

INSTRUCTION MANUAL

WGA-680A

INSTRUMENTATION AMPLIFIER

Thank you for purchasing KYOWA's product WGA-680A 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.

Generally, company names and trade names described in this Instruction Manual are trademarks or registered trademarks of the companies.

This Instruction Manual may not be copied or reproduced, in whole or part, without consent of KYOWA.

Copyright © Kyowa Electronic Instruments Co., Ltd. All rights reserved.

The contents of the Instruction Manual are subjected to change without prior notice.

We assume no responsibility whatever for any damage resulting from the use of this product

CONTENTS

CONTENTS	1
STANDARD ACCESSORIES	3
OPTIONAL ACCESSORIES	3
SAFETY PRECAUTIONS (Do not forget to read the safety precautions prior to use.)	4
LIMITED LIDE PARTS AND PREVENTIVE MAINTENANCE	7
WGA-680A REPLACEMENT BEFORE THE END OF SERVICE LIFE	7
NOTATIONS USED IN THE INSTRUCTION MANUAL	7
IMPORTANT PRECAUTIONS WHEN USING WGA-680A	8
PRECAUTIONS ON CE MARKING	8
1. OUTLINE OF PRODUCT	9
1-1. OUTLINE	9
1-2. FEATURES	9
1-3. MODEL	9
2. CONTROLS AND FUNCTIONS	10
2-1. FRONT PANEL	10
2-2. REAR PANEL	11
3. CONNECTION AND DEFAULT SETTING	12
3-1. PROCEDURES FOR MEASUREMENTS	12
3-2. TO MOUNT THE WGA-680A ON THE PANEL	13
3-3. TO CONNECT TRANSDUCERS	14
3-3-1. Terminal blocks	14
3-3-2. To connect transducers	14
3-4. TO CONNECT [INPUT] TERMINALS	15
3-5. TO CONNECT [OUTPUT] TERMINALS	15
3-6. TO CONNECT [ANALOG OUTPUT] TERMINALS	16
3-7. TO CONNECT POWER SUPPLY	17
3-7-2.WGA-680A-10~14 (DC models)	18
4. OPERATIONS AND FUNCTIONS	19
4-1.KEY OPERATIONS	19
4-1-1. Lock function	19
4-1-2. Key operations in MEASURING mode	19
4-1-3. Key operations in FUNCTION SELECTING mode	20
4-1-4. Key operations in SETTING mode	20
4-2. TO SELECT BRIDGE EXCITATION VOLTAGE	21
4-3. DIGITAL ZERO FUNCTION	21
4-4. CALIBRATION FUNCTION	22
4-4-1. Actual load calibration	22
4-4-2. Sensitivity registering calibration	23
4-4-3. Numeric value registering calibration	24
4-5. COMPARATOR FUNCTIONS	25
4-5-1. Output for [HH]/[HI]/[LO]/[LL] comparator conditions	25
4-5-2. To set the [HH] limit value and [HI] limit value	25
4-5-3. To set the [LL] limit value and [LO] limit value	26
4-5-4. To set the hysteresis	26
4-5-5. To assign comparators	26
4-6. PATTERN FUNCTION	27
4-7. LEVEL TEST FUNCTION	27
4-8. UPDATING RATE OF DISPLAYING VALUES	28
4-9. DISPLAY STABILITY FUNCTION	28
4-10. HOLD FUNCTIONS	29

4-10-1. Arbitrary point hold	32
4-10-2. Peak hold, bottom hold	33
4-10-3. Peak-to-peak hold (amplitude hold)	34
4-10-4. Interval-specified peak hold, interval-specified bottom hold, interval-specified peak-to-peak hold	35
4-10-5. Time-specified peak hold, Time-specified bottom hold, Time-specified peak-to-peak hold	37
4-11. ANALOG OUTPUT (D/A) FUNCTION	39
4-12. LIST OF FUNCTIONS	40
4-12-1. Various functions in FUNCTION SELECTING mode	40
4-12-2. Error codes	49
4-12-3. Table of functions	50
5. OPERATION TIMING	54
5-1. CONTROL INPUT SIGNALS (HOLD COMMAND, RESET COMMAND, ZERO COMMAND)	54
5-2. COMPARATOR OUTPUTS	54
5-3. DELAY TIME BETWEEN INPUT AND OUTPUT SIGNALS	54
6. TROUBLE SHOOTING	55
7. MAINTENANCE	56
8. SPECIFICATIONS	57
9. OUTSIDE DRAWING	60
9-1.WGA-680A -00: No option (AC model)	60
9-2.WGA-680A -10: No option (DC model)	61

This Manual describes the WGA-680A Instrumentation Amplifier (hereinafter referred to as the WGA-680A).

STANDARD ACCESSORIES

The following accessories are packed with the WGA-680A.

When unpacking, check the contents to ensure that all accessories are enclosed.

Instruction Manual (For WGA-680A, For BCD/RS-232C/RS-485/TEDS, For CC-Link)	1 (CD-R)
Product Warranty	1
Unit label	1
Flat-head screw driver for control input/output terminal blocks	1

OPTIONAL ACCESSORIES

100-VAC power cable (length: 2 m)	P-23
200-VAC power cable (length: 2 m)	P-28
6-conductor NDIS connector input cable	U-29 to U-32
4-conductor NDIS connector input cable	U-33 to U-36

SAFETY PRECAUTIONS (Do not forget to read the safety precautions prior to use.)

The WGA-680A is designed to be used according to "8. SPECIFICATIONS". Do not use the product in an environment exceeding the specifications. Or, it may cause troubles.

PRIOR TO USE

For safe use of the product, do not forget to read the "SAFETY PRECAUTIONS" prior to use.
KYOWA assumes no liability for any damage resulting from the user's failure to comply with the safety precautions.
For safety operation of the product, the following symbol marks are used in the Instruction Manual.

	Indicates "PROTECTIVE GROUND TERMINAL". Be sure to connect the GND terminal to the ground.
---	---

SAFETY SYMBOLS

For safety operation of the product, 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-680A Instruction Manual. ● Power supply To prevent a fire hazard, ensure that the power supply voltage specified for the product matches the local line voltage before connecting the system to the power supply. The power supply voltages are described in following. WGA-680A-00~04 (AC models) :AC100~240V, Power consumption: 20VA or less WGA-680A-10~14 (DC models) :DC10~30V, Power consumption: 10W or less ● Avoid using in environment with inflammable gas, etc. To prevent the risk of fire hazard or explosion, do not use the product in environment with inflammable gas, vapor, or dust. ● If any trouble occurs To prevent a fire hazards, if smoke is emerging from the product, immediately disconnect the USB cable or AC adapter to terminate the system operation. ● Protective ground Be sure to connect the GND terminal to the ground. Or, it may cause an electric shock hazard, lower the performance, and cause trouble.

CAUTION

- **Caution**
Be sure to observe the safety precautions described in the WGA-680A 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 +50°C.
Use at temperatures exceeding the specified range may lower the performance and cause trouble.
If use under direct sunlight or in a cold place is inevitable, prepare a sunscreen or take proper measures to keep it warm.
- Use the product in the specified operating humidity of 20 to 80%.
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 resistance: 19.6m/s² (2G), 10 to 200Hz (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 $\pm 10\%$ 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 store the product under dusty or fine particles or corrosive gas environment.
Use or store 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.

 CAUTION

- Preheat the product before use.
After the power ON, always preheat the product for approximately 1 hour.
- Cleaning.
When the product gets dirty, clean the product with a dry soft cloth. When dust exists inside the WGA-680A, clean it by using an air blow gun. Do not touch electronic parts.
- In function selection mode and set mode, analog output and control input/output are stopped.
If it is in operation, pay attention to the load on the transducer and the operation of the system as it may cause a malfunction.

LIMITED LIFE PARTS AND PREVENTIVE MAINTENANCE

The product consists of various electronic components and those components, if not all, have a useful life. Using them exceeding the years specified according to each part type (useful life) may affect the characteristics of the product, resulting in a malfunction or a failure.

Limited life parts used with the product are as follows.

- Aluminum electrolytic capacitor

The signal-noise ratio will lower due to capacity low or smoke will be emitted due to liquid leak, resulting in a malfunction of the product.

To operate the product normally, finding a sign of the product failure early by daily/periodic inspections and taking the corrective action are required. For inspection, contact KYOWA or our representatives.

* Limited life parts used with the product are aluminum electrolytic capacitor.

* All components do age and will fail.

WGA-680A REPLACEMENT BEFORE THE END OF SERVICE LIFE

Preventive maintenance and replacement parts are a cost-effective way of keeping the performance and extending the service life of the product. Regardless of the replacement parts, the product itself gradually deteriorates with age. Before the expected service life is reached, consider replacing the product with a new one or the latest series as preventive maintenance.

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 handling the product, and to information provided for reference purposes.

Examples of Notations

NOTE

Essential precautions required when handling the product.

MEMO

Reference items required when handling the product.

IMPORTANT PRECAUTIONS WHEN USING WGA-680A

NOTE

- The output signal (voltage/current) when the transducer cable is broken.
When the transducer cable is broken, the WGA-680A 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.
Output signal (voltage): Approx. -13 V
Output signal (current): Approx. 0 mA
- The output signal (voltage/current) and unbalance load
Output signal (voltage): The unbalance load should be 2 k Ω or more.
Output signal (current): The unbalance load should be 500 Ω or less.

PRECAUTIONS ON CE MARKING

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 control cables, be sure to mount ferrite core near the terminal.
Recommended ferrite core GRFC-5 (KITAGAWA INDUSTRIES CO., LTD.)
- Be sure to connect the GND terminal to the ground by using the optional ground wire.
- Power fluctuations of the power supply to the instrument should not exceed $\pm 10\%$ of the nominal voltage.

1. OUTLINE OF PRODUCT

1-1. OUTLINE

The WGA-680A Instrumentation Amplifier is a high-speed and sophisticated amplifier, designed to be used for displaying physical quantities (load, etc.) with strain gage transducers.

The WGA-680A is able to be operated from the keys on the front panel, and includes various functions (comparator functions, hold functions, D/A conversion functions, etc.) as standard equipment.

The WGA-680A is compatible for wide range of measurements and controlling functions: high-speed phenomenon measurements to be required for high-speed sampling such as press-fitting and pressing, or load measurement to be required for high-resolution.

The WGA-680A has the optional models; BCD/TEDS model, RS-232C/TEDS model, RS-485/TEDS model, and CC-Link model. The CC-Link model is able to be controlled by PLC.

1-2. FEATURES

- LEDs Numerical values and the comparator lights up in red, green, and orange, dependently on the status.
- High-speed sampling : 4000 times/sec.
- High-speed D/A conversion : 4000 times/sec.
- Connects up to 4 transducers (bridge resistance : 350Ω) in parallel.
- Equips with 4 comparators.
HH comparator, HI comparator, LO comparator, LL comparator
Each comparator selects the "High limit" or "Low limit".
- Saves 4 patterns of comparator value, and switches them.
- Various hold functions:
Arbitrary point hold, peak hold, bottom hold, peak-to-peak hold
- Indicated value: -99999 to 99999 (5 digits)
- 3 calibration functions:
Actual load calibration, Sensitivity registering calibration, Numeric value registering calibration
- Various optional models:
BCD/TEDS model, RS-232C/TEDS model, RS-485/TEDS model, CC-Link model

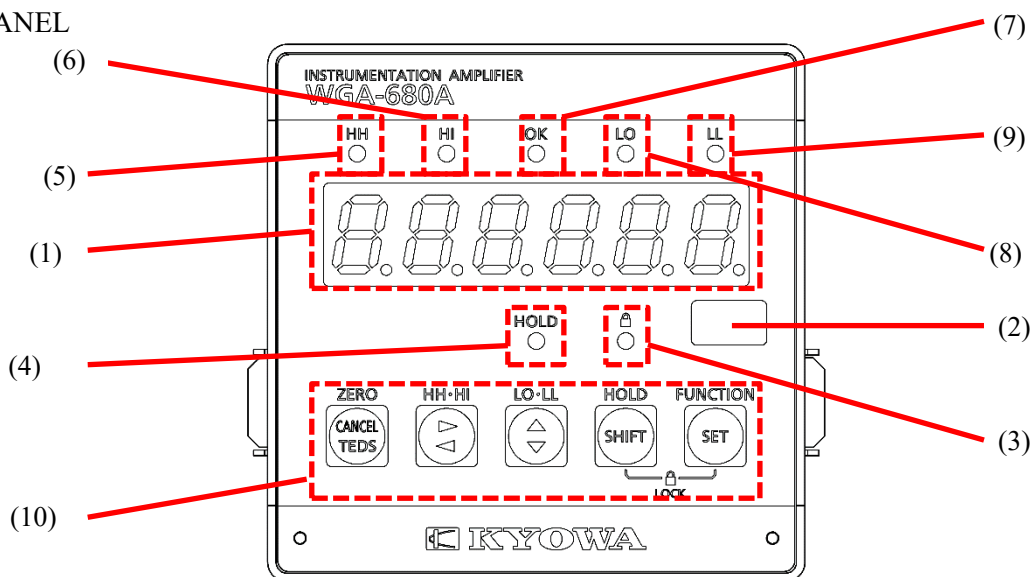
1-3. MODEL

The WGA-680A series has 8 models. Customers are required to purchase the power cable applied for your power supply specifications.

Model	Option	Power supply specs
WGA-680A-00	None	AC models Power supply : AC100 to 240V frequency : 50/60Hz Power consumption : 20VA or less
WGA-680A-01	BCD/TEDS	
WGA-680A-02	RS-232C/TEDS	
WGA-680A-03	RS-485/TEDS	
WGA-680A-04	CC-Link	
WGA-680A-10	None	DC models Power supply : DC10 to 30V Power consumption : 10W or less
WGA-680A-11	BCD/TEDS	
WGA-680A-12	RS-232C/TEDS	
WGA-680A-13	RS-485/TEDS	
WGA-680A-14	CC-Link	

2. CONTROLS AND FUNCTIONS

2-1. FRONT PANEL

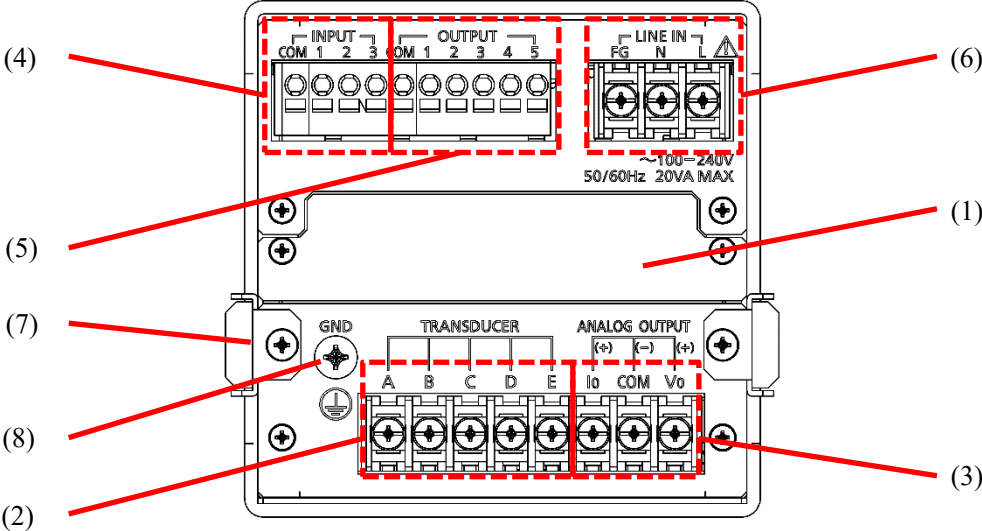


- | | |
|------------------------------------|---|
| (1) Indicator | <ul style="list-style-type: none"> Measured values, various selected functions, and pre-set values is displayed. Normally, the measured value responding to the output from transducers is displayed. However, if error occurs, error message is displayed. For details, see "4-12-2. Error codes". |
| (2) Unit Label | <ul style="list-style-type: none"> Select the desired unit from the accessory unit label sheet and attach it on this portion. |
| (3) [LOCK] LED | <ul style="list-style-type: none"> When the [LOCK] LED is ON or flickering, you are not able to set various functions. Always turn OFF the [LOCK] LED before setting functions. However, you are able to display the [HH]/[HI]/[LO]/[LL] limit values while the [LOCK] LED is ON. |
| (4) [HOLD] LED | <ul style="list-style-type: none"> Displays the detecting interval status and holding interval status in the various HOLD modes. For details, see "4-10. HOLD FUNCTIONS". |
| (5) [HH] LED
(Comparator-3 LED) | <ul style="list-style-type: none"> Lights up when the measured value is [HH] limit value or more. Flickers when the [HH] limit value is displayed. |
| (6) [HI] LED
(Comparator-1 LED) | <ul style="list-style-type: none"> Lights up when the measured value is [HI] limit value or more. Flickers when the [HI] limit value is displayed. |
| (7) [OK] LED | <ul style="list-style-type: none"> Lights up when the measured value exceeds the [LL]/[LO] limit value and lowers the [HH]/[HI] limit value. |
| (8) [LO] LED
(Comparator-2 LED) | <ul style="list-style-type: none"> Lights up when the measured value is [LO] limit value or less. Flickers when the [LO] limit value is displayed. |
| (9) [LL] LED
(Comparator-4 LED) | <ul style="list-style-type: none"> Lights up when the measured value is [LL] limit value or less. Flickers when the [LL] limit value is displayed. |
| (10) Operation keys | <ul style="list-style-type: none"> Pushbutton switches to operate the WGA-680A. Each key has multiple functions. Functions varies automatically with the measuring status and setting status. For details, see "4-1. KEY OPERATIONS". |

MEMO

When the comparator function of [LL (LO)] comparator is "High limit" and the measured value is the [LL (LO)] limit value or more, the LED lights up. For details, see "4-5-5. To assign comparators".

