

INSTRUCTION MANUAL
WGA-680A
INSTRUMENTATION AMPLIFIER
(FOR BCD/RS-232C/RS-485/TEDS OPTIONS)

AC model

WGA-680A-01: BCD/TEDS

WGA-680A-02: RS-232C/TEDS

WGA-680A-03: RS-485/TEDS

DC model

WGA-680A-11: BCD/TEDS

WGA-680A-12: RS-232C/TEDS

WGA-680A-13: RS-485/TEDS

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

Read this Instruction Manual carefully in order to make full use of the high performance capabilities of the product.

Do not use the product in methods other than described in this Manual.

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

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

CONTENTS

STANDARD ACCESSORIES	3
OPTIONAL ACCESSORIES	3
SAFETY PRECAUTIONS (Do not forget to read the safety precautions prior to use.)	4
LIMITED LIFE PARTS AND PREVENTIVE MAINTENANCE	6
WGA-680A REPLACEMENT BEFORE THE END OF SERVICE LIFE	6
NOTATIONS USED IN THE INSTRUCTION MANUAL	6
PRECAUTIONS ON CE MARKING	7
1. BCD OUTPUT	8
1-1. OUTLINE OF PRODUCT	8
1-2. CONTROLS AND INDICATORS (REAR PANEL)	8
1-3. BCD OUTPUT SPECIFICATIONS	8
1-4. PIN AND SIGNAL	9
1-5. TO CONNECT BCD OUTPUT	9
1-6. TO CONNECT BCD CONTROL INPUT	9
1-7. TO SET BCD OUTPUT	10
1-8. BCD SIGNAL TIMING	10
2. RS-232C/RS-485	12
2-1. RS-232C OPTIONS	12
2-1-1. OUTLINE OF PRODUCT	12
2-1-2. CONTROLS AND INDICATORS (REAR PANEL)	12
2-1-3. RS-232C SPECIFICATIONS	12
2-1-4. PIN AND SIGNAL	13
2-1-5. TO CONNECT EXTERNAL DEVICES	13
2-2. RS-485 OPTIONS	14
2-2-1. OUTLINE OF PRODUCT	14
2-2-2. CONTROLS AND INDICATORS (REAR PANEL)	14
2-2-3. RS-485 SPECIFICATIONS	14
2-2-4. PIN AND SIGNAL	14
2-2-5. TO CONNECT EXTERNAL DEVICES	15
2-3. TO SET RS-232C AND RS-485	16
2-4. COMMUNICATION PROCEDURES	17
2-5. OUTLINE OF CONTROL COMMANDS	18
2-6. LIST OF CONTROL COMMANDS	19
2-7. DETAILS OF CONTROL COMMANDS	20
2-7-1. Initial settings	20
2-7-2. Reading	22
2-7-3. Executing	24
2-7-4. Settings	25
2-7-5. Others	32
2-7-6. Binary code (RS-485 only)	32
3. TEDS FUNCTION	33
3-1. OUTLINE OF PRODUCT	33
3-2. TEDS SPECIFICATION	33
3-3. TO CONNECT	33
3-4. TO OPERATE	33
3-4-1. Sensitivity registration by power switch	33
3-4-2. Sensitivity registration by key operations	33
3-4-3. Sensitivity registration by command operations	34

3-5. TEDS DATA SENSITIVITY REGISTRATION	34
3-6. TO SET TEDS	35
4. TROUBLE SHOOTING.....	36
5. OUTSIDE DRAWING.....	37
5-1.WGA-680A-01: BCD/TEDS OPTION	37
5-2.WGA-680A-02: RS-232C/TEDS OPTION	38
5-3.WGA-680A-03: RS-485/TEDS OPTION	39
5-4.WGA-680A-11: BCD/TEDS OPTION	40
5-5.WGA-680A-12: RS-232C/TEDS OPTION	41
5-6.WGA-680A-13: RS-485/TEDS OPTION	42

STANDARD ACCESSORIES

The following accessories are packed with the WGA-680A-01, WGA-680A-02, WGA-680A-03, WGA-680A-11, WGA-680A-12, and WGA-680A-13.

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

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

OPTIONAL ACCESSORIES

<BCD output connector>	
Soldered plug (3M Japan Limited)	10136-3000PE
Shell kit (3M Japan Limited)	10336-52F0-008

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

The WGA-680A-01, WGA-680A-02, WGA-680A-03, WGA-680A-11, WGA-680A-12 and WGA-680A-13 are designed to be used according to "1-3. BCD OUTPUT SPECIFICATIONS", "2-1-3. RS-232C specifications", and "2-2-3. RS-485 specifications". Do not use the product in an environment exceeding the specifications.
Or, it may cause troubles.

PRIOR TO USE

For safe use of the product, do not forget to read the “Safety Precautions” prior to use.
Kyowa Electronic Instruments Co., Ltd. assumes no liability for any damage resulting from the user's failure to comply with the safety precautions.
For safety operation of the product, the following symbol marks are used in the Instruction Manual.

	Indicates “PROTECTIVE GROUND TERMINAL.” Be sure to connect the GND terminal to the ground.
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SAFETY SYMBOLS

For safety operation of the product, the following symbol marks are used in the Instruction Manual.

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

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

CAUTION

- **Caution**
Be sure to observe the safety precautions described in the WGA-680A Instruction Manual.
- Do not use the product outdoors.
Or, it may cause electric shock, fire hazard, lower the performance and cause troubles.
- Do not turn ON the power switch immediately after turning it OFF.
After turning OFF the power switch, wait (5 seconds) until the power supply is shut OFF before turning ON the power switch again.
If the power is repeatedly turned ON and OFF within 5 seconds, rush current generated by switching the power ON may damage the product.
- Use the product within temperature ranging from -10 to +50°C.
Use at temperatures exceeding the specified range may lower the performance and cause trouble.
If use under direct sunlight or in a cold place is inevitable, prepare a sunscreen or take proper measures to keep it warm.
- Use the product in the specified operating humidity of 20 to 80%.
Use in a humid place exceeding the specified range or where it is exposed to splashing water may lower the performance and cause trouble.
- Do not use the product immediately after the change in the environment.
Leave the product as it is until it becomes adaptable to the environment.
Abrupt change in ambient temperature due to transportation, etc. may cause dew condensation, which may result in lower performance and troubles.
- Use the product under environment without excessive vibration or high impact.
Vibration resistance: 19.6m/s^2 (2G), 10 to 200Hz (when in operation)
Use the product in an area where vibration and impact can be kept within the scope of specifications.
Continuous vibration or severe impact may cause deteriorated performance and system failure.
- Do not use the product in strong electromagnetic field.
Use the product in a magnetic field environment where the PC may be used.
Performance may be lowered and erroneous operation and troubles may result if it is used near a telemetry system, microwave oven, electronic furnace or any other equipment generating a strong magnetic field.
- Do not use the product under poor conditions.
Use a power source that is free from momentary power outages and noise.
Make sure that fluctuations in the power supply to the device do not exceed $\pm 10\%$ of the nominal voltage.
Operate the product within the range 50/60 Hz.
- Do not pull cords and cables.
Lay cords and cables with a certain allowance so that unreasonable force is not applied to the connections.
Or, it may interrupt the measurements, break the cables, and damage the connectors.
- Avoid installing sensors and products near a welding machine. Failure to do so will pose the risk of erroneous data, malfunction and failure.
- Do not disassemble or remodel the product. Or, it may cause electric shock hazards or damage the product. This warranty does not cover any damaged or defective parts that results from disassembling or remodeling.
- This can lead to performance problems and decreased operating efficiency. Be careful that dust may not enter the product not only during operation but also under stored conditions.
- Do not use or store the product under dusty or fine particles or corrosive gas environment.
Use or store under these environment, may result in lower performance and troubles.
- Do not expose the product to the air if it is used and stored nearby sea. Air exposure nearby sea may cause lower performance and products failure.
- Take care when handling the CD-R.
Do not expose the CD-R to direct sun light, high temperature, or high humidity.
Do not apply pressure to the CD-R by laying object or bending.
Dust, scratches, and fingerprints on either side of the CD-R can cause write errors.
- Preheat the product before use.
After the power ON, always preheat the product for approximately 1 hour.
- Cleaning.
When the product gets dirty, clean the product with a dry soft cloth. When dust exists inside the WGA-680A, clean it by using an air blow gun. Do not touch electronic parts.

