

WGA-650A
INSTRUMENTATION AMPLIFIER
INSTRUCTION MANUAL

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WGA-650A

INSTRUMENTATION AMPLIFIER

INSTRUCTION MANUAL

Thank you for purchasing this **KYOWA's WGA-650A Instrumentation Amplifier**. Read this Instruction Manual carefully, in order to make full use of the high performance of the instrument. Do not operate the instrument in methods other than described in this Manual.

- This Instruction Manual is a copyright of KYOWA ELECTRONIC INSTRUMENTS CO., LTD. and may not be copied, in whole or part, without consent of KYOWA.
- The manual has been compiled with great care. However if the need should arise for more information, contact KYOWA's service shop or representative.
- The contents of this Manual are subject to change without notice.

SAFETY PRECAUTIONS

Read carefully this Instruction Manual before using WGA-650A Instrumentation Amplifier (hereinafter referred to as WGA-650A). Take special care for securing safety and handle them with correct manner. In this Instruction Manual, safety precautions are classified into "WARNING" and "CAUTION" as described in the following.

 WARNING	Improper handling may result in death or severe injury of the operator. To avoid it, the operator must refer to the accompanying instructions in this Manual.
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 CAUTION	Improper handling may result in injury of the operator or cause damage to or destruction of parts of the product. To avoid it, the operator must refer to the accompanying instructions in this Manual.
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In addition, precautions stated in  "CAUTION" may cause serious damage to the operator and the instrument depending on the situation. It is essential to keep them with special care when handling the instrument.

Symbols used in this System	
	Indicates "HANDLE WITH CARE." It is used and put at a portion required to refer to the Instruction Manual in order to protect human body and the instrument.
	Indicates "PROTECTIVE GROUND TERMINAL." Do not forget to ground the terminal of the instrument having this mark before operating the instrument.

 WARNING	
①If the secondary damage is potential to generate in the System due to deterioration of the WGA-650 always adopt another proper technical measures for safety. Or trouble may occur resulting from erroneous output or malfunction of the instrument. ②Mounting and wiring should be conducted more than three seconds after the power OFF. Or, it may cause an electric shock to the operator or damage to the product. ③Do not forget to put a cover on the terminal board. Or, it may cause an electric shock to the operator. ④Special care should be taken not to operate the WGA-650A in environment with inflammable gas or vapor. ⑤If the WGA-650A is faulty, emitting smoke or offensive odor, or producing abnormal sound, immediately turn OFF the power. Or, it may catch fire or cause an electric shock to the operator. Contact KYOWA's representative for repair.	

- ⑥ Do not put water or foreign matters into the WGA-650A. In case if any foreign matters are entered, immediately turn OFF the power.
Or, it may cause fire or an electric shock to the operator.
Contact KYOWA's representative for repair.
- ⑦ Do not use worn out power cables.
Or, it may cause fire and/or electric shock to the operator.
- ⑧ Operate the WGA-650A only with the specified power voltage indicated in this Instruction Manual.
Or, it may cause fire and/or electric shock to the operator.
- ⑨ Do not operate the WGA-650A in environment with excessive moisture, dust or oil dust.
Or, it may cause fire and/or electric shock to the operator.
- ⑩ Do not disassemble the WGA-650A.
Or, it may cause deterioration or malfunction of the instrument.
Contact KYOWA's representative for repair.
- ⑪ When it started thundering, do not touch the WGA-650A or cables.
Or, it may cause an electric shock to the operator.
- ⑫ Always ground a protective grounding terminal.
Or, it may cause an electric shock to the operator and/or damage to the WGA-650A.



CAUTION

- ① If the WGA-650A is used in environment with exceedingly low temperature, it may take about 1 to 2 minutes to power ON after the power supplied.
- ② Before wiring, confirm the rated power voltage of the WGA-650A and the terminal assignment.
Then, conduct wirings in the correct manner.
- ③ Power consumption of the WGA-650A is maximum 20VA. If it is operated in environment with poor power condition, it is recommended to use an insulated constant voltage transformer or the like.
- ④ Special care should be taken on using the WGA-650A in environment with excessive vibration.
If the instrument is operated at a location with excessive vibration or with continuous vibration, measurement error and/or failure of the instrument may be caused.
Take great care not to drop the instrument during transportation and avoid applying strong impact.
Or, it may cause deterioration of the instrument.
- ⑤ Basically, the WGA-650A is so designed as to accept input signals from strain-gage transducers.
If it is intended to use the WGA-650A with other type of transducers, contact KYOWA for information.
- ⑥ Operate the WGA-650A conforming to the operating environment described in this Instruction Manual.
If not, malfunction and/or failure of the instrument may be caused.