2-2. REAR PANEL



*Figure is AC model.

- (1) Blank panel

Blank panel is for WGA-680A-00.
In the case of optional model, the panel is the slot of optional model. For details, see separate volume of "INSTRUCTION MANUAL (FOR BCD/RS-232C/RS-485/TEDS OPTIONS)" and "INSTRUCTION MANUAL (FOR CC-LINK OPTION)".
- (2) [Transducer] terminals

A : Bridge excitation (+) Red cable

B : Bridge output (-) White cable

C : Bridge excitation (-) Black cable

D : Bridge output (+) Green cable

E : Shield

To use the TEDS compatible transducer, see separate volume of "INSTRUCTION MANUAL (FOR BCD/RS-232C/RS-485/TEDS OPTIONS)".
- (3) [ANALOG OUTPUT] terminals

COM : Common

Vo : Voltage output terminal

Io : Current output terminal
- (4) [INPUT] terminals

COM : Common

1 : ZERO command

2 : HOLD command

3 : RESET command
- (5) [OUTPUT] terminals

COM : Common

1 : [HH] output (comparator-3 output)

2 : [HI] output (comparator-1 output)

3 : [OK] output

4 : [LO] output (comparator-2 output)

5 : [LL] output (comparator-4 output)
- (6) [LINE IN] terminals (AC model)

FG : GND terminal Be sure to connect the GND terminal to the ground.

N : AC power supply input terminal

L : AC power supply input terminal

[DC IN] terminals (DC model)

FG : GND terminal Be sure to connect the GND terminal to the ground.

- : DC power supply negative input terminal

+ : DC power supply positive input terminal

(7) Fitting metal

For mounting onto the panel.

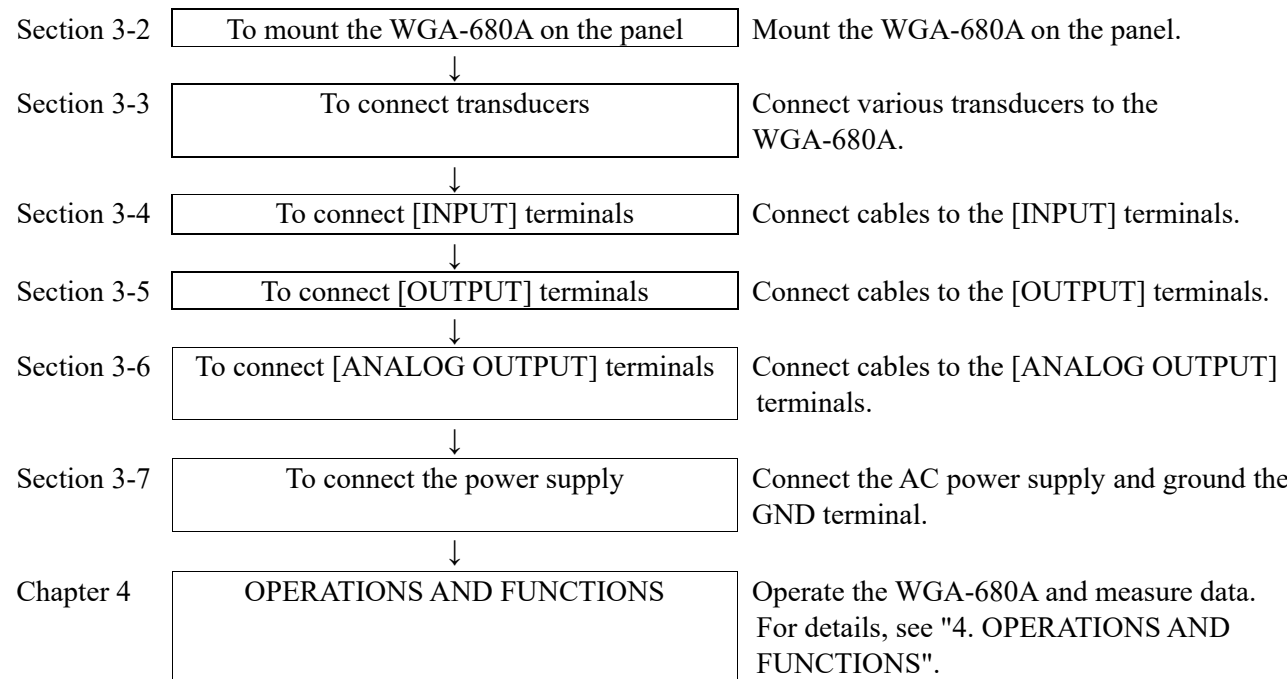
(8) Protective ground terminal

Be sure to connect the GND terminal to the ground.
- 11

3. CONNECTION AND DEFAULT SETTING

3-1. PROCEDURES FOR MEASUREMENTS

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

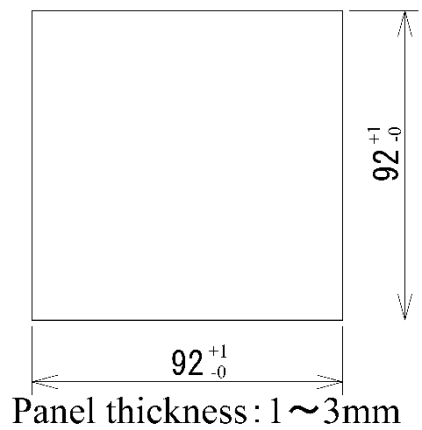


3-2. TO MOUNT THE WGA-680A ON THE PANEL

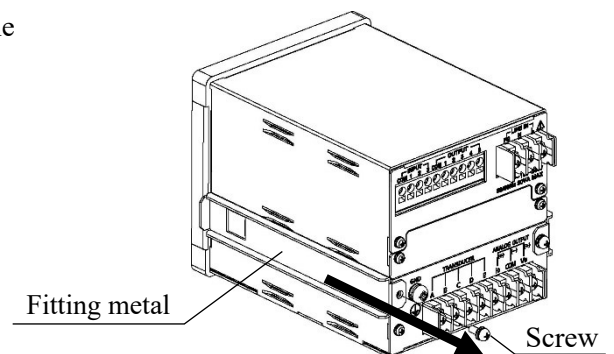
To mount the WGA-680A on the panel, prepare a panel according to the specified panel cut dimensions as shown at the right. Then, mount the WGA-680A by referring the following procedures.

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

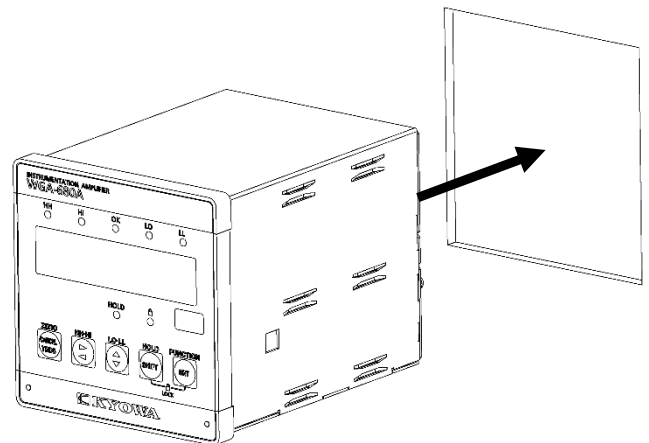
●Panel cut dimensions



(2) Loosen the screws on the WGA-680A rear and remove the fitting metal.

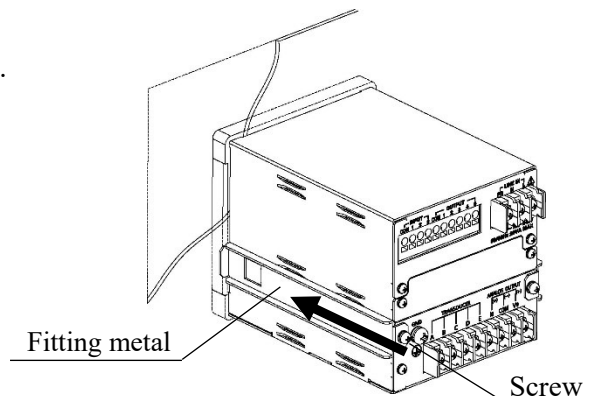


(3) Set the WGA-680A into the panel frame as described in the right figure.



(4) Set the fitting metal from the rear.

(5) Tighten the screws and firmly fix the WGA-680A.



3-3. TO CONNECT TRANSDUCERS

3-3-1. Terminal blocks

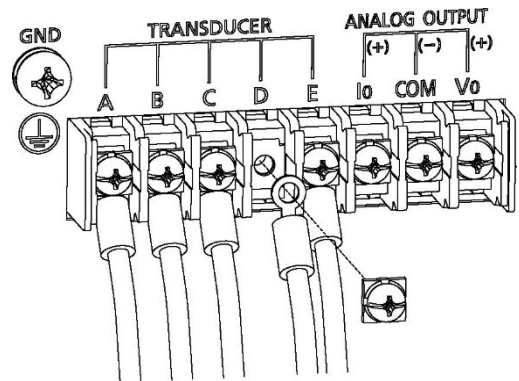
- It is recommend to connect the crimp terminals with insulation coating to the terminal blocks. Use crimp terminals with insulation coating equivalent to JIS C 2805 crimp terminal for copper wire 1.25-3.
- The terminal blocks have terminal block covers. Before connecting the wires, remove the terminal block cover.
- Before connecting the crimp terminals, remove the screws.
- After completing wiring to the terminal block, put the terminal block cover.
- Please do not press the terminal block too strongly.

	WARNING
<u>To prevent electric shock hazards, be sure to use the terminal block cover.</u>	

3-3-2. To connect transducers

- Connect transducers to terminals A to E as described in the following.
(Cable colors are KYOWA's standard color codes.)

A: Bridge excitation (+)	Red cable
B: Bridge output (-)	White cable
C: Bridge excitation (-)	Black cable
D: Bridge output (+)	Green cable
E: Shield	



NOTE

- For transducer wiring, use as short as possible 4-conductor shield cable (TEDS: 6-conductor cable). In addition, locate the transducer far apart from power lines and wirings interfered with noise.
- You cannot directly connect a remote sensing transducer.
When the WGA-680A has the optional TEDS terminals, do not connect the cables for the remote sensing transducer.

MEMO

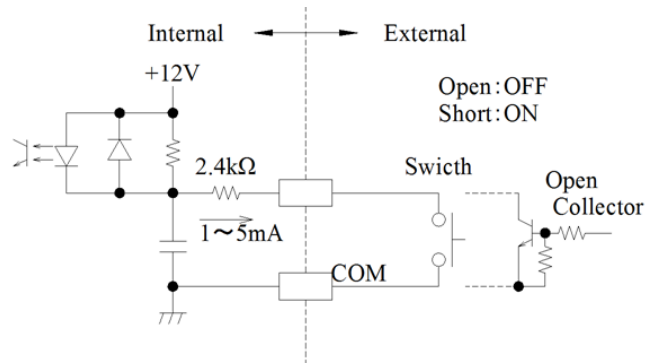
- Factory default of bridge excitation voltage is set to 2V. It can be changed to 10V. Set the voltage compatible to transducer specifications (within recommended excitation voltage) before using the transducer. For details, see “4-2. TO SELECT BRIDGE EXCITATION VOLTAGE.”

3-4. TO CONNECT [INPUT] TERMINALS

- Connection of [INPUT] terminals are as follows.

COM : Common
 1 : ZERO command
 2 : HOLD command
 3 : RESET command

- To connect an external switch, open collector, etc. to each [INPUT] terminal, connect as described in the right figure.



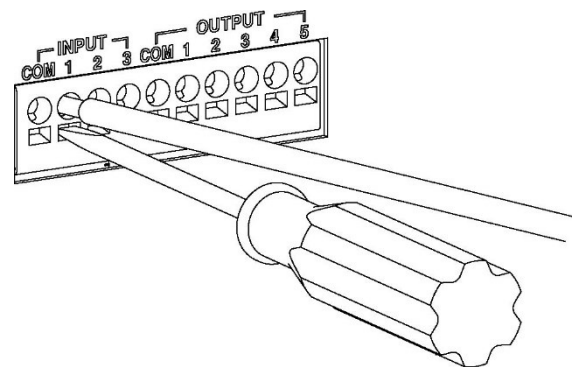
- Connect cables as follows.

- 1) Strip off the coating of the wire for approx. 11 mm and twist the tip of the wire for not to loosen.

The available wire ranges are as follows.

Solid wire : $\phi 0.4$ mm (AWG26) to $\phi 1.2$ mm (AWG16)
 Stranded wire : 0.2 mm^2 (AWG24) to 1.25 mm^2 (AWG16)

- 2) Press the lower button strongly by using the accessory flat-head screw driver as described in the right figure.
- 3) Carefully insert the twisted wires into the upper hole.
- 4) Remove the flat-head screw driver from the lower button. And pull the wires gently to check if they are securely inserted.

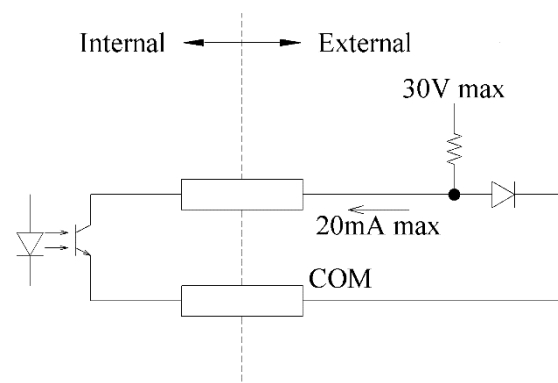


3-5. TO CONNECT [OUTPUT] TERMINALS

- Connection of [OUTPUT] terminals are as follows.

COM : Common
 1 : [HH] output (comparator-3 output)
 2 : [HI] output (comparator-1 output)
 3 : [OK] output
 4 : [LO] output (comparator-2 output)
 5 : [LL] output (comparator-4 output)

- The [OUTPUT] terminals are open collector.
 (Capacity: 30 VDC, 20 mA max)



3-6. TO CONNECT [ANALOG OUTPUT] TERMINALS

- The pins and signals of the [ANALOG OUTPUT] terminals are as follows.

COM : Common
Vo : Voltage output terminal (± 10 V)
Io : Current output terminal (4 to 20 mA)

- Output signal (voltage) : The load resistance should be $2\text{k}\Omega$ or more.
Output signal (current) : The load resistance should be 500Ω or less.

NOTE

Countermeasures against noise for [INPUT]/[OUTPUT]/[ANALOG OUTPUT] terminals

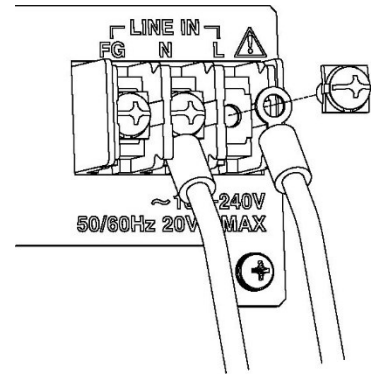
- For more than 1 m long wiring, use twisted cable.
- For more than 3 m long wiring, use a shield cable and connect the shield cable to the GND terminal.
- For more than 30 m long wiring or for using the WGA-680A outdoors, be sure to take additional countermeasures against noise.
- For connecting multiple wires, be sure to twist them together in advance. After twisting, make sure the wire is satisfied with the diameter to connect the terminal block.

3-7. TO CONNECT POWER SUPPLY

3-7-1. WGA-680A-00~04 (AC models)

Do not forget to check that power voltage is from 100 to 240 VAC, 50/60 Hz (20 VA). Be sure to use the cable with rated voltage having more than power supply voltage.

Please do not press the terminal block too strongly.



WARNING

To prevent electric shock hazards, be sure to use 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

Before connecting the AC power supply, check the power supply voltage.

The power supply voltage ranges of WGA-680A-00~04 (AC models) are from 100 to 240 VAC (50/60 Hz). Be sure to keep the voltage range. Be sure to connect the GND terminal to the ground.

If the power supply voltage exceeds the above range or if a voltage between each terminal and the grounding has a potential exceeding power supply voltage, do not connect the AC power cable to the AC power outlet. Or, it may cause system failures and accidents.