LIMITED LIFE PARTS AND PREVENTIVE MAINTENANCE

The WGA-680A-01, WGA-680A-02, WGA-680A-03, WGA-680A-11, WGA-680A-12 and WGA-680A-13 consist of various electronic components and those components, if not all, have a useful life. Using them exceeding the years specified according to each part type (useful life) may affect the characteristics of the product, resulting in a malfunction or a failure.

Particularly, when aluminum electrolytic capacitor life ends, the signal-noise ratio lowers due to capacity low or smoke is emitted due to liquid leak, resulting in a malfunction of the product. To operate the product normally, finding a sign of the product failure early by daily/periodic inspections and taking the corrective action are required. For inspection, contact KYOWA or our representatives.

- * Limited life parts used with the product are aluminum electrolytic capacitor.
- * All components do age and will fail.

WGA-680A REPLACEMENT BEFORE THE END OF SERVICE LIFE

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

NOTATIONS USED IN THE INSTRUCTION MANUAL

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

- Names described on the panel surface
Names described on the panel surface are expressed in double quotation mark " ".
- Informational notes
Certain notations are used as necessary to attract your attention to information that requires special care when handling the product, and to information provided for reference purposes.

Examples of Notations

NOTE

Essential precautions required when handling the product.

MEMO

Reference items required when handling the product.

PRECAUTIONS ON CE MARKING

NOTE

When satisfying the following conditions, we evaluated the compatibility against the requirements of the EU Directives and confirmed that the product satisfied the requirements.

- To connect products, be sure to use the shielded BCD output cables, shielded RS-232C cables and shielded RS-485 cables. Wiring should be 30 m or less.
- Before connecting the following cables, be sure to mount ferrite core near the terminal or connector.
 - Control cable
Recommended ferrite core GRFC-5 (KITAGAWA INDUSTRIES CO., LTD.)
 - BCD cable
Recommended ferrite core E04SR200932 (SEIWA ELECTRIC MFG. CO., LTD.)
- Be sure to mount the product on the control panel, etc. Before turning ON the power, make sure the product is covered to avoid contact with hands.
- The product connection should be executed by experts in electrical work.
- To immediately turn OFF the product, place switches or circuit breakers inside the building and near the product and display the functions as well.
Use switches and circuit breakers conforming to the IEC60947-1 and IEC60947-3.
- Use the product in area where elevation is 2000 m or below.
- When mounting the product in your system, approaches to satisfy the CE marking requirements vary with the configuration of the control panel to be used, the other devices to be connected, and wirings. Therefore, customers are required to check whether the CE marking requirements on the product are satisfied or not.
- Be sure to connect the GND terminal to the ground by using the optional ground wire.

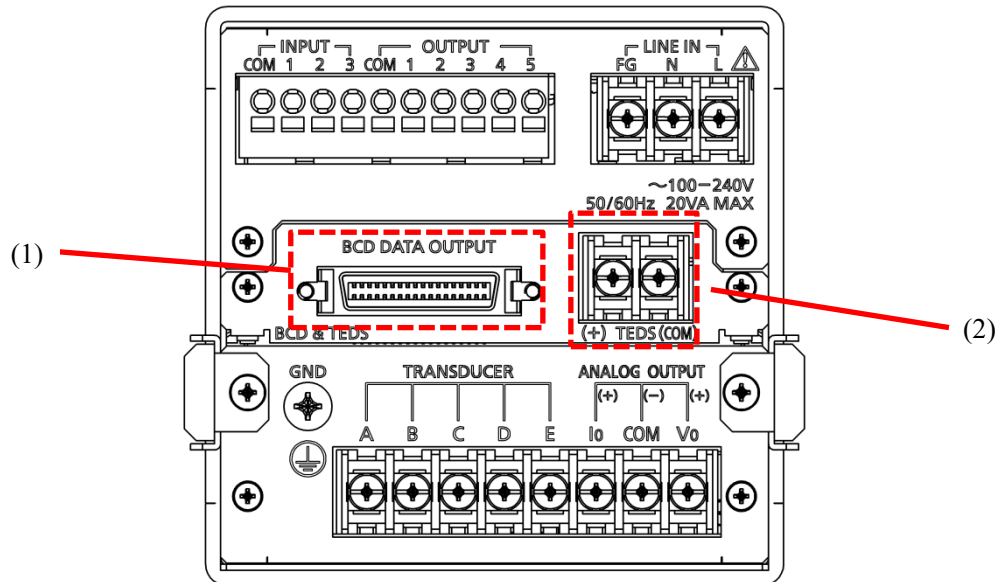
1. BCD OUTPUT

1-1. OUTLINE OF PRODUCT

The WGA-680A-01(AC model) and WGA-680A-11(DC model) are an instrumentation amplifier with the BCD/TEDS options. These products are able to retrieve the indicated values as the BCD data.

The product is able to control the PLC (sequencer), and be able to print data by using printers.

1-2. CONTROLS AND INDICATORS (REAR PANEL)



*Figure is AC model.

- (1) [BCD DATA OUTPUT] connector Retrieves the indicated values as the BCD data.
Controlled by using various input signals and output signals.
- (2) [TEDS] terminal block For details, see "3. TEDS FUNCTION".

