3)**" window.
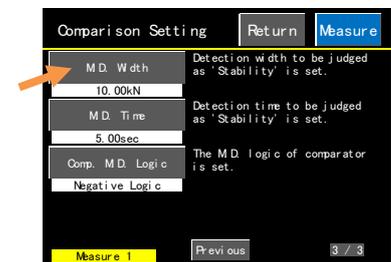
2) Input a setting value with the numeric keyboard and press the Register key to register the setting value.

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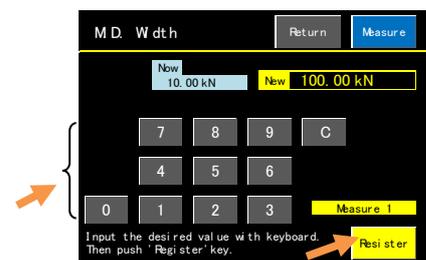
(3) Motion Detect Time

Set the Motion Detection Time.
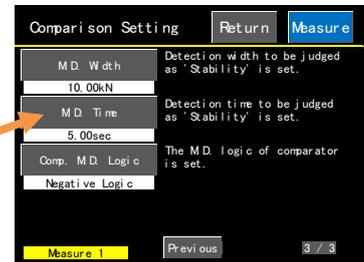
＜Setting Range＞

0.01to9.99 sec

＜How to operate＞

1）Press the M.D.Time key on the "**Meas. Cond. Setting (3/3)**" window.

2）Input a setting value with the numeric keyboard and press the Register key to register the setting value.
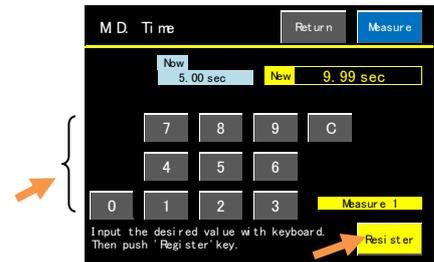
(4) Motion Detect Logic

Sets the output logic (open collector logic).

<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 M.D.Time key on the "**Meas. Cond. Setting (3/3)**" window.
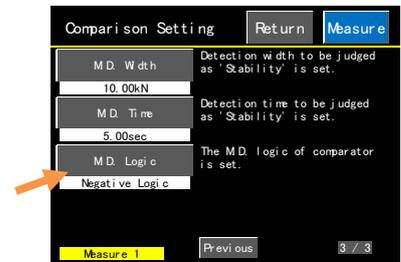
2) Input a setting value with the numeric keyboard and press the Register key for registration.
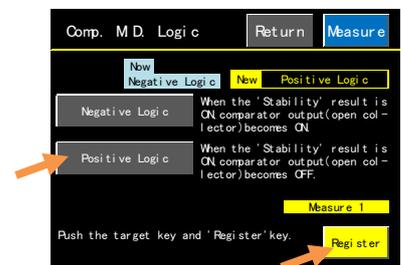
6-3-8. Waveform Comparison Setting

" Waveform Comparison Setting"is the function that compare the input and the waveform and output the ersult.

＜How to operate＞

1) Prepare

Prepare the file for Waveform Comparison "WGA910_SET_WAVE.KS".

●When using the waveform comparison function for the first time

Use the file"WGA910_SET_WAVE.KS" which is in the attached CD. Copy it to the SD card root directory (E:
¥ etc).

●When reading the saved comparison waveform data

Use the file"WGA910_SET_WAVE.KS" which has already been overwritten.Copy it to the SD card root directory
(E:¥ etc).

2) Insert the SD card

Insert the SD card which has the file"WGA910_SET_WAVE.KS".

3) Wave display setting

Press the key 「SET」 → 「Wave Display Setting」 → 「Start Mode of Wave」 and
move the screen.
And slect one of the following.
"Wave Comp. External Trigger Mode", "Wave Comp. Trigger Mode", "Wave
Comp. Single Trigger Mode"

Wave Display Setting	Return	Measure
X-axis Setting	The end point of X-axis(time) is set.	
10.0sec		
Y-axis Setting	The start and end point of Y-axis are set.	
1000.00kN		
Start Mode of Wave	The mode to start the wave display is set.	
Ext.Trig.Mode		
Passed Level	The level that measured value passes for satisfying trigger condition is set.	
0.00kN		
	Next	1 / 2
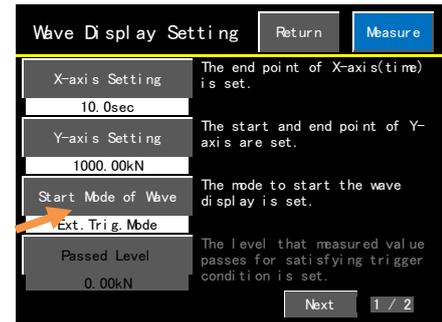
```
ATTENTION
```

◆**The file for Waveform Comparison 「WGA910_SET_WAVE.KS」**

①   The initial value of the comparison waveform data is saved in "WGA 910 _ SET _ WAVE.KS" included in
the attached CD. The contents are as stated below. This file can also be downloaded on our website.

【Common to all measurement numbers （1～32）】
・Waveform comparison HI ： all data is 0
・Waveform comparison HI ： all data is 0
・Start comparison area ： 0
・End od comparison area ： 2000
・Output Logic ： Negative

②   Comparison waveform data is saved by this instrument or attached SD card software. When saved, "WGA
910 _ SET _ WAVE.KS" file will be overwritten.
After that, all comparison waveform data is saved in "WGA 910_SET_WAVE.KS".

③   **If you delete "WGA 910 _ SET _ WAVE. KS" in the SD card or overwrite it with another file of the
same name, you can not read the registered comparison waveform data.
Please copy "WGA 910 _ SET_WAVE.KS" and back it up after registration to prevent data loss.**

④   If you create a new folder in the SD card and save "WGA 910 _ SET _ WAVE.KS" in it, it can not be read.
Please confirm that it is saved in the root directory.

(1) Set Reference Waveform

  Acquire the reference waveform for creating the comparison waveform.
  Register the waveform for the selected measurement condition number.
    < How to operate >
      1) Press the Waveform Comp.Set key on the "Meas.Cond.Setting"window.
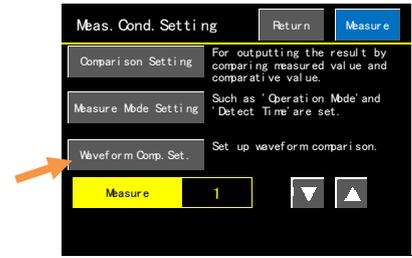
  2) Press the Set. Ref. Waveform key to display the waveform acquisition
  screen.
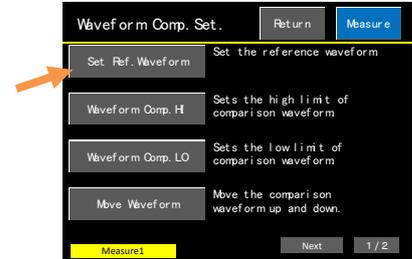
  3) When you press the Start key or turn on the waveform command,
     drawing of the graph starts. If the start mode of wave is "Wave Comp.
     Trigger mode", "Wave Comp. Single Trigger", it will wait for a trigger.

     The waveform is captured only for one screen, and the condition to finish
     (interrupt) the acquisition is as follows.
     · Pressed the Stop key
     · Waveform command changed from ON to OFF
     · Measurement ended up to the end point of X-axis
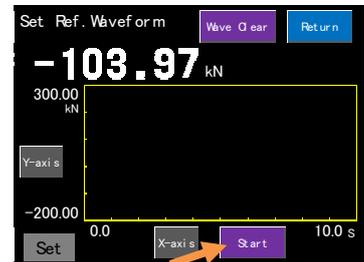
  4) After measurement, set the reference waveform with the Set key
     and return to the waveform comparison setting screen.

     Note: It is not yet registered as comparison waveform at this stage. There
     is work to register the waveform.

     When the start key is pressed, the waveform currently being displayed is
     cleared and waveform acquisition is performed again.
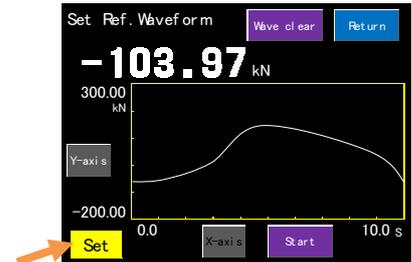
(2) Waveform comparison HI
   Make the Waveform comparison HI.
   The waveform moved by the set value of the reference becomes the Waveform comparison HI.

   <Setting Range>
   -99999 to 99999 (count)

   ＜ How to operate＞
   1) Press the Waveform Comp. HI key.
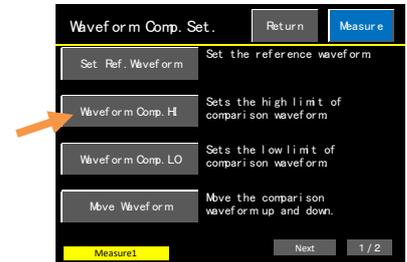
   2) Press the numeric keyboard and press the Register key.
      After press the Register key, it move on to the waveform confirmation screen.
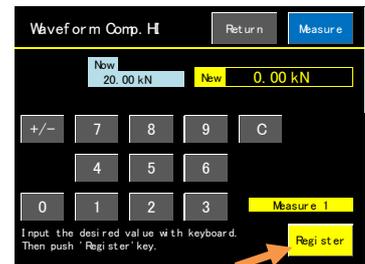
   3) You can check the waveform of HI comparison in "Waveform Comp.HI" window.

      You can change the number of seconds with the △ ▽ key and check the comparison value.

      Pressing the Set key saves the waveform comparison HI value internally and returns to the waveform comparison setting screen.
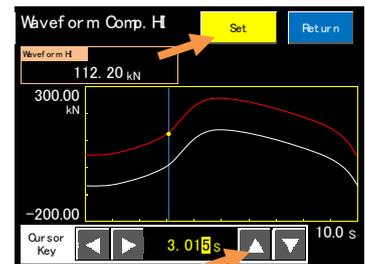
      *The comparison waveform is not saved on the SD card until "Register Waveform" performed.

      *When returning from the waveform comparison HI limit confirmation screen, the numerical value entered earlier is displayed in the column of current value.

   NOTE

   If the comparison value after setting exceeds ± 99999, an error is displayed.

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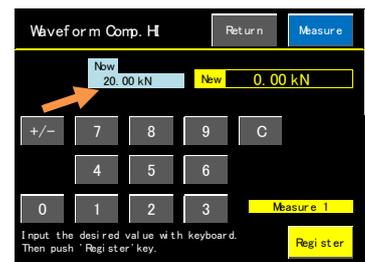
(3) Waveform comparison LO
   Make the Waveform comparison LO.
   The waveform moved by the set value of the reference becomes the Waveform comparison LO.

   <Setting Range>
   -99999 to 99999 (count)

   ＜ How to operate＞
   1) Press the Waveform Comp. LO key.
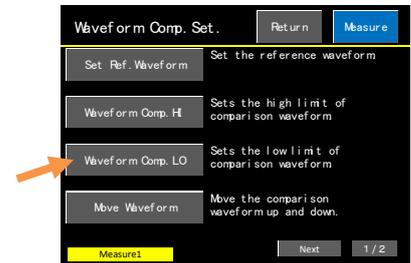
   2) Press the numeric keyboard and press the Register key.
      After press the Register key, it move on to the waveform confirmation screen.
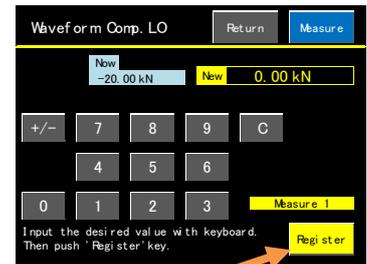
   3) You can check the waveform of LO comparison in "Waveform Comp.LO" window.

      You can change the number of seconds with the △ ▽ key and check the comparison value.

      Pressing the Set key saves the waveform comparison LO value internally and returns to the waveform comparison setting screen.
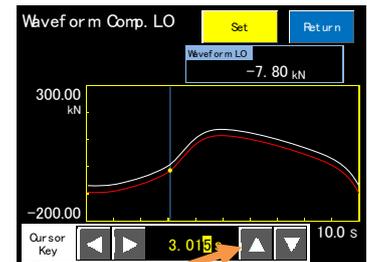
      *The comparison waveform is not saved on the SD card until "Register Waveform" performed.

      *When returning from the waveform comparison LO limit confirmation screen, the numerical value entered earlier is displayed in the column of current value.
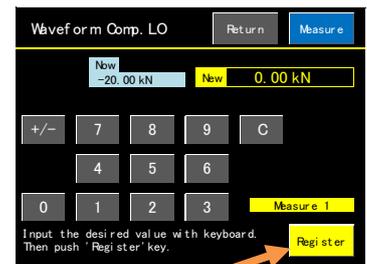
   ┌─ **NOTE** ───┐
   │ If the comparison value after setting exceeds ± 99999, an error is displayed. │
   └──┘

(4) Move Waveform

Use this when you want to move the comparison waveform up and down.
If you have not performed waveform comparison upper limit setting or waveform comparison lower limit setting immediately before, you can display the comparison waveform currently being used and shift it by the set value for that waveform.

NOTE

It is used to move the comparison waveform up and down when the comparison waveform is registered in advance.

\<Setting Range\>
-99999 to 99999 (count)

\<How to operate\>

1) Press the Move Waveform key.
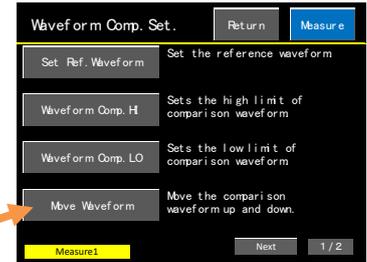
2) Press the numeric keyboard and press the Register key.
   After press the Register key, it move on to the waveform confirmation screen.
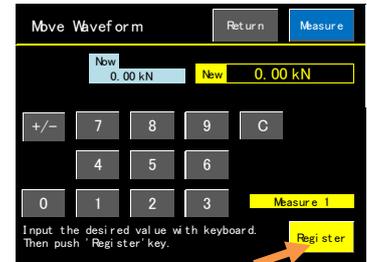
3) You can check the comparison waveform on the confirmation screen.

   You can change the number of seconds with the △ ▽ key and check the comparison value.
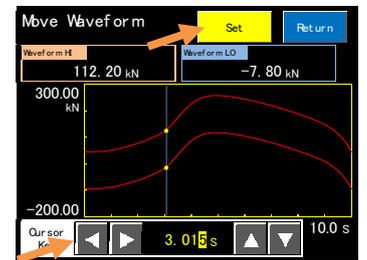
   Pressing the Set key saves the waveform comparison setting value internally and returns to the waveform comparison setting screen.

   *The comparison waveform is not saved on the SD card until "Register Waveform" performed.

   *When returning from the waveform comparison LO limit confirmation screen, the numerical value entered earlier is displayed in the column of current value.
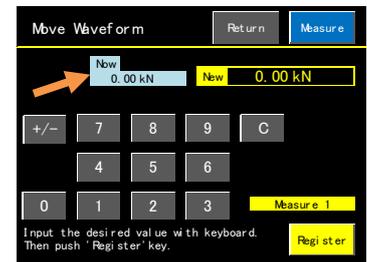
NOTE

If the comparison value after setting exceeds ± 99999, an error is displayed.

---

(5) Comparison Area
   Sets the area for waveform comparison.

   <Setting Range>
      Start: 0 to X-axis full-scale/2000
      End: 0 to X-axis full-scale/2000

   ＜How to operate＞
   1) Press the Comparison Area key.
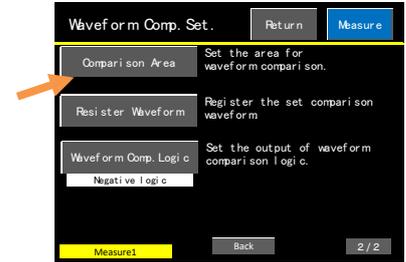
2) Set the comparison area start point.

   Set the Start line (blue line) with △ ▽ key.
   When you press the Set key, the screen for setting the waveform
   comparison (end point) is the next.
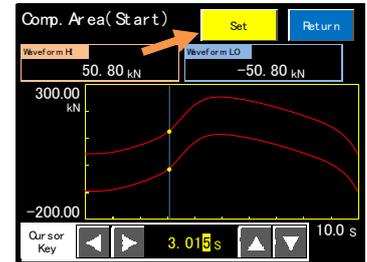
3) Set the comparison area end point.
   On the comparison area end point screen, the comparison waveform before
   the comparison area start point set earlier is not displayed.
   Set the comparison area end point as in step 2).
   The blue line can not move to the left of the comparison area starting
   point.

   Press the Return key to return to the start point setting screen of the
   waveform comparison area.
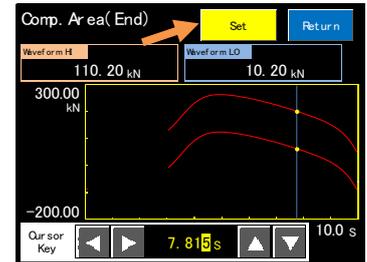
   Pressing the Set key confirms the end point of the waveform comparison
   area and moves to the setting screen for waveform comparison.

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(6) Register Waveform
  Save the comparison waveform to the SD card.

  ＜How to operate＞
  1) Press the Register Waveform key.
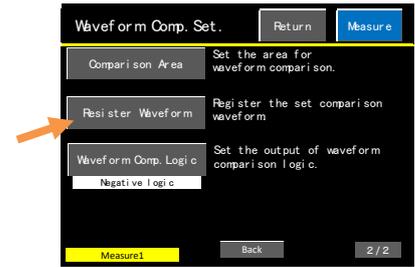
  2) You can check the comparison waveform with △ ▽ key.
    When you press the Register key, the waveform is saved on the
    SD card.
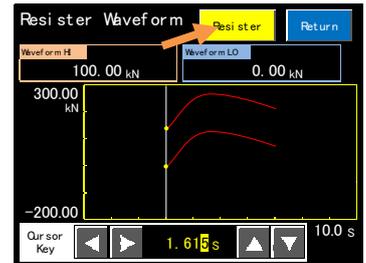
  > **NOTE**
  >
  >   The setting will be discarded when moving to a screen other than the waveform comparison setting
  >   screen without registering.

(7) Waveform Comparison Logic
  Sets the output logic of the waveform comparison output
  (Wave comparator HI, Wave comparator OK, Wave comparator LO).

  <How to operate>
  1) Press the Waveform Comp. Logic key.
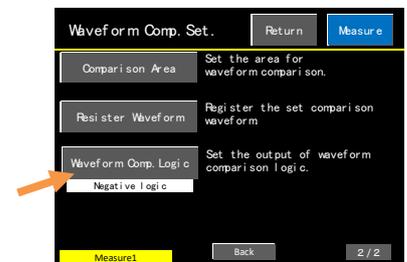
  2) Input a setting value with the numeric keyboard and press the Register key
    for registration.
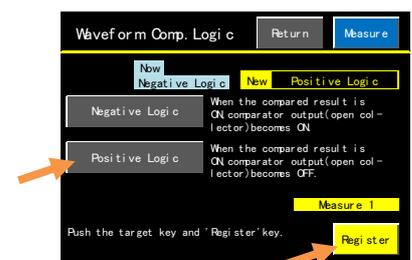
In the following cases, an error is displayed and the SD Error of the control output is turned ON. If data can be read from SD card, SD Error will turn OFF.

- ・ The waveform comparison function is enable, but the SD card is not set.
- ・ The waveform comparison function is enable, but there is no data for waveform comparison in the SD card.

An error window is displayed in the center of the measurement screen.
However, measurement is possible and the waveform comparison function is disabled (OFF).
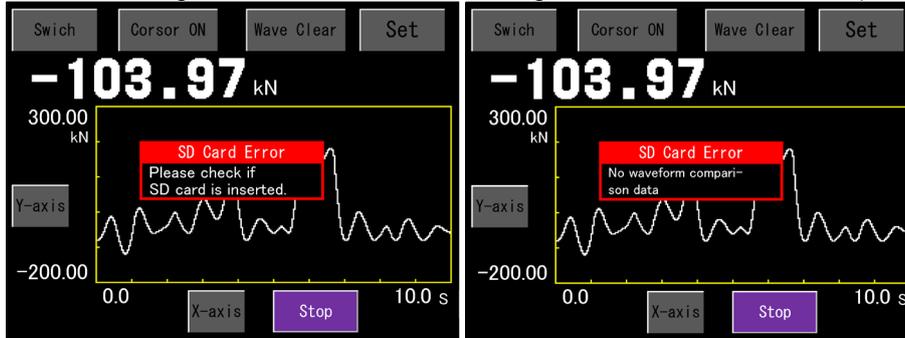
・ The key related to the waveform comparison setting was pressed, but the SD card was not inserted。
An error window is displayed in the screen.