NOTE

When power is supplied to the unit, the firmware version of the unit is displayed, followed by readings. Firmware versions are displayed in the following format.

▪ xx.yy

x : major version y : minor version

For the CC-Link option, after displaying the version of the unit firmware, the CC-Link option firmware version is displayed. Versions are displayed in the following format.

▪ Cx.yy

C : Prefix indicating CC-Link firmware version x : major version y : minor version

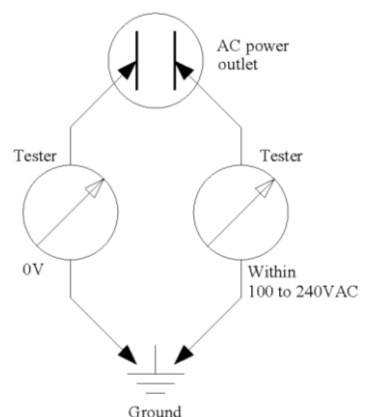
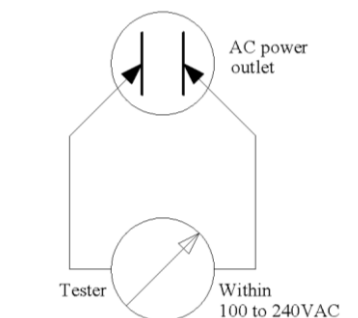
How to confirm the power voltage is as follows.

- (1) Measure the voltage between the AC power outlet terminals with the tester, and confirm that the voltage is between 100 to 240 VAC.
- (2) Measure the voltage between each end of the AC power outlet and the ground with the tester. Confirm that the one is 0 V and the other one is between 100 to 240 VAC.
- (3) If the WGA-680A 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.

NOTE

Be sure to connect the GND terminal to the ground.

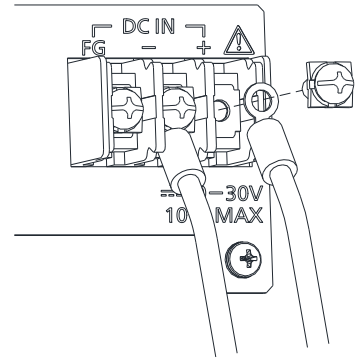
Or, it may cause an electric shock hazard, lower the performance, and cause trouble.



3-7-2.WGA-680A-10~14 (DC models)

Do not forget to check that power voltage is from 10 to 30 VDC (10W). Be sure to use the cable with rated voltage having more than power supply voltage.

Please do not press the terminal block too strongly.



WARNING

To prevent electric shock hazards, be sure to use 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

- Before connecting the power supply, check the power supply voltage.
The power supply voltage ranges of WGA-680A-00~04 (AC models) from 10 to 30 VDC (10W).
Be sure to keep the voltage range. Be sure to connect the GND terminal to the ground.
If the power supply voltage exceeds the above range or if a voltage between each terminal and the grounding has a potential exceeding power supply voltage, do not connect the power cable to the DC power outlet. Or, it may cause system failures and accidents.
- DC power supply negative input terminal is insulated from FG.
- Be sure to connect the GND terminal to the ground.
Or, it may cause an electric shock hazard, lower the performance, and cause trouble.

4. OPERATIONS AND FUNCTIONS

NOTE

DA output and control output are stopped when the instrument is in function selection mode(F-** is displayed) or during function setting.
When applying a load, pay attention to overload and control status.

4-1.KEY OPERATIONS

4-1-1. Lock function

The LOCK function is used to prohibit the change in pre-set values in order to prevent erroneous operation. In the [LOCK] status, you are not able to change the function and limit values ([HI] limit value, [LO] limit value, etc.).

However, you are able to monitor the pre-set comparator limit values.

Before changing functions and limit values, cancel the [LOCK] status.

- Power ON the WGA-680A and the mode is the MEASURING mode in the [LOCK] status.
- After changing the settings, make the WGA-680A to the [LOCK] status to prevent erroneous operation.
- How to set or cancel the [LOCK] status.

Press the **[FUNCTION]** key + the **[HOLD]** key for 2 seconds at the same time.

In [LOCK] status : [LOCK] status is canceled. [LOCK] LED turns OFF.

In NOT [LOCK] status : The status becomes [LOCK] status. [LOCK] LED turns ON.

4-1-2. Key operations in MEASURING mode

During the MEASURING mode, the WGA-680A measures physical quantities (load, pressure, torque, displacement, etc.) by using strain gage transducers and displays their values.

To go to the SETTING mode, FUNCTION SELECTING mode, and LOCK mode, press keys in the MEASURING mode.

However, the [LOCK] status limits the key operations. For details, see the following table.

Key operation	Operations when the [LOCK] LED is OFF.	Operations when the [LOCK] LED is ON.
Press the [ZERO] key for 2 seconds.	Executes the DIGITAL ZERO function, "0" is displayed as the indicated value, and goes to the MEASURING mode.	Executes no function.
Press the [HI HH] key for 2 seconds.	Goes to the [HI] limit value SETTING mode. After pressing the [SET] key to set the [HI] limit value, the SETTING mode goes to the [HH] limit value SETTING mode.	Pre-set values is displayed.
Press the [LO LL] key for 2 seconds.	Goes to the [LO] limit value SETTING mode. After pressing the [SET] key to set the [LO] limit value, the SETTING mode goes to the [LL] limit value SETTING mode.	Pre-set values is displayed.
Press the [FUNCTION] key for 2 seconds.	Goes to the FUNCTION SELECTING mode.	Executes no function.
Press the [HOLD] key.	Operates in the pre-set HOLD mode.	Executes no function.
Press the [HOLD] key + the [FUNCTION] key for 2 seconds at the same time.	The [LOCK] LED lights up and the mode goes to the MEASURING mode.	The [LOCK] LED lights off. You are able to select modes.

MEMO

Even if the [LOCK] LED is ON, the [INPUT] terminal is usable.

4-1-3. Key operations in FUNCTION SELECTING mode

- To go to the FUNCTION SELECTING mode, press the **FUNCTION** key for 2 seconds in the MEASURING mode. The "F-01" is displayed on the indicator and you are able to select functions.
- To select the functions from "F-01" to "F-27" on the FUNCTION SELECTING mode, press the **→** key or **SHIFT** + **←** key.
- To determine the function, press the **SET** key. The mode goes to the SETTING mode.
- To back to the MEASURING mode, press the **CANCEL** key on the FUNCTION SELECTING mode.

4-1-4. Key operations in SETTING mode

- Press the **SET** key after selecting the function on the FUNCTION SELECTING mode, the mode goes to the function's SETTING mode.
- To set numerical values.
 - Move digits : Press the **→** key, **←** key + **SHIFT** key.
 - Change numerical values : Press the **↑** key, **↓** key + **SHIFT** key.
 - Register pre-set values : Press the **SET** key.The changed value is determined and stored (registered) in the internal memory.
- When numeric values are not required to set, "...." is displayed. Press the **SET** key in this status, the function is executed.
- To back to the FUNCTION SELECTING mode, press the **CANCEL** key on the SETTING mode.
- To set numerical values.
 - (1) Setting available digit flickers.
 - (2) To move the target digit to the right, press the **→** key.
The flickering digit moves the leftmost digit next to the rightmost digit.
To move the target digit to the left, press the **SHIFT** + **←** key.
 - (3) To change the numerical value of the target digit, press the **↑** key.
The leftmost digit (5th digit)
→ 0 → 1 → 2 → . . . → 8 → 9 → -0 → -1 → . . . → -9 → 0 →
Other digit (1st to 4th digit)
→ 0 → 1 → 2 → 3 → 4 → 5 → 6 → 7 → 8 → 9 → 0 →
 - (4) To set the decimal point, when the function is in the calibration function.

4-2. TO SELECT BRIDGE EXCITATION VOLTAGE

You are able to select the bridge excitation voltage either 2 V or 10 V applied to the transducers. Select the higher voltage within the recommended excitation voltage range of the transducers. The factory default setting is 2 V.

a) To go to SELECTING BRIDGE EXCITATION VOLTAGE mode

Press the **FUNCTION** key for 2 seconds. The "F-01" is displayed and the mode goes to FUNCTION SELECTING mode.

Press the **→** key until the "F-13" is displayed and press the **SET** key.

The mode goes to SELECTING BRIDGE EXCITATION VOLTAGE SETTING mode.

b) To select bridge excitation voltage

The current pre-set value is displayed and flickers.

Press the **↑** key to change the setting. (0: 10 V, 1: 2 V)

Press the **SET** key and register the setting value.

c) To exit

The "F-13" is displayed. Press the **CANCEL** key.

The registered bridge excitation voltage is applied to the transducer.

4-3. DIGITAL ZERO FUNCTION

The DIGITAL ZERO function determines the reference point of the indicator. The DIGITAL ZERO function adjusts the current displaying value to "0".

The DIGITAL ZERO function has 2 methods, key operation and the operation from the rear panel.

a) Key operation

- Press the **ZERO** key for 2 seconds in the MEASURING mode. The WGA-680A executes the DIGITAL ZERO function and "0" is displayed.
- If the additional value is set, the additional value is displayed.
- The WGA-680A keeps the value after turning OFF the power.

b) Operation from the rear panel

- Short-circuit the COM (common) and 1 (ZERO command) of the [INPUT] terminals on the rear panel. You are able to execute the DIGITAL ZERO function. This function is executed even if the [LOCK] LED is ON.
- After open-circuiting the [INPUT] terminals, the WGA-680A is in the same status after executing the DIGITAL ZERO function. The WGA-680A does not keep the value after turning OFF the power.

4-4. CALIBRATION FUNCTION

There are 3 calibration functions appropriate for the required purpose, that is, "Actual load calibration" that calibrates data by applying already known load to transducers, "Sensitivity registering calibration" that calibrates data by registering a sensitivity value written in the transducer inspection report, and "Numeric value registering calibration" that calibrates data by changing the initial values.

4-4-1. Actual load calibration

The actual load calibration calibrates data by applying the actual load (already known load such as weight) to a transducer.

Suppose a load cell is "rated capacity: 1 kN" and "rated output: 2.004mV/V". This section describes how to display "100.0" by applying 100 kg.

a) To execute the DIGITAL ZERO function

Confirm the transducer is no load applied. Press the **ZERO** key to execute the DIGITAL ZERO function. The "0" is displayed. Be sure to execute the DIGITAL ZERO function to register the reference point.

b) To load the actual load

Apply the actual load to the transducer.

<Example> Gently apply the 100-kg load.

c) To go to ACTUAL LOAD CALIBRATION mode

Press the **FUNCTION** key for 2 seconds. The "F-01" is displayed and the mode is FUNCTION SELECTING mode.

Press the **→** key until the "F-02" is displayed. Press the **SET** key.

The WGA-680A is the ACTUAL LOAD CALIBRATION SETTING mode.

d) To set the indicated value

The current indicated value (Rated capacity) is displayed and the highest-order digit flickers.

Press the **→** key and **↑** key to set the value (actual load) to be displayed. Ignore the decimal point.

<Example> Set the indicated value [1000]. Press the **SET** key.

e) To set the decimal point position

The current decimal point position flickers.

Press the **→** key to move the decimal point position.

<Example> Set the indicated value [100.0]. Press the **SET** key.

f) To set the key code

The "F00000" appears.

1) To enable the key code

Make sure the "00628" or "11111" appears. Press the **SET** key.

2) To disable the key code

Press the **SET** key.

g) To exit the calibration

The "F-02" is displayed. Press the **CANCEL** key.

Remove the load. The WGA-680A starts measuring data based on the registered calibration value.

4-4-2. Sensitivity registering calibration

The sensitivity registering calibration calibrates data by registering a rated output of a transducer without applying the actual load.

Suppose a load cell is "rated capacity: 1 kN" and "rated output: 2.004 mV/V." This section describes how to display "1.000" by applying 1 kN.

a) To execute the DIGITAL ZERO function

Confirm the transducer is no load applied. Press the **ZERO** key to execute the DIGITAL ZERO function. The "0" is displayed. Be sure to execute the DIGITAL ZERO function to register the reference point.

b) To go to SENSITIVITY REGISTERING CALIBRATION mode

Press the **FUNCTION** key for 2 seconds. The "F-01" is displayed and the mode is FUNCTION SELECTING mode.

Press the **→** key until the "F-03" is displayed. Press the **SET** key.

The WGA-680A is SENSITIVITY REGISTERING CALIBRATION SETTING mode.

c) To set the rated output of transducers

The current rated output is displayed and the highest-order digit flickers.

Press the **→** key and **↑** key to set the rated output (mV/V) of the transducer.

<Example> Set the indicated value [2.0040]. Press the **SET** key.

d) To set the indicated value

The current indicated value (Rated capacity) is displayed and the highest-order digit flickers.

Press the **→** key and **↑** key to set the value (actual load) to be displayed. Ignore the decimal point.

<Example> Set the indicated value [1000]. Press the **SET** key.

e) To set the decimal point position

The current decimal point position flickers.

Press the **→** key to move the decimal point position.

<Example> Set the indicated value [1.000]. Press the **SET** key.

f) To set the key code

The "F00000" appears.

1) To enable the key code

Make sure the "00628" or "11111" appears. Press the **SET** key.

2) To disable the key code

Press the **SET** key.

g) To exit the calibration

The "F-03" is displayed. Press the **CANCEL** key.

The WGA-680A starts measuring data based on the registered calibration value.

MEMO

Suppose you measure weights with a load cell. Since the rated capacity of transducers is Newton [N], you are required to convert the value into weight unit [kg].

$$\text{Rated capacity [kg]} = \frac{\text{Rated capacity [N]}}{\text{Gravity acceleration [m/s}^2\text{] of the location}}$$

4-4-3. 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 or 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.

a) To go to NUMERIC VALUE REGISTERING CALIBRATION mode

Press the **FUNCTION** key for 2 seconds. The "F-01" is displayed and the mode is FUNCTION SELECTING mode.

Press the **→** key until the "F-19" is displayed. Press the **SET** key.

The WGA-680A is NUMERIC VALUE REGISTERING CALIBRATION SETTING mode.

b) To set the initial value of transducers

The current reference value is displayed and the highest-order digit flickers.

Press the **→** key and **↑** key to set the initial value (mV/V) of the transducer.

Press the **SET** key.

c) To exit the calibration

The "F-19" is displayed. Press the **CANCEL** key.

The WGA-680A starts measuring data based on the registered calibration value.

NOTE

The value registered on the numeric value registering, will be cleared after executing the actual load calibration or sensitivity registering calibration.

MEMO

Generally, the rated output of strain gage transducers is expressed in [mV/V]. Some strain gage transducers use the other units.

At this time, you are required to convert the units.

$$1[\text{mV/V}] = 1000[\mu\text{V/V}] = 2000[\times 10^{-6}\text{strain}] = 2000[\mu\epsilon] = 2000[\mu\text{m/m}]$$

4-5. COMPARATOR FUNCTIONS

The COMPARATOR function compares the indicated value with the [HH]/[HI]/[LO]/[LL] limit value and outputs the results.

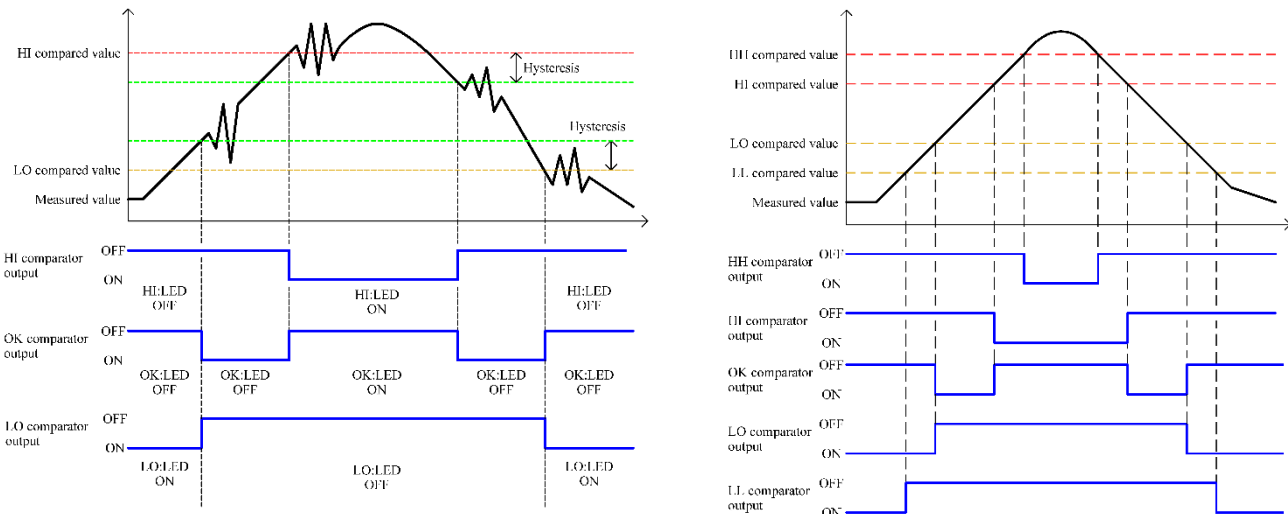
The COMPARATOR function outputs the result as the open collector output from the [OUTPUT] terminals of the rear panel.