STANDARD ACCESSORIES

The following accessories are enclosed with the WGA-650A. After unpacking, check all the accessories are correctly prepared.

Unit label.....	1
AC cord.....	1
Warranty.....	1
Instruction Manual.....	1

1. PARTS & MAJOR FUNCTIONS

1-1 Front panel

① Indicator

- Indicates measured values, preset values and selections of various functions.
- Normally, it indicates the measured values responding to the transducer's output.
- However, if faulty operation occurs, the following appears.

□ F L 1 :

Measured value exceeded the measuring range to the minus side.

□ F L 2 :

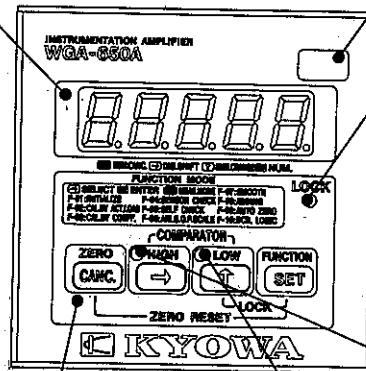
Measured value exceeded the measuring range to the plus side.

□ F L 3 :

The reading is less than -1999.

□ F L 4 :

The reading exceeded 19999.



② Paste the unit label here.

③ LOCK LED

- When this LED is lit or flickering, no functions can be set. Before setting the functions, always turn OFF the LED.
- However, even when the LED is lit, the preset values are read.

④ Upper limit LED

- Lights up when the measured value is exceeding the upper limit value.
- Flickers when the upper limit set value is read.