1-3. BCD OUTPUT SPECIFICATIONS

	SPECIFICATIONS	Initial values
Output	Data: 20 bits (4 bits × 5 digit)	
	Negative sign, OVER, EOC (End of Conversion), Outputs data during the holding interval and detecting interval.	
	Output format open collector output: 30 VDC, max. 20mA	
Input	Number of points 2 (DATA HOLDING signals and OUTPUT-prohibited signals)	
	Input format Dry contact signal or open collector signal (12 VDC voltage and 5 mA current can be applied.)	
The number of outputs	Approximately 15.6 times/s, 31.3times/s, 62.5times/s, and 125times/s	Approximately 125 times/s
Output logic	Data logic Positive logic, negative logic	Negative logic
	EOC logic Positive logic, negative logic	Negative logic
	Polarity logic Positive logic, negative logic	Negative logic

1-4. PIN AND SIGNAL

Pin No.	Signal name		Pin No.	Signal name	
1	Data 1	Output	19	Data 2	Output
2	Data 4	Output	20	Data 8	Output
3	Data 10	Output	21	Data 20	Output
4	Data 40	Output	22	Data 80	Output
5	Data 100	Output	23	Data 200	Output
6	Data 400	Output	24	Data 800	Output
7	Data 1000	Output	25	Data 2000	Output
8	Data 4000	Output	26	Data 8000	Output
9	Data 10000	Output	27	Data 20000	Output
10	Data 40000	Output	28	Data 80000	Output
11	POL (negative polarity)	Output	29	OVER	Output
12	EOC output	Output	30	Holding interval (*1)	Output
13	Detecting interval (*1)	Output	31	NC (Connection prohibited)	
14	NC (Connection prohibited)		32	NC (Connection prohibited)	
15	NC (Connection prohibited)		33	NC (Connection prohibited)	
16	NC (Connection prohibited)		34	NC (Connection prohibited)	
17	BCD DATA HOLDING signals	Input	35	BCD OUTPUT-prohibited signals	Input
18	COM		36	COM	

(*1) Outputs data during the holding interval: While holding the indicated values. Open collector output L (ON)
 Outputs data during the detecting interval: While detecting the peak values, etc. Open collector output L (ON)

To connect external devices, the compatible connector of the cables is as follows.

Connector Model: 10136-3000PE (3M Japan Limited)

Cover Model: 10336-52F0-008 (3M Japan Limited)

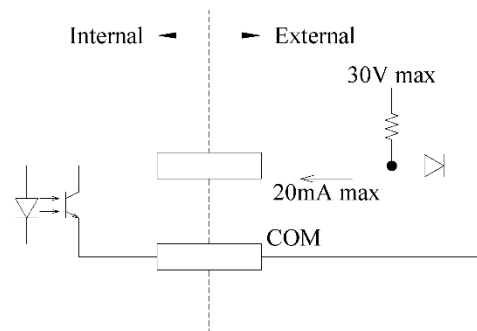
1-5. TO CONNECT BCD OUTPUT

To connect external devices, connect the following signals as described in the right figure.

Data: 1 to 80000

POL, OVER, EOC, Holding interval and detecting interval

The control outputs are open collector, 30 VDC, 20 mA max.

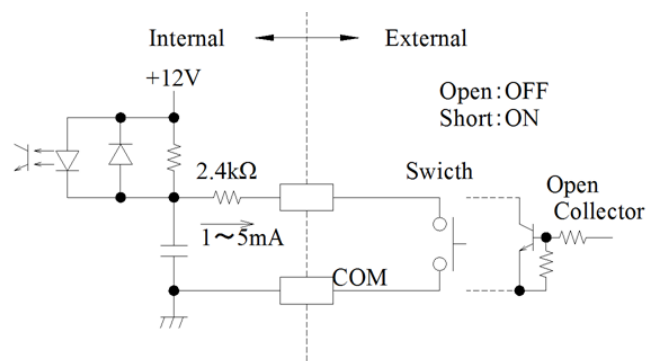


1-6. TO CONNECT BCD CONTROL INPUT

To connect external switches or open collectors, connect the following signals as described in the right figure.

BCD DATA HOLDING signals,

BCD OUTPUT-prohibited signals



1-7. TO SET BCD OUTPUT

NOTE

DA output and control output are stopped when the instrument is in function selection mode(F-** is displayed) or during function setting.

When applying a load, pay attention to overload and control status.

For details of functions, see "4" in the INSTRUCTION MANUAL.

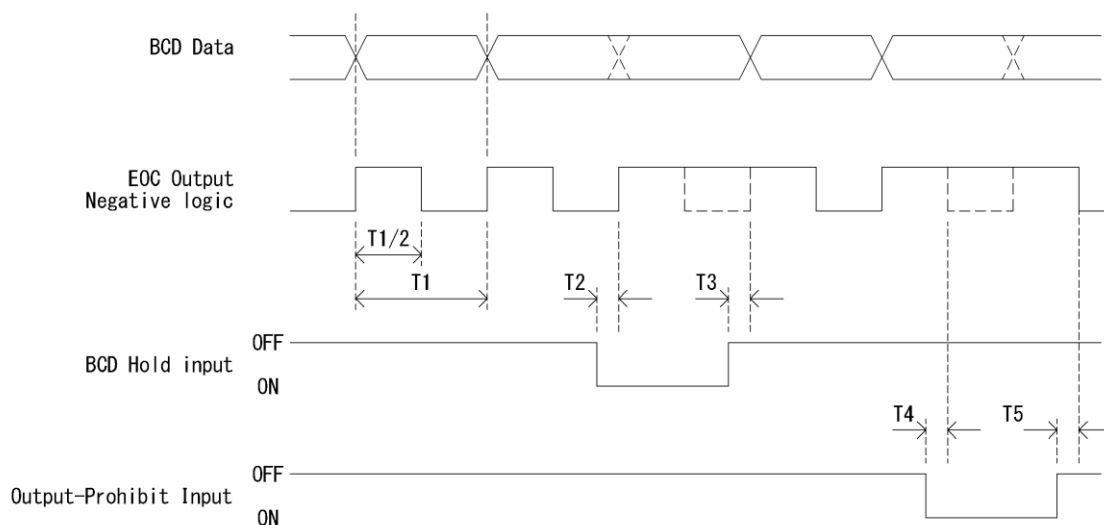
To set the data output logic, polarity logic (negative polarity), and EOC logic, go to the FUNCTION SELECTING mode [F-11].

FUNCTION SELECTING mode	Key operation and WGA-680A-0* movement in SETTING mode	Functional description
F-11 BCD Output Logic	Display the following items (1), (2), (3), (4) (1) The number of outputs 0: 125 times/s. (initial value) 1: 62.5 times/s. 2: 31.3 times/s. 3: 15.6 times/s. (2) Data Output Logic 0: Negative logic (initial value) 1: Positive logic (3) EOC logic 0: Negative logic (initial value) 1: Positive logic (4) Polarity logic 0: Negative logic (initial value) 1: Positive logic Select and change values in items (1), (2), (3) and (4) and press the SET key.	A function that sets the output logic and output rate of the BCD data. Open collector transistor output Negative logic: When the Signal is ON, the transistor output is ON.

1-8. BCD SIGNAL TIMING

To read the BCD data, POL (negative polarity) data, and OVER data by using the EOC data (negative logic) , read the data within 1/2 (msec) from the falling edge ("H" → "L").

To read data after holding the BCD data, make sure the BCD Hold input signal is "L (ON)." Then read the data 5 msec or later. The BCD data does not vary when the BCD Hold input signal is "L (ON)."



Delay time

Delay time between input and BCD output = (Delay time between input and D/A output) + (BCD conversion time)

Delay time between input and D/A output: Max. 12ms

BCD conversion time: Max. 4 ms (The number of outputs: 125 times/s)

(1) OVER signals

Outputs the OVER signals when the value exceeds the input range or display range. (The OFL1, OFL2, OFL3, or OFL4 appears.)

When the input range is over, the value immediately before over detection is output.

It outputs 99999 in case of display + over, and -99999 in case of display - over.

(2) POL (negative polarity) signals

Output the POL signal when the indicated value is negative (-).

(3) BCD OUTPUT-prohibited signals

When the OUTPUT-prohibited signal is "L (ON)", the transistor outputs are all OFF.

To connect multiple BCD outputs or to select the target channels, use the BCD OUTPUT-prohibited signals.