(8) Operation of waveform comparator output

Control output "Waveform comparator HI", "Waveform comparator OK", "Waveform comparator LO" operation will be explained. The state of the control output changes as shown in the table below.

State	Control output "Waveform comparator HI", "Waveform comparator LO"	Control output "Waveform comparator OK"
When waveform comparison mode is selected.	OFF	ON
When new measurement is started	OFF	ON
When it does not exceed the "Waveform comparator HI (LO)" in the comparison region	OFF	ON
When exceeding the "Waveform comparator HI (LO)" in the comparison region	ON	OFF
Until the next measurement is started	Keep last result	Keep last result
When the SD card is removed (No waveform comparison data)	OFF	OFF

Ex.) Wave Comp. External Trigger Mode

W1: First waveforms window are displayed and recorded
W2: Second waveforms window are displayed and recorded
W3: Hold Time of Wave elapsed
WT: Waiting for trigger
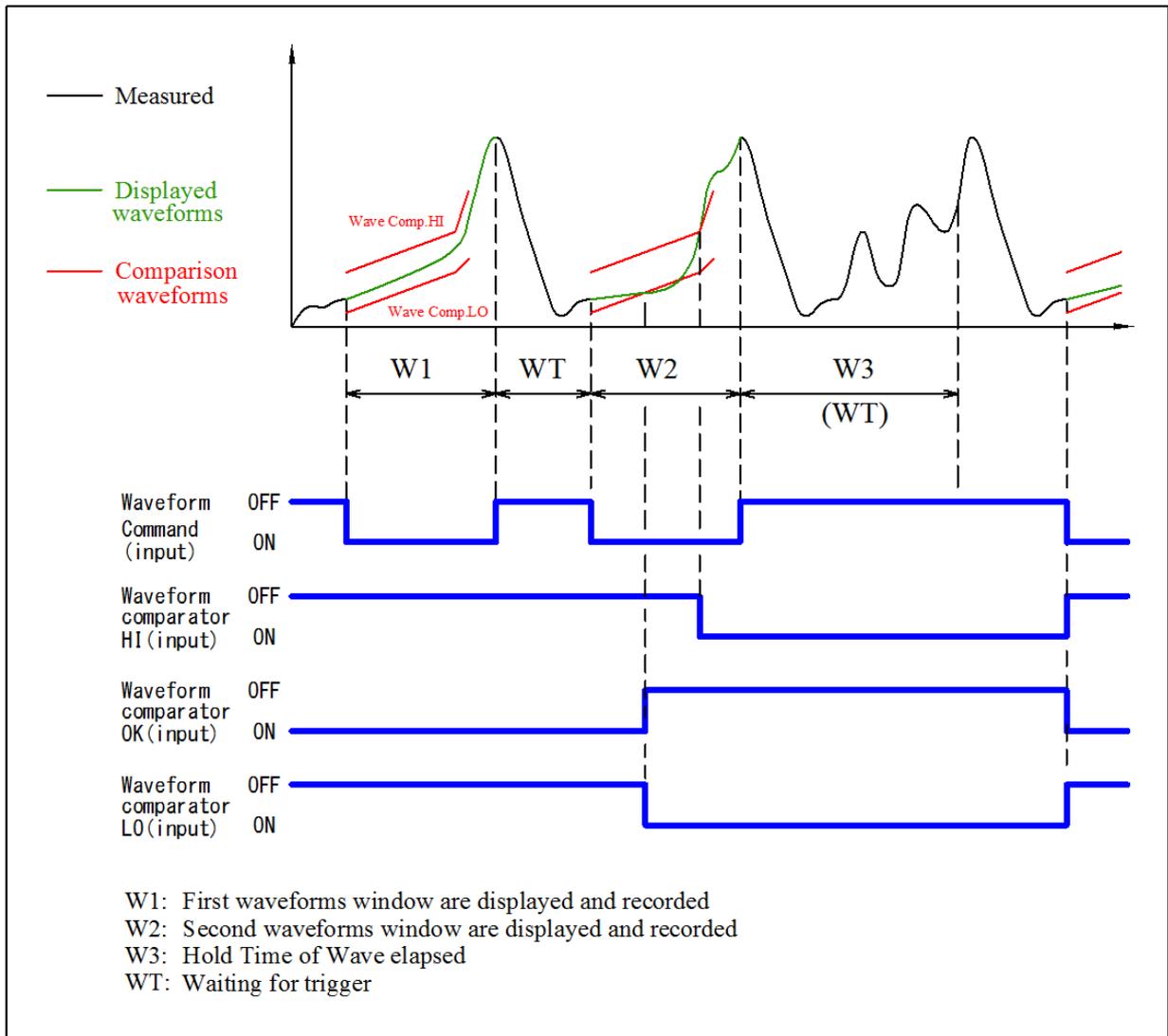
NOTE

・The waveform comparison function works only on the **"Waveform"** window.
・Waveform comparison does not function when a waveform command is input on the **"Measuring window"** (Number).
At this time, the control output (Waveform comparator HI, Waveform comparator OK, Waveform comparator LO) holds the previous state.

・To lock in the state of the waveform comparison screen, press the LOCK key.
If you want to release the lock, please press the LOCK key again.

・Even during waveform comparison, each comparator (HH, HI, OK, LO, LL) operates.
・If the measurement is started without inserting the SD card, the waveform comparison output will remain OFF.

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

Setting X-Y axis of the waveform display screen, selected from the Start Mode of Wave, trigger level condition of the waveform display, set the Hold Time of Wave.

6-4-1. Setting X-axis

Selects and sets the end point of the X-axis (time axis) of the waveform display.
Waveform is displayed with 1 screen up to the X axis end point.

<Setting Range>

    End point: 0.5, 1.0, 2.0, 5.0, 10.0, 20.0, 50.0, 100.0 (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.
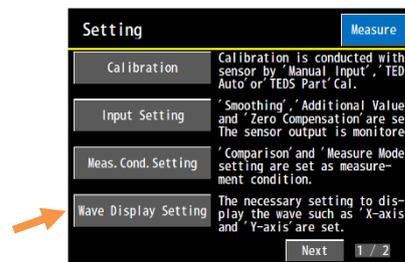
    3) Press the X-axis Setting key on the "**Wave Display Setting (1/2)**" window.
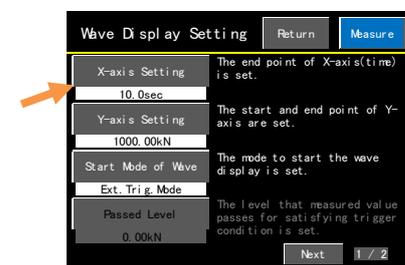
    4) X-axis setting screen
      Press the △ ▽ key to display the target value.
      Press the target key and Register key for registering.

<How to operate the X-axis directly from the "**Measuring**" window>
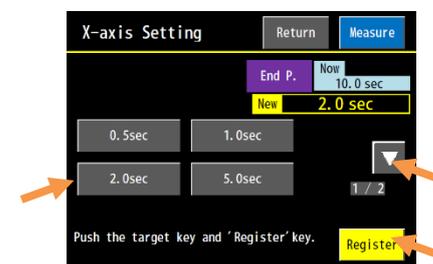
    1) Press the X-axis key on the "**Waveform**" window.

    2) The "**X-axis Setting**" window appears. Set same as above 4).

> **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 Hold value (ex. peak, bottom) is loaded without thinning or averaging.
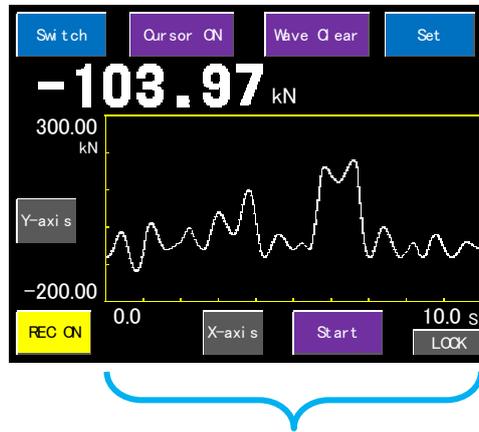
2001 data (Including the data at 0.0 sec.)

X-axis (sec)	Thinning Interval
0.5	250 μs
1.0	500 μs
2.0	1 ms
5.0	2.5 ms
10.0	5 ms
20.0	10 ms
50.0	25 ms
100.0	50 ms

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

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

6-4-2. Setting Y-axis

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

<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 Setting key on the "**Wave Display Setting (1/2)**" window.
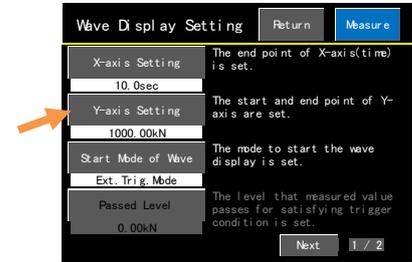
2) Set start point of Y-axis

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

    Press the Register key for the registration.
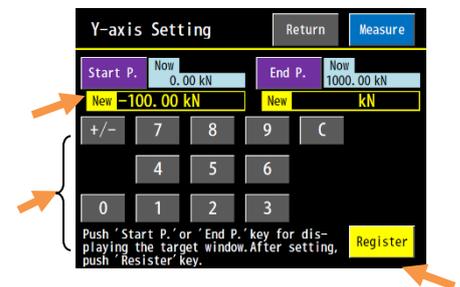
3) Set end point of Y-axis

    After pressing the End P. key, press the △ ▽ key to display the target value.

    Press the target key and Register key for registration.

    The displayed endpoint value is Start P. + End P. .

<How to operate the Y-axis directly from the "**Measuring**" window>
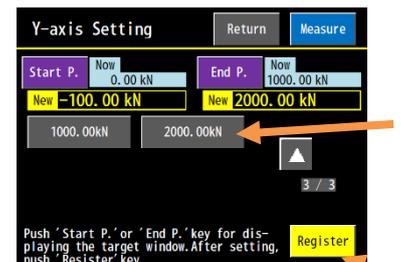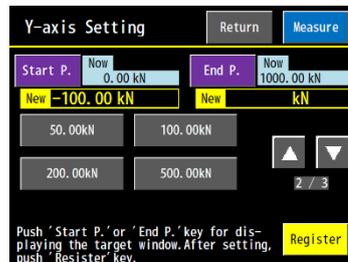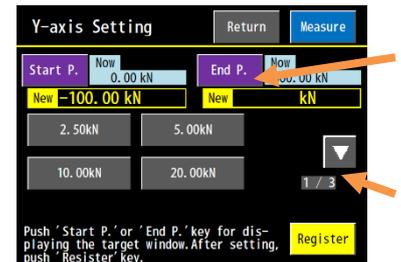
1) Press the Y-axis key on the "**Waveform**" window.
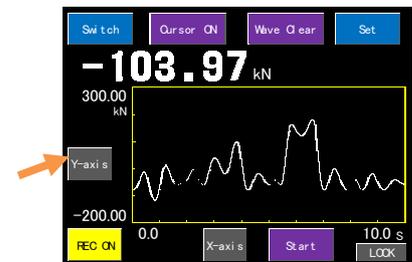
2) The "**Y-axis Setting**" window appears. Set same as above 2) and 3).

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\>

External Trigger Mode, Trigger Mode, Single Mode,

Wave Comp. External Trigger Mode, Wave Comp. Trigger Mode, Wave Comp. Single Trigger Mode

\<How to operate\>

1) Press the Start Mode of Wave key on the "**Wave Display Setting (1/2)**" window.
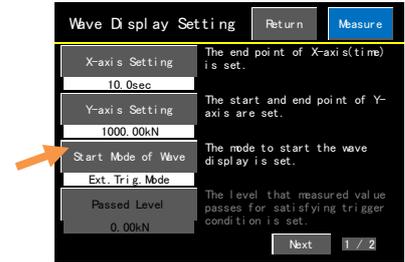
2) Press the target key and Register key for registration.

┌─ MEMO ───┐

When the Hold command and the Waveform command are turned ON at the same time, the detection block can be set as the waveform display section.

Set the Start Mode of Wave to "(Wave Comp.) External Trigger Mode".

└──┘
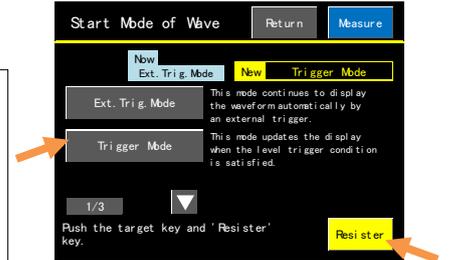
┌─ MEMO ───┐

The following functions have functions equivalent to those of WGA - 900A.

[WGA-910A]		[WGA-900A]
External Trigger Mode	→	Auto Mode
Trigger Mode	→	Normal Mode
Single Mode	→	Single Mode

└──┘

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<Explanation of each Start Mode of Wave>

(1) External Trigger Mode

This mode is to start the display of the waveform by the "Waveform command" and Start key. It keeps updating the waveform display automatically even after the X- axis end point set time has elapsed.

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

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

Press the Stop key or turn OFF the "Waveform command" for stop loading.

[Example] Start Mode of Wave: External Trigger Mode

— Waveform
— Measured value

Window: clear
Waveform: displaying
Window: Holding
Waveform: displaying
Time

X-axis End Point Setting time
Hold Time of Wave

| Start / Stop Key | ON | OFF | ON | OFF |
| Waveform Command | OFF | ON | OFF |
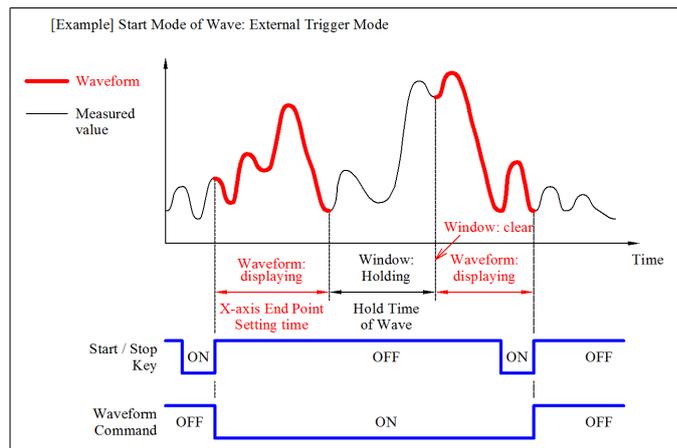
(2) Trigger Mode

This mode starts waveform display only when the measured value satisfies the trigger condition. (see the MEMO on the next page)

When you press the Start key or turn on "Waveform command", it becomes the trigger condition wait mode. After that, the waveform display starts 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-910A becomes trigger condition waiting mode and holds the waveform without updating it.

[Example] Start Mode of Wave: Trigger Mode   Level Passed Way: Rising

— Waveform
— Measured value
Passed Level

Window: Clear
Waveform: Displaying
Window: Holding
Waveform: Displaying
Time

X-axis End Point Setting time
Waiting for "Rising"

| Start / Stop Key | ON | OFF | ON | OFF |
| Waveform Command | OFF | ON | OFF |
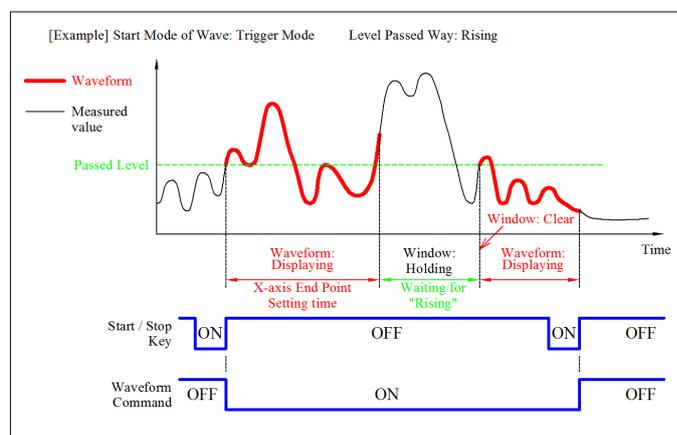
MEMO

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**.

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(3) Single Trigger Mode

This mode starts the waveform display only once when the measured value meets the trigger condition.

Press the Start key or turn ON and OFF (MIN interval: 3 ms) the "Waveform Command" to set the WGA-910A in the trigger condition waiting mode.

After that, the WGA-910A 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-910A stops loading the waveform and holds it. Press the Start key again or turn ON and OFF the "Waveform Command" to set the WGA-910A in the trigger condition waiting mode.

[Example] Start Mode of Wave: Single Trigger Mode   Level Passed Way: Falling
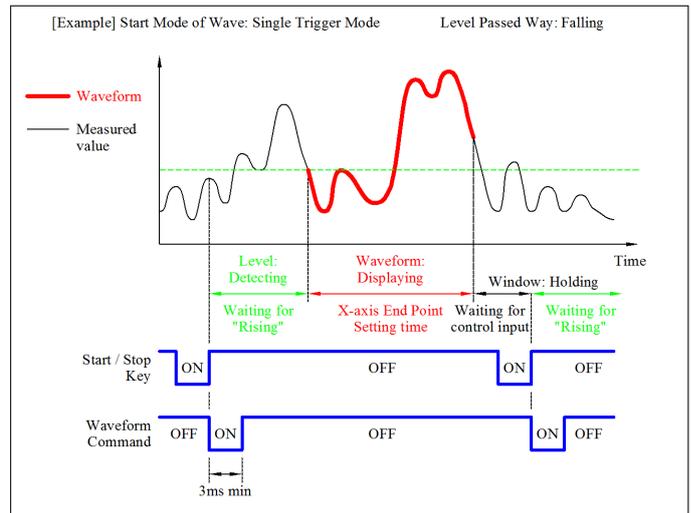
(4) Wave Comp. External Trigger Mode

In this mode, display of waveform is started by "Waveform command" and Start key, and waveform comparison is performed.

When you press the Start key or turn on "Waveform command" of control input, waveform display starts.

Pressing the Stop key, turning OFF "Waveform command" ends waveform display.

Even when the X-axis end point set time has elapsed, the display of the waveform ends.

If you want to record waveform data for several displays, it is necessary to the 6-4-6. Hold Time of Wave.

[Example] Start Mode of Wave: Wave Comp. External Trigger Mode

*1 When the time set in the waveform hold time elapses, the recording is automatically stopped and key operations other than the Start & Stop key is enable.
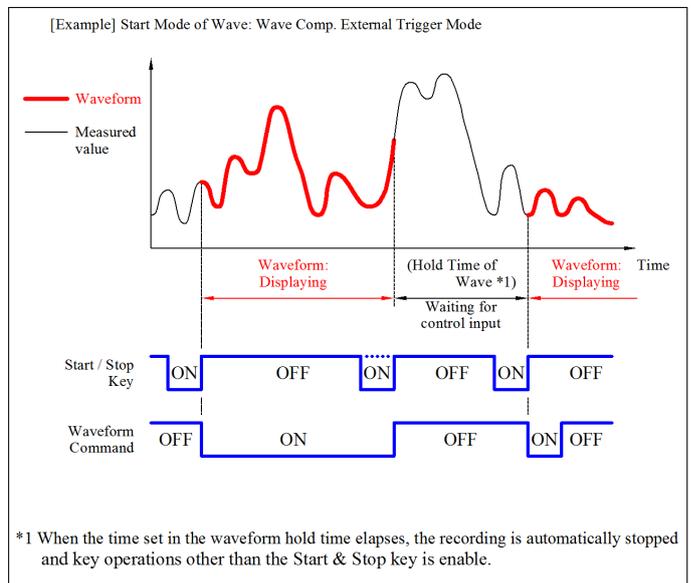
(5) Wave Comp. Trigger Mode

When the measured value satisfies the trigger condition, waveform display is started and waveform comparison is performed. The operation is the same as (2) Trigger Mode, but enables the waveform comparison function.