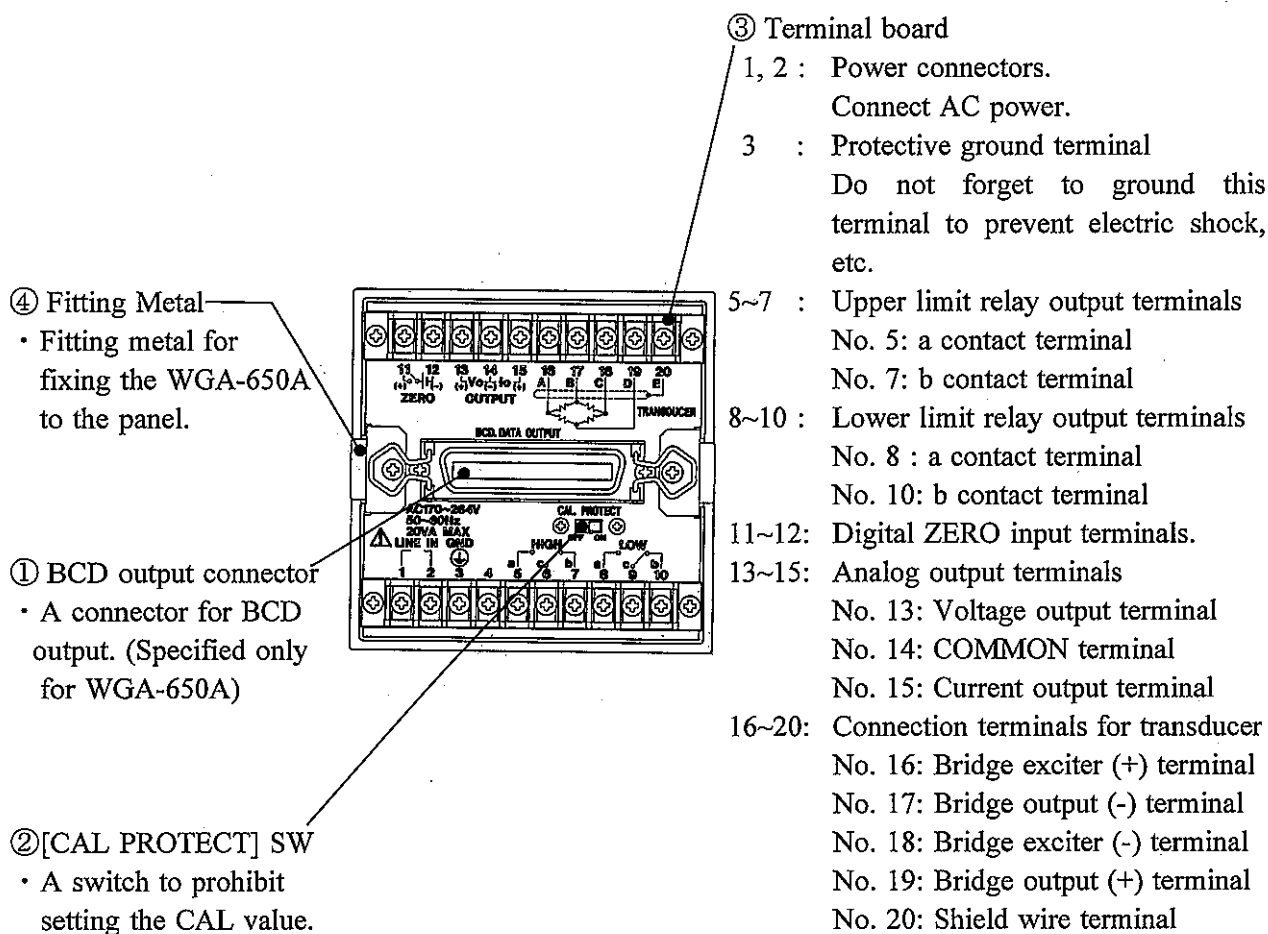
⑤ Lower limit LED

- Lights up when the measured values is below the lower limit value.
- Flickers when the lower limit value is read.

⑥ Operation keys

- Pushbutton switches to operate the WGA-650A.
- For operation, see Section 4 "Operation & Functions."

1-2 Rear Panel



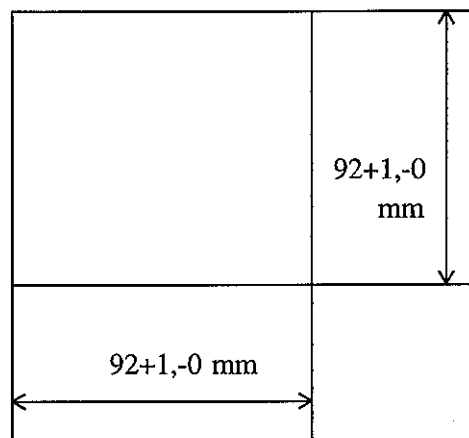
2. CONNECTION

2-1. Installing to the panel

To install the WGA-650A to a panel, prepare a panel according to the specified panel cut dimensions shown at the right. Then install the WGA-650A by referring to the following instructions.

Panel cut dimensions

Panel thickness
1 ~ 5 mm



- ① Cut out the panel by referring to the panel cut dimensions.
- ② Remove the screws of the fitting metals attached on the sides of the WGA-650A and then, pull out the fitting metals.
- ③ Set the WGA-650A into the cut out frame.
- ④ Slide in and set the fitting metals on both sides of the WGA-650A.
- ⑤ Tighten the screws and firmly fix the WGA-650A to the panel.

2-2. Wiring

2-2-1 Connecting Terminal Board

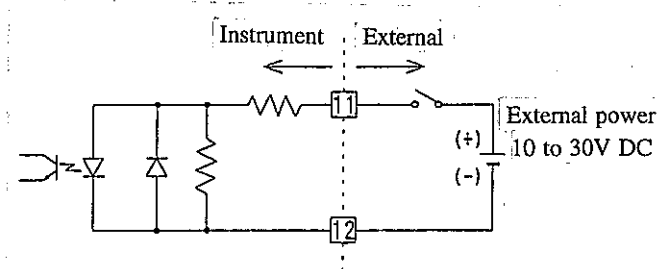
- Remove a cover from the terminal board before conducting the required wirings.
- It is recommended to attach press-fit terminals to the connecting wires.
Use the press-fit terminals having the size 1.25-3A or equivalent to 1.25-3B.
- After completing terminal board wirings, do not forget to cover the terminal board.