T1: Data output and EOC signal output time

The number of outputs (times/s)	T1 (ms)
125	8
62.5	16
31.3	32
15.6	64

T2, T3: 1 msec (min)

Relationship between the EOC signals and BCD Data Hold signals.

Read the BCD Data Hold signals when the EOC signal is turned ON.

When the BCD Data Hold signal is ON, the product does not output data and does not output EOC signals.

T4, T5: 1 msec (min)

Relationship between the EOC signals and Output-prohibited signals.

Reads the Output-prohibited signals when the EOC signal is turned ON.

When the Output-prohibited signal is "L (ON)", the data transistor outputs are all OFF. The product does not output EOC signals.

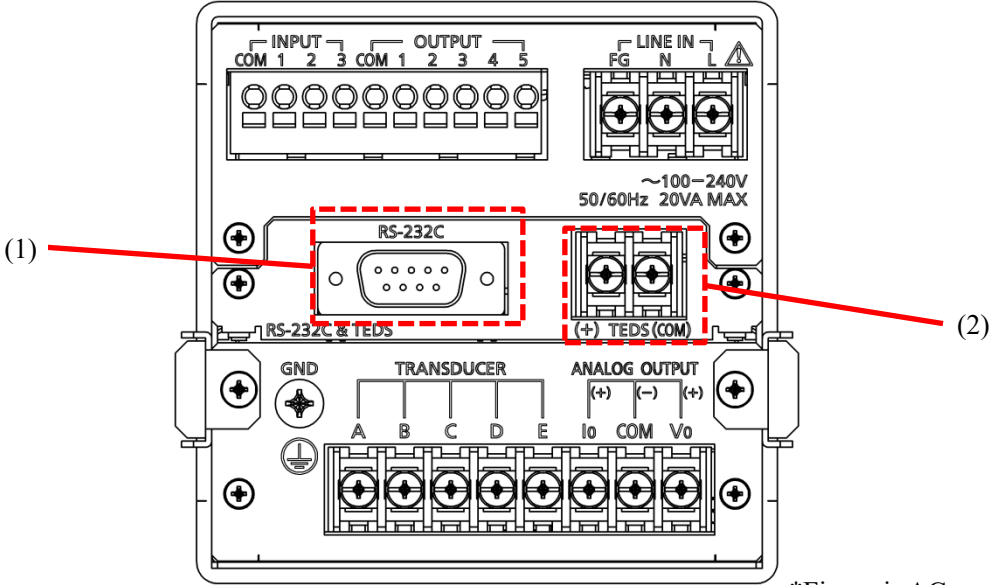
2. RS-232C/RS-485

2-1. RS-232C OPTIONS

2-1-1. OUTLINE OF PRODUCT

The WGA-680A-02(AC model) and WGA-680A-12(DC model) are instrumentation amplifier with the RS-232C/TEDS options. These products are able to set various functions and read mesured values by using external devices.

2-1-2. CONTROLS AND INDICATORS (REAR PANEL)



*Figure is AC model.

- (1) [RS-232C] connector

Sets various functions and reads mesured values by using external devices (PC, etc.).
- (2) [TEDS] terminal block

For details, see "3. TEDS FUNCTION".

2-1-3. RS-232C SPECIFICATIONS

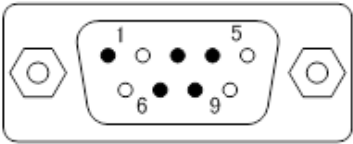
Item	Specifications	Initial values
Signaling system	RS-232C, full duplex system	
Transmission system	Asynchronous	
Communication speed	2400, 4800, 9600, and 19200bps	9600bps
Bit configuration	Data bit 7	
	Stop bit 11	
	Parity: Odd number	
Flow control	None	
Delimiter	CR, CR+LF	Tx: CR+LF, Rx: CR
Output code	ASCII	

NOTE

The WGA-680A-02 does not support the XON/XOFF and send brake signals.

2-1-4. PIN AND SIGNAL

Pin No.	Signal name	Pin No.	Signal name
1	DCD	6	DSR
2	RXD	7	CTS
3	TXD	8	RTS
4	DTR	9	N.C.
5	GND		

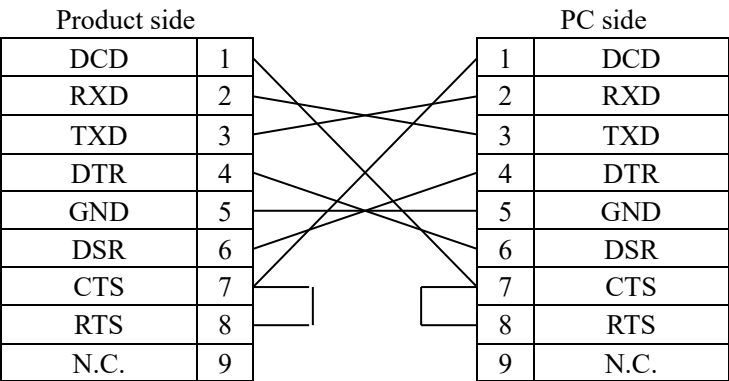


Pin type (male)
Connector front

2-1-5. TO CONNECT EXTERNAL DEVICES

(1) Connection cables

To connect PCs, etc., use the commercially available crossover cable (reversible type).



NOTE

- Before connecting cables, be sure to turn OFF the product and external devices.
Or, it may cause deterioration or trouble.
- The above figure is the connection example of the DTE-DTE.
The connection varies with devices.

(2) To set external devices

Make sure the communication settings of the external device matches the "2-1-3. RS-232C SPECIFICATIONS."

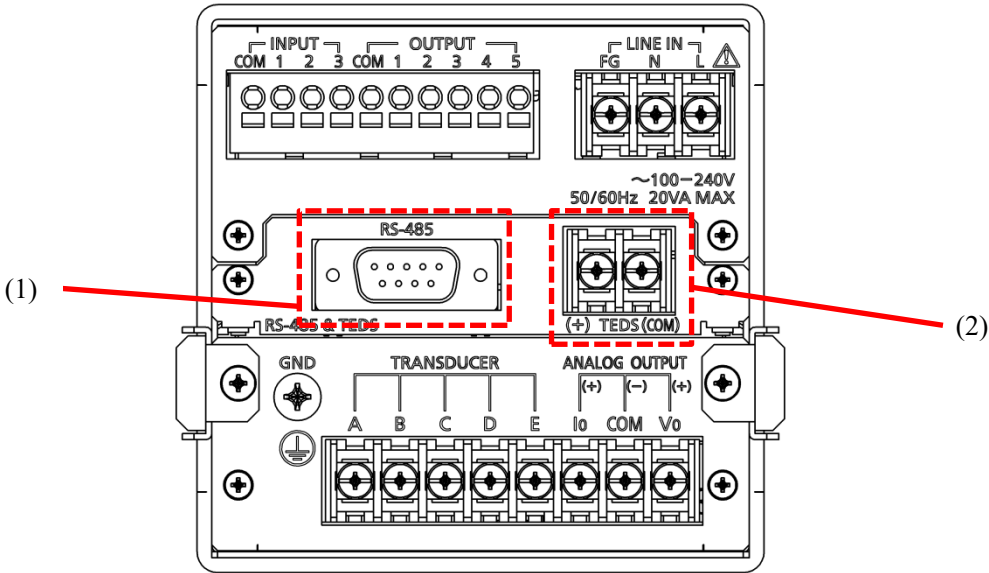
2-2. RS-485 OPTIONS

2-2-1. OUTLINE OF PRODUCT

The WGA-680A-03(AC model) and WGA-680A-13(DC model) are instrumentation amplifier with the RS-485/TEDS options. These products are able to set various functions and read mesured values by using external devices.