The results are displayed on the [HH]/[HI]/[OK]/[LO]/[LL] LED.

You are able to prevent the comparator output chattering or malfunctions by setting the hysteresis (dead band).

4-5-1. Output for [HH]/[HI]/[LO]/[LL] comparator conditions

- [HH] comparator:
When the measured value exceeds the [HH] limit value, the [HH] output turns ON.
When the measured value lowers the value ([HH] limit value - hysteresis value), the [HH] output turns OFF.
- [HI] comparator:
When the measured value exceeds the [HI] limit value, the [HI] output turns ON.
When the measured value lowers the value ([HI] limit value - hysteresis value), the [HI] output turns OFF.
- [LO] comparator:
When the measured value lowers the [LO] limit value, the [LO] output turns ON.
When the measured value exceeds the value ([LO] limit value + hysteresis value), the [LO] output turns OFF.
- [LL] comparator:
When the measured value lowers the [LL] limit value, the [LL] output turns ON.
When the measured value exceeds the value ([LL] limit value + hysteresis value), the [LL] output turns OFF.



4-5-2. To set the [HH] limit value and [HI] limit value

- 1) Press the **[HI HH]** key for 2 seconds in the MEASURING mode. The current value of the [HI] comparator is displayed and the highest-order digit flickers. At this time, the [HI] LED flickers.
- 2) Press the **[→]** key to flicker the target digit. Press the **[↑]** key to change the numerical value.
- 3) To set the [HI] limit value, press the **[SET]** key.
- 4) The current value of the [HH] comparator is displayed and the highest-order digit flickers. At this time, the [HH] LED flickers.
- 5) Press the **[→]** key to flicker the target digit. Press the **[↑]** key to change the numerical value.
- 6) To set the [HH] limit value, press the **[SET]** key.

*Initial values of the [HH] limit value and [HI] limit value are +99999

4-5-3. To set the [LL] limit value and [LO] limit value

- 1) Press the **[LO LL]** key for 2 seconds in the MEASURING mode. The current value of the [LO] comparator is displayed and the highest-order digit flickers. At this time, the [LO] LED flickers.
- 2) Press the **[→]** key to flicker the target digit. Press the **[↑]** key to change the numerical value.
- 3) To set the [LO] limit value, press the **[SET]** key.
- 4) The current value of the [LL] comparator is displayed and the highest-order digit flickers. At this time, the [LL] LED flickers.
- 5) Press the **[→]** key to flicker the target digit. Press the **[↑]** key to change the numerical value.
- 6) To set the [LL] limit value, press the **[SET]** key.

*Initial values of the [LL] limit value and [LO] limit value are -99999

4-5-4. To set the hysteresis

You are able to set the hysteresis width that turns OFF comparators which was once turned ON.

The set hysteresis is common in four comparators.

For details, see "F-10" of "4-12-1. Various functions in FUNCTION SELECTING mode".

4-5-5. To assign comparators

You are able to assign "High limit" or "Low limit" to each comparator.

Suppose the [LO] comparator is assigned "High limit" and [LL] comparator is assigned "High limit" too. You are able to set them as the level comparator.

For details, see from "F-23" to "F-26" of "4-12-1. Various functions in FUNCTION SELECTING mode".

4-6. PATTERN FUNCTION

You are able to register the [HH]/[HI]/[LO]/[LL] limit values in 4 operation patterns (pattern 0 to pattern 3). You are able to select the target pattern by the key operations.

a) To select operation patterns

Select the operation patterns.

For details, see "F-20" of "4-12-1. Various functions in FUNCTION SELECTING mode".

b) To write the pre-set values

Set the comparator values after changing the operation patterns (pattern 0 to pattern 3).

The comparator pattern that you set is registered the operation patterns.

NOTE

The WGA-680A keeps the value after turning OFF the power.

4-7. LEVEL TEST FUNCTION

The LEVEL TEST function displays the pre-set values as the indicated value. The LEVEL TEST function is used for adjusting the external connected devices or testing the output of the WGA-680A.

a) To set

- Display additional function
0 (Disabled) : Displays the pre-set value regardless of the measured value.
1 (Enable) : Displays the measured value added to the pre-set value.
- LEVEL TEST values
LEVEL TEST value : ± 99999
Initial value : 1000

For details, see "F-22" of "4-12-1. Various functions in FUNCTION SELECTING mode".

b) To operate

The pre-set value is displayed while the LEVEL TEST ON/OFF is "1: LEVEL TEST ON".

For details, see "F-22" of "4-12-1. Various functions in FUNCTION SELECTING mode".

4-8. UPDATING RATE OF DISPLAYING VALUES

Generally, the WGA-680A displays thinning data for approx. 15.6 times/sec. With high-response phenomena, rapidly-changing indicated values make it difficult to read. In such a case, by decreasing the updating-rate of display values, you are able to read values much easier.

a) Key operation

Press the **FUNCTION** key for 2 seconds. The "F-01" is displayed and the mode is FUNCTION SELECTING mode.

Press the **→** key until the "F-21" is displayed. Press the **SET** key.
The WGA-680A is "F-21" SETTING mode.

b) To select the updating rate

- The current updating rate is displayed and flickers.
 - 0: 15.60 times/sec.
 - 1: 7.80 times/sec.
 - 2: 3.90 times/sec.
 - 3: 1.95 times/sec.
 - 4: 0.98 times/sec.
 - 5: 0.49 times/sec.
 - 6: 0.24 times/sec.
 - 7: 0.12 times/sec.

c) To exit

The "F-21" is displayed. Press the **CANCEL** key.
The WGA-680A starts measuring data based on the updating rate.

4-9. DISPLAY STABILITY FUNCTION

It is a function to reduce the variation of the displayed value. Use this when you are concerned about variations in displayed values.

a) Key operation

Press the **FUNCTION** key for 2 seconds. The "F-01" is displayed and the mode is FUNCTION SELECTING mode.

Press the **→** key until the "F-27" is displayed. Press the **SET** key.

The WGA-680A is "F-27" SETTING mode.

b) To select the updating rate

The current updating rate is displayed and flickers.

- 0 (Disabled)
- 1 (Enable)

c) To exit

The "F-27" is displayed. Press the **CANCEL** key.

NOTE

Display stability function is valid only for the display value of the main unit.

There may be a difference between the DA output, BCD output, RS-232C output, RS-485 output, CC-Link output, comparator output and display value.

4-10. HOLD FUNCTIONS

The WGA-680A has the following 10 HOLD modes. Each HOLD functions has the "Display mode" and "Comparison mode".

To enable the hold functions, use the control input signals (HOLD command and RESET command) or HOLD key on the front panel.

In addition, the [HOLD] LED on the front panel indicates a state of the hold functions.

[HOLD] LED lights up : Detecting interval

[HOLD] LED flickers : Holding interval

a) HOLD modes

(1) Arbitrary point hold	When the HOLD command is turned ON and after the lapse of delay time, the WGA-680A holds the measured value at that moment (arbitrary point) until the HOLD command is turned OFF.
(2) Peak hold	When the HOLD command is turned ON and after the lapse of delay time, the WGA-680A detects and displays the peak value until the HOLD command is turned OFF. The WGA-680A releases the peak value detection and holding operation, when the hold command is turned OFF or reset command is turned ON.
(3) Interval-specified peak hold	When the HOLD command is turned ON and after the lapse of delay time, the WGA-680A detects the peak value until the HOLD command is turned OFF. The WGA-680A holds and displays the peak value when the HOLD command is turned OFF. The WGA-680A releases the holding operation when the RESET command is turned ON.
(4) Time-specified peak hold	When the HOLD command is turned ON and after the lapse of delay time, the WGA-680A detects the peak value for the pre-set detect time (detecting interval). After the lapse of pre-set detecting time, the WGA-680A holds and displays the peak value. The WGA-680A releases the holding operation when the RESET command is turned ON.
(5) Bottom hold	When the HOLD command is turned ON and after the lapse of delay time, the WGA-680A detects and displays the bottom value until the HOLD command is turned OFF. The WGA-680A releases the bottom value detection and holding operation, when the hold command is turned OFF or reset command is turned ON.
(6) Interval-specified bottom hold	When the HOLD command is turned ON and after the lapse of delay time, the WGA-680A detects the bottom value until the HOLD command is turned OFF. The WGA-680A holds and displays the bottom value when the HOLD command is turned OFF. The WGA-680A releases the holding operation when the RESET command is turned ON.
(7) Time-specified bottom hold	When the HOLD command is turned ON and after the lapse of delay time, the WGA-680A detects the bottom value for the pre-set detect time (detecting interval). After the lapse of pre-set detecting time, the WGA-680A holds and displays the bottom value. The WGA-680A releases the holding operation when the RESET command is turned ON.
(8) Peak-to-peak hold	When the HOLD command is turned ON and after the lapse of delay time, the WGA-680A detects and displays the difference (amplitude), between the peak value and bottom value, and displays the peak-to-peak value of the difference until the HOLD command is turned OFF. The WGA-680A releases the peak-to-peak value detection and holding operation, when the hold command is turned OFF or reset command is turned ON.
(9) Interval-specified peak-to-peak hold	When the HOLD command is turned ON and after the lapse of delay time, the WGA-680A detects the peak-to-peak value until the HOLD command is turned OFF. The WGA-680A holds the peak-to-peak value when the HOLD command is turned OFF. The WGA-680A releases the holding operation when the RESET command is turned ON.
(10) Time-specified peak-to-peak hold	When the HOLD command is turned ON and after the lapse of delay time, the WGA-680A detects the peak-to-peak value for the pre-set detect time (detecting interval). After the lapse of pre-set detecting time, the WGA-680A holds and displays the peak-to-peak value. The WGA-680A releases the holding operation when the RESET command is turned ON.

b) Comparison Mode

(1) Normal comparison mode

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

(2) Hold comparison mode

The comparator doesn't compare in normal measuring mode and the detecting interval, and compares in holding interval.

Suppose the mode has no hold interval like the peak hold, the setting is ignored. And the comparator always compares the measured value.

c) Display mode

(1) Normal display mode

During the detecting interval : Displays the peak/bottom/peak-to-peak value, responding to inputs.

During the holding interval : Holds and displays the peak/bottom/peak-to-peak value.

(2) Hold display mode

During the delay time and detecting interval:

Holds the measured value that is detected immediately after turning ON the HOLD command.

During the holding interval:

Displays the peak/bottom/peak-to-peak value during the detecting interval.

d) Delay time

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

e) Detect time

Sets the time of the detecting interval.

Enable : Time-specified peak hold, time-specified bottom hold, time-specified peak-to-peak hold

Disable : The other HOLD modes

f) Key operation

To operate the WGA-680A in the pre-set HOLD mode, press the **HOLD** key on the MEASURING mode. The operation varies with the pre-set hold mode.

(1) Arbitrary point hold, peak hold, bottom hold, peak-to peak hold, time-specified peak hold, time-specified bottom hold, time-specified peak-to-peak hold

Press the **HOLD** key.

The status goes to the detecting and holding status
(Detecting interval, holding interval)

↓

Press the **HOLD** key.

Releases the holding operation (RESET status)

(2) Interval-specified peak hold, interval-specified bottom hold

Press the **HOLD** key.

The status goes to the detecting status (Detecting interval)

↓

Press the **HOLD** key.

Holds the value (Holding interval)

↓

Press the **HOLD** key.

Releases the holding operation (RESET status)

g) Operation from the rear panel

- To operate the HOLD mode, short-circuit the COM (common) and 2 (HOLD command) of the [INPUT] terminals on the rear panel.
- To release the holding operation, short-circuit the COM (common) and 3 (RESET command).
- The HOLD command is valid when the RESET command is OFF.
- When the RESET command is ON, the HOLD command is invalid and the mode goes to normal measuring mode.

For details, see each HOLD mode figures.

4-10-1. Arbitrary point hold

The WGA-680A holds the instantaneous value and displays it.

- Key operation

The WGA-680A holds the instantaneous value, when the **HOLD** key is pressed and after the lapse of delay time.

The WGA-680A holds the instantaneous value until the **HOLD** key is pressed again.

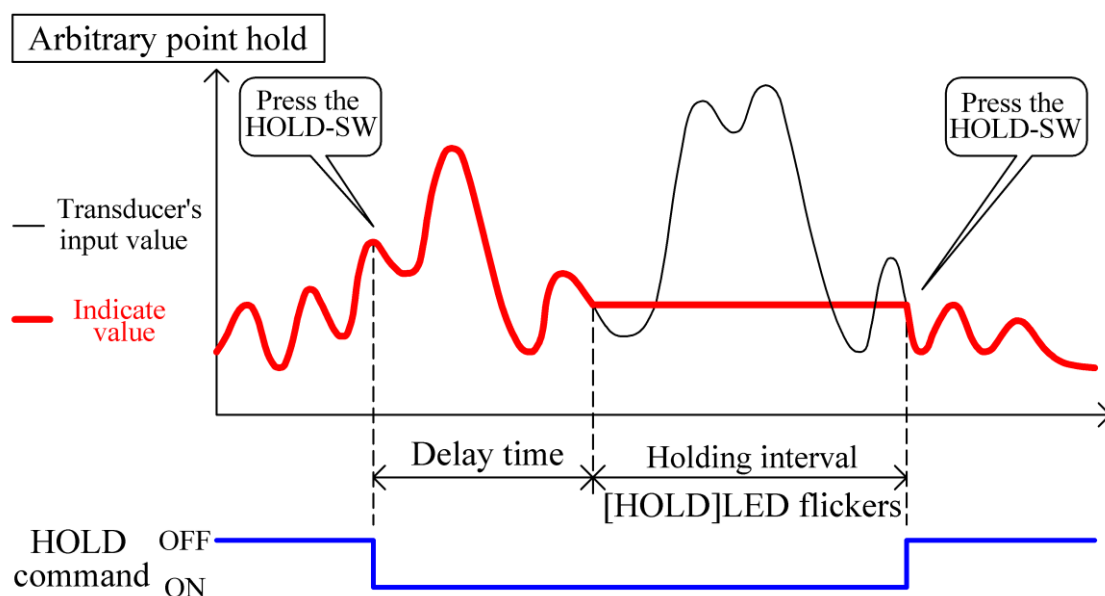
- Control input

The WGA-680A holds the instantaneous value when the HOLD command is turned ON and after the lapse of delay time.

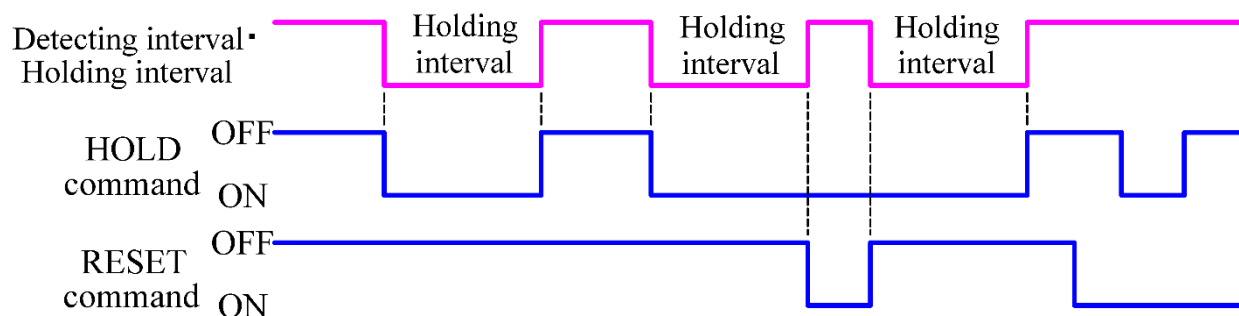
The WGA-680A holds the instantaneous value until the HOLD command is turned OFF.

NOTE

- The display mode (normal display mode or hold display mode) is invalid. The WGA-680A constantly displays the latest measured value.
- When selecting the "Hold comparison mode", the WGA-680A compares values during the holding interval only.



The WGA-680A works as follow during holding interval by turning ON/OFF the “HOLD command” and “RESET command.”



4-10-2. Peak hold, bottom hold

Peak hold : The WGA-680A displays the peak value during the detecting interval.
 Bottom hold : The WGA-680A displays the bottom value during the detecting interval.

- Key operation

The detecting interval starts when the **HOLD** key is pressed and after the lapse of delay time.

When the **HOLD** key is pressed for the second time, the detecting interval ends. The WGA-680A displays values as normal.