2-2-2 Connecting Transducer

- Connect a transducer to No. 16~20 terminals on the terminal board as follows.
(The cable colors mentioned below are KYOWA's representative color code.)
No. 16 : Bridge exciter (+) side (Red) No. 17 : Bridge output (-) side (White)
No. 18 : Bridge exciter (-) side (Black) No. 19 : Bridge output (+) side (Green)
No. 20 : Shield
- Use a shortest possible 4-conductor shielded cable for transducer wiring.
In addition, place it apart from the power cable or other cables that may cause noise.

2-2-3 Connecting ZERO External Input Signal

- To use ZERO external input signal, connect the external power supply and a switch as shown in the right figure.
- Press the switch to turn the reading to ZERO.
Turn OFF the switch to return to the measuring mode.



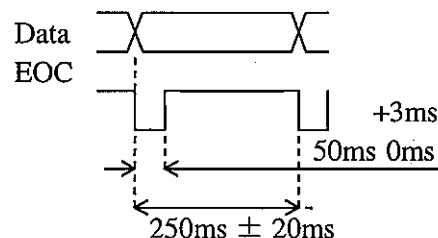
2-2-4 Connecting Analog Output Signal

- Apply a load having $2k\ \Omega$ or more to connected to the voltage output terminal.
- Apply $500\ \Omega$ or lower load to connect to the current output terminal.

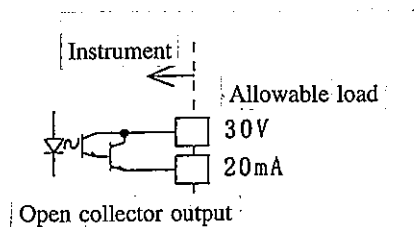
2-2-5 Connecting BCD Output Signals (Specified only for WGA-650A-1)

- Pin assignment used for BCD output is as follows.

No.	Signal name	No.	Signal name
1	COM	19	COM
2	Data 1 output	20	Data 10000 output
3	Data 2 "	21	Data 20000 "
4	Data 4 "	22	Data 40000 "
5	Data 8 "	23	Data 80000 "
6	Data 10 "	24	Not used
7	Data 20 "	25	Control *1 output
8	Data 40 "	26	Not used
9	Data 80 "	27	Not used
10	Data 100 "	28	Polarity output
11	Data 200 "	29	Over "
12	Data 400 "	30	EOC(End of Conversion) "
13	Data 800 "	31	S1 *1
14	Data 1000 "	32	S2 *1
15	Data 2000 "	33	S3 *1
16	Data 4000 "	34	S4 *1
17	Data 8000 "	35	S5 *1
18	Not used	36	Not used



Data output timing



- Signal output terminal : Collector
- COM terminal : Emitter

*1 Used for adjusting the instrument prior to shipment.

They should not be used by the operator.

3. Basic Operation Procedures

The following is summarized procedures for operating the WGA-650A.

For details, see Section 4 "Operation & Functions."

Item	Summarized Operation Procedures
① Power ON	Simply connect the pin 1 and pin 2 of the terminal board to AC power source, and the WGA-650A turns ON and activates the measuring mode. See 4-1-1 "Key Operation in Measuring Mode." Note If the WGA-650A is used in environment with exceedingly low temperature, it may take about 1 to 2 minutes to power ON after the power supplied.
② Changing to Function Selecting Mode	Press the FUNCTION key for two seconds or more to activate the function selecting mode. See 4-1-2 "Key Operation in Function Selecting Mode."
③ Initial Adjustment	Set the reading to F-01 and press the Set key. Conduct this function at least once when connecting transducers. See 4-1-2 "Key Operation in Function Selecting Mode."
④ Calibration	Set the reading to F-02 and conduct the actual load calibration, or set F-03 and conduct the sensitivity-registering calibration. See 4-1-2 "Key Operation in Function Selecting Mode."
⑤ Changing to Measuring Mode	Press the CNL key to activate the measuring mode. See 4-1-2 "Key Operation in Function Selecting Mode."
⑥ Setting Upper/Lower Limit	Press the HIGH key for two seconds or more to activate the upper limit value setting mode. Then, set the upper limit value. In the same manner, press the LOW key and set the lower limit value. See 4-2-4 "Setting Upper/Lower Limit Comparator."
⑦ Adjusting External Output	To activate analog output signal, set an analog output scale value with function number F-06. To activate BCD output signals, set BCD output logic with function number F-10. See 4-2-1 "Various Functions in Function Selecting Mode."
⑧ Others	To settle the unstable reading, use F-07 "Smoothing Function." To add or subtract the constant, use F-08 "Addition/Subtraction Functions." See 4-2-1 "Various Functions in Function Selecting Mode." To set the reading to ZERO, press the ZERO key for two seconds or more. See 4-2-3 "Digital ZERO Function."

