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IM-A-529b October 2006

KYOWA ELECTRONIC INSTRUMENTS CO., LTD.

INSTRUMENTATION AMPLIFIER

WGA-670B

INSTRUCTION MANUAL

Thank you for purchasing KYOWA's product WGA-670B Instrumentation Amplifier.
Read this Instruction Manual carefully in order to make full use of the high performance of the product.
Do not use the product in methods other than described in this Manual.

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

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SAFETY PRECAUTIONS

WGA-670B Instrumentation Amplifier (hereinafter referred to as the WGA-670B) is designed to be used in the following environment.

- Installation category (Over-voltage category): II (Refer to EN61010-1 Appendix J and IEC664)
- Pollution degree: 2 (Refer to EN61010-1 3.7.3)

PRIOR TO USE

This Instruction Manual describes details of WGA-670B Instrumentation Amplifier.
For safe use of the WGA-670B, do not forget to read the "Safety Precautions" prior to use.
KYOWA ELECTRONIC INSTRUMENTS CO., LTD. assumes no liability for any damages resulting from the user's failure to comply with the safety precautions.

SAFETY SYMBOLS

For safety operation of the WGA-670B, the following "**WARNING**" and "**CAUTION**" symbols are used in "Safety Precautions" of this Instruction Manual.

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

In addition, items in ⚠ **CAUTION** may lead to serious consequences. Take special attention to the Safety Symbols.

The following symbols are use in the WGA-670B to call operator's attention when operating the product.

Safety Symbols used in the WGA-670B.	
⚠ **WARNING**	Indicates "Handling Precautions." This symbol is attached to the WGA-670B when it requires to refer to the Instruction Manual for securing safety of the operator and the product.
⏚ **CAUTION**	Indicates "Protective Ground Terminal." Always connect to ground before operating the product.

⚠ WARNING

1) If the potential secondary damage generates in the System due to deterioration of the WGA-670B, always take appropriate technical measures for safety.
   Or, defect in the system may occur resulting from erroneous output or malfunction of the instrument.
2) Mounting and wiring should be conducted more than 3 seconds after the power OFF.
   Or, it may cause an electric shock to the operator or damage to the instrument.
3) Do not forget to put a cover on the terminal board.
   Or, it may cause an electric shock to the operator.
4) Special care should be taken not to use the WGA-670B in environment with inflammable gas or vapor
   Or, it may catch fire.
5) If the WGA-670B is faulty, emitting smoke or offensive odor or producing abnormal sound, immediately turn OFF the power.
   Or, it may cause fire and/or an electric shock to the operator.
   Contact KYOWA's representative for repair.
6) Do not put water or foreign matters into the WGA-670B. In case if any foreign matters are entered, immediately turn OFF the power.
   Or, it may cause fire and/or electric shock to the operator.
   Contact KYOWA's representative for repair.
7) Do not use a worn out power cable.
   Or it may cause fire and/or electric shock to the operator.
8) Always operate the WGA-670B 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-670B 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-670B.
   Or, it may cause deterioration or malfunction of the instrument.
11) When it started thundering, do not touch the WGA-670B or cable.
   Or, it may cause an electric shock to the operator.
12) Always ground a protective ground terminal.
   Or, it may cause an electric shock to the operator and/or damage to the WGA-670B.

⚠ CAUTION

1) Before wiring, confirm the rated power voltage and terminal assignment of the WGA-670B.
   Then, conduct wirings in the correct manner.
2) Power consumption of the WGA-670B is maximum 20 VA. If it is unavoidably operated in environment with poor power condition, it is recommended to use an insulated constant voltage transformer or the like.
3) Special care should be taken when the WGA-670B is used in environment with excessive vibration.
   If it is operated at a location with excessive vibration or with continuous vibration, it may cause measurement error and/or failure of the instrument.
   Take great care not to drop the instrument during transportation and avoid applying strong impact.
   Or, it may cause deterioration of the instrument.
4) Basically, the WGA-670B is designed to be used by connecting the strain gage transducer to the input terminal. If it is used by connecting transducers other than above, contact KYOWA for information.
5) Operate the WGA-670B by conforming to the operating environment described in this Instruction Manual.
   Or, it may cause malfunction and/or failure of the instrument.

STANDARD ACCESSORIES

The following accessories are enclosed with the WGA-670B. After unpacking, check all the items are correctly prepared.

Unit label 1
Warranty 1
Instruction Manual 1

Note: A power supply cable is not enclosed with the WGA-670B. Customers are required to separately purchase a power cable appropriate for the power supply in use.
(Ex. For 100 VAC: P-23, For 200 VAC: P-24)

TYPES

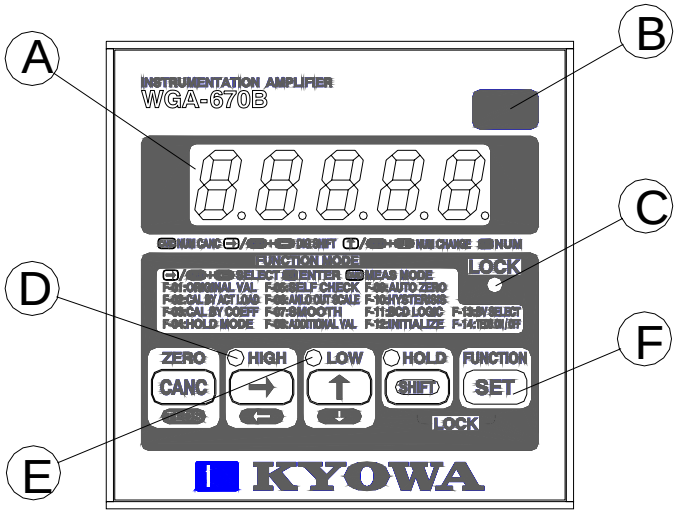
The WGA-670B has various types with optional functions as follows.

Model Name	No option	With BCD output	With RS-232C output	Compatible with TEDS
WGA-670B-0	○			
WGA-670B-1		○		
WGA-670B-7			○	○

TEDS: Transducer Electronic Data Sheet (hereinafter referred to as the TEDS)

1. PARTS NAMES & PRINCIPAL FUNCTIONS

1-1 FRONT PANEL



A) Indicator .....• Indicates measured values, selected functions, and set values.
• Normally, it indicates measured values responding to the output from the transducer. However, if error occurs, the following appears.

OFL1: When measured value is exceeding the measuring range to the minus side.
OFL2: When measured value is exceeding the measuring range to the plus side.
OFL3: When the indicated value is below -19999.
OFL4: When the indicated value is above +19999.

B) Unit Label

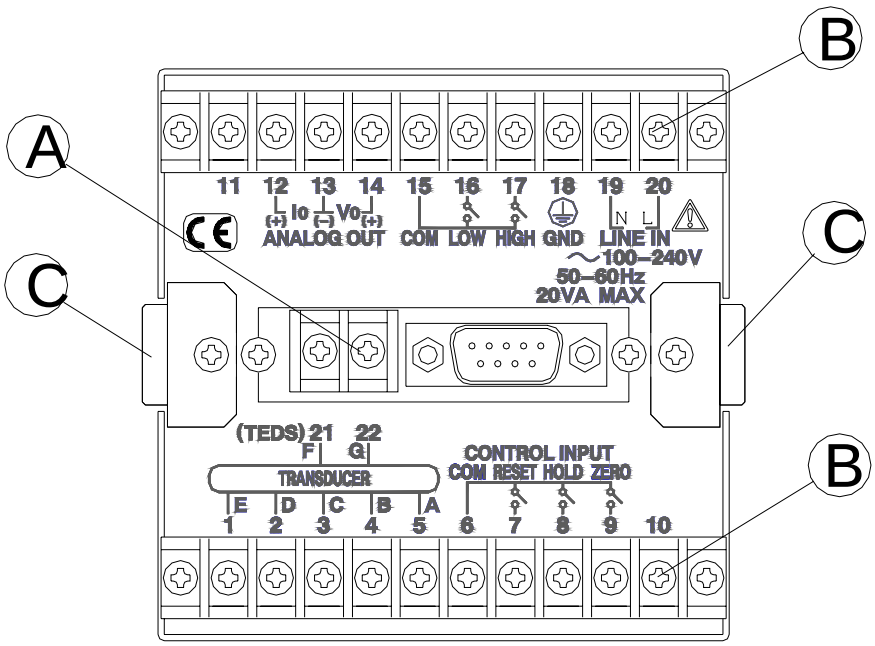
C) [LOCK] LED .....• When this LED is lit or flickering, no functions are set. Always turn OFF the [LOCK] LED before setting functions.

D) [HIGH] Limit LED .....• Lights up when the measured value exceeds the high limit value.
• Flickers when high limit value is indicated.

E) [LOW] Limit LED .....• Lights up when the measured value is less than the low limit value.
• Flickers when low limit value is indicated.

F) Operation Key .....• A pushbutton switch to operate the WGA-670B.
For operation, see “4 OPERATION & FUNCTIONS.”

1-2 REAR PANEL



A) Optional .....
- WGA-670B-0: None
- WGA-670B-1: Interface to output BCD coded WGA-670B indication.
- WGA-670B-7: Interface to connect the TEDS signal of the WGA-670B. Also equipped with RS-232C interface.

Item A) in the above figure shows the WGA-670B-7.

B) Terminal Board .....

Nos.1 to 5: Transducer connection terminals.
1: Shield, 2: Bridge output (+), 3: Bridge exciter (-),
4: Bridge output (-), 5: Bridge exciter (+)

Nos. 6 to 9: Control contact input terminals.
6: COM, 7: RESET, 8: HOLD, 9: Digital ZERO input

Nos. 12 to 14: Analog output terminals.
12: Current output, 13: Common, 14: Voltage output

Nos. 15 to 17: Comparator open collector output terminals
15: COM, 16: LOW limit output, 17: HIGH limit output

No. 18: Protective ground terminal
Grounding should be made to prevent an electric shock hazard.

Nos. 19 & 20: LINE IN. Connect AC power supply.

Nos. 10 & 11: Spare terminals. No connection

Nos. 21 & 22: TEDS signal connection terminals.
21: TEDS(+), 22: TEDS(COM)

C) Fitting Metal .....
- Fitting metal for fixing the WGA-670B to the panel.

2. CONNECTION

2-1 INSTALLING TO PANEL

To install the WGA-670B to a panel, prepare the panel according to the specified panel cut dimensions as shown at the right. Then, install theWGA-670B by referring to the following instructions.

(1) Cut out the panel according to the panel cut dimensions.
(2) Remove screws of the fitting metals attached on both sides of the WGA-670B and then, pull out the fitting metals.
(3) Set the WGA-670B into the cut out panel frame.
(4) Set the fitting metals on both sides of the WGA-670B.
(5) Tighten the screws and firmly fix the WGA-670B into the panel.

Panel cut dimensions

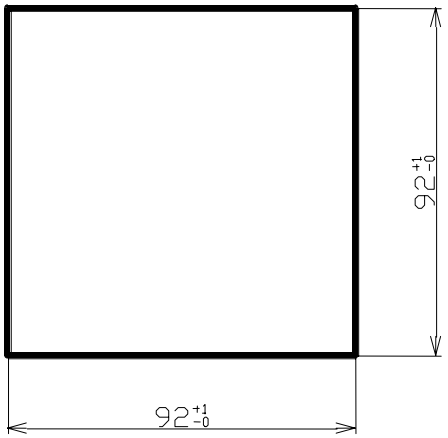


Plate thickness 1 to 5mm

2-2 WIRING

2-2-1 Terminal Board

- Remove the cover from the terminal board before conducting required wirings.
- It is recommended to attach press-fit terminals to the connecting wires.
  Use press fit terminals (equivalent to JIS C 2805 conforming copper wiring press fit terminal 1.25-3).
- After completing wirings to the terminal board, do not forget to cover the terminal board.

2-2-2 Connecting Power Supply

- Power supply terminals are as follows.

  No. 19: N, No. 20: L

- Always confirm the power voltage is 100 to 240V AC (±10%) and use a cable having higher withstand voltage capacity than power voltage.

2-2-3 Connecting Transducer

- Connect a transducer to terminals from Nos. 1 to 5.
  (Cable colors described below are KYOWA's standard color codes)

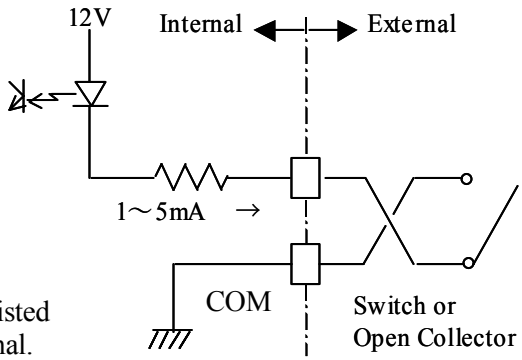
  No. 5: Bridge exciter plus (+) side (Red), No. 4: Bridge output minus (-) side (White)
  No. 3: Bridge exciter minus (-) side (Black), No. 2: Bridge output plus (+) side (Green)
  No. 1: Shielded wire

- For transducer wiring, use shortest possible 4-conductor shielded cable.
  In addition, locate it apart from the power cable or other wirings that may generate noise.
- Bridge excitation voltage is set to 2 V prior to shipment. Since it can be selected to 10 V, set the voltage appropriate for sensor specifications. (Selected with function selecting mode 'F-13.')