(6) Wave Comp. Single Mode

When the measured value satisfies the trigger condition, waveform display is started only once and waveform comparison is performed. The operation is the same as (3) Single Mode, but enables the waveform comparison function.

6-4-4. Passed Level (Trigger 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 "External Trigger Mode" or "Wave Comp. External Trigger 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.
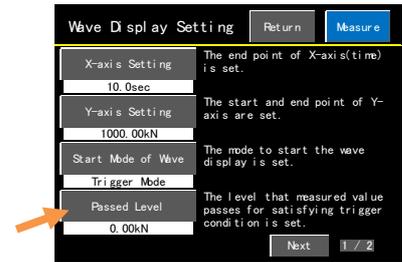
2) Input a setting value with the numeric keyboard and press the Register key for registering.
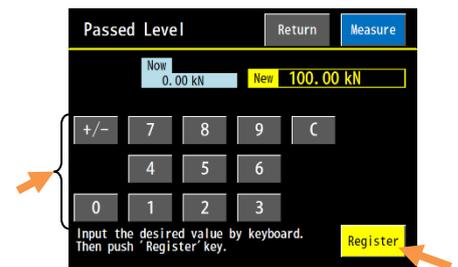
6-4-5. Level Passed Way (Trigger Slope)

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 "External Trigger Mode" or "Wave Comp. External Trigger Mode"

<Setting Range>

Rising, Falling, Both

<How to operate>

1) Press the Next key on the "**Wave Display Setting (1/2)**" window.
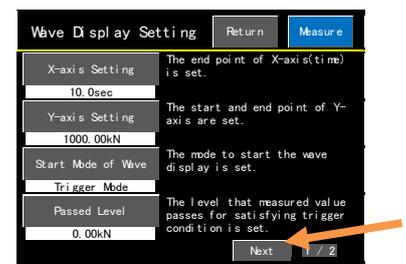
2) Press the Level Passed Way key on the "**Wave Display Setting (2/2)**" window.

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

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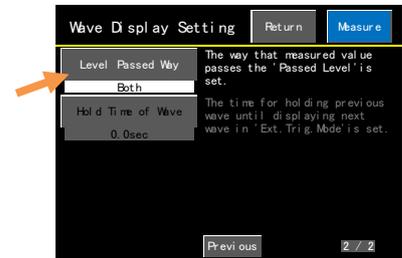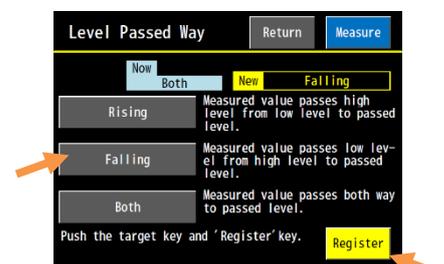
6-4-6. Hold Time of Wave

This function is valid when "External Trigger Mode" or "Wave Comp. External Trigger Mode" is selected in "Start Mode of Wave". The operation differs depending on each mode.

[External Trigger Mode]
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.

[Wave Comp. External Trigger Mode]
Set the trigger wait time after the end of one screen display. Determine the set value according to the purpose of recording. It takes time to save the SD card because WGA-910A stop the recording every screen.

● None recording →Setting value: 0.00 sec

● Recording for one display →Setting value: 0.00 sec
  After saving the data for one screen, finish recording without waiting for trigger. One screen of data per waveform file is saved.

● Recording for several displays →Setting value: Set it to be sufficiently longer than the next trigger input
  By inputting a trigger within the set time, data of several screens are saved in one waveform file. Since we do not stop recording every screen, we can shorten the time to save to SD card. When the Hold Time of Wave has elapsed, the recording is automatically stopped. (For delay time, refer to chapter 7-7-2.)

<Setting Range>
   0.0 to 99.9(sec)
<How to operate>
   1) Press the Hold Time of Wave key on the "**Wave Display Setting (2/2)**" window.
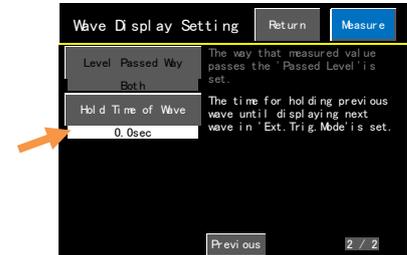
   2) Input a setting value with the numeric keyboard and press the Register key for registration.
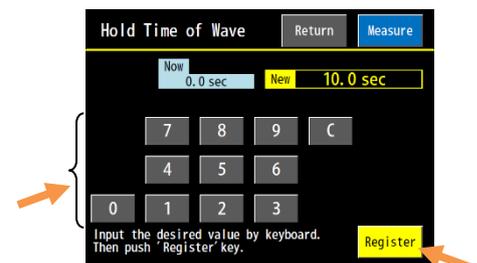
6-4-7. Record Waveform Data

Import the waveform data (drawing screen) and save it on the SD card.

Recording settings (ON/OFF) are set by REC key on waveform display screen.

Recording starts with "Waveform command" of Control input or REC key on waveform display screen.

(1) How to start recording with "Waveform command"

Recording start/stop is controlled by "Waveform command" of Control input.

1) Setting REC key

Set REC key setting to "REC ON" in advance.

"REC ON": Recording starts at the start of drawing.

"REC OFF": Not recording with drawing only.

(The state of the REC key is hold even when the power is turned off.)

Waveform command ON

2) When "Waveform command" is set to ON, recording starts.

Then start monitoring and recording at the same time.

```
┌─ MEMO ──────────────────────────────┐
│                                      │
│ ・Key operation can not be operating during monitoring. │
│ ・Start Mode of Wave: (Wave comp.) Trigger Mode │
│   Monitoring starts when the Passed Level is exceeded. │
│ ・Start Mode of Wave: (Wave comp.) Single Mode │
│   The behavior is different. Refer to 6-4-3. │
│                                      │
└──────────────────────────────────────┘
```

Passed level exceeded
(Trigger ON)

3) "Waveform command" is set to OFF, recording will be stopped.

At the same time, the monitor also stops.

```
┌─ MEMO ──────────────────────────────┐
│                                      │
│ ・Start Mode of Wave: Wave comp. Ext Trigger Mode │
│   Recording stops after Hold Time of Wave has elapsed. │
│                                      │
└──────────────────────────────────────┘
```

Waveform command OFF


```
┌─ MEMO ──────────────────────────────────────┐
│                                              │
│ For details of the timing of the "Waveform command" in each Start Mode of Wave, │
│ refer to 7-7-3.                              │
│                                              │
└──────────────────────────────────────────────┘
```
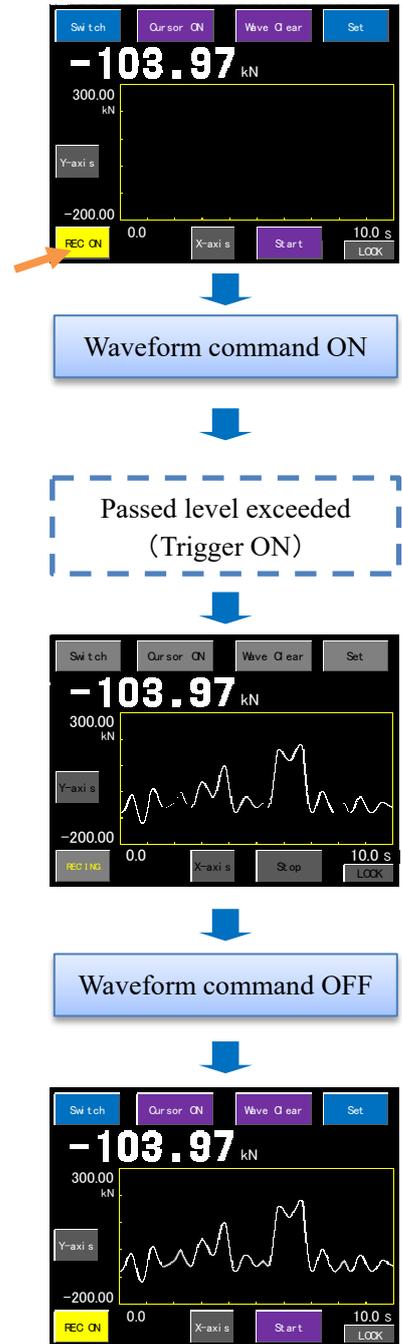
(2) How to start recording by key operation

　Contol start/stop of recording by key operation. You can either record at the same time as you start the monitor, or start recording while monitoring the waveform.

　1) Setting REC key
　　Set the REC key in advance.
　　　"REC ON": Recording can start at the start of drawing.
　　　"REC OFF": Recording can start at any position during drawing.
　　　(The state of the REC key is hold even when the power is turned off)

　2) Start drawing (recording)
　　Press the Start key. The monitor starts.

　　Depending on the status of the REC key, the operation is as follows.
　　　"REC ON": Recording start at the start of drawing.
　　　　　　　　(The REC key changes to "REC'ING")
　　　"REC OFF": Drawing starts but recording is not done.
　　　　　　　　(The REC key changes to "REC")

Passed level exceeded
（Trigger ON）

　3) Recording from arbitrary position during drawing
　　When the REC key is in the "REC" state, press the REC key.
　　The REC key changes to "REC'ING" and recording starts.

　4) Stop recording
　　Press the Stop key while the REC key is "REC'ING".
　　The REC key changes to "REC" and stops recording.
　　However, drawing continues running.

> **MEMO**
> ・Start Mode of Wave: Wave comp. Ext Trigger Mode
> 　Recording stops after Hold Time of Wave has elapsed.

　5) Stop drawing
　　When the REC key is "REC", press the Stop key.
　　The REC key changes to "REC ON" or "REC OFF", and drawing is stopped.

114
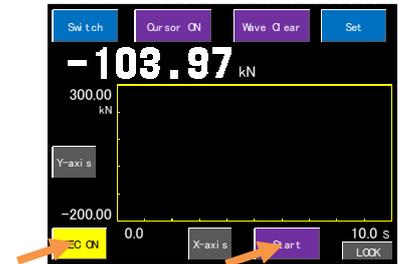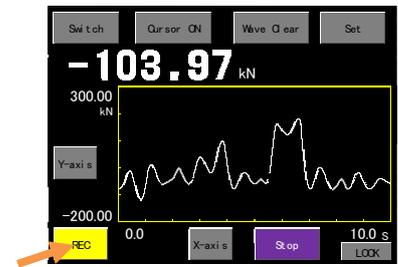
■How to save the waveform data.

1) SD card write time

It takes about 0.5 seconds to write the waveform of one window.

When using the recommended SD card (32 GB, TS32GSDHC10). Note that the writing time varies with the SD card and measuring conditions. For details, refer to 7-7.

2) Continuous waveform data storage

X axis is 5.0 s, 10.0 s, 20.0 s, 50.0 s, 100.0 s: The WGA-910A always saves continuous waveform data.

X axis is 0.5 s, 1.0 s, 2.0 s: Since the WGA-910A prioritizes the writing process than the saving process, the WGA-910A does not save waveform data continuously when changing windows.

3) You can measure while saving the waveform on the SD card. However, the next measurement can not be started until the saving of the waveform data captured before that is completed.

4) The control output "SD" is turned ON while saving the waveform data in the SD card.
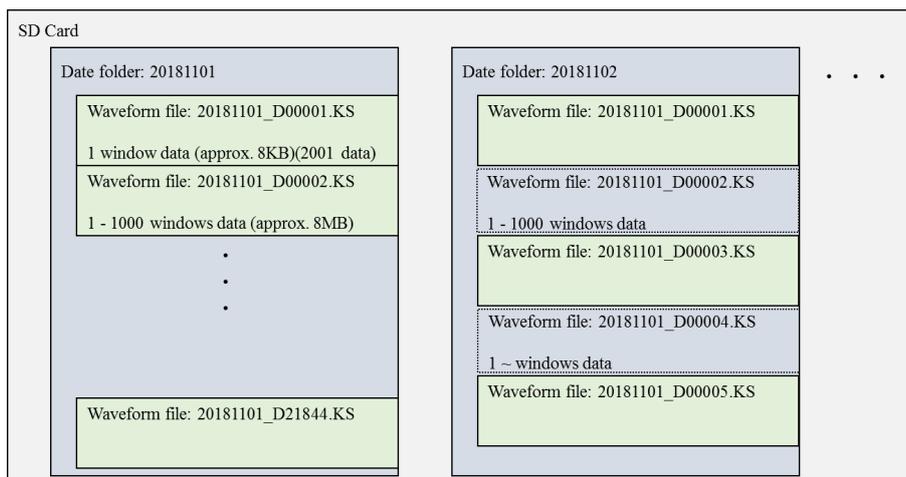
< Example of saving waveform data of SD card >

5) The waveform data is saved with the following file name and the newly created file is KYOWA original format.

The date changes and a new folder is created after saving the waveform file for yesterday.

aaaabbcc_Dxxxxx.KS (aaaa: Year bb: Month cc: Day xxxxx: 00001 to 21844)

6) New waveform file is not created when the all waveform files (No. 00001 to No. 21844) saved in the SD card is already filled. (Does not overwrite the waveform file No. 001.)

7) The number of the waveform data of one window is 2001. The capacity including the detection point data is approx. 8 KB.

8) Press the REC key to start recording data.

When you press the Stop key to stop recording data before the end point of the X-axis, the WGA-910A saves the waveform data and detecting point data until pressing.

9) Depending on the start mode of wave, the WGA-910A saves multiple waveform data, between the REC key and Stop key, successively in single waveform file.

10) 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.

11) 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. 00001, No. 00003 and No. 00005 already have waveform data.

The next target waveform data is saved in the waveform file No. 00002.

12) After saving the waveform data of 1000 windows in single waveform file, the WGA-910A saves the next waveform data in next the empty waveform file.

In the case of this example, after the waveform file No. 00002, the next waveform data is saved in the waveform file No. 00004.

・If recording the waveform is started with many files or large capacity file saved in the SD card, it seems that the WGA-910A stops while waveform data is saved to the SD card.
In addition, the WGA-910A may not immediately get back to the state before displaying the waveform unless the Stop 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.

・Recording can not be started because it is busy for several seconds after inserting SD card or reading the Waveform comparison file. At this time the Start key becomes grayed out and the control output "SD" turns ON. Start recording after the Start key is enabled or "SD" is turned OFF.

・Remove the SD card after the control output "SD" turns OFF.

・The recording possible time (X-axis: 5.0 s, SD card: 32GB used)

<Example> Continuous recording (1000 windows / 1 waveform file)
    1 waveform file recording time = 5.0 s / 1 window × 1000 screen ≒ 5000 s (8 MB)
    SD card recording possibility time = 32GB / 8MB × 5000 s ≒ 20,000,000 s ≒ 5,555 h ≒ 231 days

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 Set key on the "**Measuring**" window.

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

3) Press the Initial Setting key on the "**Setting (2/2)**" window.

4) Press the Meas. Select Signal key on the "**Initial Setting**" window.

5) Press the target key and Register key for the registration.
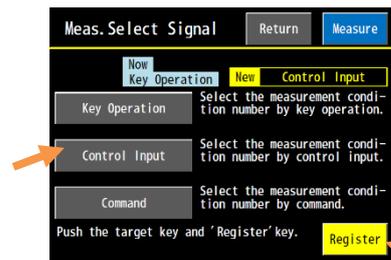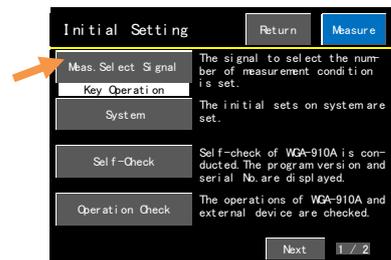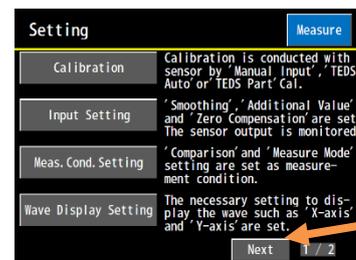
NOTE

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

6-5-2. System

(1) Key Lock

　　Select lock (inhabit 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.
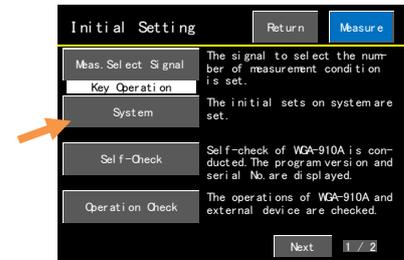
　　2) Press the Key Lock key on the "**System (1/2)**" window.
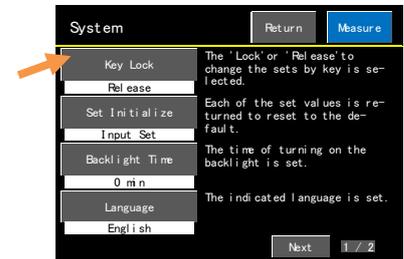
　　3) Press the Lock key and then Register key to be locked.
　　　In addition, the Return key is invalid and displayed in gray.
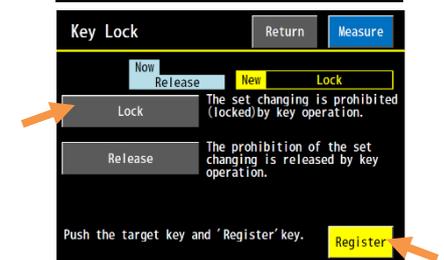
　　4) Press the Lock key to get back to the "Measuring" window.
　　　The Measure key changes to the Set key.
　　　In addition, other keys are invalid and displayed in gray.

> **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.
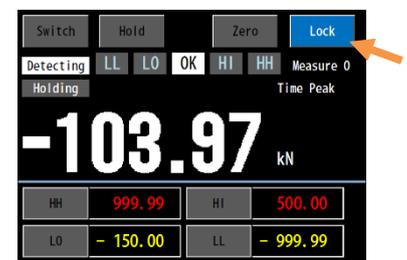
　　2) Press the Release key and then Register key for releasing.
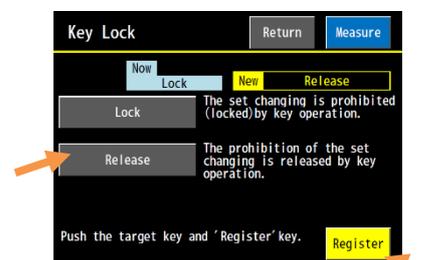
(2) Set Initialize

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.
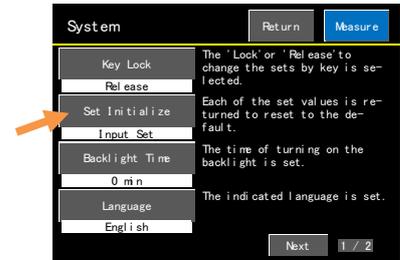
2) Press the △ ▽ key to display the target setting key.
Select and press the target key and Initial. key.
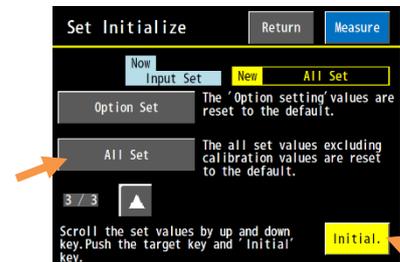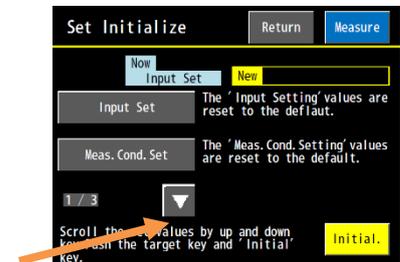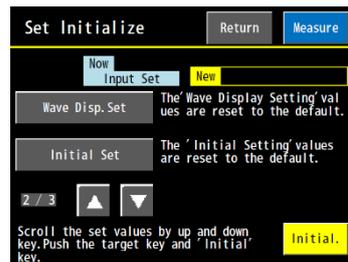
3) The "**Confirmation of Set Initialize**" window appears.
Press the Execute key for initializing.
Press the Cancel key to get back to the previous window without initialization.
The Return and Measure keys are invalid and displayed in gray.
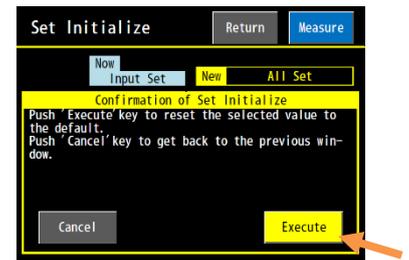
(3) Backlight Time

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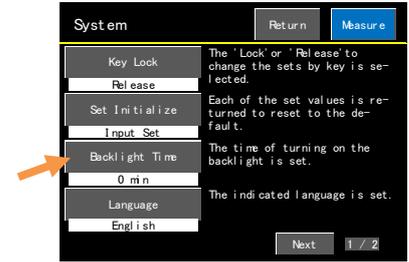
2) Input a setting value with the numerical keyboard and press the Register key for registration.