NOTES · If [LOCK LED] is lit, no setting is allowed.

- Before setting the required functions, do not forget to turn OFF the front panel [LOCK LED], and set the rear panel [CAL PROTECT] switch to "OFF" side. After completing the setting, turn ON the [LOCK LED] , and set the [CAL PROTECT] switch to "ON."
- See 4-1-1 "Key Operation in Measuring Mode."

4. OPERATION & FUNCTIONS

4-1 Key Operation

4-1-1 Key Operation in Measuring Mode

- When the WGA-650A is powered, the measuring mode is activated automatically.
- In the measuring mode, the WGA-650A measures load, pressure, torque, displacement and other physical quantities in combination with strain-gage transducers, and reads the measured values on the indicator.
- Select various keys in the measuring mode to proceed to upper limit value setting mode, lower limit value setting mode, function selecting mode, and [LOCK] state.

However, if it is in [LOCK] state (with [LOCK LED] lit), key operations thereafter may be limited.

For details, see the following Table 4-1-1.

Table 4-1-1 Key Operation in the Measuring Mode

Key operation	When the [LOCK LED] is not in [LOCK] state	When [LOCK LED] is in [LOCK] state
Press the [ZERO] key for 2 seconds.	The reading turns to ZERO ('0000') by digital ZERO function and the WGA-650A returns to the measuring mode.	No function is operated.
Press the [HIGH] key for 2 seconds.	The upper limit value setting mode is activated.	Although the WGA-650A proceed to function selecting mode or function setting mode, no value is set or no function is operated.
Press the [LOW] key for 2 seconds.	The lower limit value setting mode is activated.	
Press the [FUNCTION] key for 2 seconds.	The function selecting mode is activated.	
Press the [ZERO] key and [FUNCTION] key at the same time for 2 seconds.	Digital ZERO function is cancelled and the WGA-650A returns to the measuring mode.	No function is executed.
Press the [LOW] key and [FUNCTION] key at the same time for 2 seconds.	WGA-650A enters to [LOCK] state or exits from [LOCK] state alternatively.	[LOCK LED] lights out, and the WGA-650A returns to the measuring mode.

4-1-2 Key Operation in Function Selecting Mode

- Press the **[FUNCTION]** key for two seconds in the measuring mode to activate the function selecting mode. At this time, the indicator reads "F-01."
- Pressing the **[→]** key in the function selecting mode selects the desired functions from "F-01" to "F-10."

Select the desired function and press the **[SET]** key. Then, the selected function is determined to activate the function setting mode.

● Ten selective functions

F-01 : Initial Adjustment

F-02 : Actual Load Calibration

F-03 : Sensitivity-Registering Calibration

F-04 : Transducer Check

F-05 : Self-Check

F-06 : Analog Output Scale

OF-07 : Smoothing

F-08 : Additional Value

F-09 : Automatic ZERO Compensation

F-10 : BCD Output Logic

- For details of the functions, see "4-2-1 Various Functions in Function Selecting Mode."
 - Press the **CNL** key in the function selecting mode to return to the measuring mode.
 - In addition, if no key is pressed for about twelve seconds, it also returns to the measuring mode.

4-1-3 Key Operation in Function Setting Mode

- Select the desired function in the function selecting mode and press the **SET** key to activate the selected function setting mode.
- To set the required numerical value(s), change the current reading with the **→** and **↑** keys and press the **SET** key. Then, the set value is determined and stored in the memory at the same time.
- When no numerical value(s) is set, "...is read. Press the **SET** key in this state to activate the selected functions.

● Numerical Value Setting Procedures

- ① In the numerical value setting, each flickering digit accepts the setting.
- ② Pressing the **→** key moves the flickering digit to the right. The flickering right end digit moves to the left end digit.
- ③ Pressing the **↑** key varies the numerical value of the flickering digit as follows.