2-2-4 Connecting Control Input Terminal

- Contact connection terminal is as follows.
  - No. 6: Common terminal (COMMON)
  - No. 7: Reset
  - No. 8: Hold
  - No. 9: ZERO

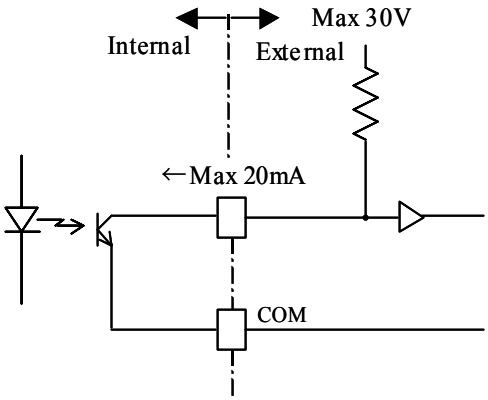
- For using the external switches; ZERO, HOLD, and RESET, connect as shown in the right figure. (Open collector enabled)
- For connecting more than 1-m long cable, use a twisted cable.
- For connecting more than 3-m long cable, use a 2-conductor twisted cable and always ground the shielded cable to the ground terminal. (No. 18).
- In addition, for connecting more than 30-m long cable or using outdoors, take special countermeasures against noise.



Input Connection Diagram

2-2-5 Connecting High/Low Limit Comparator Output

- Comparator output connection terminal is as follows.
  - No. 15: Common terminal (COMMON)
  - No. 16: Low limit
  - No. 17: High limit
- Connect as shown in the right figure.
- For connecting more than 1-m long cable, use a twisted cable.
- For connecting more than 3-m long cable, use a 2-conductor twisted cable and do not forget to ground the shielded cable to the ground terminal (No. 18).
- In addition, for connecting more than 30-m long cable or using outdoors, take special countermeasures against noise.



Output Connection Diagram

2-2-6 Connecting Analog Output (D/A Output)

- Display value is output by converting into analog signal.
- Analog output terminals are as follows.

  Rear terminal board
  - No. 12: Current output (4 to 20mA)
  - No. 13: Common
  - No. 14: Voltage output (±10V)

- Use current output having load resistance 500 Ω or less and voltage output 2 kΩ or more.
- For connecting more than 1-m long cable, use a twisted cable.
- For connecting more than 3-m long cable, use a 2-conductor twisted cable and do not forget to ground the shielded cable to the ground terminal (No. 18).
- In addition, for connecting more than 30-m long cable or using outdoors, take special countermeasures against noise.

2-2-7 Connecting BCD Output (WGA-670B-1)

- See “6. BCD OUTPUT OPTION.”

2-2-8 Connecting RS Output (WGA-670B-7)

- See “7. RS-232C OPTION.”

2-2-9 Connecting TEDS Signal (WGA-670B-7)

- See “8. TEDS OPTION.”

3. BASIC OPERATION FLOW

Procedures for operating the WGA-670B are roughly described in the following.
For details, see "4. OPERATION & FUNCTIONS."

Item	Outline of Operation
(1) Power ON	Power ON and the WGA-670B is in measuring mode. (See "4-1-1 Key Operation in Measuring Mode (Setting [LOCK])"
(2) Changing Mode	Press the FUNCTION key 2 seconds or more to activate the function selecting mode. (See 4-1-2 Key Operation in Function Selecting Mode)
(3) Calibration	Set the indication to function 'F-02' to conduct the actual load calibration or set it to function 'F-03' to conduct sensitivity registering calibration. (See "4-2-1 Various Functions in Function Selecting Mode.")
(4) Changing Mode	Press the CANC key to activate the measuring mode. (See "4-1-2 Key Operation in Function Selecting Mode.")
(5) Setting High/Low Limit	Press the HIGH key 2 seconds or more to activate the high limit setting mode and then, set the high limit value. In the same manner, press the LOW key 2 seconds or more to set the low limit value. (See "4-2-3 Setting High/Low Comparator & Hysteresis")
(6) Adjusting External Output	To activate the analog output (D/A output), set the analog output scale value with the function 'F-06.' To activate the BCD output, set the BCD output logic with the function 'F-11.' (See "4-2-1 Various Functions in Function Selecting Mode."
(7) Others	• To settle the unstable indication, use the function 'F-07 Smoothing.' • To add or subtract the constant, use the function 'F-08 Additional.' (See "4-2-1 Various Functions in Function Selecting Mode." • To set the indication to ZERO, press the ZERO key 2 seconds or more. (See "4-2-2 Digital ZERO Function.")

(Note) · If the [LOCK] LED is lit, no setting is allowed.
Before setting the required items, always confirm whether the [LOCK] LED on the front panel is turned OFF.

4. OPERATION & FUNCTION

4-1 KEY OPERATION

4-1-1 Key Operation in Measuring Mode (Setting [LOCK])

- Power ON the WGA-670B and the measuring mode is activated in [LOCK] state.
- In the measuring mode, the WGA-670B measures load, pressure, torque, displacement and other physical quantities by combining with a strain gage type transducer and indicates the measured values on the indicator.
- Various key operations in the measuring mode proceed to high limit setting mode, low limit setting mode, function selecting mode, and to the [LOCK] state.
  However, if it is in the [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 Measuring Mode

Key Operation	When [LOCK] LED is OFF	When [LOCK] LED is ON
Press the ZERO key for 2 seconds.	Digital ZERO function activates to set the indication to ZERO and to return to the measuring mode.	No function is activated.
Press the HIGH key for 2 seconds.	High limit setting mode is activated.	Only the set value is indicated.
Press the LOW key for 2 seconds.	Low limit setting mode is activated.	
Press the FUNCTION key for 2 seconds.	Function selecting mode is activated.	No function is activated.
Press the HOLD key.	WGA-670B operates with preset hold mode.	No function is activated.
Press the HOLD + FUNCTION keys at the same time for 2 seconds.	[LOCK] LED lights up and the WGA-670B returns to the measuring mode.	[LOCK] LED lights out and setting modes becomes available.

4-1-2 Key Operation in Function Selecting Mode

- Press the FUNCTION key for 2 seconds in the measuring mode to activate the function selecting mode. At this time, function 'F-01' is indicated on the indicator.
- By pressing the → key or SHIFT + ← keys in the function selecting mode, various functions are selected from 'F-01' to 'F-14.'
  Select the desired function and press the SET key. Then, the selected function is determined to activate the function setting mode.
- There are the following 14 selective functions

F-01: Original value	F-08: Additional Value
F-02: Actual Load Calibration	F-09: Automatic ZERO Compensation
F-03: Sensitivity Registering Calibration	F-10: Hysteresis
F-04: Hold Mode	F-11: BCD Output Logic
F-05: Self Check	F-12: Initialize
F-06: D/A Output Scale	F-13: BV Select
F-07: Smoothing	F-14: TEDS ON/OFF

- For details of functions, see "4-2-1 Various Functions in Function Selecting Mode."
- Press the CANC key in the function selecting mode to return 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, change the current numerical value with the →, SHIFT + ←, ↑, and SHIFT + ↓ 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 is set, "….."is indicated. Press the SET key in this state to activate the selected function.
- Press the CANC key in the setting mode to return to the measuring mode.

- Numerical Value Setting Procedures
  a) When setting the numerical value, setting available digit flickers.
  b) Pressing the → key moves the flickering digit to the right. The flickering digit next to the right end moves to the left end digit.
     Pressing the SHIFT + ← keys moves the digit the other way round.
  c) Pressing the ↑ key changes the numerical value of the flickering digit as shown in the following.

     Flickering digit in left end
     → 0 → 1 → –1 → – → 0 →
     Other flickering digits
     →0 → 1 → 2 → 3 → 4 → 5 → 6 → 7 → 8 → 9
     →0 →
     Pressing the SHIFT + ↓ keys moves the flickering digit the other way round.
  d) Set decimal point in calibration functions 'F-02 and F-03.'
     A decimal point moves to the right by pressing the → key and moves to the left by pressing the SHIFT + ← keys.
     Pressing the CANC key on the way returns to the previously set function selecting mode.

4-2 FUNCTION

4-2-1 Various Functions in Function Selecting Mode

• Function selecting mode has the following 14 functions.

F-01: Original value
F-02: Actual Load Calibration
F-03: Sensitivity Registering Calibration
F-04: Hold Mode
F-05: Self Check
F-06: D/A Output Scale
F-07: Smoothing
F-08: Additional Value
F-09: Automatic ZERO Compensation
F-10: Hysteresis
F-11: BCD Output Logic
F-12: Initialize
F-13: BV Select
F-14: TEDS ON/OFF

• 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-670B Movement in Function Setting Mode	Functional Description
F-01	Original Value	'. . . . . ' is indicated. Press the SET key at this time and the current input value is indicated in the unit of mV/V.	•A function that indicates the raw output value of the transducer.
F-02	Actual Load Calibration	Conduct digital ZERO function with no load applied to the transducer. Then, apply load to the transducer. Set a numerical value to be indicated at this time and press the SET key. Next, set a decimal point position and press the SET key. •Key code enable setting '00000' is indicated. Here, set the indication to read '00628' or '11111' and press the SET key. Then, calibration value is updated. The key code is enabled. Therefore, when the calibration value is updated the next time, the above operation is required. To disable the key code, use the function 'F-12.' •Key code disable setting '00000' is indicated. Press the SET key as it is. Then, the calibration value is updated. The key code is disabled and the calibration value is updated even if no key code entered.	•A function that applies the actual load to the transducer and sets the indicated value of that time. ●Before conducting the actual load calibration, do not forget to conduct digital ZERO function.

Function Selecting Mode	Function Name	Key operation & WGA-670B Movement in Function Setting Mode	Functional Description
F-02	Actual Load Calibration	●**The indication '00628' or '11111' is a key code to prevent calibration value from carelessly changing due to malfunction.**	
F-03	Sensitivity Registering Calibration	Set transducer rated output (Unit: mV/V) and press the SET key. Next, set the required value to be indicated and press the SET key. Then, set a decimal point position and press the SET key. •Key code enable setting '00000' is indicated. Here, set the indication to read '00628' or '11111' and press the SET key. Then, calibration value is updated. The key code is enabled. Therefore, when the calibration value is updated the next time, the above operation is required. To disable the key code, use the function 'F-12.' •Key code disable setting '00000' is indicated. Press the SET key as it is. Then, the calibration value is updated. The key code is disabled. The calibration value is updated even if no key code is entered. ●**The indication '00628' or '11111' is a key code to prevent calibration value from carelessly changing due to malfunction.** ●**Setting available range is '10000' or less per 0.1 mV/V.**	•A function that conducts calibration by registering the rated output and rated capacity of the transducer without applying the actual load. •Factory default is '4000' when 2.000 mV/V is entered. •For details, see "4-2-4."

Function Selecting Mode	Function Name	Key Operation & WGA-670B Movement in Function Setting Mode	Functional Description
F-04	Hold Mode	Indicates the following items (1), (2), and (3). (1) Setting Hold mode 0 : Tracking 1 : Arbitrary point hold 2 : Peak hold 3 : Block specified peak hold 4 : Time specified peak hold (2) Display mode 0 : Normal display mode 1 : Hold display mode (3) Comparison mode 0 : Normal comparison mode 1 : Hold comparison mode Select and change numerics in items (1), (2), and (3) and press the SET key. Previously set delay time is indicated. After it is changed, press the SET key. Previously set specified time is indicated. After it is changed, press the SET key. **●Delay time range** **0.00 to 9.99 (sec)** **●Specified time range** **0.01 to 99.99 (sec)**	•Sets various Hold functions. •For details, see "4-2-5." For setting hold display mode and hold comparison mode, hold modes 3 and 4 are enabled. Set the delay time and then, the hold operation start can be delayed by the preset time.
F-05	Self-Check	'. . . . . ' is indicated. Pressing the SET key at this time lights up all the indicators to conduct checking. The checked results are indicated as shown in the right. **●If any faulty results appear on the indicator, contact KYOWA or our representatives.**	•A function that checks the stored memory. Good: Normal E-01: RAM failure E-02: Flash memory failure
F-06	Analog Output (D/A Output) Scale	Set the indication to set the analog output value to 0V or 4mA and press the SET key. Next, set the indication to set the analog output value (D/A output) to 10 V or 20 mA and press the SET key. Then, analog output is scaled. **●Setting range: ±19999**	•A function that defines and sets ZERO and full scale values.