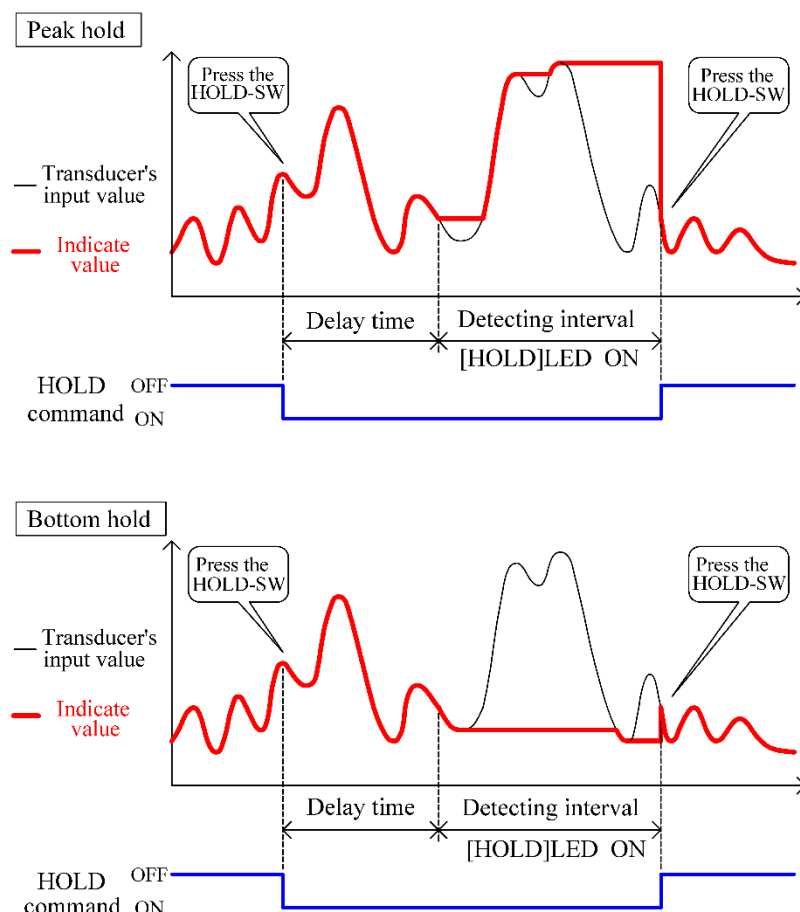
- Control input

The detecting interval starts when the HOLD command is ON and after the lapse of delay time.

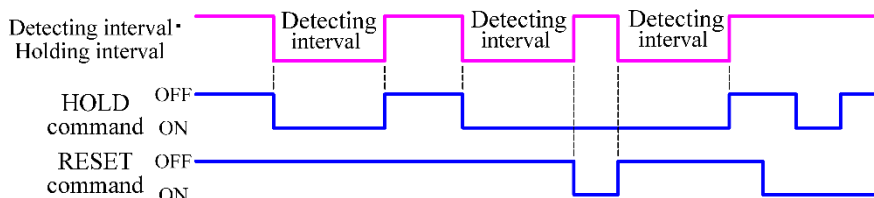
When the **HOLD** key is turned OFF, the detecting interval ends. The WGA-680A displays values as normal.

NOTE

- When the display mode is "Hold display mode", the WGA-680A constantly displays the latest measured value, because there is no holding interval.
- When the comparison mode is "Hold comparison mode", the WGA-680A constantly compares the latest measured value, because there is no holding interval.



The WGA-680A works as follow during detecting interval by turning ON/OFF the “HOLD command” and “RESET command.”



4-10-3. Peak-to-peak hold (amplitude hold)

The WGA-680A detects the difference (amplitude), between the peak value and bottom value, and displays the peak-to-peak value of the difference.

- Key operation

The detecting interval starts when the **HOLD** key is pressed and after the lapse of delay time.

When the **HOLD** key is pressed for the second time, the detecting interval ends. The WGA-680A displays values as normal.

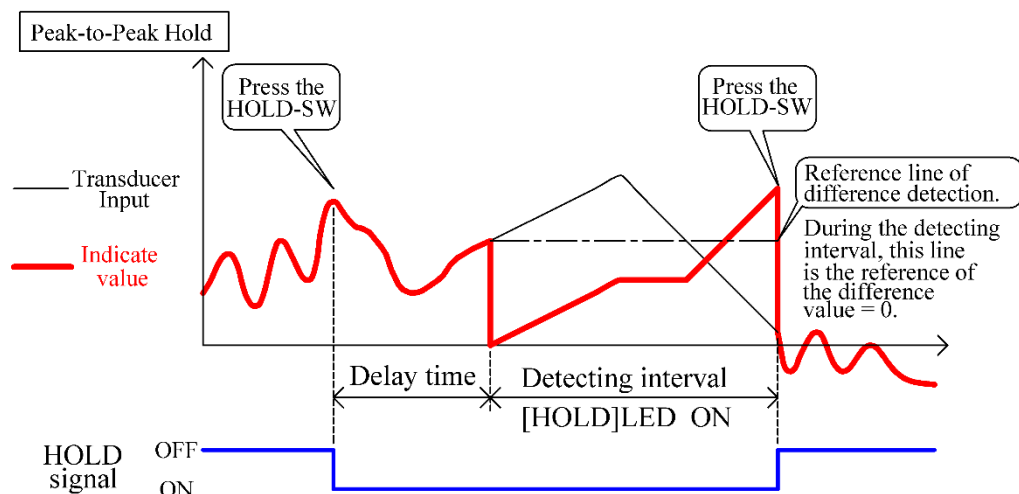
- Control input

The detecting interval starts when the HOLD command is ON and after the lapse of delay time.

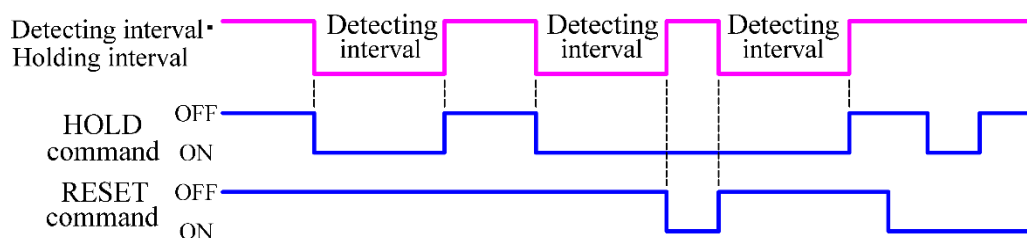
When the **HOLD** key is turned OFF, the detecting interval ends. The WGA-680A displays values as normal.

NOTE

- When the display mode is "Hold display mode", the WGA-680A constantly displays the latest measured value, because there is no holding interval.
- When the comparison mode is "Hold comparison mode", the WGA-680A constantly compares the latest measured value, because there is no holding interval.



The WGA-680A works as follow during detecting interval by turning ON/OFF the “HOLD command” and “RESET command.”



4-10-4. Interval-specified peak hold, interval-specified bottom hold, interval-specified peak-to-peak hold

Interval-specified peak hold

The WGA-680A detects the peak value during the detecting interval and displays the value during the holding interval.

Interval-specified bottom hold

The WGA-680A detects the bottom value during the detecting interval.

Interval-specified peak-to-peak hold

The WGA-680A detects the difference, between the peak value and bottom value, during the detecting interval and displays the value during the holding interval.

(1) Normal display mode

● Key operation

The detecting interval starts when the **HOLD** key is pressed and after the lapse of delay time.

When the **HOLD** key is pressed for the second time, the detecting interval ends and the holding interval starts. The WGA-680A holds the value.

When the **HOLD** key is pressed for the third time, the holding interval ends. The WGA-680A displays values as normal.

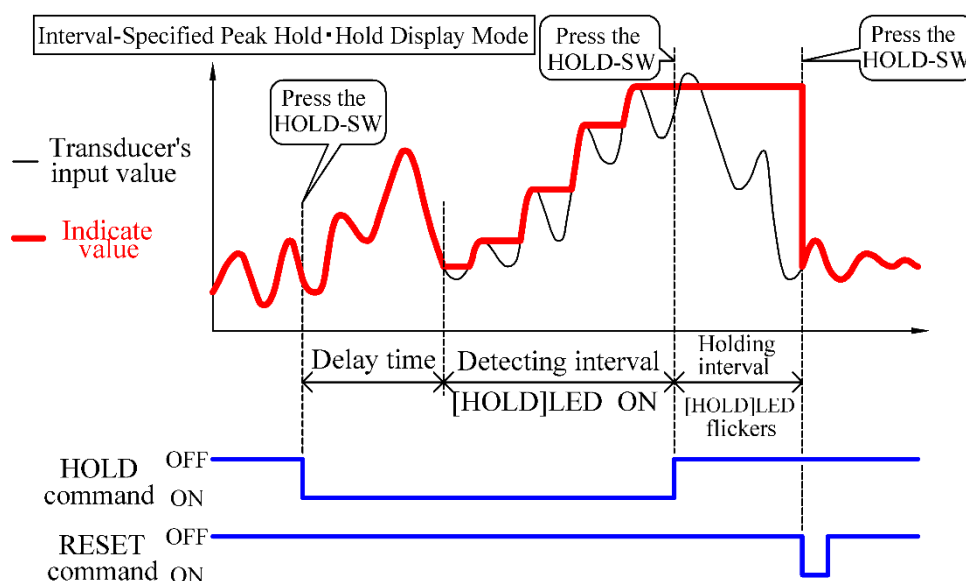
● Control input

The detecting interval starts when the HOLD command is ON and after the lapse of delay time.

When the Hold command is turned OFF, the detecting interval ends and the holding interval starts.

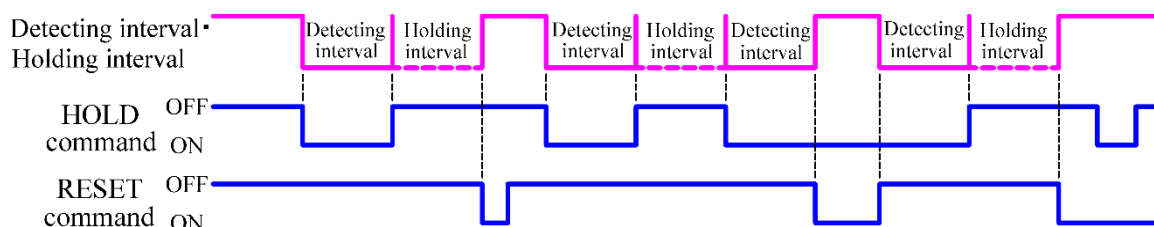
The WGA-680A holds the value.

When the RESET command is turned ON, the holding interval ends. The WGA-680A displays values as normal.



Note) Even if no RESET command is issued, it is reset with the next HOLD command.

The WGA-680A works as follow during detecting interval and holding interval by turning ON/OFF the “HOLD command” and “RESET command.”



(2) Hold display mode

● Key operation

When the **HOLD** key is pressed, the WGA-680A holds the value at that time. The detecting interval starts after the lapse of delay time.

When the **HOLD** key is pressed for the second time, the detecting interval ends and the holding interval starts. The WGA-680A displays the detected value.

When the **HOLD** key is pressed for the third time, the holding interval ends. The WGA-680A displays values as normal.

● Control input

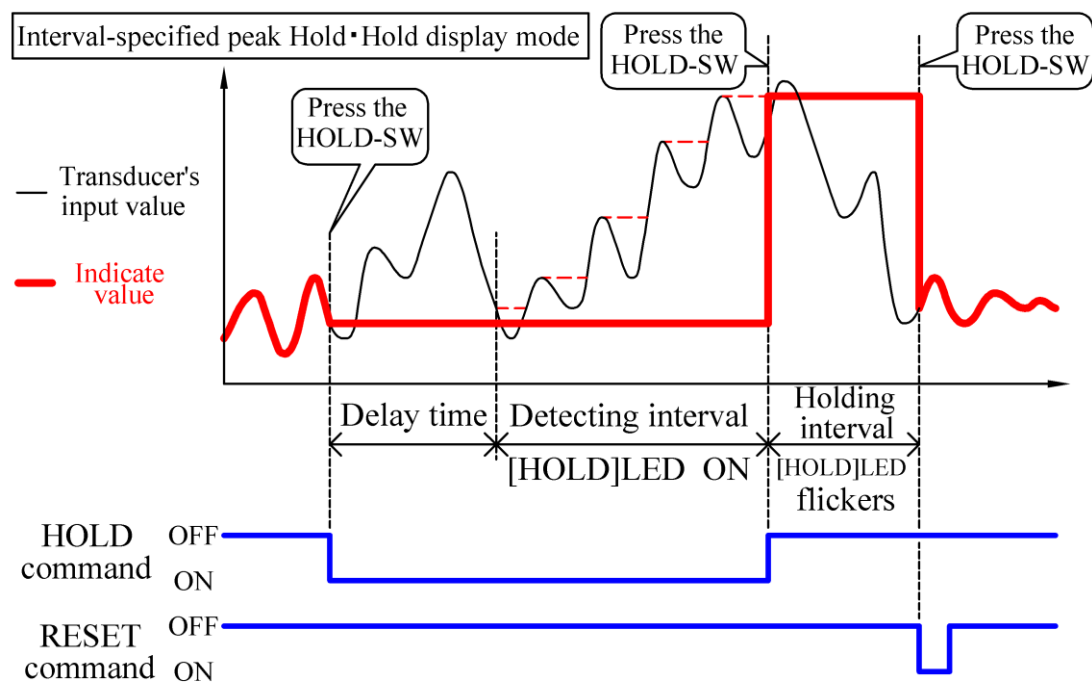
While the **HOLD** command is ON, the WGA-680A holds the value, detected when turning ON the **HOLD** command. The detecting interval starts after the lapse of delay time.

When the **HOLD** command is turned OFF, the detecting interval ends and the holding interval starts. The WGA-680A displays the detected value.

When the **RESET** command is turned ON, the holding interval ends. The WGA-680A displays values as normal.

NOTE

- When selecting the "Hold comparison mode", the WGA-680A compares values during the holding interval only.



Note) Even if no **RESET** command is issued, it is reset with the next **HOLD** command.

4-10-5. Time-specified peak hold, Time-specified bottom hold, Time-specified peak-to-peak hold

Time-specified peak hold

The WGA-680A detects the peak value during the detecting interval and displays the value during the holding interval.

Time-specified bottom hold

The WGA-680A detects the bottom value during the detecting interval and displays the value during the holding interval.

Time-specified peak-to-peak hold

The WGA-680A detects the difference, between the peak value and bottom value, during the detecting interval and displays the value during the holding interval.

(1) Normal display mode

● Key operation

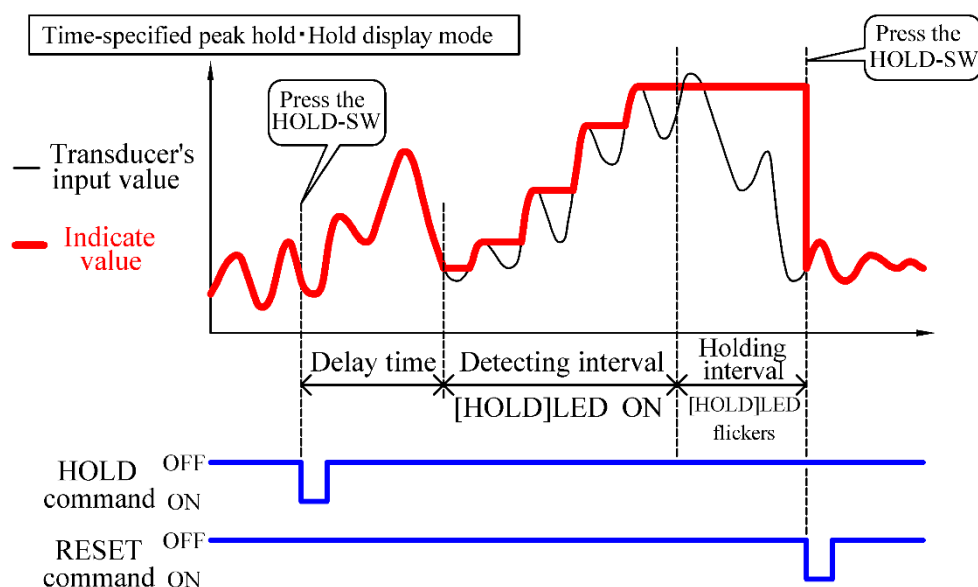
The detecting interval starts when the **[HOLD]** key is pressed and after the lapse of delay time. The pre-set the sdetect time is the detecting interval. After the detecting interval ends, the interval goes to the holding interval.

When the **[HOLD]** key is pressed for the second time, the holding interval ends. The WGA-680A displays values as normal.

● Control input

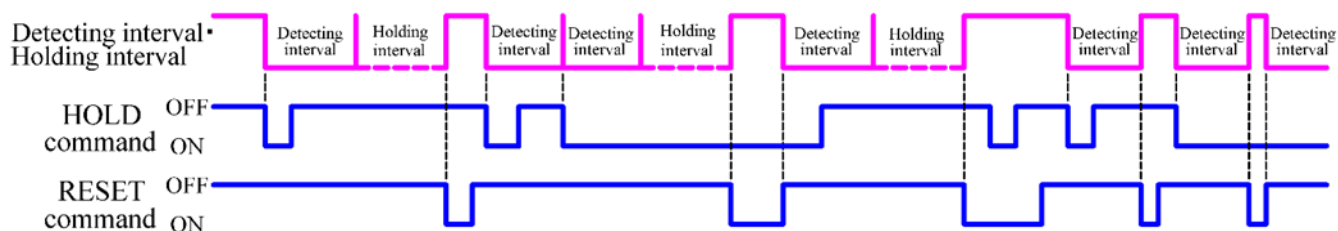
The detecting interval starts when the HOLD command is turned ON and after the lapse of delay time. The pre-set the detect time is the detecting interval. After the detecting interval ends, the interval goes to the holding interval.