These products are able to connect multiple WGA-680A-03, WGA-680A-13 units on the RS-485 network and able to control them.

2-2-2. CONTROLS AND INDICATORS (REAR PANEL)



*Figure is AC model.

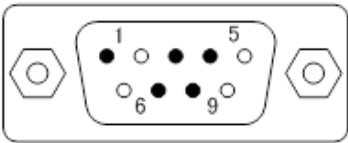
- (1) [RS-485] connector Sets various functions and reads mesured values by using external devices (PC, etc.).
- (2) [TEDS] terminal block For details, see "3. TEDS FUNCTION".

2-2-3. RS-485 SPECIFICATIONS

Item	Specifications	Initial values
Signaling system	RS-485, half duplex system	
Communication speed	2400, 4800, 9600, and 19200 bps	9600 bps
Bit configuration:	Data bit 7	
	Stop bit 1	
	Parity: Odd number	
Flow control	None	
Device ID	1 to 99	1
Delimiter	CR, CR+LF	Tx: CR+LF, Rx: CR
Output code	ASCII	

2-2-4. PIN AND SIGNAL

Pin No.	Signal name	Pin No.	Signal name
1	+ (non-inverting A)	6	TERMINATOR
2	+ (non-inverting A)	7	N.C.
3	- (non-inverting B)	8	N.C.
4	- (non-inverting B)	9	TERMINATOR
5	SG		



Pin type (male)
Connector front

To connect external devices, the compatible connector (9-pin D-sub connector) of the cables is as follows.

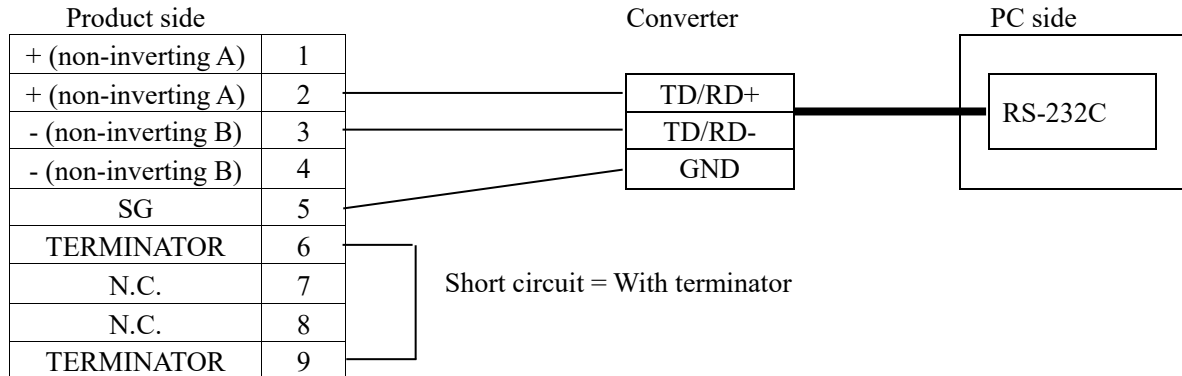
Connector Model: XM2D-0901 (socket, OMRON Corporation or equivalent)

Cover Model: XM2S-0913 (unified screw thread, #4-40UNC, OMRON Corporation or equivalent)

2-2-5. TO CONNECT EXTERNAL DEVICES

(1) Connection cables

- To connect PCs, etc., use the RS-485 ↔ RS-232C converter, etc.
- The Pin No. 1 and pin No. 2, the pin No. 3 and pin No. 4 have the same function. Use them for transition wirings.
- Be sure to connect a terminator in the device, located at the end of the transmission line. You are able to short-circuit the pin No. 6 and pin No. 9 of the WGA-680A-03 instead of connecting the terminator 120 ohm.
- Make sure the RS-485 ↔ RS-232C converter switch is [DTE].



NOTE

Before connecting cables, be sure to turn OFF the product and external devices.
Or, it may cause deterioration or trouble.

(2) To set external devices

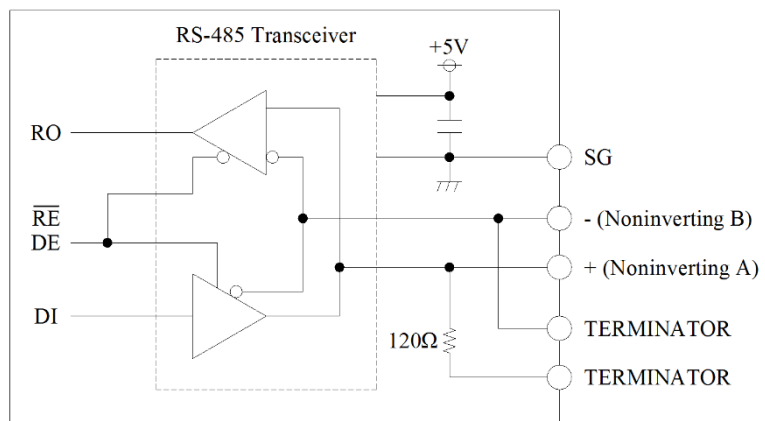
Make sure the settings of the external device matches the WGA-680A-03 specifications.

The RS-485 transceiver of the WGA-680A-03 has the fail-safe function. While receiving data, the fail-safe function makes the CPU output (RO) "1: High" when the circuit, between the pin No. 1 [+ (non-inverting A)] and pin No. 4 [- (non-inverting B)], is short circuit or open.

While receiving data, the circuit, between the pin No. 1 [+ (non-inverting A)] and pin No. 4 [- (non-inverting B)], are short circuit. Therefore, when the external device transceiver does not have the fail-safe function, some CPU output (RO) is "0: Low."

To receive the data correctly, be sure to use the transceiver with the fail-safe function on the converter side.

Product side RS-485 circuit



Logic table

[Tx]					[Rx]				
INPUT			OUTPUT		INPUT		A-B	OUTPUT	
/RE	DE	DI	B	A	/RE	DE		RO	
0	1	1	0	1	0	0	$\geq 300\text{mV}$	1	
0	1	0	1	0	0	0	$\leq -300\text{mV}$	0	
X	0	X	Hi-Z	Hi-Z	0	0	OPEN	1	
					0	0	SHORT	1	

2-3. TO SET RS-232C AND RS-485

NOTE

DA output and control output are stopped when the instrument is in function selection mode(F-** is displayed) or during function setting.

When applying a load, pay attention to overload and control status.

For details of functions, see "4" in the INSTRUCTION MANUAL.

To set the RS communication settings, go to the FUNCTION SELECTING mode [F-16] and [F-17].

You are able to use the FUNCTION SELECTING mode [F-17] (Device ID) on the RS-485 only.