Function Selecting Mode	Function Name	Key Operation & WGA-670B Movement in Function Setting Mode	Functional Description
F-07	Smoothing	Indicates the following items (1), (2), and (3). (1) Number of Moving Averages / (2)Minimum Scale 0 : None — 0 : Displays every 1 scale. 1 : 8 times — 1 : Displays every 2 scales. 2 : 16 times — 2 : Displays every 5 scales. 3 : 32 times — 3: Displays every 10 scales. 4 : 64 times — 4 : Displays every 20 scales. 5 : 128 times — 5 : Displays every 50 scales. 6 : 256 times — 6 : Displays every 100 scales. 7 : 512 times — 7 : Displays every 200 scales. 8 : 1024 times — 8 : Displays every 500 scales. 9 : 2048 times — 9 : Displays every 1000 scales. (3) Analog filter 0: 100 Hz 1: 10 Hz Select and change numerics in items (1), (2) and (3) and press the SET key.	•A function that stables the indication by smoothing varying signals issued from the transducer. •The smoothing function is classified into the following 3 types. Number of moving averages: The number of times to average the measured value. Minimum scale: Minimum unit that changes the indicated value. Analog filter: Cuts the extra high frequency transferred from the transducer. Factory default is 0: 100 Hz .
F-08	Additional Value	Set the desired additional value and press the SET key. The entered value is added to the measured value and indicated. ●**If digital ZERO function is activated with the additional value set to the measured value, the determined value is indicated on the indicator.** ●**Setting range: ±19999**	•A function that adds the desired numerical value to the measured value.

Function Selecting Mode	Function Name	Key Operation & WGA-670B Movement in Function Setting Mode	Functional Description
F-09	Automatic ZERO Compensation	Set ZERO compensation range and press the SET key. Next, set the determination time and press the SET key. Then, set ZERO near ZERO and press the SET key. ●**ZERO compensation range: -19999 to 19999** ●**Determination time range 0.0 to 9.9 (sec)** ●**ZERO near range 0 to 9**	•ZERO compensation range and determination time range When it passes the determination time, if the measured value is within the ZERO compensation range , this function automatically ZEROs the indicated value. •ZERO near ZERO range If the measured value is within the ZERO near ZERO range, this function automatically ZEROs the indicated value.
F-10	Hysteresis	Set hysteresis and press the SET key. ●**Setting range: 0 to 19999**	•A function that sets comparator hysteresis.
F-11	BCD Output Logic	Indicates the following items (1), (2) and (3). (1) Number of output times 0 : 125 times/sec 1 : 62.5 times/sec 2 : 31.3 times/sec 3 : 15.6 times/sec (2) Data logic 0 : Negative logic 1 : Positive logic (3) EOC logic 0 : Negative logic 1 : Positive logic Select and change numerics in items (1), (2) and (3) and press the SET key. (Enabled only for WGA-670B-1.)	•A function that sets output logic and output rate of BCD data. •Open collector transistor output •When the signal is enabled and when the transistor is ON, it is considered as negative logic.

Function Selecting Mode	Function Name	Key Operation & WGA-670B Movement in Function Setting Mode	Functional Description
F-12	Initialize	•Key code enable setting '00000' is indicated. Here, set the indication to read '00628' or '11111' and press the SET key. The following set values return to the factory default state. Then, the key code is enabled. Therefore, when returning the set value to the factory default the next time, the above operation is required. To disable the key code, conduct the function 'F-12.' •Key code disable setting '00000' is indicated. Press the SET key as it is. Then, the following set value returns to the factory default state. The key code is disabled. The set value returns to the factory default stage even if no key code is entered. ●Factory default state Hold mode 0-0-0 Delay time 0 second Specified time 0 second Analog output 0 V with 0000 display 10 V with 4000 display Smoothing 0-0-0 Additional value 0 Auto ZERO Compensation range 0 Determination time 0.0 second ZERO near ZERO 0 Hysteresis 0 BCD logic 0-0-0 HIGH/LOW limit set value HIGH limit +19999 LOW limit -19999 **●Calibration value and Bridge Exciter value (BV) are not initialized.** **●The indication '00628' or '11111' is a key code to prevent calibration value from carelessly changing due to malfunction.**	**• A function that returns the set values to factory default state.**

Function Selecting Mode	Function Name	Key Operation & WGA-670B Movement in Function Setting Mode	Functional Description
F-13	BV Select	BV set value 0: 10 V 1: 2 V Select either of the two and press the SET key.	•A function that selects bridge exciter voltage. •It is set to 1(2 V) prior to shipment.
F-14	TEDS ON/OFF	Indicates the following items (1) and (2) . (1) Sensitivity registration with power ON 0: OFF 1: ON (2) Digital ZERO operation with power ON 0: OFF 1: ON Select and change numerics in items (1) and (2) and press the SET key. (Enabled only for WGA-670B-7.)	•A function whether or not sensitivity registration or digital Zero is conducted by reading TEDS information with the power ON. • Factory default is '0-0.'

4-2-2 Digital ZERO Function

Digital ZERO function is a function that decides the reference point of the indicator.
It is as same as setting the scale needle to '0' position.
There are 2 methods for deciding the reference point (ZERO), by key operation and by operation of contact input from the rear panel.

(1) Key Operation
- Press the ZERO key in the measuring mode for 2 seconds and the digital ZERO function is activated to set the indication to '0.'
- If the additional value is set, it indicates the determined additional value.

Note: Results of this operation are maintained even if the power is turned OFF.

(2) Operation From the Rear Panel
- Short circuit rear terminals between Nos. 6 and 9 to conduct digital ZERO function.
  Digital ZERO function is conducted even if the [LOCK] LED is lit.
- While short-circuited, since it is conducting ZERO calculation , the indication is set to '0.'
- Open the terminals between Nos. 6 and 9 and it returns to the measuring mode after the digital ZERO function

Note: Results obtained from this function is disabled with the power OFF.

4-2-3 Setting High/Low Comparator & Hysteresis

High/low limit comparator and hysteresis function serve to compare the indicated value with the set value and outputs the compared results.

The result of comparison is obtained as open collector output from the rear terminal board and indicated on the [HIGH]/[LOW] LED on the front panel. The hysteresis (Dead zone) can be set in the set value.

(1) Output and LED Display to High/Low Limit Comparison Conditions

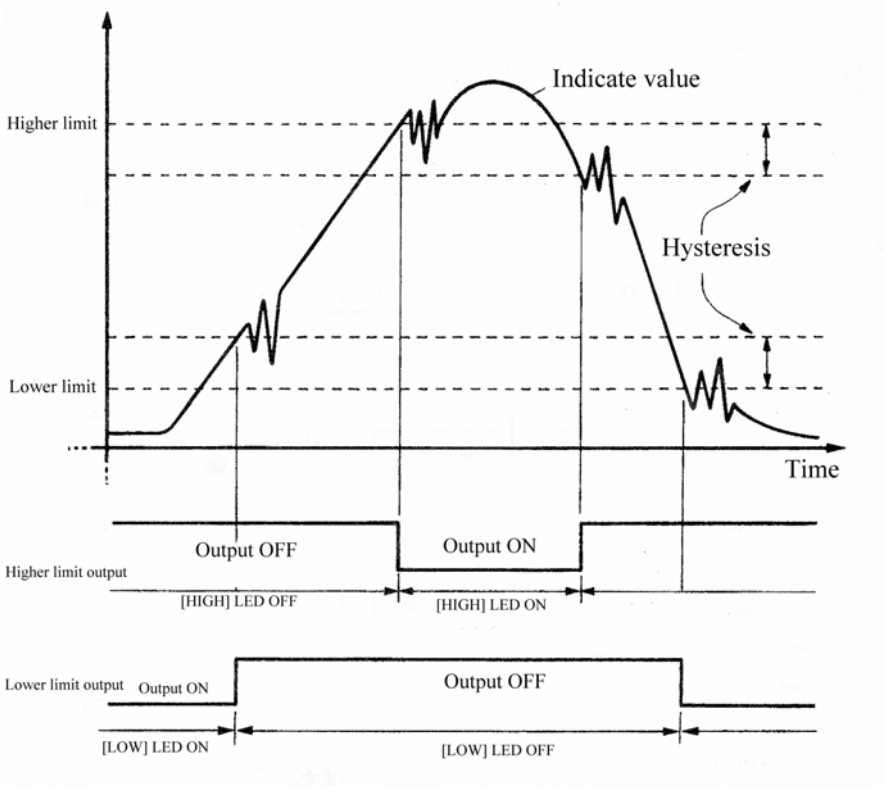
When the indicated value exceeds the higher limit value, the higher limit output becomes ON (closed).

On the contrary, when the indicated value lowers the 'higher limit value – hysteresis,' the higher limit output becomes OFF (opened).

When the indicated value lowers the lower limit value, the lower limit output becomes ON (closed).

On the contrary, when the indicated value exceeds the 'lower limit value + hysteresis,' the lower limit output becomes OFF (opened).

For details, see the following figure.



(2) Setting High/Low Limit

a) Press the HIGH (or LOW) key for 2 seconds in the measuring mode. The preset value is indicated and the maximum digit flickers.

At this time, the [HIGH] ([LOW]) LED flickers.

b) Move the flickering to the desired digit with the → or SHIFT + ← keys and change the numeric value with the ↑ or SHIFT + ↓ keys.

Decimal point position is determined by the calibration value.

c) Press the SET key to determine the setting.

(3) Setting Hysteresis

Set hysteresis using the function selecting mode 'F-10.'

4-2-4 Sensitivity Registering Calibration Function

Sensitivity registering calibration function is a function that conducts calibration by registering the rated output of the transducer without applying the actual load.

Description shall be made with an example when '1.000' is indicated by applying 1 kN of load using a transducer having rated capacity of 1 kN and rated output of 2.004 mV/V.

(1) Setting Sensitivity Registering Calibration Mode.
Confirm the [LOCK] LED is turned OFF.
If the [LOCK] LED is lit, press the HOLD + FUNCTION keys for 2 seconds or more at the same time.
Press the FUNCTION key for 2 seconds or more and the function 'F-01' is indicated to turn the mode to function selecting mode.
Press the → key to indicate the function 'F-03' and press the SET key.
Then, it turns to the sensitivity registering calibration mode.

(2) Setting Rated Output of the Transducer
The currently set value is indicated and the highest order digit flickers.
Use the arrow keys to have the indication read '02.004' and press the SET key.

(3) Setting Indicated Value
The currently set value is indicated and the highest order digit flickers.
Use the arrow keys to have the indication read '1000' and press the SET key.

(4) Setting Decimal Point Position
Currently set decimal point position flickers.
Use the arrow keys to have the indication read '1.000' and press the SET key.

(5) Entering Key Code for Registration
'00000' is indicated and the highest order digit flickers.
Use the arrow keys to have the indication read '00628' or '11111' and press the SET key.
Then, the calibration value is stored in the memory.
This key code is set to prevent the calibration value from carelessly changing due to malfunction.

(6) Returning to Measuring Mode
Function 'F-03' is indicated. Press the CANC key.
Then, the measurement starts with the currently registered calibration value.

4-2-5 Hold Function

Hold function is a function that serves to set various hold modes. Besides, this function is capable of setting display mode as well as comparison mode.

The hold function becomes enabled by the following 2 operations, key operation and operation of contact input from the rear panel. In addition, the operating state can be obtained by the [HOLD] LED state on the panel face.

[HOLD] LED ON: Peak detecting state

[HOLD] LED flickering: Hold state

(1) Key Operation

- Press the HOLD key in the measuring mode to move to the preset hold mode.
- The following operation is obtained according to the preset mode.

a) When the hold mode is set to arbitrary point hold, peak hold or time specified peak hold.

Press the HOLD key. → Hold state.

↓

Press the HOLD key. → Cancels the hold state. (Reset)

b) When the hold mode is set to block specified peak hold

Press the HOLD key. → Peak detecting state.

↓

Press the HOLD key. → Hold state.

↓

Press the HOLD key. → Cancels the hold state. (Reset)

(2) Operation From The Rear Panel

- Short-circuit between terminal Nos. Nos. 6 and 8 (Hold) on the rear face and the WGA-670B moves with the preset hold mode.
- Short-circuit between terminal Nos. 6 and 7 (RESET) on the rear face and the hold mode is canceled.

The states of the above signals are described in figures of the respective hold modes.

(3) Normal Comparison Mode & Hold Comparison Mode

a) Normal comparison mode

When the indicated value exceeds the comparative value, the output of the comparison result becomes ON (close) and OFF (open), when it lowers the comparative value.

b) Hold comparison mode

The output of the compared result does not turn ON (close) at the time when the indicated value exceeds the comparative value. It turns ON (close) when it becomes in hold state and OFF (open), when it is reset.

(4) Normal Display Mode & Hold Display Mode

a) Normal display mode

Always changes the indication with the varying input.