When the RESET command is turned ON, the holding interval ends. The WGA-680A displays values as normal.



Note) Even if no RESET command is issued, it is reset with the next HOLD command.

The WGA-680A works as follow during detecting interval and holding interval by turning ON/OFF the “HOLD command” and “RESET command.”



(2) Hold display mode

● Key operation

When the **HOLD** key is pressed, the WGA-680A holds the value at that time. The detecting interval starts after the lapse of delay time.

When the **HOLD** key is pressed for the second time, the holding interval ends. The WGA-680A displays values as normal.

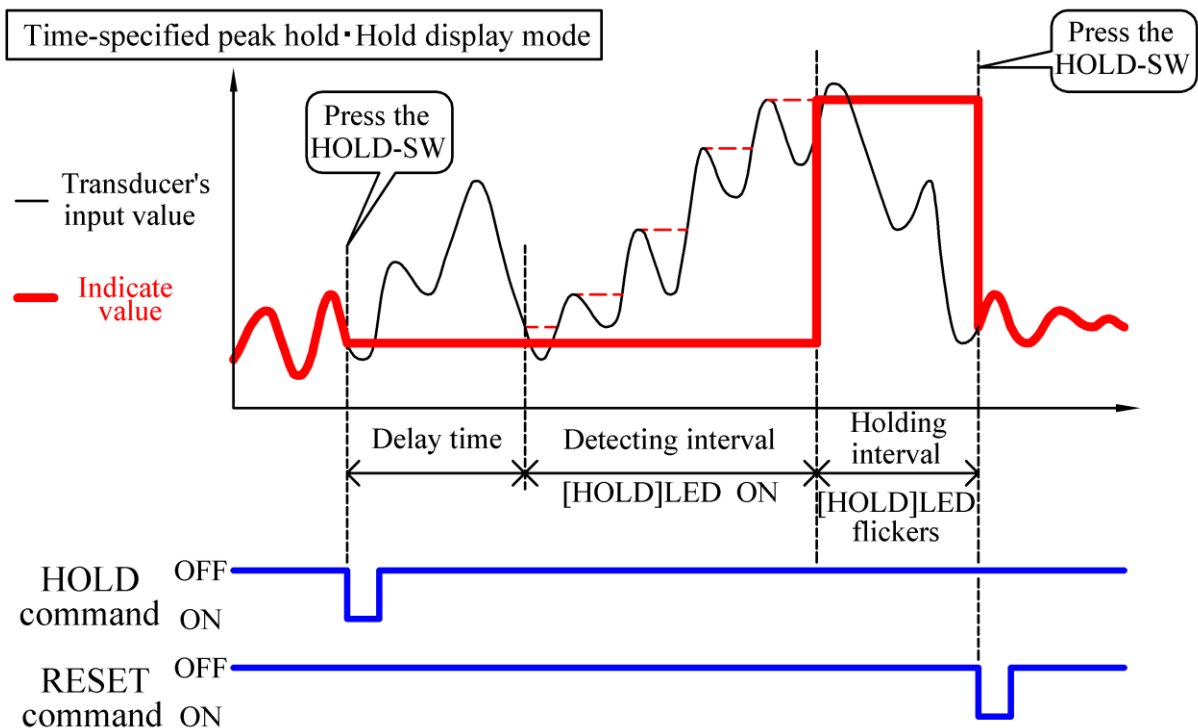
● Control input

While the HOLD command is ON, the WGA-680A holds the value, detected when turning ON the HOLD command. The detecting interval starts after the lapse of delay time.

When the RESET command is turned ON, the holding interval ends. The WGA-680A displays values as normal.

NOTE

- When selecting the "Hold comparison mode", the WGA-680A compares values during the holding interval only.



Note) Even if no RESET command is issued, it is reset with the next HOLD command.

4-11. ANALOG OUTPUT (D/A) FUNCTION

The ANALOG OUTPUT function converts the measured value to the output signal (voltage): $\pm 10\text{V}$ or output signal (current): 4 to 20mA.

When the output signal (voltage) is 0 to 10 V, the output is 4 to 20 mA fixed.

a) Key operation

Press the **FUNCTION** key for 2 seconds. The "F-01" is displayed and FUNCTION SELECTING mode is activated.

Press the **→** key until the "F-06" is displayed. Press the **SET** key.

The mode goes to ANALOG OUTPU SETTING mode.

b) Scaling analog output voltage

Select manual setting or automatic setting.

In the manual setting, set the indicated value to output the voltage 0 V and 10 V.

In the automatic setting, the indicated value for outputting 0 V and 10 V, will be set automatically when calibration is executed.

0 : Manual setting

1 : Automatic setting

When you select automatic setting, "F-06" is displayed. Execute procedure e, and exit the setting.

c) To set 0 V values

Set the indicated value to have the output to "0 V" or "4 mA".

The current 0 V value is displayed and the highest-order digit flickers.

Press the **→** key and **↑** key to set the value. Press the **SET** key.

d) To set 10 V values

Set the indicated value to have the output to "10 V" or "20 mA".

The current 10 V value is displayed and the highest-order digit flickers.

Press the **→** key and **↑** key to set the value. Press the **SET** key.

e) To exit

The "F-06" is displayed. Press the **CANCEL** key.

4-12. LIST OF FUNCTIONS

4-12-1. Various functions in FUNCTION SELECTING mode

The FUNCTION SELECTING mode has the following functions

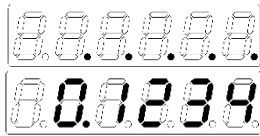
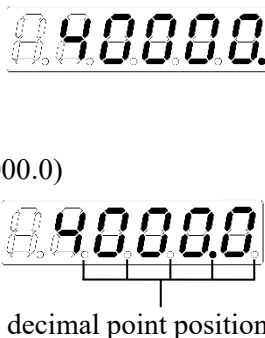
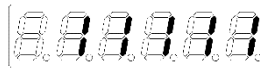
F-01: Original value	* F-16: RS communication settings
F-02: Actual load calibration	* F-17: Device ID
F-03: Sensitivity registering calibration	* F-18: CC-Link
F-04: Hold mode	F-19: Numeric value registering calibration
F-05: Self-check	F-20: Operation pattern
F-06: Analog output (D/A) scaling	F-21: Updating rate of displaying values
F-07: Smoothing	F-22: Level test signals
F-08: Additional value	F-23: [HH] comparator (comparator-3) functions
F-09: Automatic zero compensation	F-24: [HI] comparator (comparator-1) functions
F-10: Hysteresis	F-25: [LO] comparator (comparator-2) functions
* F-11: BCD output Logic	F-26: [LL] comparator (comparator-4) functions
F-12: Initialize	F-27: Display stability function
F-13: Bridge excitation selection	
* F-14: TEDS reading item	

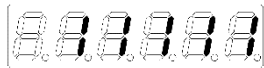
* Optional models only.

NOTE

- In function selection mode and set mode, analog output and control input/output are stopped. If it is in operation, pay attention to the load on the transducer and the operation of the system as it may cause a malfunction.

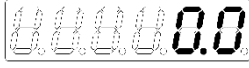
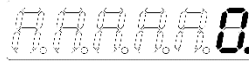
Table: FUNCTION SELECTING mode and various functions

FUNCTION SELECTING MODE	Key operation and WGA-680A movement in SETTING mode	Functional description, supplements
F-01 Original value	The "...." is displayed. To display the current input value in mV/V, press the SET key. 	A function that displays the raw output value of the transducer.
F-02 Actual load calibration	NOTE Before executing the calibration function, make sure to execute the DIGITAL ZERO function with no load applied to the transducer. ● Apply load to the transducer. ● Set a desired numeric value (load value) to be indicated, and press the SET key. Range: ± 99999 (Initial value: 4000.0) ● Set a decimal point position and press the SET key.  ● The "F00000" appears. After enabling or disabling the key code, the new calibration value appears. ● Remove the load. <To enable the key code> The "00000" is displayed at the end.  In this status, set the "00628" or "11111" and press the SET key.  or  Then, the calibration value is updated. After the settings, the key code is enabled. To update the calibration value next time, you are required to enter the key code. To disable the key code, execute the "F-12". <To disable the key code> The "00000" is displayed at the end.  Press the SET key. Then, the calibration value is updated. After the settings, the key code is disabled. You are able to update the calibration value without entering the key code.	A function that applies the actual load to the transducer and sets the indicated value at that time. For details, see "4-4-1. Actual load calibration". The "00628" and "11111" are key codes. The key codes prevents the calibration values from changing due to malfunctions.

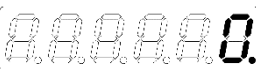
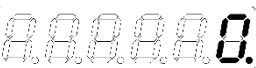
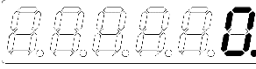
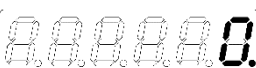
FUNCTION SELECTING MODE	Key operation and WGA-680A movement in SETTING mode	Functional description, supplements
F-03 Sensitivity registering calibration	Displays the following items (1) → (2) → (3). (See below figures) (1) Rated output Set the rated output (mV/V) of the transducer and press the SET key. Range: -3.2000 to 3.2000 (Initial value: 2.0000)  (2) Rated capacity Set a desired numeric value (rated capacity) to be indicated and press the SET key. Range: ±99999 (Initial value: 4000.0)  (3) Decimal point position Set a decimal point position and press the SET key. Then, the calibration value is updated.  (4) Enable/disable the key code The "F00000" appears. After enabling or disabling the key code, the new calibration value appears. <To enable the key code> The "00000" is displayed at the end. In this status, set the "00628" or "11111" and press the SET key.  Then, the calibration value is updated.  or  After the settings, the key code is enabled. To update the calibration value next time, you are required to enter the key code. To disable the key code, execute the "F-12". <To disable the key code> The "00000" is displayed at the end. Press the SET key. Then, the calibration value is updated.  After the settings, the key code is disabled. You are able to update the calibration value without entering the key code.	A function that conducts calibration by registering the rated output and rated capacity of the transducer without applying the actual load. For details, see "4-4-2. Sensitivity registering calibration". How to set disable/enable the key codes is same as "F-02: Actual Load Calibration". The "00628" and "11111" are key codes. The key codes prevents the calibration values from changing due to malfunctions.

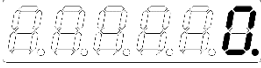
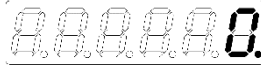
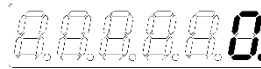
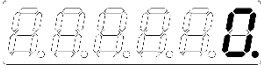
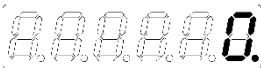
FUNCTION SELECTING MODE	Key operation and WGA-680A movement in SETTING mode	Functional description, supplements
F-04 Hold mode	Displays the following items (1). (2). (3). After setting (1).(2).(3), Displays the following items (4) → (5). (See below figures) (1) Hold Mode 0: Tracking (Initial value) 1: Arbitrary point hold 2: Peak Hold 3: Interval-specified peak hold 4: Time-specified peak hold 5: Bottom hold 6: Interval-specified bottom hold 7: Time-specified bottom hold 8: Peak-to-peak hold 9: Interval-specified peak-to-peak hold - A: Time-specified peak-to-peak hold (2) Display mode 0: Normal display mode (initial value) 1: Hold display mode (3) Comparison Mode 0: Normal comparison mode (initial value) 1: Hold comparison mode Select and change values in items (1), (2), and (3) and press the SET key. (4) Delay time The pre-set delay time is displayed. Range: 0.00 to 9.99 (sec.) (Initial value: 0.00) After changing the value, press the SET key. (5) Detect time The pre-set detect time is displayed. Range: 0.01 to 9.99 (sec.) (Initial value: 0.01) After changing the value, press the SET key.	This function sets various hold functions. For details, see "4-10. HOLD FUNCTIONS". Delays the start of holding intervals for the delay time. Sets the detecting interval time of the time-specified peak hold, time-specified bottom hold, and time-specified peak-to-peak hold.
F-05 Self-check	The "...." is displayed. To execute the self-check, press the SET key. All LEDs flicker. The self-check results is displayed as described at the right. ● If faulty self-check results is displayed on the indicator, contact KYOWA or our representatives.	A function that checks the internal memory and displays the checked results. Good: Normal E-01: RAM failure E-02: Flash memory failure

FUNCTION SELECTING MODE	Key operation and WGA-680A movement in SETTING mode	Functional description, supplements																										
F-06 Analog output (D/A) scaling	Displays the following items (1) → (2) → (3). (See below figures) (1) Automatic scaling 0: Manual setting 1: Automatic setting (initial value) Select the value and press the SET key. (2) ZERO indicated value Set the indicated value to have the output "0 V" or "4 mA" and press the SET key. Range: ±99999 (Initial value: 0) (3) FULL-SCALE indicated value Set the indicated value to have the output "10V" or "20 mA" and press the SET key. Range: ±99999 (Initial value: 4000)	With the "1: Automatic setting", the calibrated value is automatically set as the FULL-SCALE indicated value. For details, see "4-11. ANALOG OUTPUT (D/A) FUNCTION".																										
F-07 Smoothing	Displays the following items (1). (2). (3). (See below figure) <table><tr><td>(1)Number of moving average times</td><td>(2) Minimum scale</td></tr><tr><td>0 : 0 time (Initial value)</td><td>0 : 1 (Initial value)</td></tr><tr><td>1 : 2 times</td><td>1 : 2</td></tr><tr><td>2 : 4 times</td><td>2 : 5</td></tr><tr><td>3 : 8 times</td><td>3 : 10</td></tr><tr><td>4 : 16 times</td><td>4 : 20</td></tr><tr><td>5 : 32 times</td><td>5 : 50</td></tr><tr><td>6 : 64 times</td><td>6 : 100</td></tr><tr><td>7 : 128 times</td><td>7 : 200</td></tr><tr><td>8 : 256 times</td><td>8 : 500</td></tr><tr><td>9 : 512 times</td><td>9 : 1000</td></tr><tr><td>A : 1024 times</td><td></td></tr><tr><td>b : 2048 times</td><td></td></tr></table> (3) Analog filter 0 : 300 Hz (Initial value) 1 : 100 Hz 2 : 30 Hz 3 : 10 Hz Select and change values in items (1), (2), and (3) And press the SET key. NOTE When the number of moving average times is set, response of the analog output is deteriorated.	(1)Number of moving average times	(2) Minimum scale	0 : 0 time (Initial value)	0 : 1 (Initial value)	1 : 2 times	1 : 2	2 : 4 times	2 : 5	3 : 8 times	3 : 10	4 : 16 times	4 : 20	5 : 32 times	5 : 50	6 : 64 times	6 : 100	7 : 128 times	7 : 200	8 : 256 times	8 : 500	9 : 512 times	9 : 1000	A : 1024 times		b : 2048 times		A function that stables the indication by smoothing the varying signals from the transducer. (1) Number of moving average times The number of moving average times that averages the measured values for displaying. (2) Minimum scale Minimum unit that varies the indicated value. (3) Analog filter A function that cuts the higher frequencies generated from transducers.
(1)Number of moving average times	(2) Minimum scale																											
0 : 0 time (Initial value)	0 : 1 (Initial value)																											
1 : 2 times	1 : 2																											
2 : 4 times	2 : 5																											
3 : 8 times	3 : 10																											
4 : 16 times	4 : 20																											
5 : 32 times	5 : 50																											
6 : 64 times	6 : 100																											
7 : 128 times	7 : 200																											
8 : 256 times	8 : 500																											
9 : 512 times	9 : 1000																											
A : 1024 times																												
b : 2048 times																												

FUNCTION SELECTING MODE	Key operation and WGA-680A movement in SETTING mode	Functional description, supplements
F-08 Additional value	Set the additional value and press the SET key. Range: ± 99999 (Initial value: 0)  The sum of the measured value and pre-set value is displayed. To display the pre-set value on the indicator, execute the DIGITAL ZERO function with the additional value being set.	A function that adds the desired numeric value to the measured value for displaying.
F-09 Automatic ZERO compensation	Displays the following items (1) → (2) → (3) (See below figures) (1) ZERO compensation range Set the value and press the SET key. Range: 0 to 99999 (Initial value: 0)  (2) Determination time Set the time and press the SET key. Range: 0.0 to 9.9 (sec.) (Initial value: 0.0)  (3) Zero-near-zero Set the value and press the SET key. Range: 0 to 9 (Initial value: 0) 	● Zero tracking When the determination time is passed and the absolute value of the measured value is within the zero compensation range, this function executes the DIGITAL ZERO function and automatically makes the indicated value "0". ● Zero-near-zero When the measured value is within the zero-near-zero range, this function automatically makes the indicated value "0".
F-10 Hysteresis	Set the value and press the SET key.  Range: 0 to 99999 (Initial value: 0)	A function that sets the common hysteresis to four comparators.
F-11 BCD output Logic	For details, see separate volume of "INSTRUCTION MANUAL (FOR BCD/RS-232C/RS-485/TEDS OPTIONS)".	BCD/TEDS model only.