Numerical value in left end digit

→ 0 → 1 → 2 → 3 → 4 → 5 → 6 → 7 → 8 → 9
 → 10 → 11 → 12 → 13 → 14 → 15 → 16 → 17 → 18
 → 19 → -1 → -0 → 0

Numerical value in other digits

→ 0 → 1 → 2 → 3 → 4 → 5 → 6 → 7 → 8 → 9 → 0 →

- ④ A decimal point is set in calibration functions of F-02 and F-03.

In this case, the decimal point moves to the right by pressing the **→** key. It moves from the right end to the left end.

Pressing the **CNL** key on the way returns to the function selecting mode with the previously set parameters preserved.

- If no key is pressed for about twelve seconds in the function setting mode, it returns to the measuring mode.

4-2 Function

4-2-1 Various Functions in Function Selecting Mode

- Function selecting mode has the following ten functions.

F-01 : Initial Adjustment	F-06 : Analog Output Scale
F-02 : Actual Load Calibration	F-07 : Smoothing
F-03 : Sensitivity Registering Calibration	F-08 : Additional Value
F-04 : Transducer Check	F-09 : Automatic ZERO Correction
F-05 : Self-Check	F-10 : BCD Output Logic
- For details of each function, see the following Table 4-2-1.

Table 4-2-1 Various Functions in Function Selecting Mode

Function Selecting Mode	Function Name	Key Operation & WGA-650A Movement in Function Setting Mode	Functional Description
F-01	Initial Adjustment	"...." is read. Pressing the SET key at this time reads "-----" to adjust the initial value of the transducer. ● Before conducting the initial adjustment, check the following. ① Set the [CAL PROTECT] switch to "OFF" side.	• A function that adjusts the initial value of the transducer. ● Conduct this function at least once when connecting transducers.
F-02	Actual Load Calibration	Applies the actual load to the transducer. Set the numerical value corresponding to the load then, press the SET key. Next, set a decimal point position and press the SET key and conduct the calibration. ● The above set decimal point position is fixedly indicated on other functions. ● Before conducting the actual load calibration, check the following. ① Set the [CAL PROTECT] switch to "OFF" side.	• A function that applies the actual load to the transducer and sets the reading of that time. ● Before conducting the actual load calibration, do not forget to conduct the initial adjustment.

Function Selecting Mode	Function Name	Key Operation & WGA-650A Movement in Function Setting Mode	Functional Description
F-03	Sensitivity-Registering Calibration	Set the transducer's rated output (Unit: mV/V) and press the SET key. Set the corresponding value to be read on the display and then, press the SET key. Next, set a decimal point position and press the SET key and conduct the calibration. ● The above set decimal point is fixedly read on other functions. ● Before conducting the sensitivity registering calibration, check the following. ① Turn the [CAL PROTECT] switch to the "OFF" side. ● Calibration available range is 1500 or less per 0.1 mV/V.	• A function that conducts calibration without applying the actual load by registering the transducer's rated output and rated capacity.
F-04	Transducer Check	"...." is read. Pressing the SET key at this time reads "-----" and checks the transducer connection. Then, the checked results are read for twelve seconds. ● It should be noted that transducers may not be correctly checked in the following cases. • When transducer bridge resistance is exceeding the applicable range. • When transducers other than strain gage transducer are used. ● If any abnormal results appear on the indicator, check the transducer and the connection cables by referring to the reading.	• A function that checks and confirms the transducer connected state. • Checked results are described as follows. Good: Normal A-nG: Bridge exciter (+) cable is faulty. b-nG: Bridge output (-) cable is faulty. C-nG: Bridge exciter (-) cable is faulty, d-nG: Bridge output (+) cable is faulty. S-nG: Short-circuit mode E-03: Initial value is faulty.

Function Selecting Mode	Function Name	Key Operation & WGA-650A Movement in Function Setting Mode	Functional Description
F-05	Self-Check	"...." is read. Pressing the SET key at this time alternately lights up the indicator and three LED lamps for two times. Visually inspect whether or not segment failure exists. Then, the WGA-650A self-check results are read for twelve seconds. ● If any abnormality is found, contact KYOWA's representative.	• A function that conducts self-check and indicates the checked results. • Self-check results are described as follows. Good: Normal E-01: Faulty RAM E-02: Faulty NOV RAM
F-06	Analog Output Scale	Set ZERO scale and press the SET key. Next, set full scale and press the SET key. Then analog output is scaled and read by corresponding to the preset values. ● Zero scale : A reading corresponding to 0V voltage output (4 mA current output) ● Full scale : A reading corresponding to 10V voltage output (29 mA current output)	• A function that sets ZERO and full scales of analog output.