Indication changes with the varying peak value even if it is detecting peak.

b) Hold display mode

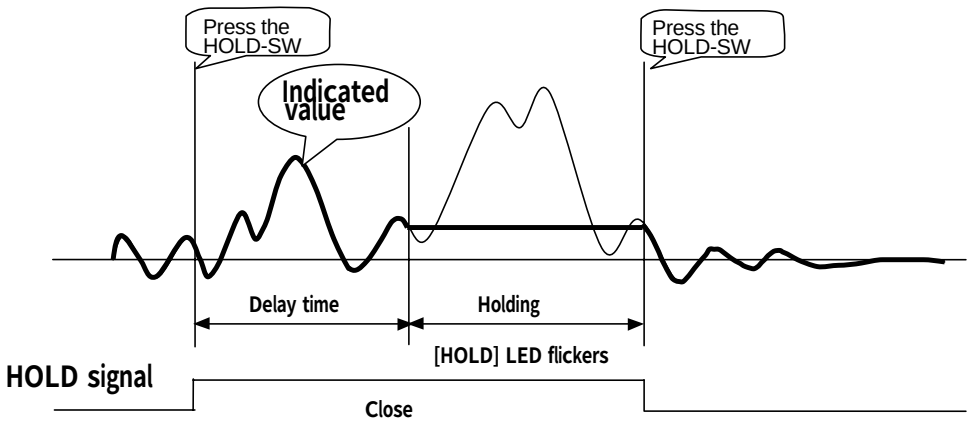
When it is in hold state, maximum value is indicated while detecting peak.

No indication changes while detecting peak.

Note that the above functions in items (3) and (4) operate only when it is in block specified peak hold mode and time specified peak hold mode.

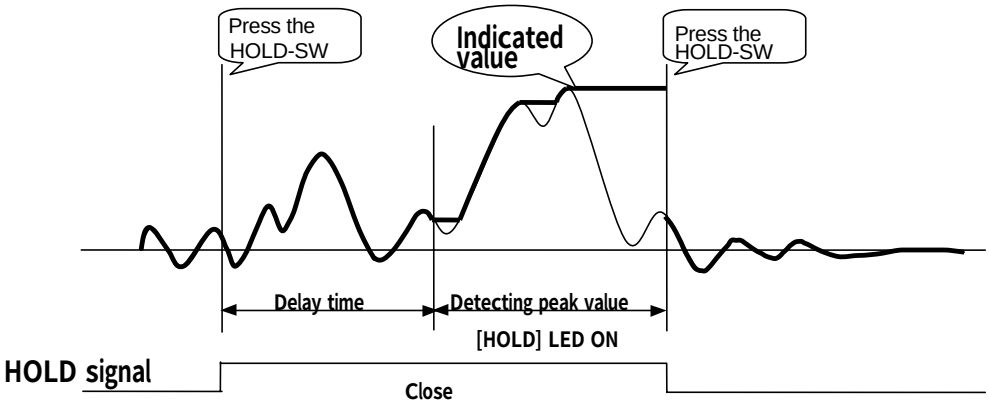
4-2-5-1 Arbitrary Point Hold Mode

- Press the HOLD key and after the lapse of delay time, the indication is kept hold until it is pressed the next time.
- Or, when the [HOLD] signal from the rear terminal board is turned ON (close) and after the lapse of delay time, the indication is kept hold until the [HOLD] is signal is turned OFF.



4-2-5-2 Peak Hold Mode

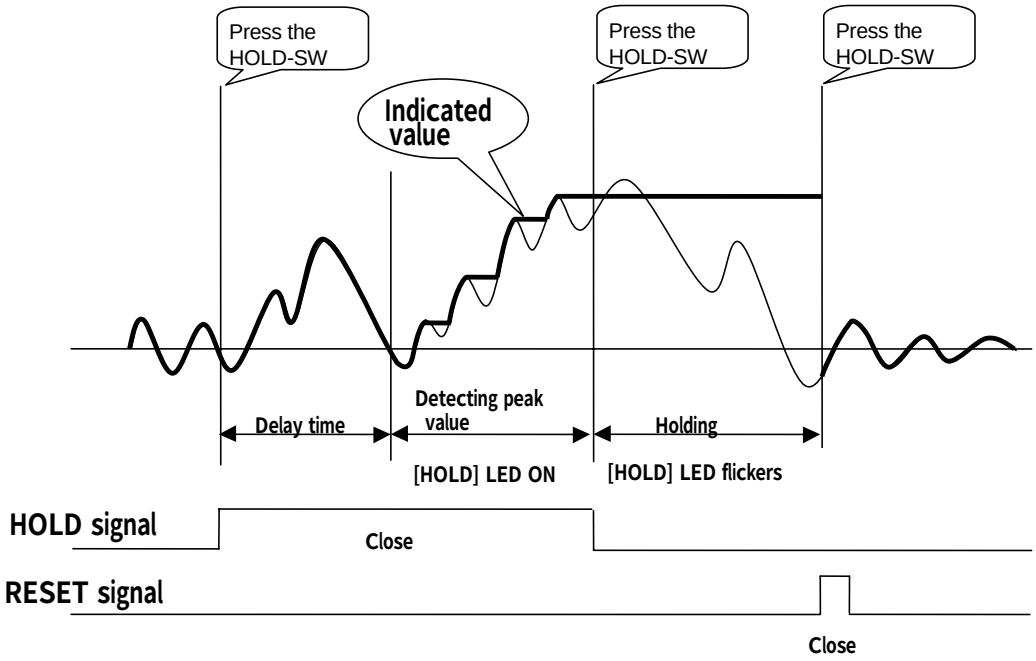
- Press the HOLD key and after the lapse of delay time, the peak value is indicated until it is pressed the next time.
- Or, when the [HOLD] signal from the rear terminal board is turned ON (close) and after the lapse of delay time, the peak value is indicated until the [HOLD] signal is turned OFF.



4-2-5-3 Block Specified Peak Hold Mode

a) For normal display mode

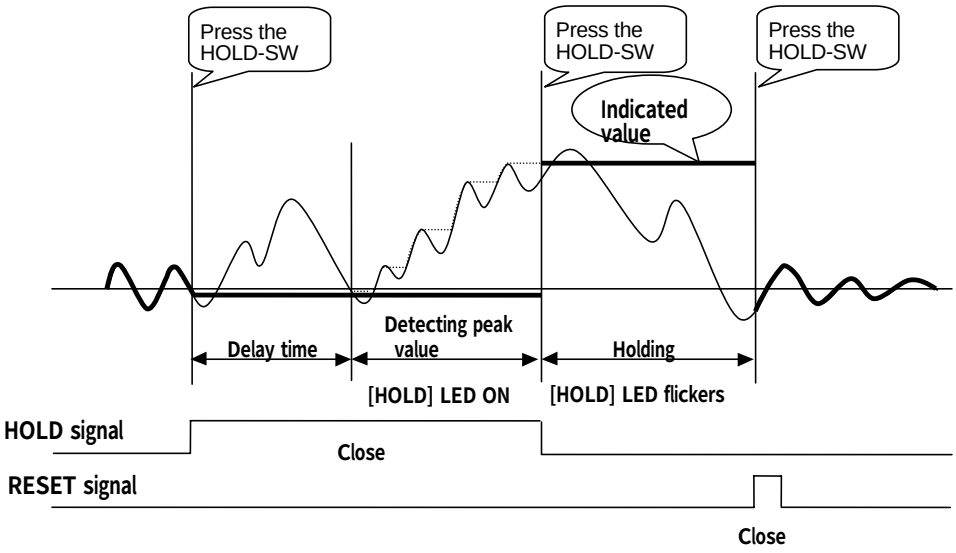
- Press the HOLD key and after the lapse of delay time, the peak value is indicated.
  Press the HOLD key the 2nd time and the peak value is kept hold.
  Press the HOLD key the 3rd time and the peak hold mode is canceled.
- Or, when the [HOLD] signal from rear terminal board is turned ON (close) and after the lapse of delay time, the peak value is indicated until the [HOLD] signal is turned OFF.
  If the [HOLD] signal is turned OFF (open), the indicated value is kept hold.
  When the [RESET] signal from the rear terminal board is turned ON (close), the peak hold mode is canceled.



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

b) Hold display mode

- Press the HOLD key and the indication of that time is kept hold.
  After the lapse of delay time, although it is not shown on the indicator, the WGA-670B is in peak value detecting state.
  Press the HOLD key the 2nd time and the peak hold until then is indicated.
  Press the HOLD key the 3rd time and peak hold is canceled.
- Or, while the [HOLD] signal from the rear terminal board is turned ON (close), the indicated value is kept hold and after the lapse of delay time, the peak value is detected.
  When the [HOLD] signal is turned OFF (open), the peak values until then is indicated.
  When the [RESET] signal from the rear terminal board is turned ON (close), the peak hold mode is canceled.

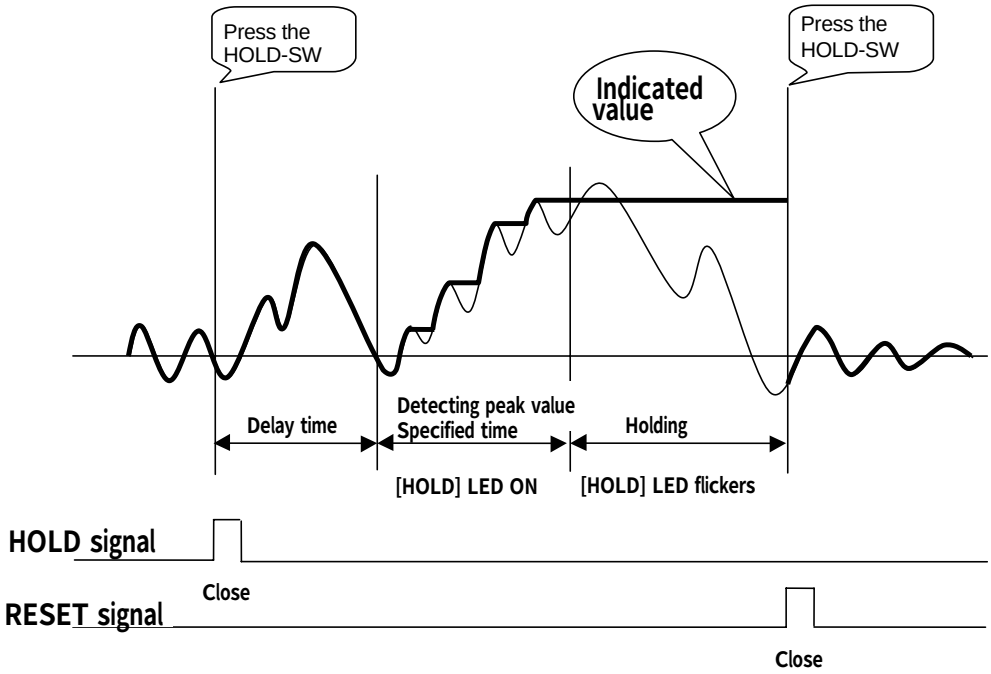


Note) Even if no RESET signal is issued, it is reset with the next HOLD signal.

4-2-5-4 Time Specified Peak Hold Mode

a) Normal display mode

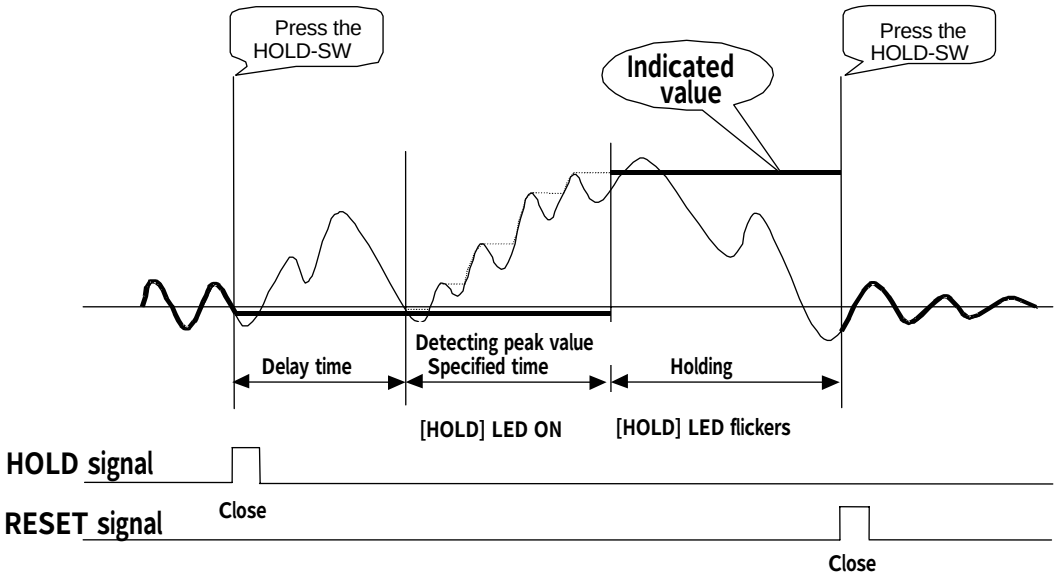
- Press the HOLD key and after the lapse of delay time, the peak value is detected and kept hold for the preset specified time.
  Press the HOLD key the 2nd time and the peak hold mode is canceled.
- Or, when the [HOLD] signal from the rear terminal board is turned ON (close) and after the lapse of delay time, the peak value is detected and kept hold for the preset specified time.
  When the [RESET] signal from the rear terminal is turned ON (close), the peak hold mode is canceled.