┌─ **MEMO** ─────────────────────────────────────┐
│   │
│   The backlight does not go off and keeps ON when setting 0 minute. │
│   │
└──┘
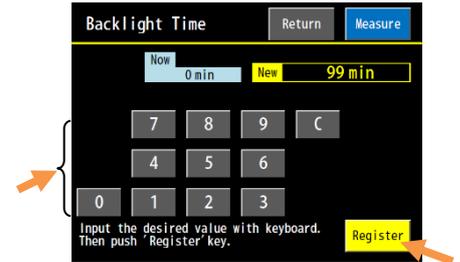
(4) Language

Sets the display language.

<Setting Range>

English or Japanese

<How to operate>

1) Press the Language key on the "**System (1/2)**" window.
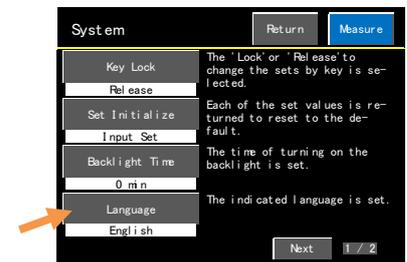
2) Select the target key and Register key for changing.
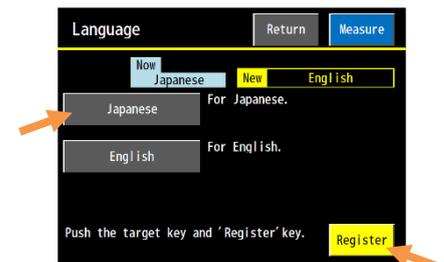
(5) Clock

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 Clock key on the "**System (2/2)**" window.
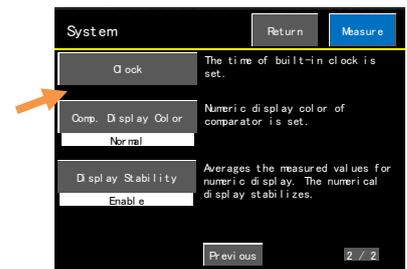
2) Press the ◁ ▷ key on the window to blink the target place.

2000 / 01 / 01 00 : 00 : 00

Year, Month, Day, Hour, Minute, Second
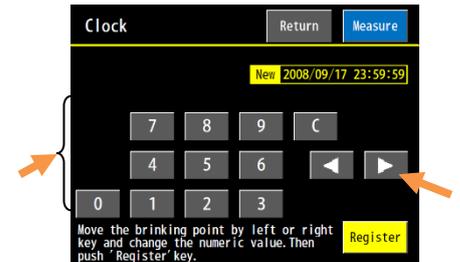
3) Input a value with numbers on the window and press the Register key for registration.

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

6) Comparison Display Color

Change the color of the **"Measuring"** window according to the comparison result.

<Setting Range>

Normal, All Red, All White, All Yellow

<How to operate>

1) Press the Comp. Display Color key on the "**System (2/2)**" window.
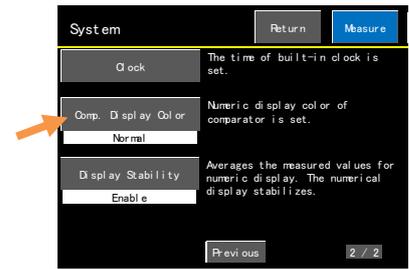
2) Select the target key and Register key for changing.

Normal: It is the default setting to change the numeric display color
according to the comparison result.
(Comparator HI, HH: Red)
(Comparator OK   : White)
(Comparator LO, LL: Yellow)

All Red: Regardless of the result of comparison, the value is displayed in red.

All White: Regardless of the result of comparison, the value is displayed in white.

All Yellow: Regardless of the result of comparison, the value is displayed in yellow.

After changing color, Comparator HH, HI, OK, LO, LL on "Measuring" window also change.

(In the case of "All white" in the figure)
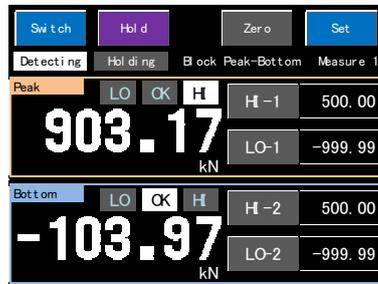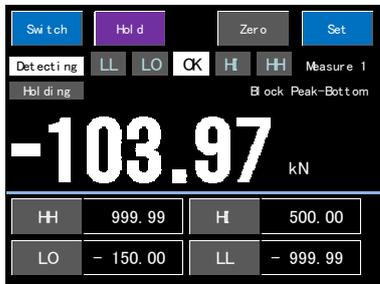
(7) Display Stability

To stabilize the numerical display, average processing is performed on the measured value.

```
┌─  MEMO  ─────────────────────────────────────────────────────────┐
│                                                                   │
│  ・The average processing performed by the display stabilization  │
│    function has no effect on comparison judgment and hold value   │
│    detection.                                                     │
│                                                                   │
└───────────────────────────────────────────────────────────────────┘
```

＜Setting Range＞

Enable・Disable

<How to operate>

1) Press the Display Stability key on on the "**System (2/2)**" window.
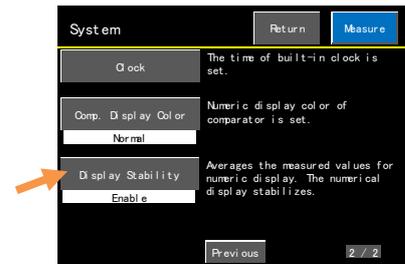
2) Press the Enable key to use the Display Stability.
And press the Register key.

6-5-3. Self-Check

Self diagnosis the WGA-910A 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.

When an error occurs, the WGA-910A turns ON the control output "Abnormal memory."

<How to operate>

1) Press the Self-Check key on the "**Initial Setting**" window.
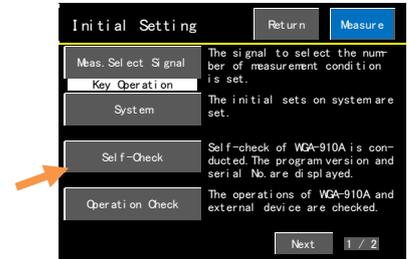
2) Press the Memory Check key on the "**Self-Check**" window.

MEMO

The program version and serial No. of the WGA-910A can be checked.

---

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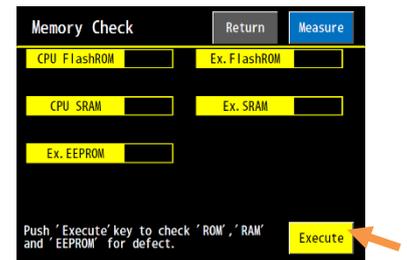
4) The result is displayed after a short time.

Only the "**Ex. SRAM**" is displaying **Error** in the right window.
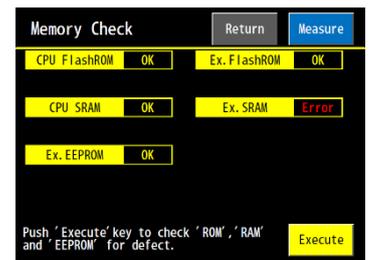
(2) Channel Check

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.

When an error occurs, the WGA-910A turns ON the control output "Abnormal channel."

<Setting Range>

Bridge Volt.: Checks that the measured value of the excitation voltage (bridge voltage) is within ±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.
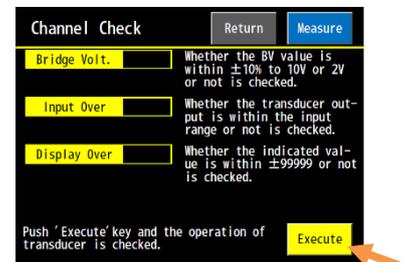
3) The result is displayed after a short time.

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

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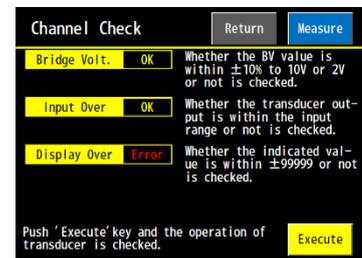
6-5-4. Operation Check

(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 Color key.

    Backlight: Press the Backlight key to go off the backlight. Touch the window to light up the backlight.

  <How to operate>

    1) Press the Operation Check key on the "**Initial Setting**" window.
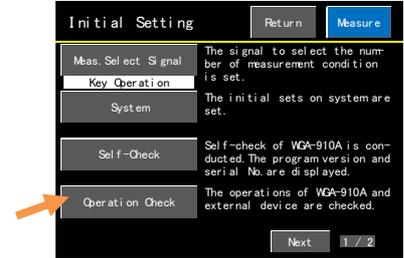
    2) Press the Display Check key on the "**Operation Check (1/2)**" window.
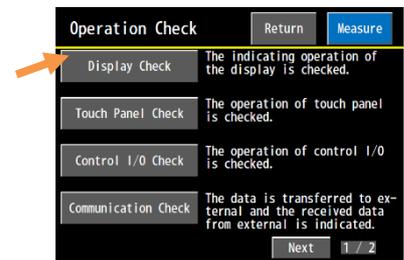
    3) Window color automatically changes from Red - Green - Blue - Yellow - Red by pressing the Color key.
       At this time, other than Color keys are invalid and displayed in gray.
       Press the Color key again to get back to the standard window (background color is black).

Window color
changes in order.

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

Touch the window
again to light up.

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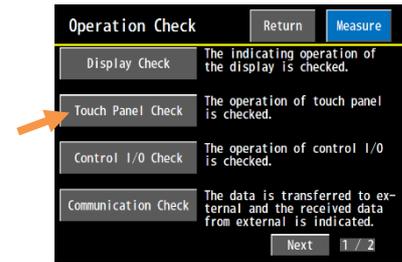
2) Press a white key on the window to change in yellow.

Press the yellow key again to get back to white.
Press the Return key to get back to the "**Operation Check**" window.
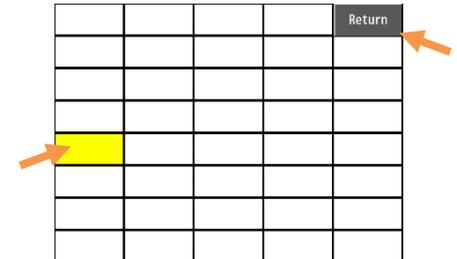
(3) Control I/O Check

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 34 (Pin No. 19 to 34)

Output: 1 to 16 (Pin No. 1 to 16)

<How to operate>

1) Press the Control I/O Check key on the "**Operation Check (1/2)**" window.
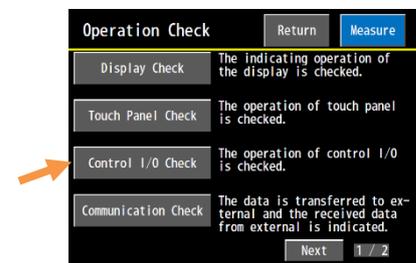
2) White square of the target pin No. lights up in blue while the control input signal is turned ON.
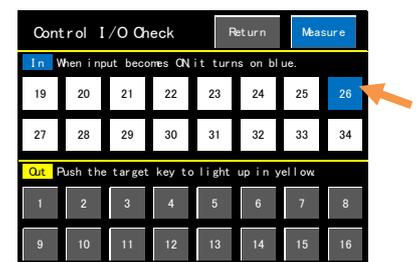
3) Press the target output signal key of the pin No. The display color becomes yellow and the open collector output signal is turned ON.

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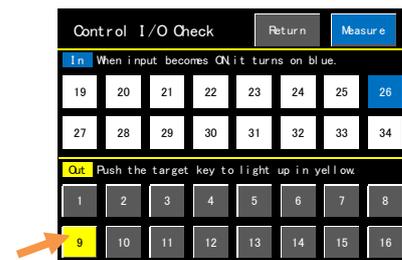
(4) Communication Check

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

When an error occurs, the WGA-910A turns ON the control output "Communication error."

Press the Transfer key to transfer data "WGA-910A" 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-910A" 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

Transferred Data
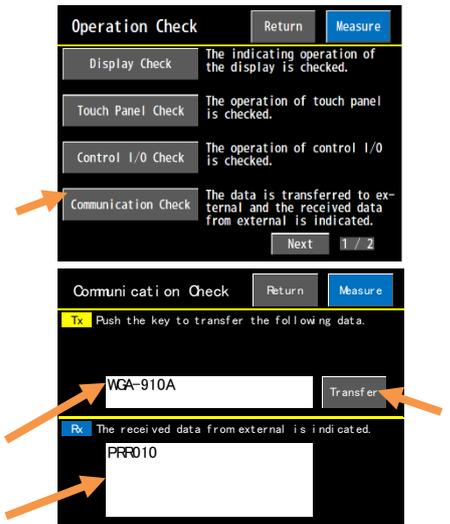
(5) BCD Output Check

Valid for equipping the optional BCD output (WGA-910A-1) or BCD and D/A output (WGA-910A-12).

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.

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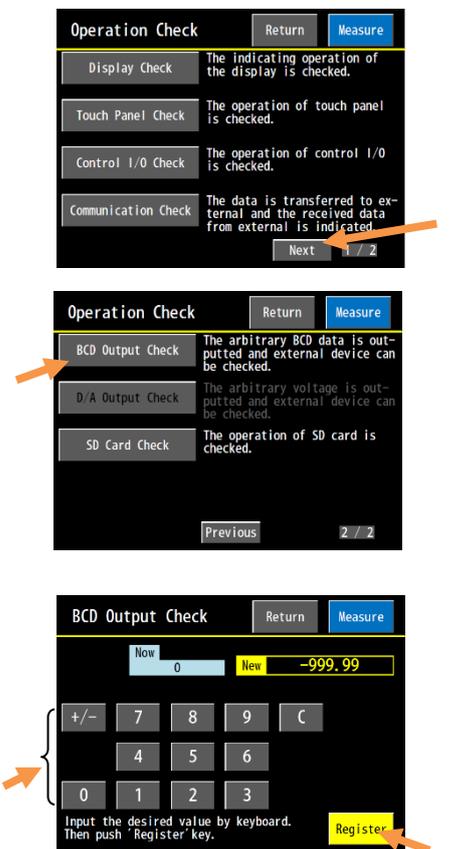
(6) D/A Output Check

  Valid for equipping the optional D/A output (WGA-910A-2) or BCD and D/A output (WGA-910A-12).

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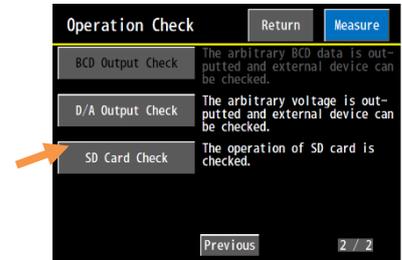
  2) Press the target key and Register key to output the target voltage.

┌─ **MEMO** ──────────────────────────────────┐

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

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

└──┘
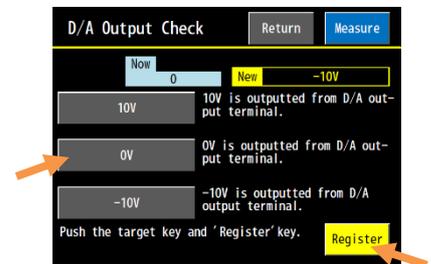
(7) SD Card Check

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.
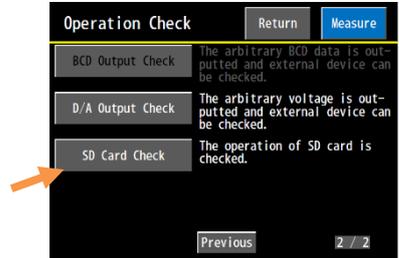
2) Press the Execute key to start the SD card operation and the "**Checking SD card**" window blinks.
The Return Measure Execute keys are displayed in gray.
The result is displayed in a short moment.
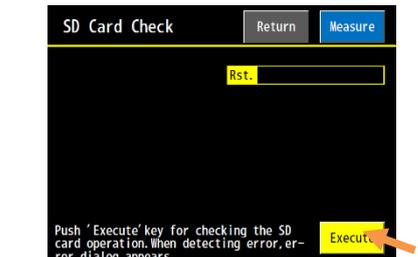
Blinks
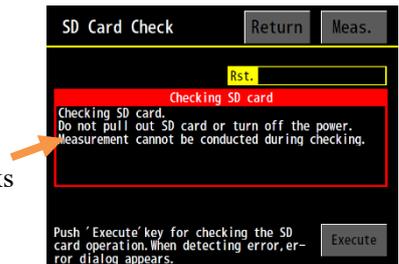
3) "**OK**" is displayed in the "**Rst.**" column when the operations of the SD card are correct.

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

Error Dialog

<Error of the SD card check>
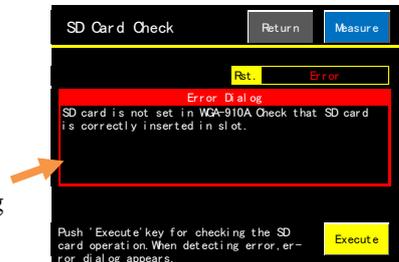
	Display
1	SD card is not set in WGA-910A. Confirm that SD card is correctly inserted in slot.
2	SD card has no enough the empty capacity. The data cannot be saved no more.
3	SD card is state of write protect.
4	The set value file is not existed in SD card.

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

Or, it may cause damage or may disrupt the WGA-910A operation.

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-910A 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.

About error message of the "**SD card is not set in WGA-910A. 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.

Please make sure that the SDHC card is formatted as FAT32 and the SD card as FAT.

6-5-5. SD CARD SETTING

(1) Set Value Save (Saving Setting Value)

Capable of saving the all setting values of the WGA-910A 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 Next key on the "**Initial Setting (1/2)**" window.

2) Press the SD Card Setting key on the "**Initial Setting (2/2)**" window.

3) Press the Set Value Save key on the "**SD Card Setting (1/2)**" window.

4) 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.

5) 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-910A.
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.

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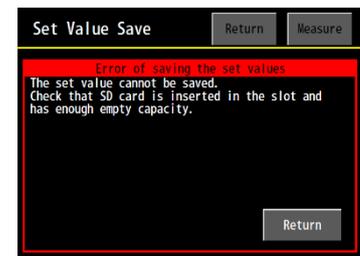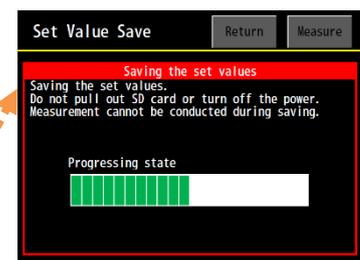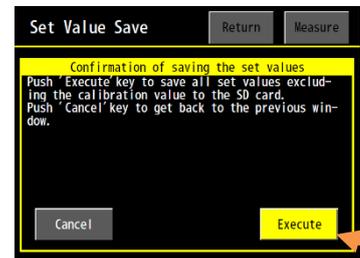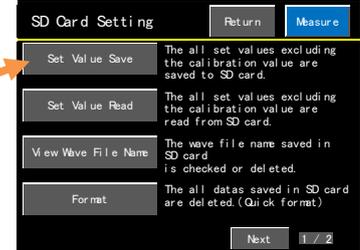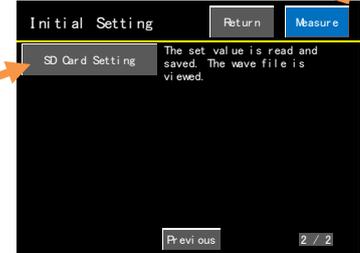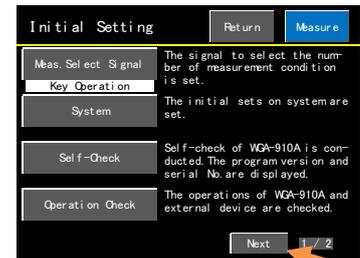
(2) Set Value Read (Reading Setting Value)

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-910A for reading. And the setting values of the WGA-910A 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.
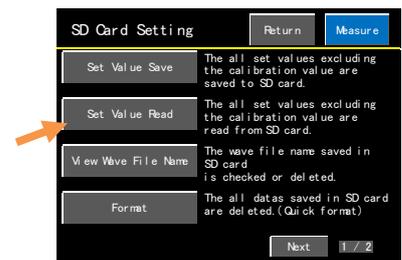
2) Press the Execute key on the "**Confirmation of reading the set values**" window.