Function Selecting Mode	Function Name	Key Operation & WGA-650A Movement in Function Setting Mode	Functional Description																		
F-07	Smoothing	Select either the number of moving averages or minimum change value with the  key and press the  key to conduct the smoothing function. Display  <table><thead><tr><th>No. of Moving Averages</th><th>Minimum Change Value</th></tr></thead><tbody><tr><td>01: No moving averages</td><td>01: Changes every 1 reading</td></tr><tr><td>02: 2 times (0.5-sec)</td><td>02: Changes every 2 reading</td></tr><tr><td>04: 4 times (1-sec)</td><td></td></tr><tr><td>08: 8 times (2-sec)</td><td>05: Changes every 5 reading</td></tr><tr><td>16: 16 times (4-sec)</td><td>10: Changes every 10 reading</td></tr><tr><td></td><td>20: Changes every 20 reading</td></tr><tr><td></td><td>50: Changes every 50 reading</td></tr><tr><td></td><td>00: Changes every 100 reading</td></tr></tbody></table>	No. of Moving Averages	Minimum Change Value	01: No moving averages	01: Changes every 1 reading	02: 2 times (0.5-sec)	02: Changes every 2 reading	04: 4 times (1-sec)		08: 8 times (2-sec)	05: Changes every 5 reading	16: 16 times (4-sec)	10: Changes every 10 reading		20: Changes every 20 reading		50: Changes every 50 reading		00: Changes every 100 reading	• A function that stabilizes the reading by smoothing varied signals issued from the transducer. • Smoothing has the following two types. Number of moving averages: Number of averages to indicate the average of the measured value. Minimum change value: The minimum unit by which readings vary on the indicator.
No. of Moving Averages	Minimum Change Value																				
01: No moving averages	01: Changes every 1 reading																				
02: 2 times (0.5-sec)	02: Changes every 2 reading																				
04: 4 times (1-sec)																					
08: 8 times (2-sec)	05: Changes every 5 reading																				
16: 16 times (4-sec)	10: Changes every 10 reading																				
	20: Changes every 20 reading																				
	50: Changes every 50 reading																				
	00: Changes every 100 reading																				
F-08	Additional Value	Set the desirable value to be added, and press the  key. The entered value is then added to the reading.	• A function that adds the desired numerical value to the measured value.																		
F-09	Automatic ZERO Compensation	Set the ZERO correction range and press the  key. ● ZERO compensation range From -(Set value) to (Set value)	• A function that automatically ZEROs the reading when the measured value exists in the preset range more than two seconds.																		

Function Selecting Mode	Function Name	Key operation and WGA-650A Movement in Function Setting Mode	Functional Description
F-10	BCD Output Logic	Set the desirable BCD data output logic and press the SET key. (Effective only for WGA-650A-1)) Note: Negative logic is set prior to shipment. Display 0 : Negative logic 1 : Positive logic	• A function that sets the BCD data output logic.

4-2-2 [CAL PROTECT] Switch

- Setting the [CAL PROTECT] switch on the rear panel to "ON" side prohibits various functions such as F-01 Initial Adjustment, F-02 Actual Load Calibration, and F-03 Sensitivity Registering Calibration in order to protect misoperation of the above functions.
- If calibration is conducted with the [CAL PROTECT] switch "ON," the [LOCK LED] flickers to indicate that the [CAL PROTECT] is in "ON" state.
- Always set the [CAL PROTECT] switch to "OFF" side before conducting the functions, that is, F-01 Initial Adjustment, F-02 Actual Load Calibration, and F-03 Sensitivity-Registering Calibration. After completing the above calibrations, set the [CAL PROTECT] switch to "ON" to protect misoperation of the above functions.

4-2-3 Digital ZERO Function

A function that defines the reference of the indicator.

Two methods are available for selection: One is done by key operation and the other, by voltage input on the rear panel.

(1) Key operation

- ① Press the **ZERO** key in the measuring mode for two seconds and the digital ZERO function is conducted to set the reading to "0."
If additional value is set, it reads the determined additional value.
- ② Press the **ZERO** and **FUNCTION** keys at the same time for two seconds, and the digital ZERO function is cancelled and the reading returns to ZERO point obtained at the initial adjustment.