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

b) Hold Display Mode

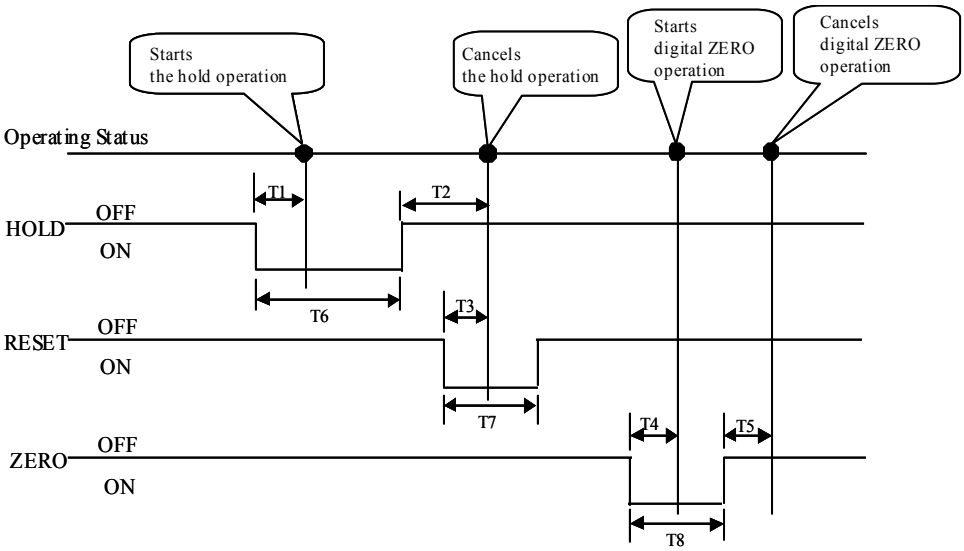
- Press the HOLD key and the indicated value is kept hold.
  After the lapse of delay time, the peak value is detected and indicated for the preset specified time.
  Press the HOLD key the 2nd time and the hold display mode is canceled.
- Or, just when the [HOLD] signal from the rear terminal board is turned ON (close), the indicated value is kept hold.
  After the lapse of delay time, the peak value is detected and indicated for the preset specified time.
  When the [RESET] signal from the rear terminal board is turned ON (close), the hold display mode is canceled.



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

5. OPERATION TIMING

5-1 CONTROL INPUT (HOLD, RESET, ZERO)



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 peak hold mode and arbitrary point 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.

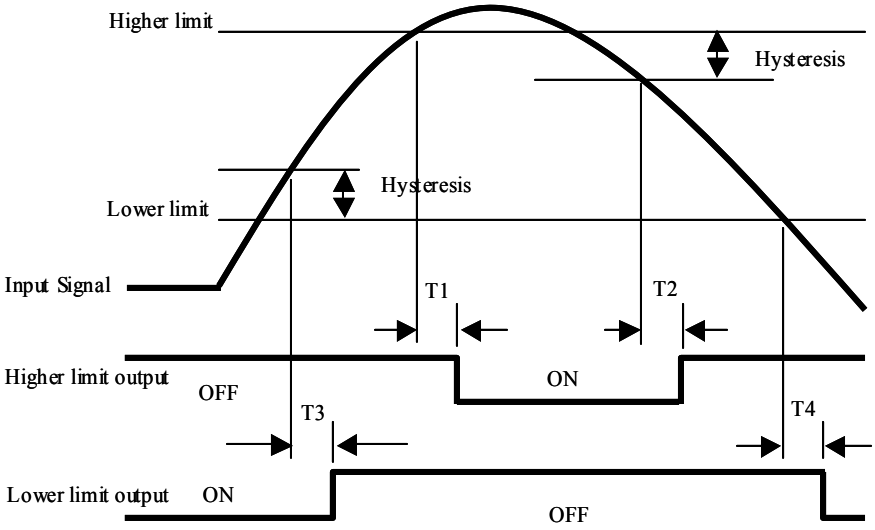
T5: 4ms(Max) ..... A period of time required for canceling the digital ZERO operation starting from the [ZERO] signal OFF.

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 HIGH/LOW LIMIT COMPARATOR OUTPUT



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

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

T3: 4ms(Max) ..... A delay time required, starting from the time when the input value exceeds by the hysteresis width from the low limit comparative value preset on the comparator until the low limit output becomes OFF.

T4: 4ms(Max) ..... A delay time required, starting from the time when the input value lowers from the low limit comparative value preset on the comparator until the low limit output becomes ON.

5-3 DELAY TIME BETWEEN INPUT & OUTPUT SIGNALS

Delay time between input and BCD output	Maximum 4 ms (Output times: 125 times/sec)
Delay time between input and RS output	Maximum 30 ms
Delay time between input and D/A output	Maximum 8 ms

6. BCD OUTPUT OPTION

6-1 OUTLINE

By installing the BCD interface to the WGA-670B-1, indicated values can be acquired as a BCD coded data. In addition, by connecting to a sequencer, printer, etc., various processing items such as data control and data recording are conducted with ease.

6-2 PIN NO. & SIGNAL NAME

• BCD output pin assignment is described in the following table.

BCD Output Pin Assignment Table

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	Not used
5	Data 8	23	Not used
6	Data 10	24	Not used
7	Data 20	25	Hold output
8	Data 40	26	Peak hold output
9	Data 80	27	A *1
10	Data 100	28	Minus (Polarity) output
11	Data 200	29	Over output
12	Data 400	30	EOC(End of Conversion) output
13	Data 800	31	T *1
14	Data 1000	32	R *1
15	Data 2000	33	BCD hold input
16	Data 4000	34	BCD output prohibit input
17	Data 8000	35	C *1
18	Not used	36	COM

*1: Used for adjusting the instrument at KYOWA factory prior to shipment.
They should not be used by the operator.

(Note) Since bits 4 and 8 of the highest order digits are not output, apply appropriate processing on the external side.
Reference For positive logic: Pull down
For negative logic: Pull up

(Note) Hold output (25 pins)
When in hold state (See “4-2-5 Hold Function.”): Low (ON)
Peak hold output (26 pins)
When in peak detecting state (See “4-2-5 Hold Function.”): Low (ON)

6-3 SETTING BCD OUTPUT

The number of output times, data logic, and EOC logic are set with the function selecting mode 'F-11.'
Since the hold input and output prohibit input are set to negative logic, no change is allowed.

'F-11' indication: (1) Output times – (2) Data logic – (3) EOC logic

(1) Setting the Number of Output Times

The first numeric value (1) indicated with the function selecting mode 'F-11' describes the following number of output times. Select the desired item with arrow keys. See "4-1 OPERATION & FUNCTION."

0: 125 times/sec
1: 62.5 times/sec
2: 31.3 times/sec
3: 15.6 times/sec

(2) Setting Data Logic

The center value (2) indicated with the function selecting mode 'F-11' describes the following BCD output logic. Select either of the two with the arrow keys.

In addition, when the signal is enabled and when the transistor is ON, it is considered as negative logic.

0: Negative logic
1: Positive logic

(3) Setting EOC Logic

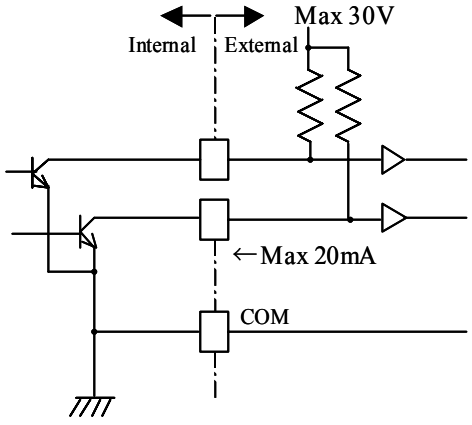
The last numeric (3) indicated with the function selecting mode 'F-11' describes the following EOC logic. Select either of the two with the arrow keys.

0: Negative logic
1: Positive logic

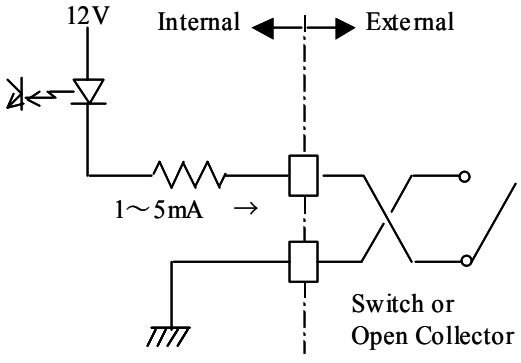
6-4 CONNECTING BCD OUTPUT

For connecting to external devices, separately prepare the following connector.
For connection, see "6-2 PIN NOS & SIGNAL NAMES" and the following figures.
(One example of the connection)

Connector in use: 57-30360 (DDK Ltd. equivalent)



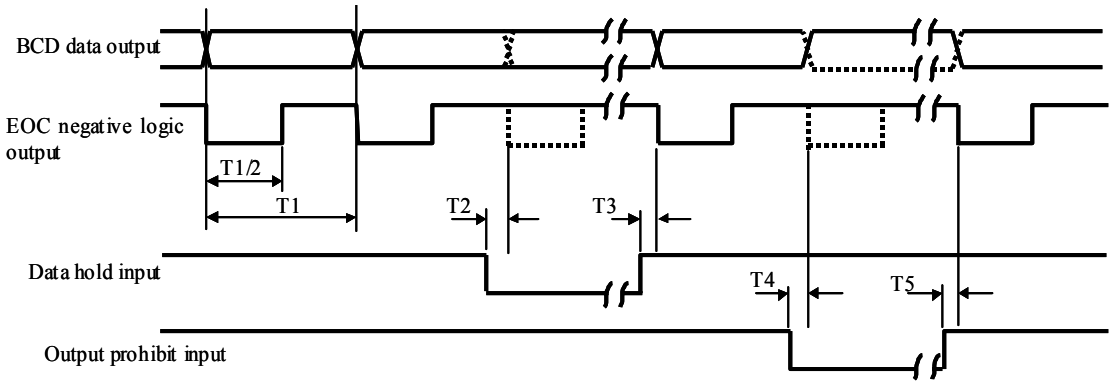
Output Connection Diagram



Input Connection Diagram

6-5 SIGNAL TIMING

Signal operation timing is described in the following figure.
To read data by EOC (End of Conversion), when it is set to negative logic, read BCD data, polarity data, and over data within 4ms from rising (positive) edge (when it is changed from "L" to "H").
To read data after conducting BCD data hold, set the data hold input to "L" and read the required data after 5 ms. No BCD changes during "L."
When the output prohibit input is set to "L," all the output transistors become OFF.
By controlling the output prohibit input, the BDC data output of parallel connected multiple WGA-670Bs are sequentially read.



T1: Data output & EOC signal output time

Number of BCD Output Times/sec	T1(ms)
125	8
62.5	16
31.3	32
15.6	64

T2, T3: 1ms (min) ..... Relation between BCD signal output and data hold signal input
The [HOLD] signal is read at a timing when the EOC signal output is turned ON.
At this time, if the data hold signal is ON, no data and no EOC signal are output.

T4, T5: 1ms(min) ..... Relation between EOC signal output and output prohibit signal input
The output prohibit signal is read at a timing when the EOC signal output is turned ON.
At this time, if the output prohibit signal is ON, all the data output transistors become OFF.
In addition, no EOC signal is output.

7. RS-232C OPTION

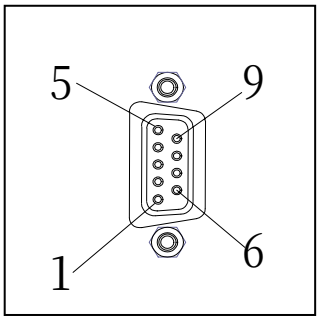
7-1 OUTLINE

With the WGA-670B-7 (Equipped with TEDS interface + RS-232C interface), various functions can be set and measured values can be read from external devices.

7-2 RS-232C INTERFACE

This section describes details of the RS-232C interface.