The setting values are read from the SD card and setting values of the WGA-910A are rewritten.

Press the Cancel key to get back to the previous window without reading the setting values.
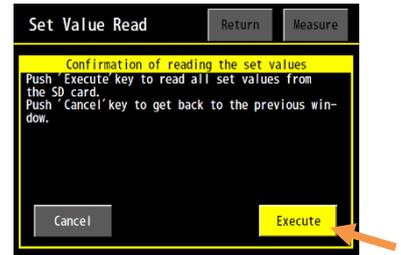
3) Starts reading the setting values and "**Reading the set values**" window appears.

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.
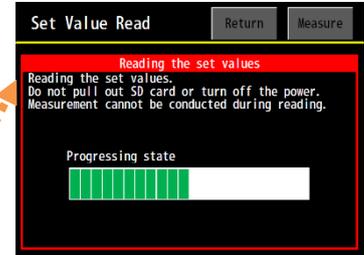
Blinks

```
┌─ NOTE 1 ──────────────────────────────────────┐
│                                                │
│  Do not remove the SD card or do not turn OFF the WGA-910A. │
│  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-910A.

WGA910_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-910A.         │
│                                                                     │
└─────────────────────────────────────────────────────────────────────┘
```

■ 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 Record key and if the following conditions happen, an error window appears.
> To close the error windows, operate as follows.

1) The SD card is nor inserted to the slot or the SD card is still write-protected even if the Record key is pressed on the "**Waveform**" window.
   To close the error window, press the Return key to get back to the "**Waveform**" window.
   Insert the SD card or release the write-protected mode.
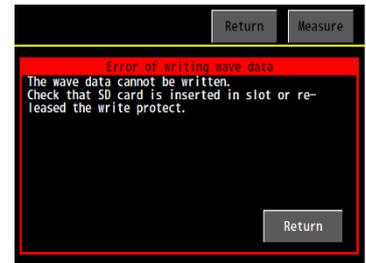
2) After pressing the Record key on the "**Waveform**" window or while saving the waveform data after starting the waveform display, the waveform files from No. 00001 to No. 21844 are all filled with data.
   To close the error window, press the Set Switch key to change the window or remove the SD card from the slot.

3) The SD card is removed from the slot after starting the waveform display.
   To close the error window, press the Stop key and stop the updating of the waveform display.
   Then press the Set Switch 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 Record key on the waveform display window.
   To close the error window, press the Return 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.
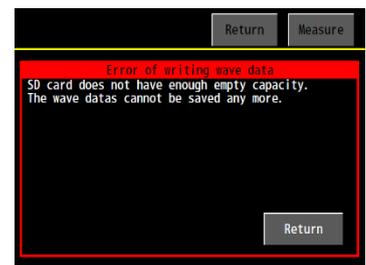
5) The free capacity of the SD card is not enough while saving the waveform data.
   Press the Stop key and stop updating the waveform display to close the error window.
   To close the error window, press the Set Switch key to change the window or remove the SD card from the slot.
   Then remove the SD card from the slot and increase the free capacity by erasing the extra file, etc.

(3) View Wave File Name

This section describes how to display the waveform file name saved in the SD card and delete waveform files.

The WGA-910A saves the waveform files in date-based directories. You are able to delete the date-based directories.

You are able to delete single waveform file, multiple waveform files, and all waveform files.

You are also able to delete all waveform files by deleting date-based directories.

While loading the waveform files, changing the names, and deleting data, the WGA-910A turns ON the control output "SD."

<To display the waveform file name>

  1) Press the View Wave File Name key on the 【SD Card Setting (1/2)】 window.
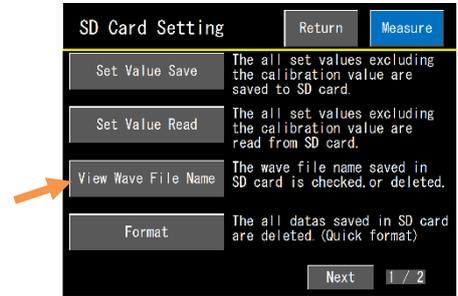
  2) The date-based directories, saving the waveform files, appear.
    Each single page includes 10-day data.
    To display the past 10-day data, press the Next key.
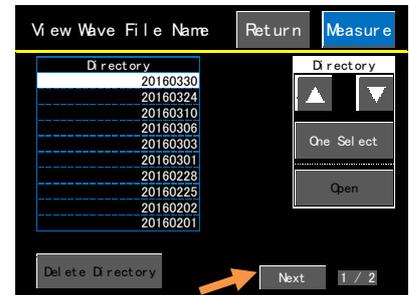
  3) Select the directory which includes the target waveform files by the △ ▽ key.
    Press the One Select key.
    The background color changes to yellow and the character color changes to black.
    Press the Open key to display the waveform file names, saved in the directory.
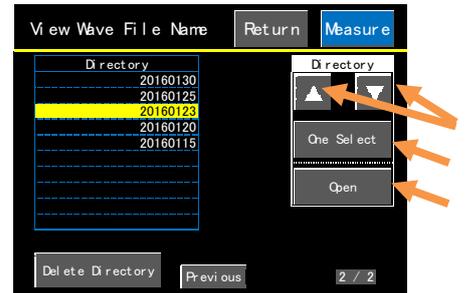
  4) The "Name", "Size", and "Renewal Date" of the waveform files appear.
    Each single page includes 10-file data.
    To display the next 10-file data (2nd page), press the Next key.
    The WGA-910A has 2184 pages (21844 data) in total.
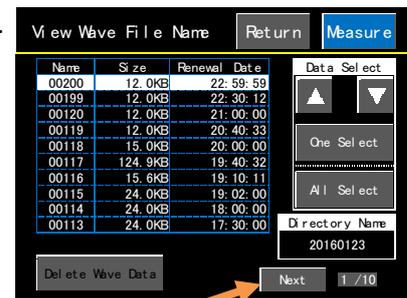
┌─ **MEMO** ─────────────────────────────────┐

The control output [SD] is turned ON while reading or deleting waveform data.

└──┘

<To select/cancel the directory>
1) Select the page by the Next Previous key.
   Select the directory by the △ ▽ key for highlighting
   (background color: white, character color: black).
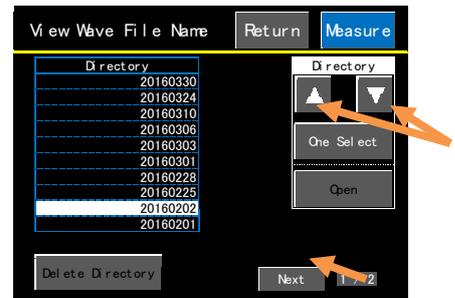
2) Press the One Select key.
   The "Renewal Date" of the background color changes to yellow and
   the character color changes to black.
   In the case of this example, the "20160202" is selected.
   To cancel, press the One Select key again for highlighting
   (background color: yellow, character color: black).

<To select/cancel the single waveform file or multiple waveform files>
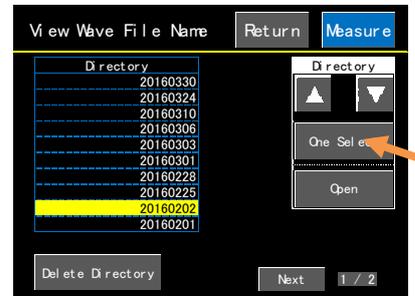
1) Select the page by the Next Previous key.
   Select the waveform file by the △ ▽ key for highlighting
   (background color: white, character color: black).
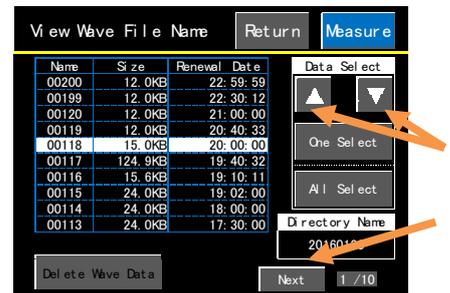
2) Press the One Select key.
   The "Name", "Size", and "Renewal Date" of the background color
   changes to yellow and the character color changes to black.
   In the case of this example, the "00118" is selected.

   To cancel, press the One Select key again for highlighting (background
   color: white, character color: black).
   To select multiple files, repeat the operations 1) and 2).

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<To select/cancel all waveform files>
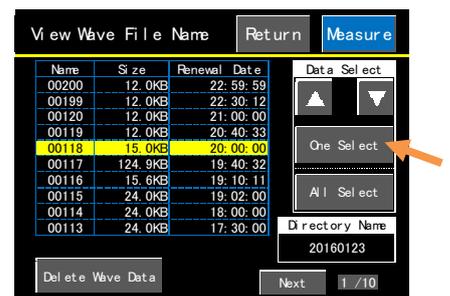
1) To select all waveform files, press the All Select key.
The "Name", "Size", and "Renewal Date" of all waveform files of the background color changes to yellow and the character color changes to black.
Note that when the directory has no waveform file, nothing happens.

2) To cancel, press the All Select key again.
The selected waveform files, before pressing the key, becomes highlighted (background color: white, character color: black).

┌─ **NOTE** ─────────────────────────────────────┐

Do not remove the SD card or turn OFF the WGA-910A.
Otherwise, it may cause troubles.
The WGA-910A does not measure data while displaying
【View Wave File Name】.

└──┘
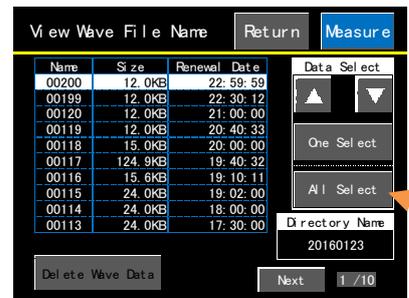
<To delete the directory>
  1) Select the directory as described in the <To select/cancel the directory>.
      In the case of this example, the "20160202" is selected.

  2) Press the Delete Directory key.

  3) Check the directory next to the 【Selected Directory】.
    Press the Execute key to start deleting the directory.
    As the directory is deleted, all waveform data in the directory are deleted as well.
    To cancel, press the Cancel key. The previous window appears.

  4) The 【Deleting the directory】 window appears while deleting.
    While deleting, the red frame blinks and the progress bar indicates the progress of the task.
    After the deleting completes, the 【View Wave File Name】 window appears.
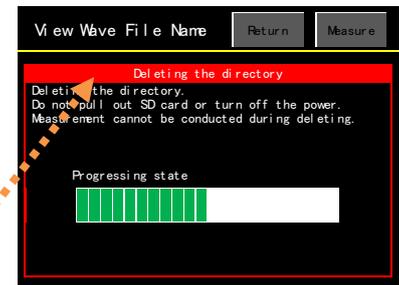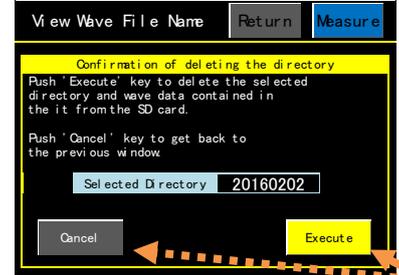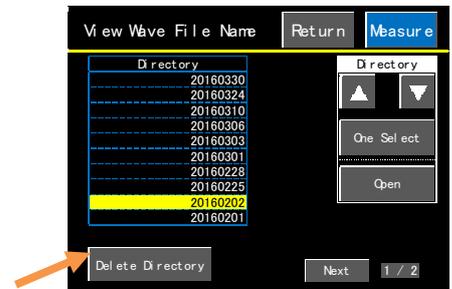
Blinks

<To delete the waveform files>
  1) Select the waveform files as described in the <To select/cancel the single waveform file or multiple waveform files> and <To select/cancel all waveform files>.
    In the case of this example, the "00108" and "00118" are selected.

  2) Press the Delete Wave Data key.

  3) Check the number next to the 【Selected data number】.
    Press the Execute key to start deleting the waveform files.
    To cancel, press the Cancel key. The previous window appears.

  4) The 【Deleting the wave data】 window appears while deleting.
    While deleting, the red frame blinks and the progress bar indicates the progress of the task.
    After the deleting completes, the 【View Wave File Name】 window appears.
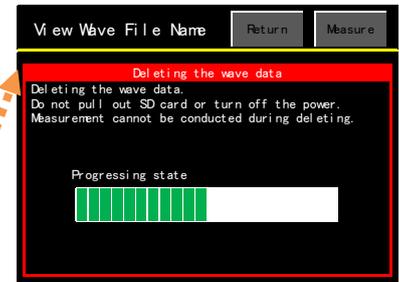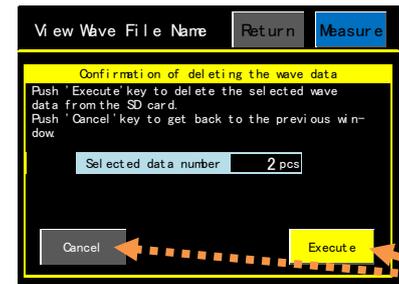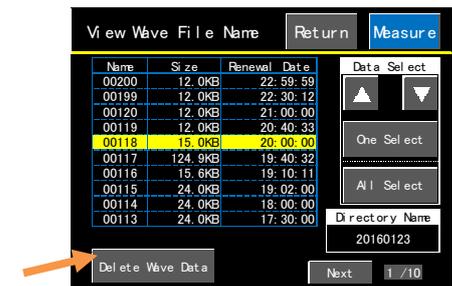
Blinks

(4) Format

Erases (quick format) the all data saved in the SD card.

<How to operate>

1) Press the Format key on the "**SD Card Setting (1/2)**" window.
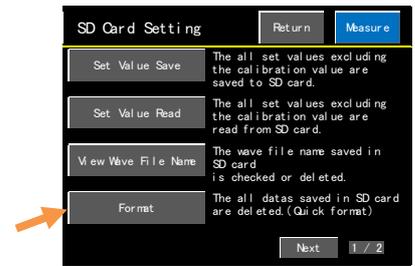
2) Press the Execute key on the "**Confirmation of Format**" window to format the SD card.
Press the Cancel key to get back to the previous window without formatting.
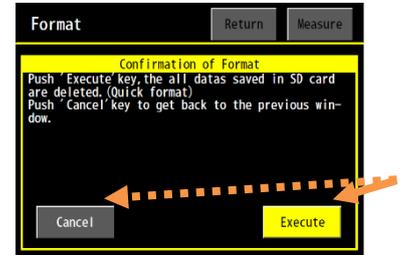
3) Format starts and the "**Formatting**" window appears.
The red flame blinks and the progress condition is displayed on the progress bar during formatting.
After completing the formatting, the "**SD Card Set (1/2)**" window appears again.

Blinks
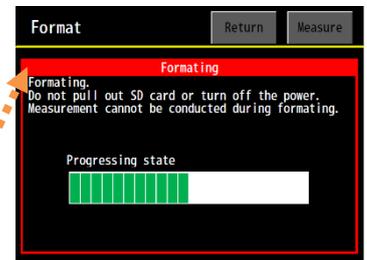
NOTE

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.

(5) Update

Capable of updating the program version of the WGA-910A 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-910A 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-910A to that in the SD card.

Press the Cancel key to get back to the previous window without updating.
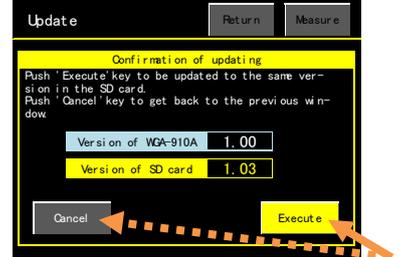
3) After starting the updating, the progress condition is displayed with the progress bar.

The "POWER" LED lights up in orange during updating.

After finishing the updating, the "POWER" LED lights up in green.
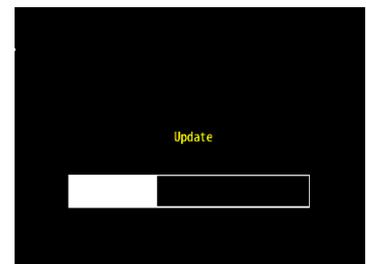
```
┌───── NOTE 1 ──────────────────────────────┐
│                                            │
│  Do not remove the SD card or turn OFF the WGA-910A during │
│  updating.                                 │
│  Or, it may cause trouble such as a window does not start again. │
│                                            │
└────────────────────────────────────────────┘
```

```
┌───── MEMO ─────────────────────────────────┐
│                                            │
│  The version of the SD card is displayed as "-" with no SD card │
│  inserted or no updating program written in the SD card. │
│                                            │
└────────────────────────────────────────────┘
```
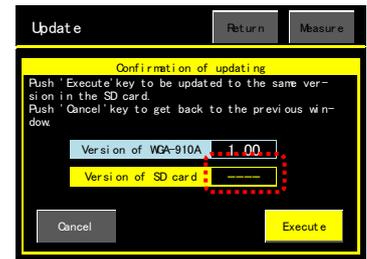
```
┌───── NOTE 2 ──────────────────────────────┐
│                                            │
│  The "Update Error" window appears if the Execute key is pressed │
│  with no SD card inserted or with no updating program written in the │
│  SD card.                                  │
│  Press the Return key to get back to the "Confirmation of update" │
│  window.                                   │
│                                            │
└────────────────────────────────────────────┘
```

4) Turn OFF the WGA-910A 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-910A is updated on the "Self-check" window.

■ About program for updating

4 program names are as follows.

    PVER.h
    WGA910_A.BIN
    WGA910_B.BIN
    WGA910_C.BIN

The file format is dedicated to the WGA-910A.

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. OPERATION TIMING

7-1. CONTROL INPUT (HOLD COMMAND, RESET COMMAND, ZERO COMMAND)
7-1-1. Control Input

T1 : 4ms(max)   A period of time required for starting the HOLD operation starting from the [HOLD] signal ON.

T2 : 4ms(max)   When it is in hold mode, a period of time required for canceling the HOLD operation starting from the [HOLD] signal OFF.

T3 : 4ms(max)   When it is in block specified hold mode and time specified hold mode, a period of time required for canceling the HOLD operation starting from the [RESET] signal ON.

T4 : 4ms(max)   A period of time required for conducting the digital zero from the [ZERO] signal ON.

T5 : 5ms(max)   Time required for the [HOLD] signal.
T6 : 5ms(min)   Time required for the [RESET] signal.
T7 : 5ms(min)   Time required for the [ZERO] signal.

7-1-2. Block-specified

Normal operation | Detect Block | Hold Block | Normal operation

Measurement Condition

HOLD command — OFF / ON

T1 2ms T2 2ms

RESET command — OFF / ON

T3 2ms

T4 5ms

T1 : 2ms(max)   A delay time required, starting from the time when the HOLD command becomes ON until it becomes the detect block.
T2 : 2ms(max)   A delay time required, starting from the time when the HOLD command becomes OFF until it becomes the hold block.
T3 : 2ms(max)   A delay time required, starting from the time when the RESET command becomes ON until it returns the normal measurement.
T4 : 5ms(min)   The minimum pulse width of the RESET command.

7-1-3. Time-specified

Normal operation | Detect Block | Hold Block

Measurement Condition

HOLD command — OFF / ON

T1 2ms

Specified time

T2 5ms

T1 : 2ms(max)   A delay time required, starting from the time when the HOLD command becomes ON until starting the time specified measuring operation.
T2 : 5ms(min)   The minimum pulse width required, starting from the time specified measuring operation responding the HOLD command.

7-2. COMPARATOR OUTPUT
7-2-1. HI, OK, LO Comparator output

T1 : 4ms(max)   A delay time required, starting from the time when the input value exceeds the high limit comparative value preset on the comparator until the high limit output becomes ON.