FUNCTION SELECTING mode	Key operation and WGA-680A-0* movement in SETTING mode	Functional description
F-16 RS communication settings	The ①, ②, and ③ appear at the same time on the indicator. (See the following figure.) ① Baud rate 0: 2400bps 1: 4800bps 2: 9600 bps (initial value) 3: 19200bps ② Receive delimiter 0: CR/LF 1: CR (initial value) ③ Transmit delimiter 0: CR/LF (initial value) 1: CR Set the value and press the SET key. NOTE You are able to set the transmission mode (Repeat output, output at hold, and Tx and Rx) by using the RS communication command.	Sets the common communication speed for the RS-232C and RS-485.
F-17 Device ID	Sets the device ID. Range: 01 to 99 (Initial value: 01) Set the value and press the SET key.	Sets the device IDs and discriminates the products when multiple products are connected on the RS-485.

2-4. COMMUNICATION PROCEDURES

(1) TO ESTABLISH COMMUNICATION

To establish the communication, specify the device ID since the RS-485 is able to communicate multiple units. Enters the following command by using software, which is able to transmit binary codes.

Communication establishing command

<ENQ>01<CR>
└──────────┘ Device ID (2 digits)

After establishing the communication, the response command is as follows.

<ACK>01<CR><LF>
└──────────┘ Device ID

MEMO

No responding when the device ID does not match.

NOTE

On the RS-232C, do not sent the above communication establishing command.
Or, the product replies the ng<CR><LF>.

(2) To enter commands

After establishing the communication, enter commands based on the "2-6. LIST OF CONTROL COMMANDS"

(3) To open communication

To open the communication, enter the following command.

<EOT><CR>

MEMO

No responding when the communication is open in advance.

When you specify the other device ID without opening the communication, the products establish communications with the new device ID.

(4) Command interval

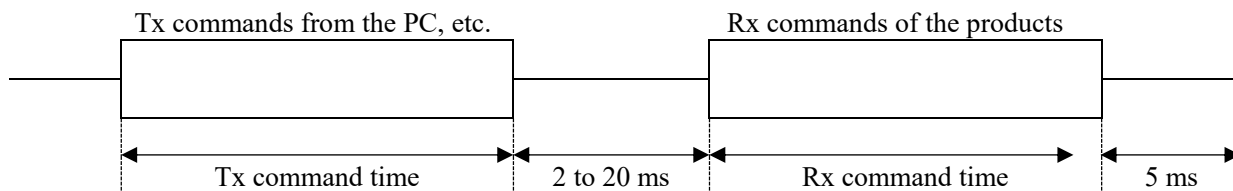
When transmitting commands from the PC, PLC, etc., make sure the interval is longer than the following time. (Excluding the setting commands and calibration commands.)

Command interval = Tx command time + 20 msec + Rx command time + 5 msec

Tx command time: The send character transmit time based on the pre-set baud rate.

Rx command time: The response character transmit time based on the pre-set baud rate.

Suppose the baud rate is 9600 bps (initial value). The recommended interval of the [GDT1] is 50 msec or more.



(5) Delay time

Delay time between the input and RS output Max. 30 ms

2-5. OUTLINE OF CONTROL COMMANDS

This section describes the format, type, etc. of the control commands, output from the external devices (PC, etc.) to the products.

To set control commands of the products, use external devices.

(1) Control command codes

- The control commands are ASCII codes and 3 characters.
- The control commands may include parameters based on the command characteristics.
- The control commands include the termination code as the exit code of the control commands.

The termination code varies with the operations.

<CR> Outputs commands to products.

<CR><LF> Outputs data from the products.

- When entering undefined commands, numerical values, and different decimal point position from the calibration value, the product replies the character string in the following format.

W□□□□□?<CR><LF>

- When an error occurs while writing the pre-set values in the EEPROM, the product replies the following format.
ng<CR><LF>

(2) Delimiters

- The delimiter appears as the exit code of the control commands.
- The delimiter varies with the operations.

<CR> Outputs commands, from the external devices to products.

<CR><LF> Outputs data, from the products to external devices.

2-6. LIST OF CONTROL COMMANDS

Type	Contents	Functions	Command	Page
Initial settings	(1) To initialize	F-12	RES	20
	(2) RS line test		RS-	20
	(3) Model		SYS	20
	(4) To set transmission modes (RS-232C)		MOD	21
	(5) SAVE command		/M	21
Reading	(6) To read indicated values		GDT1	22
	(7) To read statuses		GST	22
	(8) To display original values	F-01	GOD	22
	(9) To read pre-set values		PRR	23
Executing	(10) Self-check	F-05	CHK	24
	(11) HOLD command		HLD	24
	(12) RESET command		RST	24
	(13)ZERO command		ZAD*	24
	(14) To set operation patterns	F-20	SOP*	24
	(15) To set key locks		LCK	25
Settings	(16) To execute actual read calibrations	F-02	VCL	25
	(17) To execute sensitivity registering calibrations	F-03	EIC	25
	(18) To execute numeric value registering calibrations	F-19	VRC	25
	(19) To execute TEDS sensitivity registering calibrations		EID	26
	(20) To set smoothing functions	F-07	SSM*	26
	(21) To set additional values	F-08	SZM*	27
	(22) To set Automatic ZERO compensation functions	F-09	SZT*	27
	(23) To select bridge excitation voltage	F-13	SBV*	27
	(24) To set display updating rates	F-21	SDR*	28
	(25) To set LEVEL TEST	F-22	LVS*	28
	(26) To set analog outputs (D/A) scaling	F-06	OP1*	29
	(27) To set Hold modes	F-04	SMF*	29
	(28) To set comparator values		SCV*	30
	(29) To set hysteresis	F-10	SCV*	30
	(30) To set comparator functions	F-23 to F-26	SCF*	31
Others	(31) Response of the undefined command		ng	32
	(32) Communication error		Error X	32
Binary code (RS-485 only)	[1] To establish communication		<ENQ>	32
	[2] To open communication		<EOT>	32

* Corresponding to the SAVE command [/M].

2-7. DETAILS OF CONTROL COMMANDS

This section describes various control commands and parameters following after the commands.
<CR> and <CR><LF> denote termination code.

2-7-1. Initial settings

(1) [RES]

Contents:	To initialize
Format:	RES0628<CR> └───┘ Key code (Enter "0628" when the key code is enabled or disabled.)
Parameter:	None
Return value format:	ok<CR><LF>
Description and others:	The results of the command will be disabled after turning OFF the power.

(2) [RS-]

Contents:	RS line test
Format:	RS-<CR>
Parameter:	None
Return value format:	ok<CR><LF>
Description and others:	RS-232C<CR><LF> (for the RS-232C) or RS-485<CR><LF> (for the RS-485) (When properly received)

(3) [SYS]

Contents:	Models, etc.
Format:	SYS<CR>
Parameter:	None
Return value format:	WGA-680A-a, xx.xx, yyyyyyyyyy<CR><LF> └───┘ Serial No. (9 digits) Character strings (0 to 9, A, B, and C) Program version When the value has no 10th digit, it is filled with "0s" from the head. Options Model of the product
Description and others:	The contents of the return value is as follows. 0: No options 1: Reserved 2: With RS-232C, TEDS supported 3: With RS-485, TEDS supported 4: Reserved

(4) [MOD]

Contents:	To set transmission modes
Format:	MODpp<CR>
Parameter:	pp  00: Repeatedly outputs the indicated values and statuses. 02: Outputs the indicated value and status only once during the Hold mode. 10: Operation by control commands
Return value format:	The results of the command will be disabled after turning OFF the power. When turning ON the power, the products will be Mode 10.