(1) Connector Pin No. and Signal Name



Pin No.	Signal Name
1	DCD
2	RxD
3	TxD
4	DTR
5	GND
6	DSR
7	CTS
8	RTS

Connector: Equivalent to ESDE-9P-RIN(ITT Cannon made)

(2) Signal Specifications

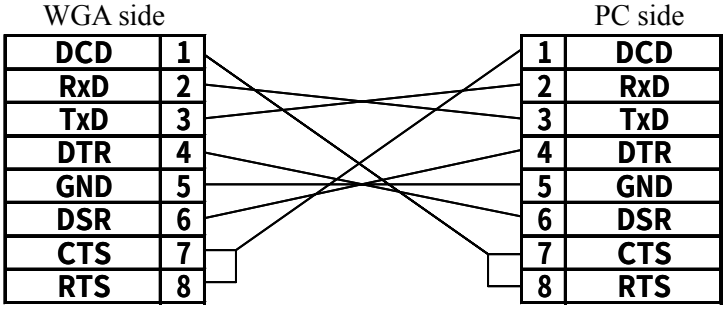
Transmission speed:	9600bps
Data bit:	7 bits
Parity bit:	Odd number parity
Stop bit:	1 bit
Output code:	ASCII

(3) Connecting to External Devices

a) Connection cable

For connecting the WGA-670B to the PC, etc., use a commercially available RS cross cable (reverse type).

(For reference, KRS-DOSV9C07K, KRS-403XFO7K, etc.: SANWA SUPPLY LTD. made)



(Note) Do not forget to power OFF both WGA-670B and the external devices before connection. Or, correct operation may not be obtained or may cause damage.

b) Settings of external devices

Set the external devices by conforming to WGA-670B signal specifications.

(Note) The WGA-670B is not corresponding to XON/XOFF control and send brake signal.

7-3 OUTLINE of CONTROL COMMAND

This section describes format and types of control commands issued from the PC to the WGA-670B.

(1) Control Command Code

- Command is in ASCII code with 3 characters.
- Attached with parameters according to command characteristics.
- Attached with termination code at the end (Not visible on the screen).
- If unidentified command is received, its character string is sent back with the following format.
  W□□□□□□?<CR><LF>
- If error occurs when writing a set value to the EEPROM, the following message is sent back.
  "ng<CR><LF>"

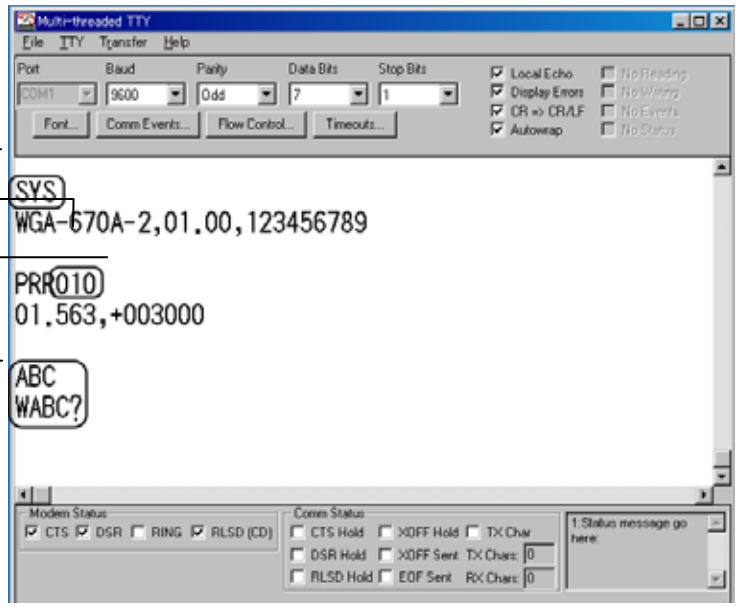


Figure . Example of sending & receiving the control command by " Microsoft Multi-threaded TTY Sample."

Note: Termination code

- Added at the end as the last code of the control command.
- Termination code varies with command output and data output.
  - <CR>: Command output to the WGA-670B.
  - <CR><LF>: Command output from the WGA-670B.

(2) List of Control Commands

Type	Contents	Command	Page
Reading	Reads the measured value.	GDT	39
	Reads the status.	GST	39
	Reads various set values.	PRR	40
	Monitors the original value.	GOD	41
Measurement	Hold function	HLD	45
	Hold reset function	RST	45
	Auto-ZERO function	ZAD*	45
	Self check function	CHK	45
Setting	Actual load calibration	VCL	41
	Sensitivity registering calibration	EIC	42
	Automatic sensitivity registration with TEDS	EID	42
	Sets hold mode.	SMF*	42
	Set moving average.	SSM*	43
	Set additional value.	SZM*	43
	Automatic ZERO compensation.	SZT*	43
	Set Analog output (D/A output) scale.	OP1*	44
	Sets comparator.	SCV*	44
	BV selection.	SBV	45
	Keylock.	LCK	45
Others	Initialize	RES	37
	RS line test	RS-	37
	Reads Model name, etc.	SYS	37
	Sets transmission mode.	MOD	38
	Setting save command	/M	39

Commands with (*) marks are corresponding to '/M'.

7-4 DETAILS of VARIOUS CONTROL COMMANDS

This section describes details of various control commands and parameters that are following the commands. (<CR>,<CR><LF> represent termination code.)

(1) [RES]

Contents:	Initialize (Relevant to panel operation F-12.)
Format:	RES0628<CR>
	Key code (Input '0628' regardless of enable/disable of the key code.
Parameter:	None
Return value format:	ok<CR><LF>
Description & others:	Results of this command are disabled with the power OFF.

(2) [RS-]

Contents:	RS line test
Format:	RS-<CR>
Parameter:	None
Return value format:	RS-232C<CR><LF>(When normally received)

(3) [SYS]

Contents:	Outputs Model name, etc.
Format:	SYS<CR>
Parameter:	None
Return value format:	WGA-670B-a,xx.xx,yyyyyyyyy<CR><LF>
	Production No.
	Program version
	Model
Description & others:	Details of the return value 'a' is as follows.
	0: No option
	1: BCD option
	7: RS-232C+TEDS option

(4) [MOD]

Contents: Sets transmission mode

Format: MODpp<CR>

Parameter: pp (Transmission mode)

- 00: Repeatedly outputs the indicated value and status.
- 02: Outputs the indicated value and status only once at hold mode.
- 10: Operation by control command.

Description & others: This command becomes disabled with the power OFF. Power ON, and it is in the Mode 10 operation mode.

Return value format:

a) Mode 00 return value format

Mode 00 repeatedly outputs the indicated value and status in order.

D1±xxxxxx<CR><LF>
Sabcdefgh<CR><LF>

- The return value ±xxxxxx is an indicated value with a decimal point.
  If the indicated value has no decimal point, it is filled with '0' from the head.
- 'abcdefgh' describes status with '1' or '0.'
  Numeric '1' is outputted to describe the following state.
  - a: Comparator H is [ON].
  - b: Comparator L is [ON].
  - c: Spare
  - d: Spare
  - e: During measurement
  - f: Detecting peak
  - g: During hold
  - h: Various errors occurred

- To stop the output, set the mode to Mode 10.

b) Mode 02 return value format

Mode 02 outputs the indicated value and status only once at hold.

D1±xxxxxx<CR><LF>
Sabcdefgh<CR><LF>

- Contents of the indicated value and status are as same as those of the Mode 00.
- Assume that it is operated in the Mode 00. If the Mode 02 is specified, the following message is sent back.

  ng<CR><LF>

c) Mode 10 return value format

Mode 10 operates the WGA-670B according to contents of the control commands.

ok<CR><LF>

(5) [/M]

Contents:	Writes the settings to non-volatile memory.
Format:	********/M<CR> └──────── Corresponding command
Description & others:	Add '/M<CR>' at the end of the determined command. Then, it is stored in the non-volatile memory. If the power is turned OFF, the contents determined without this command shall return to the original setting.

(6) [GDT]

Contents:	Outputs indicated value.
Format:	GDT1<CR>
Parameter:	None
Return Value Format:	D1±xxxxxx<CR><LF>
Description & others:	Return value ±xxxxxx is an indicated value including a decimal point. If the indicated value has no decimal point, it is filled with '0' from the head.

(7) [GST]

Contents:	Outputs the status.
Format:	GST<CR>
Parameter:	None
Return Value Format:	Sabcdefgh<CR><LF>
Description & others:	Return value abcdefgh represents the status with '1' or '0.' Numeric '1' is output in the following state. a: Comparator H is [ON]. b: Comparator L is [ON]. c: Spare d: Spare e: During measurement f: Detecting peak g: During hold h: Various errors occurred

(8) [PRR]

Contents: Outputs set value.

Format: PRRppp<CR>

Parameter: ppp

- 010: Sensitivity registering value
- 020: Smoothing
- 030: Additional value
- 050: Hysteresis set value
- 051: Comparator H set value
- 052: Comparator L set value
- 053: Spare
- 054: Spare
- 070: Hold mode
- 090: Auto-ZERO compensation set value
- 100: Option

Return value format:

a) Return value of sensitivity registering value

0x.xxx,±yyyyyy<CR><LF>

- ±yyyyyy: Indicates the indicated value with a decimal point. If the indicated value has no decimal point, it is filled with '0' from the head.
- 0x.xxx: Sensor rated output value (mV/V)

b) Return value of smoothing value

a, b, c<CR><LF>

- a: Moving average set value
- b: Minimum resolution set value
- c: Analog filter set value

• See SSM command.

c) Return value of additional value

1, ±xxxxxx<CR><LF>

- ±xxxxxx: Indicates the indicated value with a decimal point. If the indicated value has no decimal point, it is filled with '0' from the head.

d) Return value of hysteresis set value

xxxxxx<CR><LF>

- xxxxxx: Indicates the indicated value with a decimal point. If the indicated value has no decimal point, it is filled with '0' from the head.

e) Return value of comparator set value

±xxxxxx<CR><LF>

- ±xxxxxx: Indicates the indicated value with a decimal point. If the indicated value has no decimal point, the indicated value is fille with '0' from the head.

f) Return value of hold mode

a, b, c,x.xx,yy.yy<CR><LF>

- yy.yy — Specified (second)
- x.xx — Delay time (second)
- c — Comparison mode
- b — Display mode
- a — Hold mode

• See SMF command.

g) Return value of auto-ZERO compensation set value

xxxxxx,y.y,z<CR><LF>

- z — ZERO near ZERO range
- y.y — Definition time
- xxxxxx — Indicates ZERO range and indicated value with a decimal point. If the indicated value has no decimal point, it is filled with '0' from the head.

h) Optional return values

• Outputs the following according to the installed options.

01: a,b,c<CR><LF>: BCD
02: <CR><LF>: RS-232C+TEDS
04: ±xxxxxx, ±yyyyyy<CR><LF>: Analog output

• When multiple options are installed, the required return values are outputted according to the multiple options.

Contents of parameters are described in the following.

a:	BCD Data output logic
b:	BCD EOC output logic
c:	BCD Number of output times
±xxxxxx:	Indicated value at 0 V analog output
±yyyyyy:	Indicated value at 10 V analog output

(9) [GOD]

Contents:	Indicates the original value. (Relevant to panel operation F-01)
Format:	GOD<CR>
Parameter:	None
Return value format:	D0±0x.xxx<CR><LF>
Description & others:	Return value ±0x.xxx is input value with unit mV/V.

(10) [VCL]

Contents:	Conducts actual load calibration (Relevant to panel operation F-02)
Format:	VCL±xxxxxx<CR>
Parameter:	±xxxxxx — Indicates the indicated value with a decimal point. If the indicated value has no decimal point, it is filled with '0' from the head.
Return value format:	ok<CR><LF> When error occurs, E-00<CR><LF>
Description & others:	Saves the results of this command.

(11) [EIC]

Contents: Conducts sensitivity registering calibration.
(Relevant to panel operation F-03)

Format: EIC0x.xxx, ±yyyyyy<CR>

Parameter: 0x.xxx, ±yyyyyy

- ±yyyyyy: Indicates the indicated value with a decimal point. If the indicated value has no decimal point, it is filled with '0' from the head.
- 0x.xxx: Sensor rated output value (mV/V)

Return value format: ok<CR><LF>
When error occurs, E-00<CR><LF>

Description & others: Saves the results of this command.

(12) [EID]

Contents: Automatically conducts sensitivity registering calibration with TEDS information.

Format: EID<CR>

Parameter: None

Return value format: ok<CR><LF>
When error occurs, E-03<CR><LF>

Description & others: Among TEDS information, rated capacity, rated output, and recommended excitation voltage are read to set sensitivity registration and excitation voltage.

(13) [SMF]

Contents: Set the hold mode. (Relevant to panel operation F-04.)

Format: SMFa, b,c,x.xx,yy.yy<CR>

Parameter: a, b, c,x.xx,yy.yy

- yy.yy: Specified time (sec)
- x.xx: Delay time (sec)
- c: Comparison mode
  - 0: Normally compare
  - 1: Compare at hold mode
- b: Display mode
  - 0: Normally display
  - 1: Display at hold mode
- a: Hold mode
  - 0: Tracking
  - 1: Arbitrary point hold
  - 2: Peak hold
  - 3: Block specified peak hold
  - 4: Time specified peak hold

Return value format: ok<CR><LF>

Description & others: Corresponding to '/M' command

(14) [SSM]

Contents: Set smoothing, moving average and minimum resolution.
(Relevant to panel operation F-07.)