T2 : 4ms(max)   A delay time required, starting from the time when the input value lowers by the hysteresis width from the high limit comparative value preset on the comparator until the high limit output becomes OFF.

T3 : 6ms(max)   A delay time required, starting from the time when the input value exceeds by the hysteresis width from the low limit comparative value preset on the comparator until the low limit output becomes OFF.

T4 : 6ms(max)   A delay time required, starting from the time when the input value lowers from the low limit comparative value preset on the comparator until the low limit output becomes ON.

7-2-2. Waveform Comparator HI, OK, LO output

T1 : 4ms (Max)   A delay time required, starting from the time when the abnormal waveform, wave HI turns ON and the time until the Wave OK turns OFF.

T2 : 4ms (Max)   A delay time required, starting from the time when start of graph drawing until waveform comparison result turns OFF.

* In the Wave Comp. Trigger Mode

7-3. DELAY TIME OF THE INFLECTION POINT OUTPUT

T1 : Inflection point discrimination time2
    It is a set value to obtain the slope of the measured value.

T2 : 10ms (Max)   Time from inflection point calculation to inflection point discrimination output.

7-4. DELAY TIME OF THE EXTREME VALUE OUTPUT

Maximal value

Minimal value

Measured value

T1

Inflection point/
Extreme value

OFF

ON

T1 : 10ms (Max)   Time from input to extreme value output determining
the maximum / minimum value signal.

*When the judgment magnification is 1.0 times

7-5. DELAY TIME OF MOTION DETECT OUTPUT

0.25ms   Motion detect time

Measured value

Motion detect
(output)

OFF

ON

T1   T2

T1 : 4ms (Max)   A delay time required, starting from the time when it is judged as
"stable" until "Motion detect" output becomes ON.

T2 : 4ms (Max)   A delay time required, starting from the time until "Motion detect"
output becomes OFF.

7-6. DELAY TIME OF RS-232C OUTPUT

Delay time between   MAX 30 ms
input – RS-232C output:

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7-7. DISPLAYING WAVEFORMS AND OUTPUTTING SD SIGNAL WITH WAVEFORM COMMAND (CONTROL OUTPUT) AND RECORD KEY

7-7-1. External Trigger Mode

\<Conditions\>

Measuring condition setting	Operation mode: Normal
Record	Set "Record" to "Rec ON", input waveform command.

Execute the next recording after SD signal turns from ON to OFF.

W1: First waveforms window are displayed and recorded
W2: Second waveforms window are displayed and recorded
W3: Third waveforms window are displayed and recorded

T1: 20 ms (Max) : A delay time required, starting from the time after turning ON the Waveform command until displaying and recording the waveform data.
T2: 170 ms (Typ) : A delay time required, starting from the time with the first waveforms window after turning ON the Waveform command until the SD becomes ON.
T3: 300 ms (Typ) : A delay time required, starting from the time after recording the first waveforms window data until the SD becomes OFF.
T4: 300 ms (Typ) : A period time required, starting from the time after recording the second waveforms window data until the SD becomes ON.
T5: 100 ms (Typ) : A delay time required, starting from the time with the third waveforms window after turning OFF the Waveform command until the SD becomes ON.
T6: 500 ms (Typ) : A period time required, starting from the time after recording the waveforms window data until the SD becomes OFF.

NOTE

・You can obtain the typical values with the blank recommended SD card (refer to page 28).
・According to the followings, typical values of the T2~T6 may change with the above values.

    Manufactures and types, speed class and capacites of the SD card

    Data in the SD card

    Measure modes (Block Peak-Bottom, etc.)

    The date changed during

    Saved every 1000 screen data (To create a new wave file, the values of T3 and T4 will be T6.)

・When X-axis setting is 0.5 sec, 1.0 sec, and 2.0 sec, measurement data during switching between screens (T4, T5) can't be display and record. (Writing of data to SD card take a priority)
・When X-axis setting is X-axis setting: 5.0 sec, 10.0 sec, 20.0 sec, 50.0 sec, and 100.0 sec, the waveforms window data can be saved continuous.
・If a large amount of data is stored on the SD card, recording start will be delayed. Increase the free space of the SD card and record it.
・Waveform command is valied only for the Waveform display screen.
・Do not turn off the power while SD is ON, never remove the SD card. Data may be damaged.

7-7-2. Wave Comp. External Trigger Mode

<Conditions>

Measuring condition setting	Operation mode: Normal
Record	Set "Record" to "Rec ON", input waveform command.
Hold Time of Wave	10.0 sec

Execute the next recording after SD signal turns from ON to OFF.

When waveform is displayed up to the X-axis End Point, it will automatically write to the SD.

If there is no trigger in Hold Time of Wave, stop recording.

W1: First waveforms window are displayed and recorded
W2: Second waveforms window are displayed and recorded
W3: Hold Time of Wave elapsed
WT: Waiting for trigger

T1: 20 ms (Max) : A delay time required, starting from the time after turning ON the Waveform command and satisfying trigger condition until displaying and recording the waveform data.
T2: 170 ms (Typ) : A delay time required, starting from the time with the first waveforms window after turning ON the Waveform command until the SD becomes ON.
T3: 300 ms (Typ) : A delay time required, starting from the time after recording the first waveforms window data until the SD becomes OFF.
T4: 300 ms (Typ) : A period time required, starting from the time after recording the second waveforms window data until the SD becomes ON.
T5: 100 ms (Typ) : A delay time required, starting from the time until SD turns ON after Hold Time of Wave has elapsed.
T6: 500 ms (Typ) : A period time required, the time while SD turns ON after Hold Time of Wave has elapsed.

NOTE

・ You can obtain the typical values with the blank recommended SD card (refer to page 28).
・ According to the followings, typical values of the T2~T6 may change with the above values.
     Manufactures and types, speed class and capacites of the SD card
     Data in the SD card
     Measure modes (Block Peak-Bottom, etc.)
     The date changed during
     Saved every 1000 screen data (To create a new wave file, the values of T3 and T4 will be T6.)

・ If a large amount of data is stored on the SD card, recording start will be delayed. Increase the free space of the SD card and record it.
・ When recording waveform data for several screens, set the Hold Time of Wave. (refer to 6-4-6.)
・ The next measurement can not be started while SD is ON. Start the next measurement after SD turns OFF.

・ Waveform command is valied only for the Waveform display screen.
・ Do not turn off the power while SD is ON, never remove the SD card. Data may be damaged.

7-7-3. Trigger Mode and Wave Comp. Trigger Mode

<Conditions>

| Measuring condition setting | Operation mode: Normal |
| Record | Set "Record" to "Rec ON", input waveform command. |

The next trigger will be recognized after SD turns ON to OFF.

Execute the next recording after SD signal turns from ON to OFF.

W1: First waveforms window are displayed and recorded
W2: Second waveforms window are displayed and recorded
W3: Third waveforms window are displayed and recorded
WT: Waiting for trigger

T1: 20 ms (Max)   : A delay time required, starting from the time after turning ON the Waveform command
                 (and satisfying trigger condition) until displaying and recording the waveform data.
T2: 170 ms (Typ) : A delay time required, starting from the time with the first waveforms window
                 after turning ON the Waveform command until the SD becomes ON.
T3: 300 ms (Typ) : A delay time required, starting from the time after recording
                 the first waveforms window data until the SD becomes OFF.
T4: 300 ms (Typ) : A period time required, starting from the time after recording
                  the second waveforms window data until the SD becomes ON.
T5: 100 ms (Typ) : A delay time required, starting from the time with the third waveforms window
                 after turning OFF the Waveform command until the SD becomes ON.
T6: 500 ms (Typ) : A period time required, starting from the time after recording the waveforms
                 window data until the SD becomes OFF.

NOTE

・You can obtain the typical values with the blank recommended SD card (refer to page 28).
・According to the followings, typical values of the T2~T6 may change with the above values.

    Manufactures and types, speed class and capacites of the SD card

    Data in the SD card

    Measure modes (Block Peak-Bottom, etc.)

    The date changed during

    Saved every 1000 screen data (To create a new wave file, the values of T3 and T4 will be T6.)

・If a large amount of data is stored on the SD card, recording start will be delayed. Increase the free space of the SD card and record it.

・Waveform command is valied only for the Waveform display screen.
・Do not turn off the power while SD is ON, never remove the SD card. Data may be damaged.

7-7-4. Single Mode and Wave Comp. Single Mode

<Conditions>

Measuring condition setting	Operation mode: Normal
Record	Set "Record" to "Rec ON", input waveform command.

T1: 20 ms (Max)   : A delay time required, starting from the time after turning ON the Waveform command and satisfying trigger condition until displaying the waveform data.

T2: 3 ms (Min)   : A period of time required for displaying and recording waveforms with the "(Wave comp) Single Trig. Mode" before turning OFF the Waveform command.

T3: 170 ms (Typ)   : A delay time required, starting from the time after turning ON the Waveform command until the SD becomes ON.

T4: 500 ms (Typ)   : A delay time required, starting from the time after recording the waveform data equivalent to one window until the SD becomes OFF.

NOTE

・ You can obtain the typical values with the blank recommended SD card (refer to page 28).

・ According to the followings, typical values of the T3~T4 may change with the above values.

    Manufactures and types, speed class and capacites of the SD card

    Data in the SD card

    Measure modes (Block Peak-Bottom, etc.)

    The date changed during

・ If a large amount of data is stored on the SD card, recording start will be delayed. Increase the free space of the SD card and record it.

・ Waveform command is valied only for the Waveform display screen.

・ Do not turn off the power while SD is ON, never remove the SD card. Data may be damaged.

MEMO

・ If you want to cancel the displaying of waveform data during displaying of waveform data, turn ON and OFF the Waveform command again.

8. RS-232C COMMUNICATION

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

> **NOTE**
>
> When the optional "RS-485" or "CC-Link" is equipped, the standard RS-232C does not function. In the case of "BCD", "D / A", "BCD, D / A", the standard RS-232C functions.

8-1. 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-910A does not cope with XON/XOFF control and Send Break Signal.

8-2. CONTROL COMMAND

The following is an explanation of the formats and kinds of control commands which are output to the WGA-910A from external equipment such as PC.

Sets the control command that is output from the external device to WGA-910A.

(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-910A.

            <CR><LF>:   Data output from the WGA-910A.

      ・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-910A.

            <CR><LF>:   Data output from the WGA-910A to the external equipment.

(2) LIST OF CONTROL COMMANDS

Type		Contents	Command	Page
Initial settings	(1)	Initialize	RES	152
	(2)	RS line test	RS-	152
	(3)	Output model, etc	SYS	152
	(4)	Transmission mode setting (RS-232C only)	MOD	153
	(5)	Command of saving the setting (saving the setting value to the internal memory)	/M	153
Reading	(6)	Output the displayed value.	GDT	154
	(7)	Read the status.	GST	155
	(8)	Display the original value.	GOD	155
	(9)	Read the setting value.	PRR	155
	(10)	Control input state	SIC	156
	(11)	Control output state	GOC	156
Executing	(12)	HOLD command	HLD	157
	(13)	RESET command	RST	157
	(14)	ZERO command	ZON	157
	(15)	Memory check	CK1	158
	(16)	Channel check	CK2	158

Type			Contents	Command	Page
Settings	(17)		Measuring condition setting (No.)	SOP	158
	(18)		Key lock setting	LCK	158
	(19)		Set the excitation voltage.	SBV*	159
	(20)		Conduct the no-load zero.	ZAD*	159
	(21)		Conduct the actual load calibration.	VCL	159
	(22)		Conduct the sensitivity registering calibration.	EIC	159
	(23)		Execute numeric value registering calibrations	VRC	160
	(24)		Conduct the TEDS-based automatic calibration.	EID	160
	(25)		Smoothing function setting	SSM*	160
	(26)		Additional value setting.	SZM*	161
	(27)		ZERO compensation setting.	SZT*	161
	(28)		Comparison setting.	SCF*	162
	(29)		Compared value setting.	SCV*	162
	(30)		Measuring mode setting	SMF*	163
	(31)		Detection trigger	STS*	164
	(32)		Inflection point setting	SIS*	164
	(33)		Extreme value discrimination	SES*	165
	(34)		Previous value comparison	SDS*	165
	(35)		Motion detect	SMD*	166
	(36)		Waveform display setting 1	SG1*	166
	(37)		Waveform display setting 2	SG2*	167
	(38)		Meas. Select signal setting	SPN*	167
	(39)		Backlight lightning time settings	SBC*	167
	(40)		Language	SLG*	168
	(41)		Clock setting	STM*	168
	(42)		Comparison display color	SDC*	168
	(43)		Communication setting (RS-232C/RS-485)	OP1*	169
	(44)		Move wave form	SWB	169
	(45)		Comparison area	SWA	169
	(46)		Waveform Comparison Logic	SWL	170
Other	(47)		BCD output setting	OP2*	171
	(48)		D/A output setting	OP3*	172
	(49)		BCD and D/A output setting	OP2*,OP3*	172
	(50)		Replying of the undefined command	W?	172

Commands with asterisk mark (*) correspond to "Setting save command [/M]."

For details, refer to "Setting save command [/M]" on page 155.

8-3. DETAILS OF CONTROL COMMANDS

This section describes various control commands and parameters following after the commands.

<CR> and <CR><LF> denote termination code.

8-3-1. Initial setting

(1) [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.

(2) [RS-]

Content:	RS line test
Format:	RS-<CR>
Parameter:	None
Return value format:	RS-232C<CR><LF> (For the RS-232C) or
	RS-485<CR><LF> (For the RS-485)
	(when the data is received correctly)

(3) [SYS]

Content:	Output model, etc.
Format:	SYS<CR>
Parameter:	None
Return value format:	WGA-910A-aa, xx. xx, yyyyyyyyy <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.

    1: With the BCD output.

    2: With the D/A output.

    3: With the RS-485.

    4: With the CC-Link.

    12: With the BCD and D/A output.

(4) [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,zz<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.
・The zz is Unit. It is represented by 0 to 79. Refer to "12-2. UNIT LIST".
・Return value abcdefghi represents status with '1' or '0'.
   Following is the status for outputting "1."

        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

・Set the mode 10 to stop the outputting.
・When you cannot set the mode.
   Turn OFF the WGA-910A once and turn ON again to set it to mode 10.

(2) Return value of the mode 02
        D1±xxxxxx,zz<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-910A 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-910A 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-910A is controlled with commands.
・The WGA-910A is controlled with the contents of the control commands.

> **NOTE**
>
> The [MOD] is for the RS-232C only. You are not able to use the [MOD] with the RS-485.
> When sending the [MOD] on the RS-485, the product replies the ng<CR><LF>.

(5) [/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 (*).)

8-3-2. Reading

(6) [GDT]

Content	: Output the displayed value.
Format	: GDT x <CR>
Parameter	: x

For the hold mode that has two hold values

    0: Hold value1 (measured value 1) and hold value2 (measured value 2) in order.

    1: Hold value1 (measured value 1)   2: Hold value2 (measured value 2)

For the hold mode that has one hold value

    1: Current measuring value (measured value 1)

Return value format : Dx±yyyyyy, zz<CR><LF>

    Unit: 01 to 79   79 types   Refer to "12-2 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 "0" from the head.

    Measured value 1 or measured value 2

Description and others : For the hold mode that has two hold values

        D1±yyyyyy, zz   D2±yyyyyy, zz

For the hold mode that has one hold value

        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>

The return value ±yyyyyy is the indicated value, including the decimal point.

When the value has no decimal point, it is filled with "0s" from the head.

Example

  Suppose the current indicated value is ＋999.99. The return value is as follows.

        D1+999.99, 03<CR><LF>

  Suppose the current indicated value is -99. The return value is as follows.

        D1-000099, 03<CR><LF>

  Suppose the current indicated value is larger than +999.99.

  The return value is as follows.

        D1+   OFL, 03<CR><LF>

NOTE

The outputted measured value with the [GDT] command is different from the displayed value of the WGA-910A according to the sensor output variation or setting value of the input setting

(7)[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	

(8)[GOD]

Content:	Display the original value (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)

(9) [PRR]

Content:	Read the setting value.
Format:	PRRppp<CR>
Parameter	ppp

010: Sensitivity registering value
011: Numeric Value Registering Calibration value
012: Excitation voltage   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
115: Keylock   130: Waveform display setting 1
131: Waveform display setting 2
150: Measuring condition selection signal
151: Backlight lightning time
152: Language
153: Clock   155:Comparison display color
200:Detection trigger   210:Inflection point discrimination
220:Extreme value discrimination   230:Previous value comparison
260:Motion detect   270:Comparison area
280:Waveform comparison logic

Return value format:	For details, see each command. (Excluding the options.)

000<CR><LF>   Option: None (WGA-910A-0)

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(10) [SIC]

Content:	Control input state
Format:	SIC <CR>
Parameter:	none
Return value format:	a,b,c,d,e,f,g,h,i,j,k,l,m,n,o,p<CR><LF>
	└────────── Control input state (0:OFF, 1:ON)

Description and others:

The return values abcdefghijklmnop correspond to the state of the control input (pins 19 to 34) at the time of sending the command.

(11) [GOC]

Content:	Control output state
Format:	GOC <CR>
Paramete:	None
Return value format:	a,b,c,d,e,f,g,h,i,j,k,l,m,n,o,p<CR><LF>
	└────────── Control output state (0:OFF, 1:ON)

Description and others:

The return values abcdefghijklmnop correspond to the state of the control output (pins 1 to 16) at the time of sending the command.

8-3-3. Executing

(12) [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.

For reference: Arbitrary point hold   HLD <CR> → Holding interval → RST <CR>

Peak hold   HLD <CR> → Detecting interval → RST <CR>

Interval-specified peak hold   HLD <CR> → Detecting interval → Holding interval → RST <CR>

Time-specified peak hold   HLD <CR> → Detecting interval + Holding interval → RST <CR>

(13) [RST]

Content:	Reset command (To execute the peak hold, etc.)	
Format:	RST<CR>	
Parameter:	None	
Return value format:	ok<CR><LF>	Working properly.

(14) [ZON]

Content:	ZERO command(To execute the DIGITAL ZERO function.)	
Format:	ZON<CR>	
Parameter:	None	
Return value format:	ok<CR><LF>	Working properly.
Description and others	Corresponding to the [/M] command.	

(15) [CK1]

Content:	Memory check
Format:	CK1<CR>
Parameter:	None
Return value format:	ok<CR><LF> (when in normal)
	E-01<CR><LF> (error)

(16) [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>

8-3-4. Setting

(17) [SOP]

Content:	To set operation patterns
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.)
Reading command	PRR058<CR>
Return value	aa<CR><LF>
	Meas.condition 01 to 32

(18) [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.
Reading command	PRR115<CR>
Return value	a<CR><LF>
	0: Release　1: Lock

(19) [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.

- -

Reading command	PRR012<CR>
Return value	a<CR><LF>
	└── 0: 2V 1: 10V

(20) [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.

(21) [VCL]

Content:	Conduct actual load calibration.
Format:	VCL ± yyyyyy, zz<CR>
Parameter:	±yyyyyy, zz
	└── Unit: 01 to 79 79 types Refer to "12-2 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>
	E-12<CR><LF> (When an error occurs)
Description and others	The results of the command will be saved.

- -

Reading command	PRR010<CR>
Return value	For details, see the [EIC].

(22) [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>
	E-12<CR><LF> (When an error occurs)
Description and others	The results of the command will be saved.

- -

Reading command	PRR010<CR>
Return value	±x.xxxx, ±yyyyy, zz<CR><LF>
	└── Unit:
	└── Rated display value
	└── Rated output value

(23) [VRC]

Content:	To execute numeric value registering calibrations
Format:	VRC±x.xxxx<CR>
Parameter:	±x.xxxx

                    └──────── Initial value of transducers: -3.2000 to 3.2000 (mV/V)

Return value format:	ok<CR><LF> E-12<CR><LF>(When an error occurs)
Description and others	The results of the command will be saved.
Reading command:	PRR011<CR>
Return value	±x.xxxx<CR><LF>

                    └──────── Initial value of transducers:

(24) [EID]

Content:	Conduct TEDS-based automatic calibration.
Format:	EID<CR>
Parameter:	None
Return value format:	rd-*<CR><LF> (when in normal)
	(*Indicates the number of transducers which succeeded in connecting)
	E-13<CR><LF> (When an error occurs)
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.
Reading command	PRR010<CR>
Return value	±x.xxxx, ±yyyyyy, zz<CR><LF>

                          │   │   └──── Unit
                          │   └────────── Rated display value
                          └───────────────────── Rated output value

(25) [SSM]

Content:	Set the smoothing function.
Format:	SSMaa, b, c<CR>
Parameter:	aa, b, c

            │   │ └──── 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   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.
Reading command	PRR020<CR>
Return value	aa, b, c<CR><LF>

            │   │ └──── Analog filter
            │   └─────── Minimum scale
            └─────────── Moving average

(26) [SZM]

Content:	Set the additional value.
Format:	SZM1, ±xxxxxx<CR>
Parameter:	±xxxxx

-99999 to 99999 (count)

Indicated value with a decimal point. If the indicated value has no decimal point, it is filled with '0' from the head.