FUNCTION SELECTING MODE	Key operation and WGA-680A movement in SETTING mode	Functional description, supplements
F-12 Initialize	The "00000" is displayed.  Set the "00628" or "11111" and press the SET key. The pre-set value returns to the factory default setting.  or  ● The pre-set value returns to the factory default setting. ● Sensitivity registering calibration(F-03), bridge excitation(F-13) and numeric value registering calibration(F-19) are not initialized.	A function that returns the pre-set values to the factory default. NOTE If the main unit firmware version is 1.15 or earlier, initialization will be executed even if "00000" is entered.
F-13 BV selection	The pre-set value is displayed. 0: 10 V 1: 2 V (Initial value) Set the value and press the SET key. 	A function that selects and changes the bridge excitation voltage. For details, see "4-2. TO SELECT BRIDGE EXCITATION VOLTAGE".
F-14 TEDS reading item	For details, see separate volume of "INSTRUCTION MANUAL (FOR BCD/RS-232C/RS-485/TEDS OPTIONS)".	BCD/TEDS model, RS-232C/TEDS model, and RS-485/TEDS model only.
F-16 RS communication Settings	For details, see separate volume of "INSTRUCTION MANUAL (FOR BCD/RS-232C/RS-485/TEDS OPTIONS)".	RS-232C/TEDS model and RS-485/TEDS model only.
F-17 Device ID	For details, see separate volume of "INSTRUCTION MANUAL (FOR BCD/RS-232C/RS-485/TEDS OPTIONS)".	RS-485/TEDS model only.
F-18 CC-Link	For details, see separate volume of "INSTRUCTION MANUAL (FOR CC-LINK OPTION)".	CC-Link model only.

FUNCTION SELECTING MODE	Key operation and WGA-680A movement in SETTING mode	Functional description, supplements
F-19 Numeric value registering calibration (Calibration zero registration)	The calibration-zero value (mV/V) is displayed.  Set the initial value of the transducer. Press the SET key. Then, the calibration-zero value is updated.	A function that re-sets the calibration-zero value (a standard zero point). For details, see "4-4-3. Numeric value registering calibration".
F-20 Operation pattern	The pre-set value is displayed. 0: Pattern 0 (Initial value) 1: Pattern 1 2: Pattern 2 3: Pattern 3  Set the value and press the SET key.	Select comparator values from 4 patterns. For details, see "4-6. PATTERN FUNCTION".
F-21 Updating rate of displaying values	The pre-set value is displayed. 0: 15.60 times/sec. (Initial value) 1: 7.80 times/sec. 2: 3.90 times/sec. 3: 1.95 times/sec. 4: 0.98 times/sec. 5: 0.49 times/sec. 6: 0.24 times/sec. 7: 0.12 times/sec.  Set the value and press the SET key.	This function sets the updating-rate of the measured displaying value. For details, see "4-8. UPDATING RATE OF DISPLAYING VALUES".
F-22 Level Test signals	Displays the following items (1) → (2) → (3) (See below figures) (1) Display additional function 0: Disable (Initial value) 1: Enable  Set the value and press the SET key. (2) LEVEL TEST values Set the value and press the SET key.  Range: 0 to ±99999 (Initial value: 1000) (3) LEVEL TEST ON/OFF 0: LEVEL TEST OFF (Initial value) 1: LEVEL TEST ON  Set the value and press the SET key.	For details, see "4-7. LEVEL TEST FUNCTION". A function that turns OFF/ON the Level Test values, pre-set in the (1) and (2).

FUNCTION SELECTING MODE	Key operation and WGA-680A movement in SETTING mode	Functional description, supplements
F-23 [HH] Comparator (Comparator-3) Functions	The pre-set value is displayed. 0: High limit (Initial value) 1: Low limit Set the value and press the SET key. 	Assign "High limit" or "Low limit" to [HH] comparator as comparator-3.
F-24 [HH] Comparator (Comparator -1) Functions	The pre-set value is displayed. 0: High limit (Initial value) 1: Low limit Set the value and press the SET key. 	Assign "High limit" or "Low limit" to [HI] comparator as comparator-3.
F-25 [LO] Comparator (Comparator -2) Functions	The pre-set value is displayed. 0: High limit 1: Low limit (Initial value) Set the value and press the SET key. 	Assign "High limit" or "Low limit" to [LO] comparator as comparator-3.
F-26 [LL] Comparator (Comparator -4) Functions	The pre-set value is displayed. 0: High limit 1: Low limit (Initial value) Set the value and press the SET key. 	Assign "High limit" or "Low limit" to [LL] comparator as comparator-3.
F-27 Display stability	The pre-set value is displayed. 0: Disable(Initial value) 1: Enable Set the value and press the SET key. 	

4-12-2. Error codes

Error	Contents	Countermeasures
OFL1	The measured value is exceeding the input range to the minus side.	Decrease the input signal. Use the input signal within ± 3.2 mV/V.
OFL2	The measured value is exceeding the input range to the plus side.	
OFL3	The indicated value is below -99999.	Decrease the input signal or reset the sensitivity registering value.
OFL4	The indicated value is above +99999.	
E-00	The sensitivity registering value is exceeding the specified range.	Use the sensitivity registering value 10000 or less per 0.1 mV/V.
E-01	RAM Failure	Failure Contact KYOWA or our representatives for repair.
E-02	Flash memory Failure	
E-03	TEDS Failure	Check that the TEDS transducer is correctly connected.

4-12-3. Table of functions

No.	Functions	Initialize	Parameters	Digits	Options/ranges		Initial values	Remarks	
F-01	Original value							The current input value (mV/V) is displayed.	
F-02	Actual load calibration		Rated value		-99999 to +99999		4000.0	Linked to the sensitivity registering calibration.	
			Decimal point position	10e0		None	None	Decimal point: None	
				10e1					The 10th digit lights up.
				10e2					The 100th digit lights up.
				10e3					The 1000th digit lights up.
10e4	The 10000th digit lights up.	The decimal point is displayed at the 10000th digit.							
F-03	Sensitivity registering calibration		Rated output		-3.2000 to +3.2000		2.0000	Rated input (mV/V)	
			Rated value		-99999 to +99999		4000.0	The indicated value when the input is the rated input. This parameter is linked to the rated value of the actual load calibration.	
			Decimal point position	10e0		None	None	Decimal point: None	
				10e1					The 10th digit lights up.
				10e2					The 100th digit lights up.
10e3	The 1000th digit lights up.								
10e4	The 10000th digit lights up.	The decimal point is displayed at the 10000th digit.							

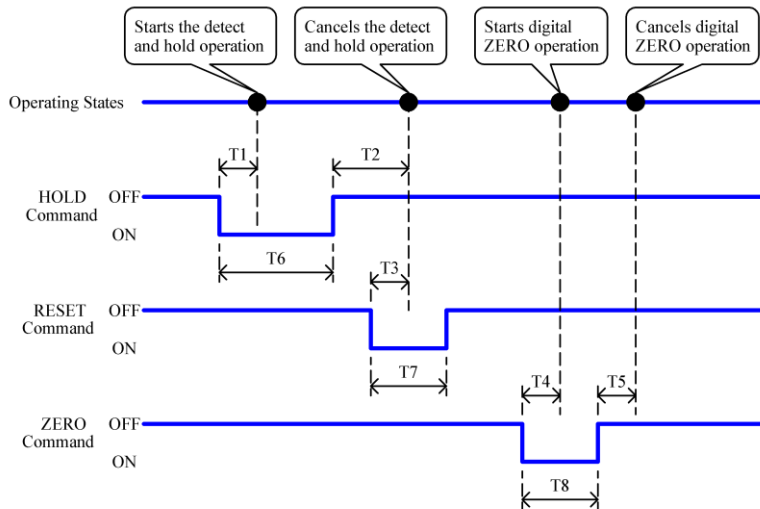
No.	Functions	Initialize	Parameters	Digits	Options/ranges		Initial values	Remarks
F-04	Hold mode	✓	Hold mode	10e2	0	Tracking	0	Normal measurements
					1	Arbitrary point hold		Sample hold
					2	Peak Hold (PH)		Peak Hold
					3	Interval-specified PH		Interval-specified peak hold
					4	Time-specified PH		Time-specified peak hold
					5	Bottom hold (BH)		Bottom hold
					6	Interval - specified BH		Interval -specified bottom hold
					7	Time-specified BH		Time-specified bottom hold
					8	Peak-to-peak hold (p-p)		Peak-to-peak hold
					9	Interval - specified P-P		Interval-specified peak-to-peak hold
			Display mode	10e1	0	Normal display mode	0	Interval-specified and time-specified only.
					1	Hold display mode		Interval-specified and time-specified only.
			Comparison mode	10e0	0	Normal comparison mode		Compares data normally.
					1	Hold comparison mode		Compares data during the holding operations.
			Delay time		0.00 to 9.99		0.00	The time to starting the detection interval from being turned on HOLD command.
			Detect time		0.01 to 9.99		0.01	Time specification PH/BH/P-P Only.
F-05	Self-check							Self-check function (EEPROM and RAM)
F-06	Analog output (D/A) scaling	✓	Automatic scaling	10e0	0	Manual	1	Automatically not executes the scaling during the sensitivity registering calibration.
					1	Auto		Automatically executes the scaling during the sensitivity registering calibration.
			ZERO indicated value		-99999 to +99999		0	Indicated value that outputs 0V.
			FULL-SCALE indicated value		-99999 to +99999		4000	Indicated value that outputs 10V.

No.	Functions	Initialize	Parameters	Digits	Options/ranges		Initial values	Remarks
F-07	Smoothing	✓	The number of moving average times	10e2	0	0 times	0	None
					1	2 times		2 times (0.5msec)
					2	4 times		4 times (1msec)
					3	8 times		8 times (2msec)
					4	16 times		16 times (4msec)
					5	32 times		32 times (8msec)
					6	64 times		64 times (16msec)
					7	128 times		128 times (32msec)
					8	256 times		256 times (64msec)
					9	512 times		512 times (128msec)
					A	1024 times		1024 times (256msec)
					b	2048 times		2048 times (512msec)
			Minimum scale	10e1	0	1	0	1 counts.
					1	2		2 counts.
					2	5		5 counts.
					3	10		10 counts.
					4	20		20 counts.
					5	50		50 counts.
					6	100		100 counts.
					7	200		200 counts.
					8	500		500 counts.
					9	1000		1000 counts.
			Analog filter	10e0	0	300Hz	0	Cutoff frequency : 300Hz
					1	100Hz		Cutoff frequency : 100Hz
					2	30Hz		Cutoff frequency : 30Hz
					3	10Hz		Cutoff frequency : 10Hz
F-08	Additional value	✓			-99999 to +99999		0	Display offset
F-09	Automatic ZERO compensation	✓	ZERO compensation range		0 to 99999		0	The range of the Automatic ZERO compensation.
			Determination time		0.0 to 9.9		0.0	The determination time of the Automatic ZERO compensation.
			Zero-near-zero		0 to 9		0	The compensation range that automatically changes the least significant digit number to zero.
F-10	Hysteresis	✓			0 to 99999		0	Common hysteresis
F-11	BCD output Logic							For details, see the "INSTRUCTION MANUAL (FOR BCD/RS-232C/RS-485/TEDS OPTIONS)".
F-12	Initialize		Initialize					Initialize by entering the key code.
F-13	BV selection		Bridge excitation voltage	10e0	0	10 V	1	Bridge excitation voltage: 10 V
					1	2 V		Bridge excitation voltage : 2 V
F-14	TEDS reading item							For details, see the "INSTRUCTION MANUAL (FOR BCD/RS-232C/RS-485/TEDS OPTIONS)".

No.	Functions	Initialize	Parameters	Digits	Options/ranges		Initial values	Remarks
F-16	RS communication settings	✓						For details, see the "INSTRUCTION MANUAL (FOR BCD/RS-232C/RS-485/TEDS OPTIONS)".
F-17	Device ID	✓						For details, see the "INSTRUCTION MANUAL (FOR BCD/RS-232C/RS-485/TEDS OPTIONS)".
F-18	CC-Link	✓						For details, see the "INSTRUCTION MANUAL (FOR CC-LINK OPTION)".
F-19	Numeric value registering calibration		Zero-point output value		-3.2000 to +3.2000		0.0000	The ZERO indicated value that is registered at calibration.
F-20	Operation pattern	✓	Operation pattern	10e0	0	Pattern 0	0	Selects the pattern of comparator values from registered 4 patterns.
					1	Pattern 1		
					2	Pattern 2		
					3	Pattern 3		
F-21	Updating rate of displaying values	✓	Updating rate	10e0	0	15.60 times/sec	0	Thinning: 1/256 time, 64msec
					1	7.80 times/sec		Thinning: 1/512 time, 128msec
					2	3.90 times/sec		Thinning: 1/1024 time, 256msec
					3	1.95 times/sec		Thinning: 1/2048 time, 512msec
					4	0.98 times/sec		Thinning: 1/4096 time, 1024msec
					5	0.49 times/sec		Thinning: 1/8192 time, 2048msec
					6	0.24 times/sec		Thinning: 1/16384 time, 4096msec
					7	0.12 times/sec		Thinning: 1/32768 time, 8192msec
F-22	Level Test Signals	✓	Display additional function	10e0	0	Disabled	0	Outputs the LEVEL TEST values only.
					1	Enable		Outputs a value (current indicated value + LEVEL TEST value).
			Level Test values		-99999 to +99999		0	
			Level Test ON/OFF	10e0	0	OFF	0	Turns OFF the LEVEL TEST values.
					1	ON		Turns ON the LEVEL TEST values.
F-23	[HH] comparator (comparator-3) functions	✓	"High limit" or "Low limit"	10e0	0	High limit	0	Assign "0: High limit" or "1: Low limit" of the [HH] comparator (comparator-3).
					1	Low limit		
F-24	[HI] comparator (comparator-1) functions	✓	"High limit" or "Low limit"	10e0	0	High limit	0	Assign "0: High limit" or "1: Low limit" of the [HI] comparator (comparator-1).
					1	Low limit		
F-25	[LO] comparator (comparator-2) functions	✓	"High limit" or "Low limit"	10e0	0	High limit	1	Assign "0: High limit" or "1: Low limit" of the [LO] comparator (comparator-2).
					1	Low limit		
F-26	[LL] comparator (comparator-4) functions	✓	"High limit" or "Low limit"	10e0	0	High limit	1	Assign "0: High limit" or "1: Low limit" of the [LL] comparator (comparator-4).
					1	Low limit		
F-27	Display stability	✓	Disable/Enable	10e0	0	Disable	0	
					1	Enable		

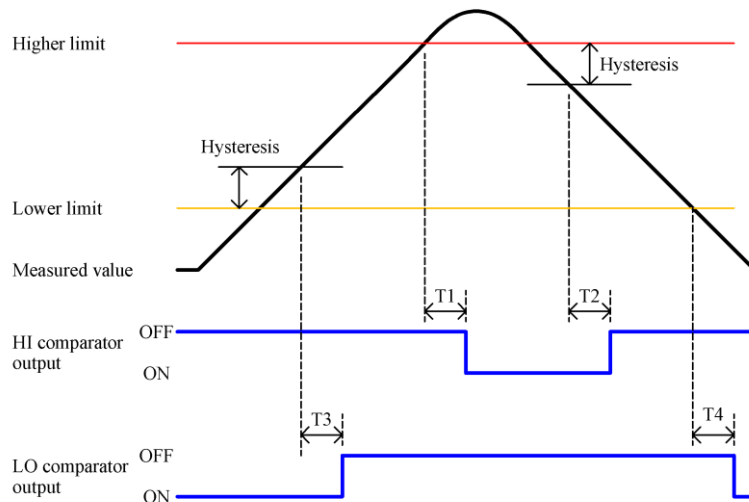
5. OPERATION TIMING

5-1. CONTROL INPUT SIGNALS (HOLD COMMAND, RESET COMMAND, ZERO COMMAND)



- 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 starting digital ZERO operation starting from the [ZERO] signal ON.
- T5 : 4ms(max) A period of time required for canceling the digital ZERO operation starting from the [ZERO] signal OFF.
- T6 : 5ms(min) Time required for the [HOLD] signal.
- T7 : 5ms(min) Time required for the [RESET] signal.
- T8 : 5ms(min) Time required for the [ZERO] signal.