Format: SSM3a00, b, c<CR>

Parameter: 3a00, b, c

- a: Moving Average
  - 0: None
  - 1: 8 times
  - 2: 16 times
  - 3: 32 times
  - 4: 64 times
  - 5: 128 times
  - 6: 256 times
  - 7: 512 times
  - 8: 1024 times
  - 9: 2048 times
- b: Minimum Resolution
  - 0: 1
  - 1: 2
  - 2: 5
  - 3: 10
  - 4: 20
  - 5: 50
  - 6: 100
  - 7: 200
  - 8: 500
  - 9: 1000
- c: Analog filter
  - 0: 100 Hz
  - 1: 10 Hz

Description & others: Corresponding to '/M' command.

(15) [SZM]

Contents: Set additional value (Relevant to panel operation F-08.)

Format: SZM1, ±xxxxxx<CR>

Parameter: ±xxxxxx

- ±xxxxxx: Indicated value with a decimal point. If it has no decimal point, it is filled with '0' from the head.

Return value format: ok<CR><LF>

Description & others: Corresponding to '/M' command.

(16) [SZT]

Contents: Set automatic ZERO compensation function.
(Relevant to panel operation F-09.)

Format: SZTxxxxxx,y.y,z

Parameter: xxxxxx,y.y,z

- xxxxxx: Indicates ZERO range, indicated value with decimal point. If the indicated value has no decimal point, it is filled with '0' from the head.
- y.y: Definition time (sec)
- z: ZERO near ZERO range

Return value format: ok<CR><LF>

Description & others: Corresponding to '/M' command.

(17) [OP1]

Contents: Set analog output (A/D output). (Relevant to panel operation F-06.)

Format: OP1020, ±xxxxxx,±yyyyyy<CR>

Parameter: ±xxxxxx,±yyyyyy

- ±xxxxxx: Indicated value at 0 volt output.
- ±yyyyyy: Indicated value at 10 volts output

• Both indicated values include decimal point.
If the indicated value has no decimal point, it is filled with '0' from the head.

Return value format: ok<CR><LF>

Description & others: Corresponding to '/M' command.

(18) [SCV]

Contents: Set comparator

Format: SCVx, ±yyyyyy<CR>

Parameter: x, ±yyyyyy

- x: Select the comparator.
  - 1: Comparator H
  - 2: Comparator L
  - 3: Spare
  - 4: Spare
- ±yyyyyy: Comparative value
  Indicated value with a decimal point
  If the indicated value has no decimal point, it is filled with '0' from the head.

Return value format: ok<CR><LF>

Description & others: Corresponding to '/M'command.

(19) [SCV]

Contents: Set hysteresis. (Relevant to panel operation F-10.)

Format: SCV0,xxxxxx<CR>

Parameter: xxxxxx

- xxxxxx: Indicates the indicated value with a decimal point. If the indicated value has no decimal point, it is filled with '0' from the head.

Return value format: ok<CR><LF>

Description & others: Corresponding to '/M' command.

(20) [LCK]

Contents:	Set keylock
Format:	LCKa<CR>
Parameter:	a 0: Cancels keylock 1: Sets keylock
Return value format:	ok<CR><LF>
Description & others:	This command becomes disabled with the power OFF.

(21) [ZAD]

Contents:	Auto-ZERO function
Format:	ZAD<CR>
Parameter:	None
Return value format:	ok<CR><LF>
Description & Others:	Corresponding to '/M' command.

(22) [CHK]

Contents:	Self-check function (Relevant to panel operation F-05.)	
Format:	CHK<CR>	
Parameter:	None	
Return value format:	ok<CR><LF>	
	RAM failure	E-01<CR><LF>
	Flash memory failure	E-02<CR><LF>

(23) [SBV]

Contents:	Select BV. (Relevant to panel operation F-13.)
Format:	SBVa<CR>
Parameter:	a 0: 10 V 1: 2 V
Return value format:	ok<CR><LF>
Description & others:	Corresponding to '/M' command.

(24) [HLD]

Contents:	Hold function
Format:	HLD<CR>
Parameter:	None
Return value format:	ok<CR><LF>
Description & others:	This command simulates the panel face hold switch operation.

(25) [RST]

Contents:	Hold reset command
Format:	RST<CR>
Parameter:	None
Return value format:	ok<CR><LF>

8. TEDS OPTION

8-1 OUTLINE

By connecting the TEDS (Transducer Electronic Data Sheet) built-in sensors to the WGA-670B-7, the most appropriate sensitivity registration is automatically available.
Connecting up to 4 sensors of the same standard is available.

8-2 CONNECTION

Connect TEDS signal sensors to the following terminal boards Nos. 21 and 22 on the rear panel as shown in the following figure.
Take care of the polarity of the TEDS signals and correctly connect the signals. Or, error occurs when reading data. (Error display 'E-03'). However, no sensors are damaged by connecting to wrong polarity.

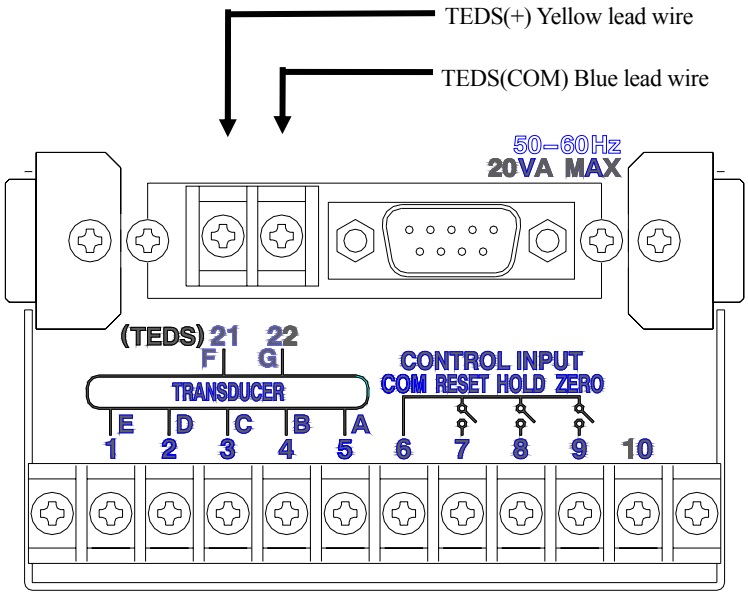


Figure 8-1 Connecting TEDS signals

8-3 OPERATION

There are 3 methods for automatically registering sensitivity by reading the sensor information. One is to automatically register the sensitivity with the power ON. The second is to register the sensitivity by panel key operation. And the third is to send command from the PC that is connected to RS-232C port. Operations of the respective methods are described in the following.

(1) Setting of automatic sensitivity registration with the power ON

- Confirm the [LOCK] LED is turned OFF.
  If it is ON, press the HOLD + FUNCTION keys at the same time for more than 2 seconds to cancel the [LOCK] state.
- Press the FUNCTION key for more than 2 seconds to activate the function selecting mode and 'F-01' is displayed on the indicator.
- Press the → key or SHIFT + ← keys to indicate 'F-14' and then, press the SET key.
- '0-0' is displayed on the indicator and the left side '0' flickers .The 2 numbers denote the following.

  0 – 0
  - Digital-ZERO function when the power ON
    0: OFF 1: ON
  - TEDS automatic sensitivity registration function when the power ON
    0: OFF 1: ON

- The flickering numeric is operable. Press the ↑ key as it is to indicate '1-0.'
- Pressing the SET key indicates 'F-14.' Then, press the CANC key.
- Now, when the power is turned ON the next time, automatic sensitivity registration is conducted.
  To return to the original state that conducts no automatic sensitivity registration, return the above '1' to '0.'
- In addition, whether or not to conduct digital ZERO function with the power ON is set in the same manner.

(2) Automatic sensitivity registration by key operation

Other than by turning the power On, arbitrary reading the TEDS information enables to automatically conduct the sensitivity registration.

- Confirm the [LOCK] LED is turned OFF.
  If the [LOCK] LED is ON, press the HOLD + FUNCTION keys at the same time for more than 2 seconds and cancel the [LOCK] state.
- Press the SHIFT + TEDS keys for more than 2 seconds.
  Then, '_____' is indicated to read the TEDS information and to conduct sensitivity registration.

(3) Automatic sensitivity registration by receiving command

By connecting the WGA-670B to the PC using RS-232C interface, the automatic sensitivity registration command is received via RS-232C interface from the PC

For details of PC connection, see "7. RS-232C OPTION."

The command of the automatic sensitivity registration is described in the following.

Command: EID<CR>
Parameter: None
Return value: ok<CR><LF>
When error occurs, E-03<CR><LF>

(4) When error is displayed

Owing to the following cause, an error message 'E-03' may appear when conducting the automatic sensitivity registration. At this time, no sensitivity is registered.

Pressing the CANC key cancels the error display and starts the operation with already registered set value.

- TEDS signal wires are incorrectly connected.
  Refer to "8-2 CONNECTION" and check the connected state.
- Sensor connection is not appropriate.
  Connect 1 to 4 sensors.
- Length of the cable too long
  If the cable length is exceeding 30 m, the TEDS information may not correctly operate.
  Take special care when using an extension cable to the sensor.
- Sensors not compatible with the TEDS are connected.
  Cancel the automatic sensor registration function before use.