Description and others:

1. Return value format of the Mode 00

D1±xxxxxx<CR><LF>

Sabcdefghi<CR><LF>

- The Mode 00 repeatedly outputs the measured values and statuses in the order.
- The ±xxxxxx includes the decimal point. When the value has no decimal point, it is filled with "0s" from the head.

- The return value "sabcdefghi" indicates the status. 1 or 0

When the return value "sabcdefghi" is 1, see as follows.

- a: The [HI] comparator (comparator-1) is ON.
- b: The [LO] comparator (comparator-2) is ON.
- c: The [HH] comparator (comparator-3) is ON.
- d: The [LL] comparator (comparator-4) is ON.
- e: Measuring...
- f: Detecting...
- g: Holding...
- h: Error
- i: The OK output is ON.

- To stop the output, select the Mode 10.
- When you are not able to select the Mode 10, turn OFF the power and turn ON the power again. The products will be Mode 10.

2. Return value format of the Mode 02

D1±xxxxxx<CR><LF>

Sabcdefghi<CR><LF>

- The Mode 01 outputs the measured value and status only once during the Hold mode.
- After outputting the data, the products will be Mode 10.
- Contents of the measured value and status are the same with that of the Mode 00.
- When specifying the Mode 02 during the Mode 00, the product replies the following command.

ng<CR><LF>

3. Return value format of the Mode 10

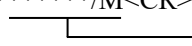
ok<CR><LF>

- The Mode 10 controls products by using commands.
- Products operate based on each control command.

NOTE

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

(5) [/M]

Contents:	SAVE command (To save the pre-set values in the internal memory.)
Format:	*****/M<CR>  Corresponding command
Description and others:	To save the pre-set values in the internal memory, add the [/M<CR>] at the end of the setting commands. Or, the settings will be cleared after turning OFF the power. (The * commands only.)

2-7-2. Reading

(6)[GDT]

Contents:	To read indicated values
Format:	GDT1<CR>
Parameter:	None
Return value format:	D1±yyyyyy<CR><LF> └──────────┘ Indicated value: -99999 to 99999 (count)
Description and others:	The return value ±yyyyyy is the indicated value, including the decimal point. When the value has no decimal point, it is filled with “0s” from the head. Example Suppose the current indicated value is +999.99. The return value is as follows. D1+999.99<CR><LF> Suppose the current indicated value is -99. The return value is as follows. D1-000099<CR><LF> Suppose the current indicated value is larger than +999.99. The return value is as follows. D1+ OFL<CR><LF>

(7)[GST]

Contents:	To read statuses
Format:	GST<CR>
Parameter:	None
Return value format:	Sabcdefghi<CR><LF>
Description and others:	The return value "abcdefghi" indicates the status. 1 or 0 When the return value "abcdefghi" is 1, see as follows. - a: The [HI] comparator (comparator-1) is ON. - b: The [LO] comparator (comparator-2) is ON. - c: The [HH] comparator (comparator-3) is ON. - d: The [LL] comparator (comparator-4) is ON. - e: Measuring - f: Detecting... - g: Holding... - h: Error - i: The OK output is ON.

(8) [GOD]

Contents:	To display original values
Format:	GOD<CR>
Parameter:	None
Return value format:	D0±x.xxxx<CR><LF> └──────────┘ Original value: -3.2000 to 3.2000 (mV/V)

(9) [PRR]

Contents: To read pre-set values

Format: PRRppp<CR>

Parameter:

ppp

010: Sensitivity registering value
011: Numeric Value Registering Calibration value
012: Bridge excitation voltage pre-set value
020: Smoothing pre-set value
030: Additional Value
031: LEVEL TEST values
041: Analog output (D/A) pre-set value
050: Hysteresis pre-set value
051: The comparator value of the [HI] comparator (comparator-1)
052: The comparator value of the [LO] comparator (comparator-2)
053: The comparator value of the [HH] comparator (comparator-3)
054: The comparator value of the [LL] comparator (comparator-4)
055: The pre-set value of the [HI] comparator (comparator-1)
056: The pre-set value of the [LO] comparator (comparator-2)
057: The pre-set value of the [HH] comparator (comparator-3)
058: The pre-set value of the [LL] comparator (comparator-4)
063: Operation pattern No.
070: Hold mode
090: Automatic ZERO compensation function pre-set value
096: Display updating rates pre-set value
100: Options

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

Return value of the options

The output varies with the options.

(A) RS-232C/RS-485

02, a<CR><LF>

Communication speed

0: 2400 bps

1: 4800 bps

2: 9600 bps

3: 19200 bps

2-7-3. Executing

(10) [CHK]

Contents:	Self-check
Format:	CHK<CR>
Parameter:	None
Return value format:	ok<CR><LF> Working properly. E-01<CR><LF> RAM error E-02<CR><LF> Flash memory error

(11) [HLD]

Contents:	HOLD command (To execute the peak hold, etc.)
Format:	HLD<CR>
Parameter:	None
Return value format:	ok<CR><LF>
Description and others:	The same operation as the [HOLD] switch on the front panel.
For reference:	Arbitrary point hold HLD <CR> → Holding interval → RST <CR> Peak hold HLD <CR> → Detecting interval → RST <CR> Interval-specified peak hold HLD <CR> → Detecting interval → Holding interval → RST <CR> Time-specified peak hold HLD <CR> → Detecting interval + Holding interval → RST <CR>

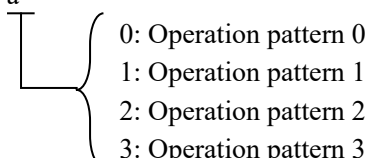
(12) [RST]

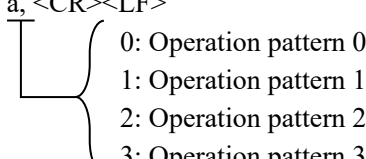
Contents:	RESET command (To execute the peak hold, etc.)
Format:	RST<CR>
Parameter:	None
Return value format:	ok<CR><LF> Working properly. ng<CR><LF> Tracking...

(13) [ZAD]

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

(14) [SOP]

Contents:	To set operation patterns
Format:	SOPa<CR>
Parameter:	a 
Return value format:	ok<CR><LF> Working properly.
Description and others:	Corresponding to the SAVE command [/M].

Reading command:	PRR063
Return value format:	a, <CR><LF> 

(15) [LCK]

Contents:	To set key locks
Format:	LCKa<CR>
Parameter:	a 0: OFF 1: ON
Return value format:	ok<CR><LF>
Description and others:	The settings of the command will be disabled after turning OFF the power.

2-7-4. Settings

(16) [VCL]

Contents:	To execute actual read calibrations
Return value format:	VCL±yyyyyy<CR>
Parameter:	±yyyyyy Rated value: -99999 to 99999 The value, including the decimal point. When the value has no decimal point, it is filled with “0s” from the head.
Return value format:	ok<CR><LF> E-00<CR><LF> (When an error occurs)
Description and others:	The results of the command will be saved.

Reading command: PRR010
Return value: For details, see the [EIC].

(17) [EIC]

Contents:	To execute sensitivity registering calibrations
Format:	EIC±x.xxxx, ±yyyyyy<CR>
Parameter:	±x.xxxx, ±yyyyyy Rated value: -99999 to 99999 The value, including the decimal point. When the value has no decimal point, it is filled with “0s” from the head. Rated output: -3.2000 to 3.2000 (mV/V)
Return value format:	ok<CR><LF> E-00<CR><LF>(When an error occurs)
Description and others:	The results of the command will be saved.