Return value format:	ok<CR><LF>
Description and others	Corresponding to the [/M] command.

- -

Reading command	PRR030<CR>
Return value	±xxxxxx<CR><LF>

Additional value

(27) [SZT]

Content:	To set Automatic ZERO compensation functions
Format:	SZTxxxxxx, y.yy, z<CR>
Parameter:	xxxxxx, y.yy, z

Zero-near-zero: 0 to 9 (count)

Determination time: 0.00 to 9.99 (sec)

Automatic ZERO compensation range: 0 to 99999 (count)

The value, including the decimal point. When the value has no decimal point, it is filled with "0" from the head.

Return value format:	ok<CR><LF>
Description and others	Corresponding to the [/M] command.

- -

Reading command	PRR090<CR>
Return value	xxxxxx, y.yy, z<CR><LF>

Zero-near-zero.

Determination time.

Automatic ZERO compensation range.

(28) [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\> (The measuring condition selecting signal is command.)
Description and others	Corresponding to the [/M] command.
Reading command	PRR041\<CR\>
Return value	a, b, c, d, e, xxxxx\<CR\>\<LF\>

       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

(29) [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.
Reading command	PRR051\<CR\>, PRR052\<CR\>, PRR053\<CR\>, PRR054\<CR\>
Return value	a, ±xxxxxx\<CR\>\<LF\>

       Compared value
       Comparator selection

Content:	Set the measuring mode setting.
Format:	SMFaa, b, c, x. xx, y. yy<CR>
Parameter:	aa, b, c, x. xx, y. yy

Detect time: 0.01 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
12: Block Inflection Hold	13: Time Inflection Hold
14: Block Maximal / minimal Hold	15: Time Maximal / minimal Hold
16: Block Peak / Average Hold	17: Time Peak / Average Hold
18: Block Bottom / Average Hold	19: Time Bottom / Average Hold
20: Block Peak / Arbitary Hold	21: Time Peak / Arbitary Hold
22: Block bottom / Arbitrary Hold	23: Time bottom / Arbitrary Hold
24: Previous Value Comparison Peak Hold	
25: Block Previous Value Comparison Peak Hold	
26: Time Previous Value Comparison Peak Hold	
27: Previous Value Comparison Bottom Hold	
28: Block Previous Value Comparison Bottom Hold	
29: Time Previous Value Comparison Bottom Hold	

Return value format:	ok<CR><LF>
Description and others	Corresponding to the [/M] command.
Reading command	PRR070<CR>
Return value	aa, b, c, x.xx, y.yy<CR><LF>

Detect time

Delay time

Comparison mode

Display mode

Operation mode

(31) [STS]

Content:	Detection trigger
Format:	STS, a,±xxxxxx<CR>
Parameter:	a, ±xxxxxx

Detection trigger level
-99999～99999(count)
Indicated value with a decimal point. If the indicated value has no decimal point, it is filled with '0s' from the head.

Detection trigger way
0:Rising   1:Falling   2:Both

Return value format:	ok<CR><LF>
Description and others:	Corresponding to the [/M] command.

- -

Reading command:	PRR200<CR>
Return value format:	a, ±xxxxxx<CR><LF>

Detection trigger level
Detection trigger way

(32) [SIS]

Content:	Inflection point setting
Format:	SIS, x.xx, y.yy, xxxxxx<CR>
Parameter:	x.xx, y.yy, xxxxxx

Inflection point discrimination value:
1 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.

Discrimination time 2:   0.01 to 1.00sec.
Discrimination time 1:   0.01 to 1.00sec.

Reading command:	ok<CR><LF>
Description and others:	Corresponding to the [/M] command.

- -

Reading command:	PRR210<CR>
Return value format:	x.xx, y.yy, xxxxxx<CR><LF>

Inflection point discrimination value:
Discrimination time 2
Discrimination time 1

(33) [SES]

Content:	Extreme value discrimination
Format:	SES, xxxxxx, y.y <CR>
Parameter:	xxxxxx, y.y

Magnitude: 0.1 to 5.0

Discrimination value: 1 to 99999(count)

Reading command:	ok<CR><LF>
Description and others:	Corresponding to the [/M] command.

- -

Reading command:	PRR220<CR>
Return value format:	xxxxxx, y.y <CR><LF>

Magnitude

Discrimination value

(34) [SDS]

Content:	Previous value comparison
Format:	SDS, ±xxxxxx <CR>
Parameter:	±xxxxxx<CR>

Initial value for compare:-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.

Reading command:	ok<CR><LF>
Description and others:	Corresponding to the [/M] command.

- -

Reading command:	PRR230<CR>
Return value format:	±xxxxxx <CR><LF>

Initial value for compare

(35) [SMD]

Content:	Motion detect
Format:	SMDa,xxxxxx, y.yy, z <CR>
Parameter:	a, xxxxxx, y.yy, z

Output Logic:
  0:Negative logic   1:Positive logic

Motion detect time:
  0.01 to 9.99 sec.

Motiondetect width: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.

Function enable/disable:
  0:Enable   1:disable

Reading command:	ok<CR><LF>
Description and others:	Corresponding to the [/M] command.

- -

Reading command:	PRR260<CR>
Return value format:	a, xxxxxx, y.yy, z<CR><CF>

Output Logic
Motion detect time
Motion detect width
Function enable/disable

(36) [SG1]

Content:	Set the waveform display setting 1 (X-axis and Y-axis settings)
Format:	SG1a, b, ±xxxxxx<CR>
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.   5: 20.0 sec.   6: 50.0 sec.   7: 100.0 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.

- -

Reading command	PRR130<CR>
Return value	a, b, ±xxxxxx<CR><LF>

Start point of the Y-axis: -99999 to 99999 (count)
End point of the X-axis
End point of the Y-axis

(37) [SG2]

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

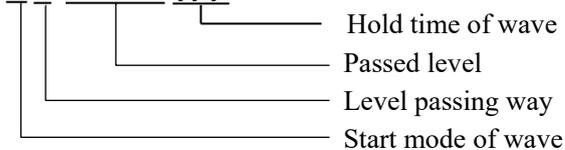   Start mode of wave

           0: External Trigger Mode

           1: Trigger Mode

           2: Single Mode

           3: Wave comp. External Trigger Mode

           4: Wave comp. Trigger Mode

           5: Wave comp. Single Mode

Return value format:	ok<CR><LF>
Description and others	Corresponding to the [/M] command.
Reading command	PRR131<CR>
Return value	a, b, ±xxxxxx, yy.y<CR><LF>

        Hold time of wave

        Passed level

        Level passing way

        Start mode of wave

(38) [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.
Reading command	PRR150<CR>
Return value	a<CR><LF>

        measuring condition selecting signal

(39) [SBC]

Content:	Set the backlight time
Format:	SBC, xx <CR>
Parameter:	xx

        Backlight time: 0 to 99 (min.)

Return value format:	ok<CR><LF>
Description and others	Corresponding to the [/M] command.
Reading command	PRR151<CR>
Return value	xx

        Backlight time

(40) [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.
Reading command	PRR152<CR>
Return value	a<CR><LF>
	└── language

(41) [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.
Reading command	PRR153<CR>
Return value	uu, vv, ww, xx, yy, zz<CR><LF>
	Second
	Minute
	Hour
	Day
	Month
	Year

(42) [SDC]

Content:	Comparison display color
Format:	SDCa <CR>
Parameter:	a
	└── Comparison display color
	0:Normal, 1:Red, 2:white, 3:Yellow
Return value format:	ok<CR><LF>
Description and others	Corresponding to the [/M] command.
Reading command	PRR155<CR>
Return value	a<CR><CF>
	└── Comparison display color

(43) [OP1]

Content:	Set communication (RS-232C and RS-485)
Format:	OP1, a <CR>
Parameter:	OP1, 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.
Reading command	PRR100<CR>
Return value	030, a<CR><LF>
	└── Data Rate

(44) [SWB]

Content:	Move wave form
Format:	SWB, ±xxxxxx<CR>
Parameter:	±xxxxxx
	└── Amount of movement -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>
	ng<CR><LF> *Can not be set
Description and others:	The setting is saved in SD card.
	It can not be set if there is a waveform comparison value after comparative waveform movement that exceeds ± 99999. Also, it is impossible to set it when SD card is not inserted or set value of comparison waveform is not included in SD card.

(45) [SWA]

Content:	Comparison area
Format:	SWAa, xxxx<CR><LF>
Parameter:	a, xxxx
	└── Data number: 0000 to 2000
	└── 0:Start point, 1:End point
Return value format:	ok<CR><LF>
	ng<CR><LF> *Can not be set
Description and others:	Please set "comparison end data number> comparison end data number". Otherwise it can not be set. Also, it can not be set even when SD card is not inserted.
Reading command	PRR270<CR>
Return value	030, xxxx, yyyy <CR><LF>
	└── Data number of the end
	└── Data number of the start

(46) [SWL]

Content:	Waveform Comparison Logic
Format:	SWLa<CR>
Parameter:	a

                    └─────── Logic   0:Negative logic, 1:Positive Logic

Return value format:	ok<CR><LF>
Description and others:	The setting is saved in SD card.

- -

Reading command	PRR280<CR>
Return value	030, a<CR><LF>

                    └─────────Logic

8-3-5. Other

(47) [OP2]

Content:	Set the BCD output
Format:	OP2, a, b, c, d, e, f<CR>
Parameter:	OP2, a, b, c, d, e, f

    BCD classification (*2)
        0:Hold value1   1: Hold value2   2:Measuring 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.
        4: Approx. 250 times/sec.   5: Approx. 500 times/sec.
        6: Approx. 1000 times/sec.
        4: Approx. 250 times/sec.   5: Approx. 500 times/sec.
        6: Approx. 1000 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.
*2	For the values assigned to hold value 1 and hold value 2, refer to "6-3-3. Measure mode setting".

- -

Reading command	PRR100<CR>
Return value	010,a, b, c, d, e, f<CR><LF>

    BCD classification (*2)
    Data form
    Transmission speed
    EOC logic
    Polarity logic
    Data logic

*2 For the [Block Peak-Bottom] and [Time Peak-Bottom] only. Or, you will not get the BCD or D/A classification value.

(48) [OP3]

Content:	Set the D/A output.
Format:	OP3, ±xxxxxx, ±yyyyyy, a<CR>
Parameter:	OP3, ±xxxxxx, ±yyyyyy, a

D/A classification (*2)
0:Hold value1   1: hold value2   2:Measuring 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.

- -

Reading command	PRR100<CR>
Parameter:	020,±xxxxxx, ±yyyyyy, a

D/A classification (*2)
Full display: -99999 to 99999 (count)
ZERO display: -99999 to 99999 (count)

*2 For the values assigned to hold value 1 and hold value 2, refer to "6-3-3. Measurement mode setting".

(49) [OP2, OP3]

Content	Set the BCD output and D/A output.	
Format	BCD output	The same as the [OP2].
	D/A output	The same as the [OP3].
Parameter	BCD output	The same as the [OP2].
	D/A output	The same as the [OP3].
Return value format	ok<CR><LF>	
Description and others	Corresponding to the [/M] command.	

- -

Reading command	PRR100<CR>
Parameter	120, a, b, c, d, e, f, ±xxxxxx, ±yyyyyy, a

D/A classification
Full display: -99999～99999 (count)
ZERO display: -99999～99999 (count)
BCD classification
Output format
Transmission speed
EOC logic
Polarity logic
Data logic

(39) [Undefined command response]

Content:	Response responses to undefined command.
Format:	W□□□□□□?<CR><LF>

8-4. OPERATION AND FUNCTION OF THE COM. SETTING (COMMUNICATION SETTING)

(1) Communication Speed

Sets the communication speed (baud rate) of the RS-232C .

<Setting Range>

2400, 4800, 9600, 19200 (bps)

<How to operate>
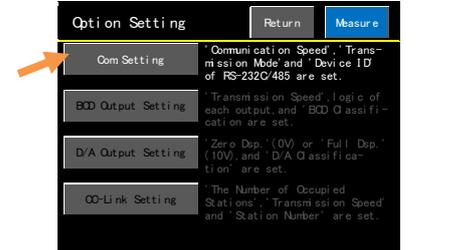
1) Press the Set key on the "**Measuring**" window.
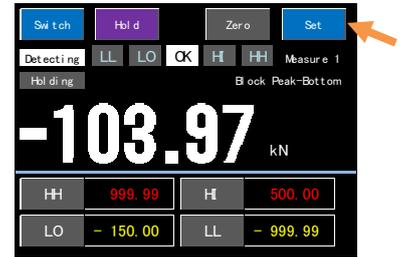
2) Press the Next key on the "**Setting (1/2)**" window.
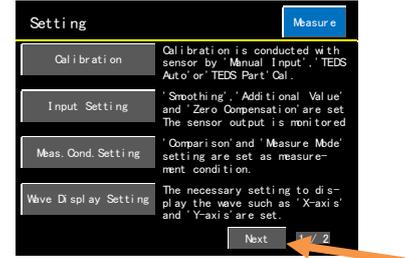
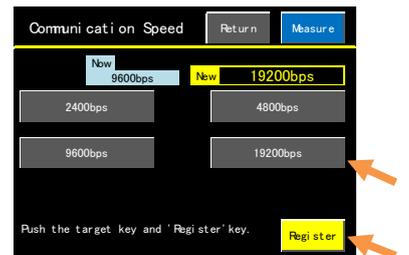3) Press the Operation Setting key on the "**Setting (2/2)**" window.
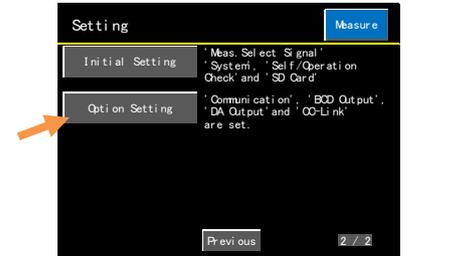
4) Press the Com.Setting key on the "**Option Setting**" window.

5) Press the Communication Speed key on the "**Com. Setting**" window.
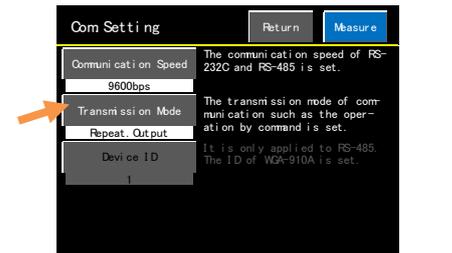
6) Press the target key and Register key to register the target value.

(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.
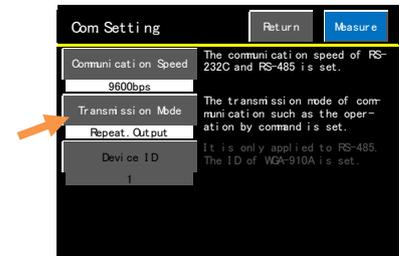
2) Press the target key and Register key to register the target value.
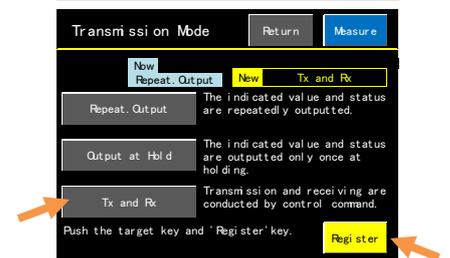
9. TROUBLESHOOTING

If the WGA-910A does not function as expected or is found unstable, do not immediately take it that the WGA-910A 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-910A has been damaged through improper usage (i.e. not confirming to guidelines described in this manual), or when the WGA-910A has been disassembled or modified by the user.

For troubles and countermeasures relating to the optional units, see WGA-910A INSTRUCTION MANUAL (FOR OPTIONS).

9-1. POWER SWITCH CANNOT TURN ON THE WGA-910A

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-910A 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:	Transducer input is exceeding ±3.2 mV/V during conducting the no-load zero. In addition, the Transducer may be faulty, cable may be disconnected or may be incorrectly connected.
How to Check:	Check that the Transducer 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 transducer (including zero point float) may exceeds ±3.2 mV/V. In addition, the transducer may be faulty, cable may be disconnected or may be incorrectly connected.
How to Check:	Conduct the channel check.

5) TEDS Error

Displaying Content:	Stops the reading of the TEDS information.
Cause:	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 transducer 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 transducer is corresponding to the TEDS.
	Check that the connecting transducer has information based on the IEEE template No. 33.
	Check that the cable length is 30 m or less.

6) SD Card Error

Displaying content:	Please check if SD card is inserted.
Cause :	Comparison waveform data can not be read from the SD card.
How to check:	Check the SD card is inserted in the main unit.
	Check that the waveform comparison data file is included in the SD card.

7) SD Card Error

Displaying content:	No waveform comparison data
Cause :	Comparison waveform data can not be read from the SD card.
How to check:	Check that the waveform comparison data file is included in the SD card.
	Make sure that the waveform comparison data is included in the selected measurement condition file.

■ Error during the measurement :examlpes

Screen 1: Switch | Hold | Zero | Set — Detecting LL LO OK H HH Measure 0 — Holding — Time Peak — Input Value +Over / Input value exceeds +3.2mV/V — kN — HH 999.99 | H 500.00 | LO −150.00 | LL −999.99

Screen 2: Switch | Hold | Zero | Set — Detecting LL LO OK H HH Measure 0 — Holding — Time Peak — Input Value −Over / Input value is below −3.2mV/V — kN — HH 999.99 | H 500.00 | LO −150.00 | LL −999.99

Screen 3: Switch | Hold | Zero | Set — Detecting LL LO OK H HH Measure 0 — Holding — Time Peak — Indicated Value +Over / Indicated value exceeds +99999 — kN — HH 999.99 | H 500.00 | LO −150.00 | LL −999.99

Screen 4: Switch | Hold | Zero | Set — Detecting LL LO OK H HH Measure 0 — Holding — Time Peak — Indicated Value −Over / Indicated value is below −99999 — kN — HH 999.99 | H 500.00 | LO −150.00 | LL −999.99

Screen 5: Switch | Hold | Zero | Set — Detecting LL LO OK H HH Measure 0 — Holding — Time Peak — No-load Zero Error / Stopping no-load Zero — kN — HH 999.99 | H 500.00 | LO −150.00 | LL −999.99

Screen 6: Switch | Hold | Zero | Set — Detecting LL LO OK H HH Measure 0 — Holding — Time Peak — Sens. Regist. Error / Stopping sens. registering — kN — HH 999.99 | H 500.00 | LO −150.00 | LL −999.99

Screen 7: Switch | Hold | Zero | Set — Detecting LL LO OK H HH Measure 0 — Holding — Time Peak — TEDS Error / Stopping TEDS calibration — kN — HH 999.99 | H 500.00 | LO −150.00 | LL −999.99

Screen 8: Switch | Hold | Zero | Set — LL LO OK H HH — Input Value +Over / Input value exceeds +3.2mV/V — −200.00 kN

■ Error during the setting :examples

Screen 1: Input value +over / Input value exceeds +3.2mV/V — Measure — Calibration: Calibration is conducted with sensor by 'Manual Input', 'TEDS Auto' or 'TEDS Part' Cal. — Input Set: 'Smoothing', 'Additional Value' and 'Zero Compensation' are set. The sensor output is monitored — Meas. Condition Set: 'Comparison Set' and 'Measure Mode Set' are set as measurement condition. — Wave Display Set: The necessary setting to display the wave such as 'X-axis' and 'Y-axis' are set. — Next 1/2

Screen 2: Input value −over / Input value is below −3.2mV/V — Measure — (same menu as Screen 1) — Next 1/2

Screen 3: Indicated value +over / Indicated value exceeds +99999 — Measure — (same menu) — Next 1/2

Screen 4: Indicated value −over / Indicated value is below −99999 — Measure — (same menu) — Next 1/2

Screen 5: No-load Zero Error / Stoping no-load Zero — Measure — (same menu) — Next 1/2

Screen 6: Sens. Registering Error / Stoping sens. registering — Measure — (same menu) — Next 1/2

Screen 7: TEDS Error / Stoping TEDS calibration — Measure — (same menu) — Next 1/2

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 or 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

6) SD 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-910A for approx. 30 minutes.