9. SPECIFICATIONS

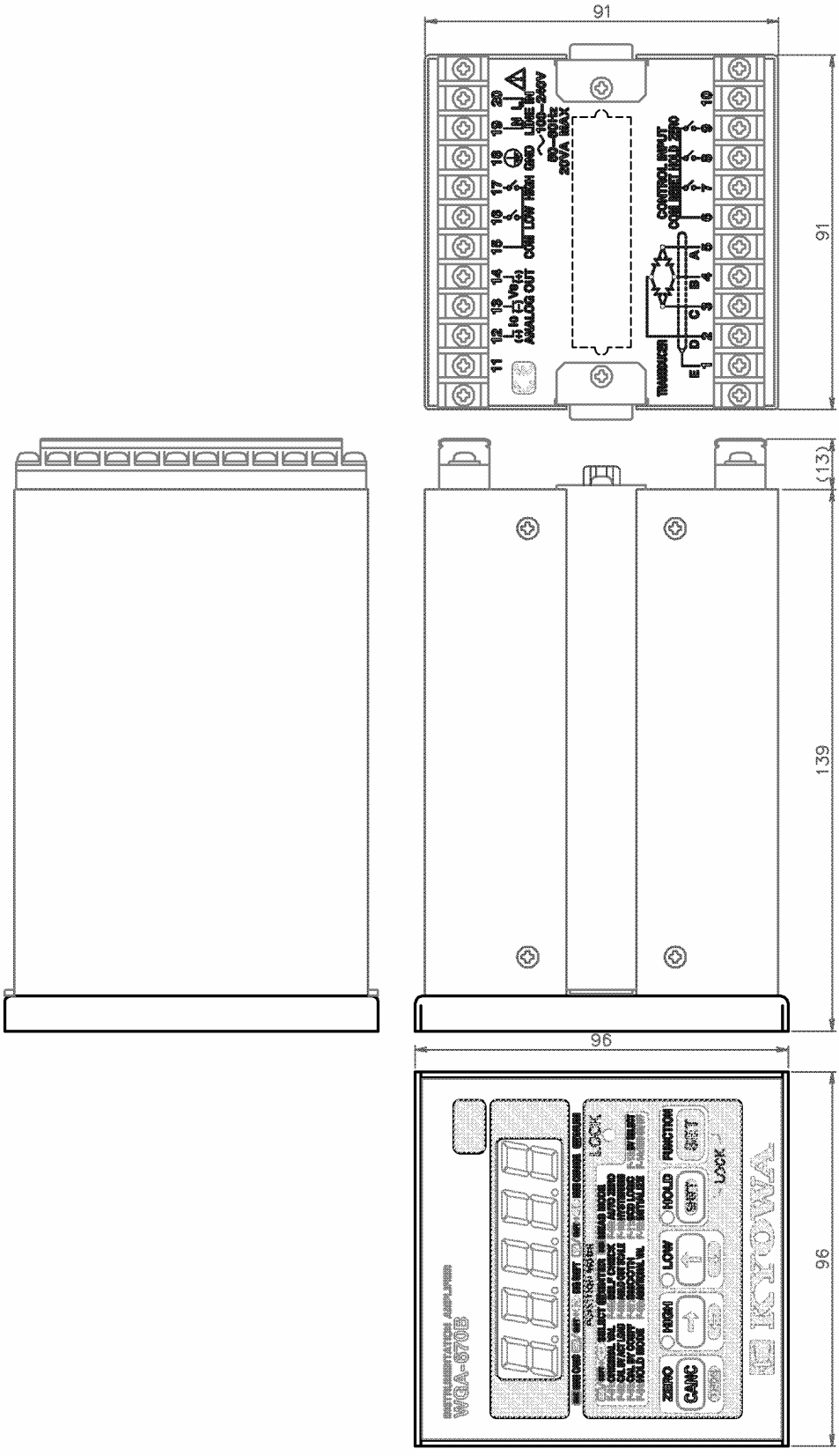
9-1 SPECIFICATIONS

Model Name	WGA-670B	
Number of Measuring channels	1	
Applicable Transducer	Strain Gage Transducer	
Applicable Bridge Resistance	87.5 Ω to 10 kΩ (350 Ω connecting four WGA-670Bs in parallel)	
Bridge Exciter	10 VDC, 2 VDC	
Measuring Range	±3.2 mV/V (In gross weight)	
Zero Adjusting Range	Same as measuring range (Digital operation)	
Nonlinearity	±(0.03% FS +1 digit)	
Temperature Stability	ZERO:	±0.25 μVRTI/℃
	Sensitivity:	±0.01%/℃
Frequency Response Range	2 steps selectable:	DC to 100Hz
		DC to 10 Hz
Sampling Frequency	2000 times/second	
Display	Display range:	±19999
	Character height:	14mm, Red, 7-seg LED
	Display mode:	Normal/Hold
	Display speed:	15.6 times/sec (In Normal Display mode)
Calibration Function	Sensitivity registering calibration, actual load calibration	
Smoothing Function	Minimum scale fixing function	
		1, 2, 5, 10, 20, 50, and 100
	Auto-ZERO compensation function	
		Automatically ZEROing within the preset range
	Moving average	8, 16, 32, 64, 128, 256, 512, 1024, and 2048 times
	Zero near zero function	
		Automatically ZEROing within the preset range from 0 to 9
High/Low Limit Comparator	Number of Points:	2 (High/Low limit)
	Setting range:	±19999
	Output format:	Open collector
	Load capacity:	30 VDC, 20 mA (Resistance load)
	Comparison mode:	Normal/Hold
	Comparison speed:	500 times/sec
Additional Function	Setting range:	±19999
Original Value MEAS Function	±3.200 mV/V	
Hold Function	Arbitrary point hold, peak hold, block specified hold, time specified hold	
	Delay time setting is allowed.	
Control Input	Type:	HOLD, RESET & ZERO
	Signal format:	Dry contact (Capacity:12 VDC,5 mA or more)

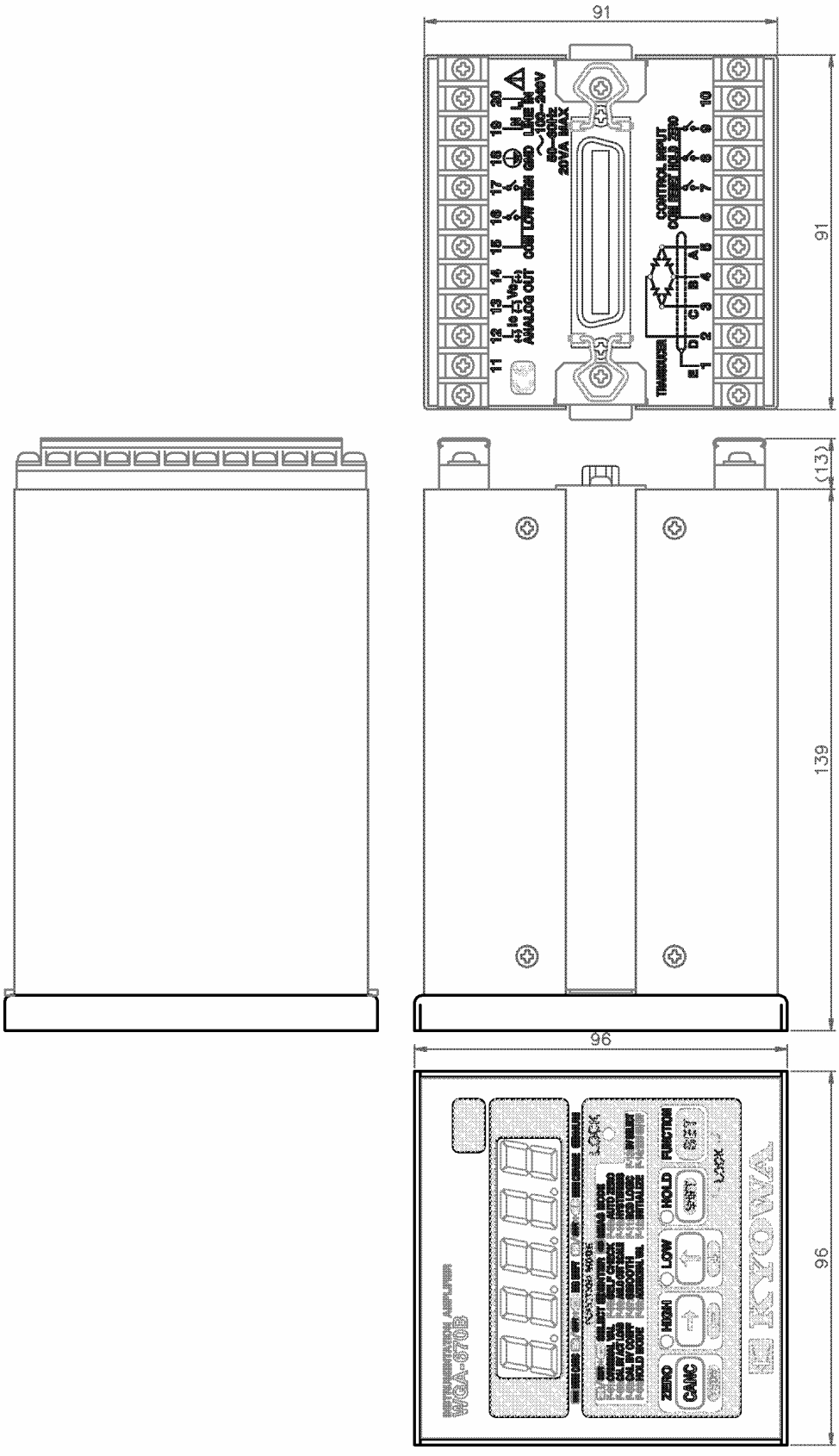
Analog Output (D/A Output)	Insulated voltage output:	±10 V (Load resistance: 2kΩ or more) Arbitrary scaling is allowed
	Insulated current output:	4 to 20 mA (Load resistance: 500 Ω or less) Fixed to voltage output from 0 to 10 V
	Output Speed:	500 times/sec
	Withstand voltage:	250V AC for 1 minute
	Nonlinearity:	Within ±0. 1 % FS
	Temperature stability:	ZERO Within ±150μV/℃ Sensitivity Within ±0.01%/℃
BCD Output ..... (WGA-670B-1)	Output format:	Insulated open collector output 5 digits, minus code, OVER, printout command (EOC)
	Output logic:	Setting is allowed
	Output speed:	15.6, 31.3, 62.5, and 125 times/sec
	Driving capacity:	30 VDC, 20 mA
	Connector:	Equivalent to 57-40360 (DAIICHI DENSHI KOGYO made)
RS Output ..... (WGA-670B-7)	Signal method:	RS-232C Full duplex method
	Transmission method	Asynchronous method
	Transmission speed	9600 bps
	Bit structure:	Data bit 7 Stop bit 1 Parity bit Odd number parity
	Connector:	Dsub 9-pin (male)
	Flow control:	Not compatible
TEDS Compatible ..... (WGA-670B-7)	Interface:	Compatible with IEEE1451.4 Mixed Mode Transducer Interface Class 2
	Applicable sensors:	Sensor with information conforming to IEEE template No. 33 Cable length: 30 m or less
Operating Temp & Humid Range	-10 to 50℃, 20 to 85% RH (Non condensing)	
Power Supply	100 to 240 VAC ±10% 50/60Hz single phase, 20 VA or less	
Dimensions	96(W) × 96(H)× 139(D) (Protruded portion not included)	
Weight	Approximately 1.1kg (WGA-670B-0)	
Notation	English or Japanese	
EMC Standard	EN61326-1 (Class A)	
Safety Standard	EN61010-1 (Installation category: II, Pollution degree: 2)	

9-2 OUTSIDE DRAWING

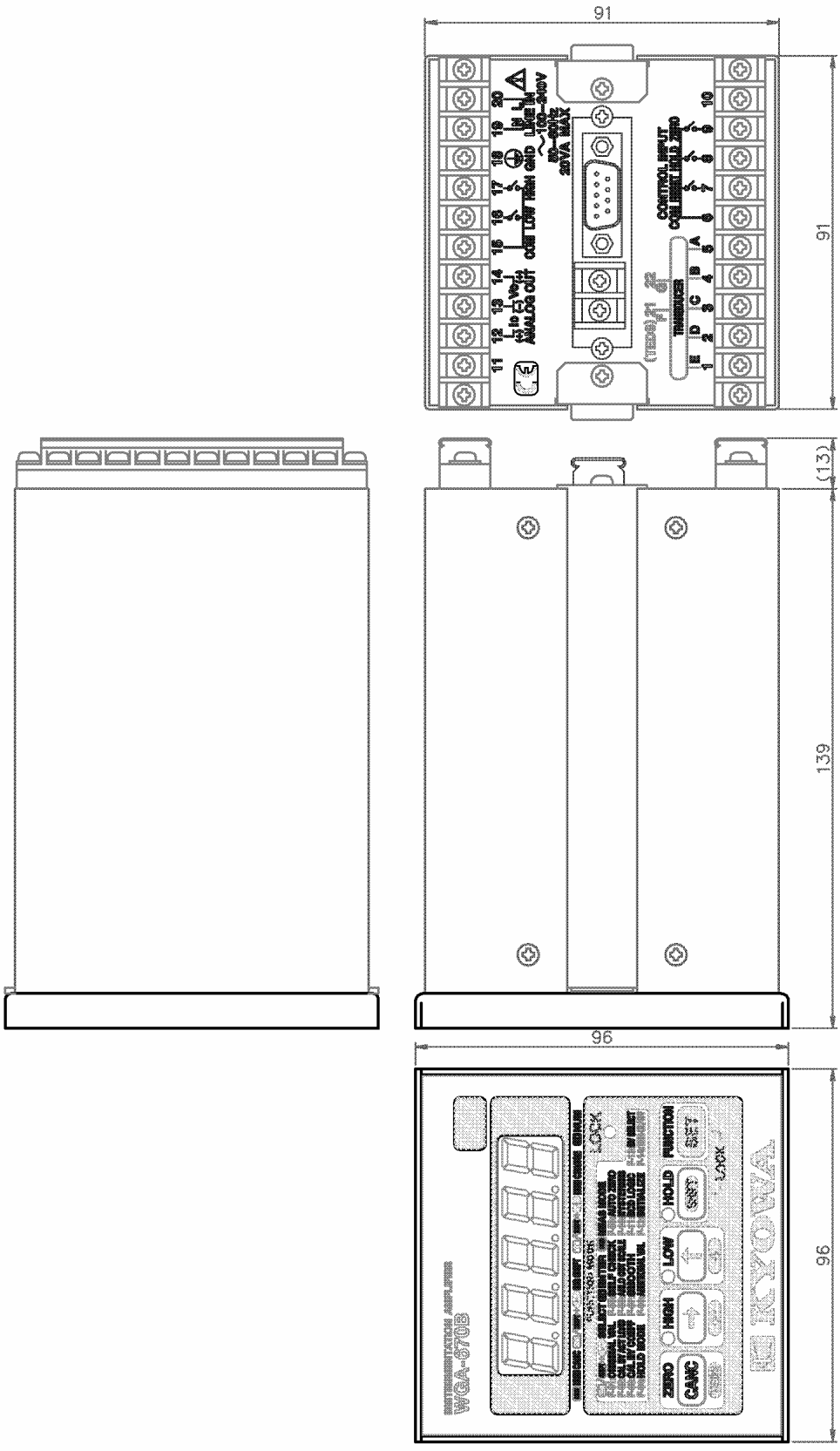
(1) With No Option (WGA-670B-0)



(2) With BCD Option (WGA-670B-1)



(3) With RS+TEDS Option (WGA-670B-7)



10. ERROR CODE LIST

Error Display	Contents	Countermeasures
0FL1	Measured value is exceeding the measuring range to the minus side.	Decrease the input signal. Use the WGA-670B within measuring range of ±3.2 mV/V.
0FL2	Measured value is exceeding the measuring range to the plus side.	
0FL3	Indicated value is below -19999.	Decrease the input signal or reset the sensor registration.
0FL4	Indicated value is above +19999.	
E-00	Sensitivity registering value is exceeding the allowable range.	Use the WGA-670B with indication less than 10000 per 0.1 mV/V.
E-01	Memory (RAM) failure	Failure Contact KYOWA or our representatives for repair.
E-02	Memory (EEP ROM) failure	
E-03	TEDS automatic sensitivity registration failure	See item (4) in “8. TEDS OPTION” when this error display is shown.

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