5-2. COMPARATOR OUTPUTS



- T1 : 12ms(max) A delay time required for the HI comparator output to turn ON after the input value exceeds the preset HI comparator output value.
- T2 : 12ms(max) A delay time required for the HI comparator output to turn OFF after the input value lowers only by the hysteresis width from the preset HI comparator value.
- T3 : 12ms(max) A delay time required for the LO comparator output to turn OFF after the input value lowers only the hysteresis width from the preset LO limit comparator value.
- T4 : 12ms(max) A delay time required for the LO comparator output to turn ON after the input value lowers the preset LO comparator output value.

5-3. DELAY TIME BETWEEN INPUT AND OUTPUT SIGNALS

Delay times between the input and analog output (D/A)

Maximum 12 ms

6. TROUBLE SHOOTING

In the event that the product would not operate as expected or in a stable manner, you should trace the factor(s) that may be causing such a condition before concluding that the system has failed.

Items to be checked and countermeasure against various phenomena are described in the following table.

If troubles are not solved despite countermeasures, contact KYOWA or our representative.

If the product is damaged due to any causes other than as written in the Instruction Manual or if the user has disassembled or remodeled the product, Kyowa Electronic Instruments Co., Ltd. may not be able to offer repair service.

Trouble	Checked Items and Countermeasures
The power is not turned ON. (LEDs are OFF.)	● Confirm the power terminal block has the specified voltage. ⇒ Check the voltage with a tester. For details, see "3-5. TO CONNECT [OUTPUT] TERMINALS". The fuse has blown out. * Contact KYOWA or our representatives.
The "E-01" or "E-02" is displayed.	● The product is failure. Stop using the product. ⇒ Contact KYOWA or our representatives.
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. For details, see the following "Noisy" part.
The measured value varies.	● The operation failed due to noise. ⇒ Take appropriate countermeasures for removing the noise. For details, see the following "Noisy" part. ● Confirm the input cables are connected correctly. ⇒ Connect them correctly and keep them from moving.
The measured value is incorrect.	● Confirm the transducer connections are correct. ⇒ Correctly connect them. ● Confirm the calibration settings and bridge excitation voltage settings are correct. ⇒ Correctly set them based on the transducer specifications.
Noisy	● Confirm the GND terminal is connected to the ground. ● Do not locate the input cable near the inverter motor, machine tool, welding machine, or AC motor power supply. ⇒ Separately locate the input cable from the power source. ● Set the low-pass filter or moving average of the smoothing function to reduce noise. Set the cutoff frequency of the low-pass filter 2 to 5 times as large as the input signal frequency. Example: Suppose the input is DC to 30Hz. Set the cutoff frequency 100 Hz.

MEMO

● Inductive interference

Using the product, near equipment generating strong magnetic field, generates induction noise.

The equipment includes large motors, transformer, and ferro-resonant constant voltage transformer.

Locating the product, far away from measuring points, also generates induction noise.

Take the following measures to protect against induction noise.

- Separately locate the product from the power source.
- Use a shielded cable for transducer connection. Connect the shield to the E terminal of the [TRANSDUCER] connector.

- **Potential interference**

Potential interference occurs when the target to be measured has a DC/AC potential.

At this time, grounding the product is not necessarily a good thing. It may be appropriate to connect the target to be measured and product.

If there is induction noise or if the target to be measured has potential, it is rare to be solved by a simple method.

Especially nowadays, the number of electrical devices that are used together in the measuring environment are increasing resulting to affect with each other as the noise cause.

The above mentioned countermeasures are mere examples. Fully consider the operational environment and take appropriate measures to obtain the most preferable results.

7. 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 consumable parts

The aluminum electrolytic capacitor is a consumable item. The service life, depending on the frequency of use and temperature, is approximately 5 years under the usage at 25°C.

We recommend you to overhaul a product 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 in the above period.

To operate the product normally, daily/periodic inspections is recommended.

We shall not be responsible for any failure by incorrect usage against the specifications and safety precaution within the warranty period.

8. SPECIFICATIONS

(1) Number of channel	1
(2) Compatible sensor	Strain gage transducers (4-wire system)
(3) Compatible bridge resistance	87.5 to 1000 Ω (Up to four 350 Ω transducers can be connected in parallel.)
(4) Bridge excitation	10 VDC, 2 VDC, selectable
(5) Measurement range	± 3.2 mV/V (input range including zero adjustment range)
(6) Zero adjustment range	Within measurement range (not retained when power supply interrupted)
(7) Nonlinearity	Within $\pm (0.02 \%FS + 1 \text{ digit})$
(8) Stability	Zero point: Within $\pm 0.25 \mu V_{RTI} / ^\circ C$ Sensitivity: Within $\pm 0.01 \% / ^\circ C$
(9) Sampling speed	4000 times/s
(10) A/D resolution	24 bits
(11) Calibration	Actual load calibration, Sensitivity registering calibration, and Numeric value registering calibration
(12) Smoothing function	Filter: 10, 30, 100, 300 Hz Attenuation characteristics: -12 dB/oct. Moving average: None, 2, 4, 8, 16, 32, 64, 128, 256, 512, 1024, and 2048 times Minimum scale: 1, 2, 5, 10, 20, 50, 100, 200, 500, and 1000 counts
(13) Automatic ZERO compensation function	Zero tracking (Auto digital Zero within the setting range) Zero near zero (Automatic Zero display)
(14) Additional function	Setting range: ± 99999
(15) Original value display function	± 3.2000 mV/V Accuracy: Within $\pm 0.1 \%FS$

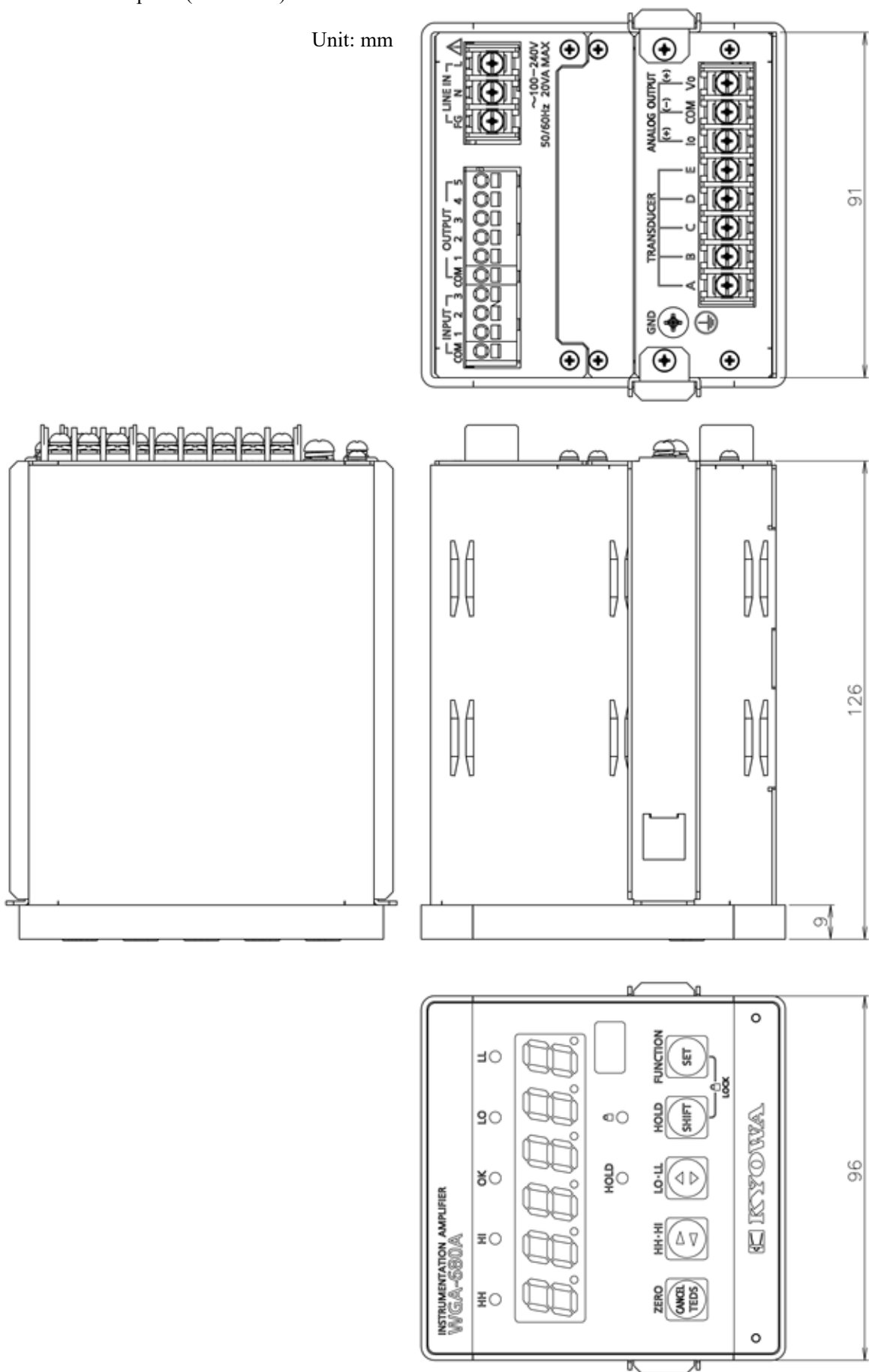
(16) Comparator function	The number of points: 4 Pattern: Registers 4 groups of pattern files (comparative values) and enables switching through setting of functions Type: extra high [HH], high [HI], OK, low [LO], extra low [LL] Setting range: ± 99999 Hysteresis width: 0 to 99999 Comparison mode: normal, at hold High/Low assignment: Enables assigning high or low to each comparator
(17) Hold function	Digital peak/bottom hold (without analog peak/bottom hold) Type: Arbitrary point hold, peak hold, bottom hold, peak to peak hold, interval definition peak hold, time specification peak hold, interval definition bottom hold, time specification bottom hold, interval definition peak to peak hold, time specification peak to peak hold Delay time: 0.00 to 9.99 s. Detect time: 0.01 to 9.99 s.
(18) Display	Display range: ± 99999 Display: 7 segment LED, Character Height 14 mm, Color: red/green/orange Update Speed: 0.12, 0.24, 0.49, 0.98, 1.95, 3.90, 7.80, and 15.6 times/s Display Mode: normal, at hold Determinator: 5 points (HH, HI, OK, LO, LL) Status display: 2 points (HOLD, LOCK)
(19) Analog output	Voltage Output: ± 10 V (Load resistance 2 kΩ or more) Possible to scaling arbitrarily Current Output: 4 to 20 mA (Load resistance 500 Ω or less) Corresponds to voltage output of 0 to 10 V. Conversion Speed: 4000 times/s Non-linearity: Within ± 0.1 %FS Setting contents: Display value of zero, Display value of full scale
(20) Control input	The number of points: 3 Type: Zero order, hold order, and reset order Signal Format: Non-voltage contact signal, or open collector (Capacity: 12 VDC, 5 mA or more)
(21) Control output	The number of points: 5 Type: HH, HI, OK, LO, and LL Output Format: Open collector (Capacity: 30 VDC, 20 mA max)
(22) Level test signal	Display of arbitrary values possible Display additional function: Disabled, Enabled Setting range: ± 99999 Level test: ON, OFF

(23) Power supply	AC models	
	AC 100 to 240 V 50/60 Hz	Power consumption: 20 VA or less
	DC models	
	DC 10 to 30 V	Power consumption: 10 W or less
(24) Dimensions	96(W) × 96(H) × 126(D) mm (Excluding protrusions)	
(25) Weight	Approx 750 g (Without option)	
(26) Operating temperature range and humidity range		
	-10 to +50 °C, 80 % or less (Noncondensing)	
(27) Compliance	Directive 2014/30/EU (EMC)	
	Directive 2014/35/EU (LVD)	AC models only
		Installation category II
		Pollution degree 2
	Directive 2011/65/EU,(EU)2015/863(10 restricted substances) (RoHS)	

9. OUTSIDE DRAWING

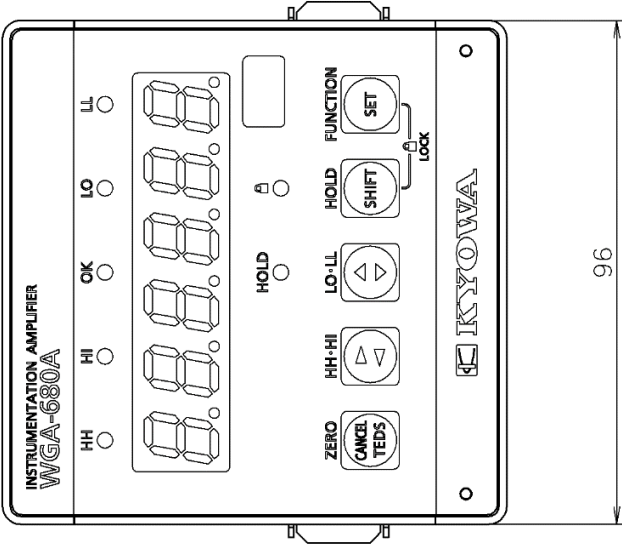
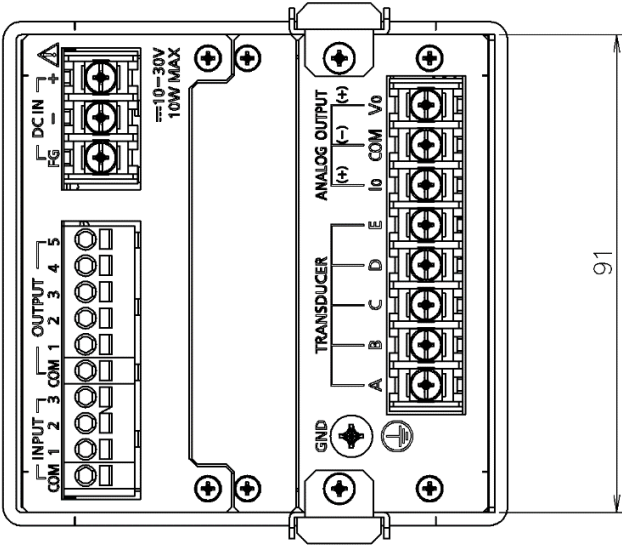
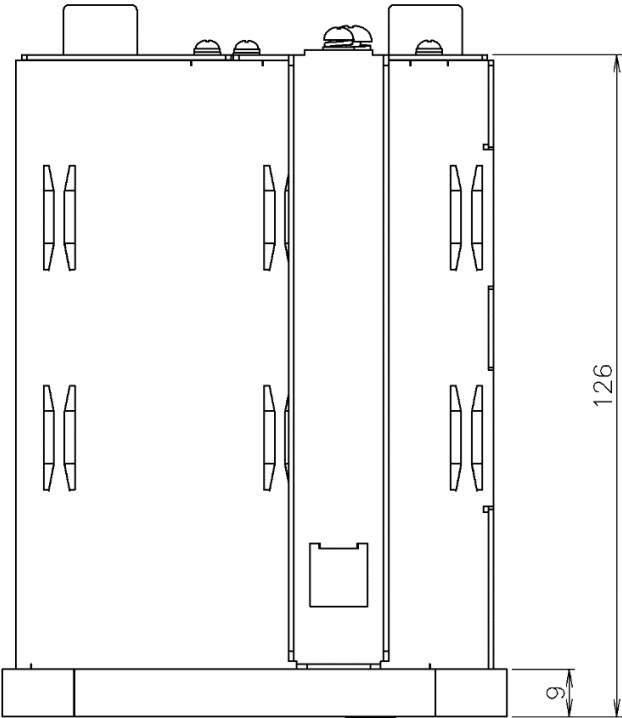
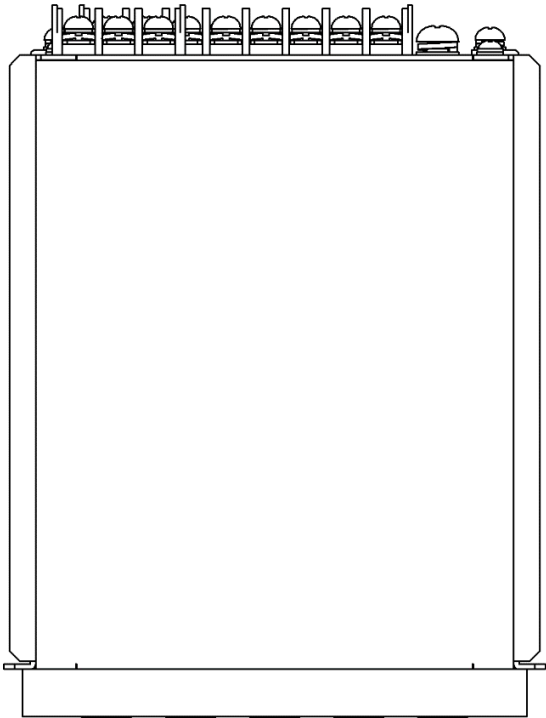
9-1.WGA-680A -00: No option (AC model)

Unit: mm



9-2.WGA-680A -10: No option (DC model)

Unit: mm





Kyowa Electronic Instruments Co.,Ltd.

3-5-1, Chofugaoka, Chofu, Tokyo 182-8520 Japan

<https://www.kyowa-ei.com/>