(2) Operation on the rear panel

- Apply DC voltage ranging from 10 to 30V to No. 11 and 12 (ZERO) terminal boards on the rear panel, and digital ZERO is conducted. This functions is also allowed when [LOCK LED] is lit.
- While applying the above voltage, since it is conducting ZERO calculation, "0" is read on the display.
- By setting the applied voltage to 0V or turning OFF the applied voltage, it returns to the measuring mode after the digital ZERO function.
- Cancellation of digital ZERO is not allowed from the rear panel.
- Adjustment conducted by the above terminals shall become invalid if the power switch is turned OFF.

4-2-4 Setting Upper/Lower Limit Comparator

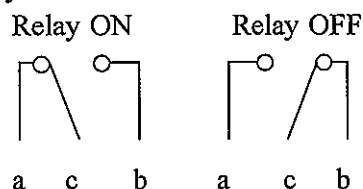
A function that compares the reading with the set value and outputs the result.

The result of comparison is obtained as relay contact output issued from the rear panel terminal board. In addition, it is read on the front panel [HIGH/LOW LED]s.

(1) Relay Contact Output and LED Reading to Upper/Lower Limit Value Conditions

Comparison Conditions	Upper limit relay	Lower limit relay	Upper limit LED	Lower limit LED
Power OFF	OFF	OFF	OFF	OFF
Reading $\geq$ Upper limit value	ON	OFF	ON	OFF
Lower limit value $<$ Reading $<$ Upper limit value	OFF	OFF	OFF	OFF
Reading $\leq$ Lower limit value	OFF	ON	OFF	ON

• Relay contact state



(2) Setting upper/lower limit value

- ① Press the the **HIGH** (or **LOW**) key for two seconds in the measuring mode. The preset value is indicated and the maximum digit flickers.
At this time, the upper (lower) limit LED flickers.
- ② Select the desired digit using the **→** key and change the numeral value with the **↑** key.
Decimal point position is determined by the calibration value.
- ③ Press the **SET** key to determined the setting.

5. Specifications

5-1 Specifications

Model name	WGA-650A
Number of measuring channels	1
Applicable transducers	Strain-gage type transducers
Applicable bridge resistance	350 ~ 87.5 Ω (350 Ω parallel connection of 4 units)
Bridge excitation voltage	10V DC
Measuring range	0 ~ 2.5 mV/V
Initial adjusting range	± 2 mV/V
Calibration function	Sensitivity-registering calibration or actual load calibration (selectable)
Display	-1999 ~ 99999 (a decimal point can be set optionally) 15 mm height, 5-digit 7-segment LED
Sampling rate	4 times/second
Non-linearity	$\pm(0.03\% \text{ FS} + 1 \text{ digit})$
Temperature stability	ZERO : $\pm 0.5 \mu \text{ VRTI}/^\circ\text{C}$ Sensitivity : $\pm 0.0025\%/^\circ\text{C}$
Zero correction function	Digital ZERO, automatic ZERO correction
Additional function	Setting range : -1999 ~ 19999
Upper/lower limit comparator	Number of points : 2 (Upper and lower) Setting range : -1999 ~ 19999 Contact output : Relay contact output (Transfer) Contact capacity : 250V AC, 0.5A(resistive load)
Filter	Analog filter : Cutoff frequency : 1 Hz Smoothing function : Moving average, minimum change value
D-A output	Voltage output : 0 ~ 10V (2k Ω or higher resistive load), optional scaling possible Current output : 4 ~ 20 mA (500 Ω or lower resistive load) corresponding to voltage output of 0 ~ 10V Withstand voltage : 500V AC between output and mainframe Output system : Insulated open collector output, selectable BCD output logic
BCD output	Drive capacity : 30v, 20 mA Output : BCD 5-digit display, polarity, OVER, print command (EOC) Connector : Equivalent to 57-40360 (DAIICHI DENSHI KOGYO made)
Check function	Transducer check, self-check
Operating temperature range	-10 ~ 50 $^\circ\text{C}$, 20 ~ 80% RH (no dew condensing)
Power requirement	85 to 132V AC or 170 ~ 264V AC, 50/60 Hz monophas, 20VA or below
Dimensions & weight	96(W) $\times$ 96(H) $\times$ 139(D) mm (excluding protrusions) Approx. 1 kg

5-2 Dimensions