● When the no-load output of the connecting transducer is unstable.

The input cable is not correctly connected to the [INPUT] connector or is broken.

Conduct the channel check.

9-5. OPERATION STOPS AND ACCEPTS NO INSTRUCTION AT ALL.

The operation failed due to noise.Turn OFF the power and turn ON again. If the same phenomenon still generates due to noise, take appropriate countermeasures for removing the noise from operating environment, power supply, etc.

9-6. 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-910A.

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-910A.

Take countermeasures as follows.

・Set the WGA-910A away from the noise source.

・Use the shielded cable for the transducer 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-910A but connect the measuring object and WGA-910A.

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 compatible 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. MAINTENANCE

For the product, the following items should be serviced for scheduled maintenance.
Maintenance service should be performed at the intervals specified below.

(1) Calibration of apparatus

An annual maintenance inspection is recommended to ensure the operation and measuring accuracy of the product.
Must be returned to KYOWA for the scheduled maintenance inspection.

(2) Replacement of limited life parts

Item	Content	Frequency
Aluminum electrolytic capacitor	The signal-noise ratio will lower due to capacity shortage or smoke will be emitted due to liquid leak, resulting in a malfunction of the product. Service life, depends on the frequency of use and ambient temperature, is approximately 5 years at 25 ℃. Overhaul the product every 5 years.	Every 5 years
Lithium battery	When the battery is died, the clock function is reset to the default settings after turning ON the power. The startup window is also reset to the default settings.Service life, depends on the frequency of use and ambient temperature, is approximately 5 years. Replace the product every 5 years.	Every 5 years

The above figure is only a rough indication. We do not promise or guarantee that the product is error-free or will be repaired at no additional cost during the above period.
To operate the product normally, finding a sign of the product failure early by daily/periodic inspections and taking the corrective action are required.
We do not guarantee any damage resulting from the user's failure to comply with the safety precautions. Replacement will be charged within the warranty period.

11. SPECIFICATIONS

11-1. WGA-910A (WGA-910A-0)

Number of channel	1
Compatible sensor	Strain gage transducers (Connectable TEDS compatible sensor)
Compatible bridge Registance	87.5 to 1000 Ω
TEDS compatible	Interface: Compatible with IEEE1451.4 Mixed Mode
	Transducer Interface Class 2
	Compatible transducer: Should have the information according to
	IEEE template No. 33.
	cable length should be 30 m or less
Bridge excitation	10 VDC, 2 VDC, selectable
Measurement range	±3.2 mV/V (input range including zero adjustment range)
Zero adjustment range	Within measurement range
	(Not retained when power supply interrupted)
Nonlinearity	Within ±(0.02 %FS+1 digit)
Stability	Zero point: Within ±0.25 μV_{RTI}/°C
	Sensitivity: Within ±0.005 %/°C
Peak/Bottom detection	Detecting scheme: digital hold
Frequency response range	DC to 1 kHz (+1 dB, -2 dB)
Sampling speed	4000 times/s.
AD resolution	24 bits
Analog monitor	Voltage output: ±(5 V ±200 mV) (load regable 5 kΩ or more)
Indicators	3.5 inch TFT color LCD,
	Display area: 70.6 × 59.2 mm, 320 × 240 dots, touch panel
Indication	Setting range: -99999 to +99999 count
	Update speed: Numeric value display: Approx.4 times/s
	Wave display: Approx.2 times/s
Calibration function	Manual calibration: Sensitivity registering calibration
	Actual load calibration,
	Unit
	TEDS auto calibration
	TEDS part calibration: TEDS calibration item
	TEDS operation Configuration: TEDS reading operation
	Zero during TEDS
	TEDS Information display
	Numeric value registering calibration
Smoothing Function	Analog filter: 1, 30, 300 Hz, Flat (1 kHz or more)
	Attenuation characteristics: -12 dB/oct.
	Minimum scale: 1, 2, 5, 10, 20, 50, 100 counts
	Moving average: None, 2, 4, 8, 16, 32, 64, 128, 256,
	512, 1024, 2048 times
Zero compensation function	Zero tracking (Auto digital Zero within the setting range)
	Judging time: 0.00 to 9.99 s.
	Compensation range: 0 to 99999 count
	Zero near zero (Auto zero display)
	Setting range: 0 to 9 count
Additional value	-99999 to +99999 count
Original value (Sensor output value)	-3.2000 to +3.2000 mV/V (5 digit)
	Accuracy: within ±0.1 %FS

Measurement condition numbers	32 points (16 for control input) of measurement condition file can be saved. Capable of switching by the key operation, control input, communication command.
Comparator setting	The number of points: 5
	Type: extra high (HH), high (HI), OK, low (LO), extra low (LL).

<table>
<tr><td>Measurement condition numbers</td><td>32 points (16 for control input) of measurement condition file can be saved.
Capable of switching by the key operation, control input, communication command.</td></tr>
<tr><td>Comparator setting</td><td>The number of points: 5
Type: extra high (HH), high (HI), OK, low (LO), extra low (LL).
    If there are two hold values, they are assigned as follows.
    Hold value1: high1 (HI1), low1 (LO1),
    Hold value2: high2 (HI2), low2 (LO2).
Setting range: -99999 to +99999 count
Hysteresis width: 0 to 9999 count
Setting: Using comparator can be set
Output logic: positive/negative
Comparison speed: 4000 times/s. (Normal comp. mode)</td></tr>
<tr><td>Waveform comparison setting</td><td>The number of points: 3
Type: Wave HI, Wave OK, Wave LO
Set Reference Waveform,
Waveform comparison HI, Waveform comparison LO,
Move Waveform, Comparison Area, Register Waveform,
Waveform Comprison Logic: positive/negative</td></tr>
<tr><td>Motion detect</td><td>Motion Detect Function Enable/Disable
Motion Detect Width: 0 to 99999
Motion Detect Time: 0.01 to 9.99
Motion Detect Logic: positive/negative</td></tr>
<tr><td>Measurement mode setting</td><td>Operation mode:</td></tr>
</table>

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 Hold,	Time Peak-Bottom Hold,
Block Average Hold,	Time Average Hold
Block Inflection Hold,	Time Inflection Hold,
Block Maximal/Minimal Hold,	Time Maximal/Minimal Hold,
Block Peak/Average Hold,	Time Peak/Average Hold,
Block Bottom/Average Hold,	Time Bottom/Average Hold,
Block Peak/Arbitary Hold,	Time Peak/Arbitary Hold,
Block Bottom/Arbitary Hold,	Time bottom/Arbitary Hold,

Previous Value Comparison Peak Hold,
Block Previous Value Comparison Peak Hold,
Time Previous Value Comparison Peak Hold,
Previous Value Comparison Bottom Hold,
Block Previous Value Comparison Bottom Hold,
Time Previous Value Comparison Bottom Hold

Detect times: 0.01 to 9.99 s
Delay time: 0.00 to 9.99 s
The following settings can be changed according to the operation mode.

Detection trigger level, Detection trigger way, Inflection point discrimination time, Inflection point discrimination value, Extreme value discrimination setting, Initial value for compare with measuring value

Comparison mode: Normal comparison, Hold comparison
Display mode: Normal display, Hold display

Wave form display	X-axis setting:

Wave form display　　　　　　　X-axis setting:
　　　　　　　　　　　　　　　　　　End point: 0.5, 1.0, 2.0, 5.0, 10.0, 20.0, 50.0, 100.0 s
　　　　　　　　　　　　　　　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 level way, Holding time of waveform
　　　　　　　　　　　　　　　WGA displays the waveform of the input variation regardless to the
　　　　　　　　　　　　　　　"Operation Mode Set" setting.

System　　　　　　　　　　　　Key lock, Setting value initialize, Backlight illumination time,
　　　　　　　　　　　　　　　Language, Clock, Comparison Display Color, Display Stability

Self-check　　　　　　　　　　　Memory, channel

Operation check　　　　　　　　Display, Touch panel, Control input/output, Communication,
　　　　　　　　　　　　　　　BCD output, D/A output, SD card

Control input　　　　　　　　　The 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 (NPN)
　　　　　　　　　　　　　　　　　　　　　(Capacity: 12 VDC, 5 mA or more)

Control output　　　　　　　　　The number of points: 16
　　　　　　　　　　　　　　　Type: HH, HI, OK, LO, LL, Healthy, Abnormal channel,
　　　　　　　　　　　　　　　　　Abnormal memory, SD, Communication error, SD Error,
　　　　　　　　　　　　　　　　　WaveHI, WaveOK, WaveLO, Motion detect,
　　　　　　　　　　　　　　　　　Inflection point/Extreme value
　　　　　　　　　　　　　　　Output format: Open collector (NPN)
　　　　　　　　　　　　　　　Load capacity: 30 VDC, 20 mA (Registance load)

Communication　　　　　　　　Signal system: RS-232C　Full duplex system
　　　　　　　　　　　　　　　Transmission mode: Asynchronous
　　　　　　　　　　　　　　　Bit configuration: Data bit: 7
　　　　　　　　　　　　　　　　　　　　　　Stop bit: 1
　　　　　　　　　　　　　　　　　　　　　　Parity bit: 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

NOTE: When equipping the optional CC-Link (RS-485),the RS-232C of the standard equipment is disable.

SD card　　　　　　　　　　　　Saving setting 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 to the read one
　　　　　　　　　　　　　　　Recording measuring value: Pushing recording key, WGA records
　　　　　　　　　　　　　　　　　　the wave data to the SD card.
　　　　　　　　　　　　　　　View wave file name: Browsing the waveform data, deleting the wave
　　　　　　　　　　　　　　　　　　data, and deleting the directory are available.
　　　　　　　　　　　　　　　Format: Erase all data that are saved in the SD card is available
　　　　　　　　　　　　　　　　　　(Quick format is available)
　　　　　　　　　　　　　　　Update: Capable of updating the program version that is saved in
　　　　　　　　　　　　　　　　　　the SD card
　　　　　　　　　　　　　　　SD card type: SD, SDHC (up to 32 GB)

Power supply	100 to 240 V 50/60 Hz, Power consumption: 20 VA or less
Dimensions	100 (W) × 96 (H) × 135 (D) mm (Not include protrusions)
Weight	Approx. 950 g (Not include Option)
Operating temperature Humidity	-10 to 40 °C, 20 to 85 % (Noncondensing)
Compliance	Directive 2014/30/EU (EMC)
	Directive 2014/35/EU (LVD)
	Installation category II, Pollution degree 2
	Directive 2011/65/EU, (EU)2015/863(10 restricted substances) (RoHS)

11-2. DIMENSIONS

Unit:mm
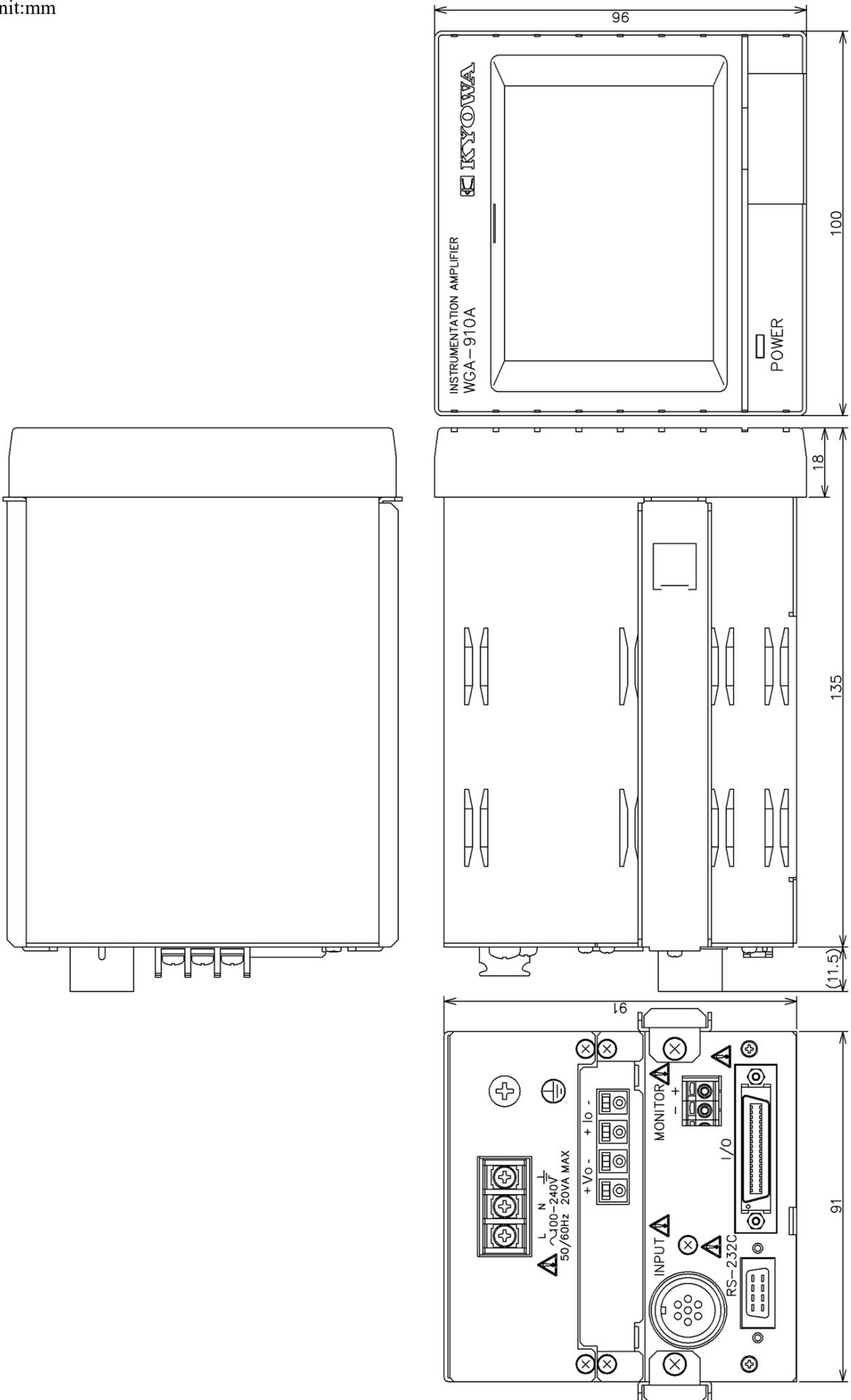
12. APPENDIX

12-1 LIST OF SETTING ITEM

12-1-1. 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 "12-2 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			
Numeric Regist Cal.		Initial Value	-3.2000 to 3.2000 mV/V	(0.000 mV/V)

12-1-2. 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)	1 Hz
	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 tracking	Judging time	0.00 to 9.99 sec.	0.00 sec.
		Compensation range	-99999 to 99999	0
	Zero nearly zero		0 to 9	0
Additional Value			-99999 to 99999	0
Original Value			(-3.2000 to 3.2000 mV/V)	

12-1-3. 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
	Motion Detect Function		0: Enable, 1: Disable	Disable
	Motion Detect Width		0 to 99999 (count)	1000
	Motion Detect Time		0.01 to 9.99 sec	1.00
	Motion Detect Logic		0: Negative Logic, 1: Positive Logic	Negative Logic

Measure Mode Setting	Operation Mode		0: Normal,
			1: Peak Hold,
			2: Block Peak,
			3: Time Peak,
			4: Bottom Hold
			5: Block Bottom,
			6: Time Bottom,
			7: Arbitrary Hold,
			8: Block Peak-Bottom,
			9: Time Peak-Bottom,
			10: Block Average,
			11: Time Average
			12: Block Inflection
			13: Time Inflection
			14: Block Maximal/Minimal
			15: Time Maximal/Minimal
			16: Block Peak/Average
			17: Time Peak/Average
			18: Block Bottom/Average
			19: Time Bottom/Average
			20: Block Peak/Arbitary
			21: Time Peak/Arbitary
			22: Block Bottom/Arbitary
			23: Time Bottom/Arbitary
			24: Previous Value
			    Comparison Peak
			25: Block Previous Value
			    Comparison Peak
			26: Time Previous Value
			    Comparison Peak
			27: Previous Value
			    Comparison Bottom
			28: Block Previous Value
			    Comparison Bottom
			29: Time Previous Value
			    Comparison Bottom
				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.
	Det. Trigger Level		-99999 to 99999 (count)	1000
	Det. Trigger Way		0: Rising, 1: Falling, 2: Both	Both
	Inf. Disc. Time	Time1	0.01 to 1.00 sec	1.00 sec
		Time2	0.01 to 1.00 sec	1.00 sec
	Inf. Disc. Value		1 to 99999 (count)	1000
	Extreme disc.	Width	1 to 99999 (count)	1000
		Magnitude	0.1 to 5.0 (times)	1.0 times
	Pre. Comp. Ini. value		0 to 99999 (count)	1000
Waveform comparison setting	Set reference waveform			
	Waveform comparison HI		-99999 to 99999count	
	Waveform comparison LO		-99999 to 99999 count	
	Move waveform		-99999 to 99999count	
	Comparison area	Start	0 to X-axis full scale(sec)/2000	0
		End	0 to X-axis full scale(sec)/2000	X-axis full scale/2000
	Resister waveform			
	Waveform logic		0: Negative Logic, 1: Positive Logic	Negative Logic

12-1-4. Waveform Display Setting

Item	Function Name	Parameter Name	Setting Value	Initial Value
X-axis Setting		End P.	0: 0.5 sec, 1: 1.0 sec, 2: 2.0 sec, 3: 5.0 sec, 4: 10.0 sec, 5: 20.0 sec, 6: 50.0 sec, 7: 100.0 sec	10.0 sec
Y-axis Setting		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: External Trigger Mode, 1: Trigger Mode, 2: Single Mode, 3: Wave Comp. External Trigger Mode, 4: Wave Comp. Trigger Mode, 5: Wave Comp. Single Mode	External Trigger 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.

12-1-5. 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
	Language		0: Japanese, 1: English	Japanese
	Clock		2000/01/01 00:00:00 to 2099/12/31 23:59:59	Initial value
	Comp. Display Color		0: Normal, 1: All Red 2: All White, 3: All Yellow	Normal
	Display Stability		Enable, Disable	Disabel
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)	
	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			
SD Card Setting	Set Value Save			
	Set Value Read			
	View Wave File Name		(File Number:00001to21844) Delete Directory Delete Wave Data	
	Format			
	Update			
Recording			ON,OFF (Set at Meas.window.)	OFF

12-1-6. 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

12-2. UNIT LIST

The left numbers are command parameters or return value format of the communication (RS-232C/RS-485).

Force and Mass		Pressure		Torque		Displacement		Others			
01	mN	14	Pa	30	mN・m	39	μm	45	(None)	64	℃
02	N	15	hPa	31	N・m	40	mm	46	μV	65	K
03	kN	16	kPa	32	kN・m	41	cm	47	mV	66	m/s^2
04	MN	17	MPa	33	MN・m	42	m	48	V	67	G
05	mgf	18	gf/mm^2	34	gf・cm	43	km	49	kV	68	Gal
06	gf	19	kgf/mm^2	35	kgf・cm	44	inch	50	μA	69	No.
07	kgf	20	tf/mm^2	36	gf・m			51	mA	70	m^3
08	tf	21	gf/cm^2	37	kgf・m			52	A	71	ml
09	mg	22	kgf/cm^2	38	tf・m			53	kA	72	l
10	g	23	tf/cm^2					54	mΩ	73	kl
11	kg	24	atm					55	Ω	74	%
12	t	25	mmHg					56	kΩ	75	‰
13	ton	26	mmH_2O					57	W	76	ppm
		27	mmAq					58	kW	77	/s
		28	mbar					59	VA	78	/min
		29	psi					60	με	79	/h
								61	μm/m		
								62	μV/V		
								63	mV/V		