Reading command: PRR010
Return value:

±x.xxxx, ±yyyyyy<CR><LF>

Rated value: -99999 to 99999 (count)

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

Rated output: -3.2000 to 3.2000 (mV/V)

(18) [VRC]

Contents:	To execute numeric value registering calibrations
Format:	VRC±x.xxxx<CR>
Parameter:	±x.xxxx Initial value of transducers: -3.2000 to 3.2000 (mV/V)
Return value format:	ok<CR><LF> E-00<CR><LF>(When an error occurs)
Description and others:	The results of the command will be saved.

Reading command: PRR011
Return value:

±x.xxxx<CR><LF>

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

(19) [EID]

Contents: To execute TEDS sensitivity registering calibrations
Format: EID<CR>
Parameter: None
Return value format: rd-*<CR><LF>
(*: Indicates the number of transducers which succeeded in connecting.)
E-03<CR><LF> (When an error occurs)
Description and others: Executes the sensitivity registrations and sets the bridge excitation voltage by using some TEDS data (rated capacity, rated output, and recommended bridge excitation voltage).

Reading command: PRR010
Return value: $\pm x.xxxx, \pm yyyyyy$ <CR><LF>
Rated value: -99999 to 99999 (count)
The value, including the decimal point. When the value has no decimal point, it is filled with "0s" from the head.
Rated output: -3.2000 to 3.2000 (mV/V)

(20) [SSM]

Contents: To set smoothing functions
Format: SSMaa, b, c<CR>
Parameter: aa, b, c
Moving average
00: None
01: 2 times
02: 4 times
03: 8 times
04: 16 times
05: 32 times
06: 64 times
07: 128 times
08: 256 times
09: 512 times
10: 1024 times
11: 2048 times
Minimum scale
0: 1
1: 2
2: 5
3: 10
4: 20
5: 50
6: 100
7: 200
8: 500
9: 1000
Analog filter
0: 1 Hz
1: 30 Hz
2: 100 Hz
3: 300 Hz

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

Reading command: PRR020
Return value: aa, b, c<CR><LF>
Analog filter
Minimum scale
The number of moving averaging times

(21) [SZM]

Contents: To set additional values
Format: SZM1, $\pm$ xxxxxx<CR>
Parameter: $\pm$ xxxxxx
 -99999 to 99999 (count)
 The value, including the decimal point. When the value has no decimal point, it is filled with "0s" from the head.
Return value format: ok<CR><LF>
Description and others: Corresponding to the SAVE command [/M].

Reading command: PRR030
Return value: 1, $\pm$ xxxxxx<CR><LF>
 Additional value

(22) [SZT]

Contents: To set Automatic ZERO compensation functions
Format: SZTxxxxxx, y.y, z<CR>
Parameter: xxxxxx, y.y, z
 Zero-near-zero: 0 to 9 (count)
 Determination time: 0.0 to 9.9 (sec)
 Automatic ZERO compensation range: 0 to 99999 (count)
 The value, including the decimal point. When the value has no decimal point, it is filled with "0s" from the head.
Return value format: ok<CR><LF>
Description and others: Corresponding to the SAVE command [/M].

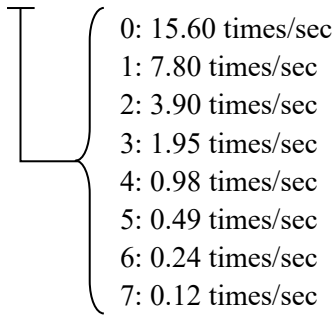
Reading command: PRR090
Return value: xxxxxx, y.y, z<CR><LF>
 Zero-near-zero:
 Determination time
 Automatic ZERO compensation range

(23) [SBV]

Contents: To select bridge excitation voltage
Format: SBVa<CR>
Parameter: a
 0: 10 V
 1: 2 V
Return value format: ok<CR><LF>
Description and others: Corresponding to the SAVE command [/M].

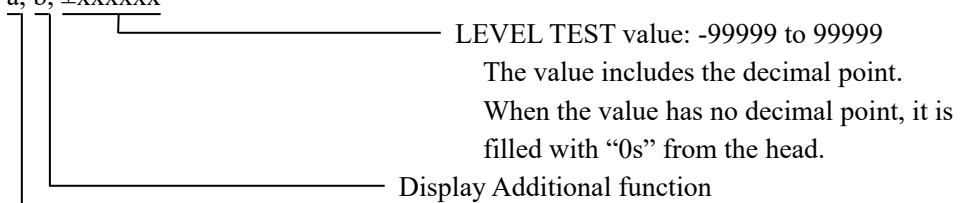
Reading command: PRR012
Return value: a<CR><LF>
 0: 10 V
 1: 2 V

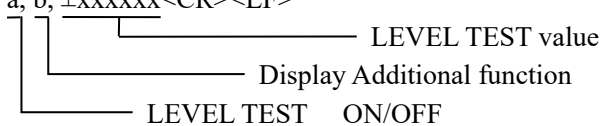
(24) [SDR]

Contents: To set display updating rates
Format: SDRa<CR>
Parameter: a

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

Reading command: PRR096
Return value: a<CR><LF>


(25) [LVS]

Contents: To set LEVEL TEST
Format: LVSa, b, ±xxxxxx<CR>
Parameter: a, b, ±xxxxxx

LEVEL TEST ON/OFF
0: OFF
1: ON
0: Disabled
1: Enable
Return value format: ok<CR><LF>
Description and others: Corresponding to the SAVE command [/M].

Reading command: PRR031
Return value: a, b, ±xxxxxx<CR><LF>


(26) [OP1]

Contents: To set analog outputs (D/A)
Format: OP1020, a, ±xxxxxx, ±yyyyyy<CR>
Parameter: a, ±xxxxxx, ±yyyyyy

FULL SCALE indicated value: ±99999 (count)
ZERO indicated value: ±99999 (count)
The value includes the decimal point. When the value has no decimal point, it is filled with "0s" from the head.
Automatic scaling
0: Manual setting
1: Automatic setting

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

Reading command: PRR041
Return value: a, ±xxxxxx, ±yyyyyy<CR><LF>

FULL SCALE indicated value
ZERO indicated value
Automatic scaling

(27) [SMF]

Contents: To set Hold modes
Format: SMFa, b, c, x.xx, y.yy<CR>
Parameter: a, b, c, x.xx, y.yy

Detect time: 0.01 to 9.99 (sec)
Delay time: 0.00 to 9.99 (sec)
Comparison mode
0: Normal comparison mode
1: Hold comparison mode
Display mode
0: Normal display mode
1: Hold display mode
Hold mode
0: tracking
1: Arbitrary point hold
2: Peak Hold
3: Block-specified peak hold
4: Time-specified peak hold
5: Bottom hold
6: Block-specified bottom hold
7: Time-specified bottom hold
8: Peak-to-peak hold
9: Block-specified peak-to-peak hold
A: Time-specified peak-to-peak hold

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

Reading command: PRR070
Return value: a, b, c, x.xx, y.yy<CR><LF>

Detect time
Delay time
Comparison mode
Display mode
Hold mode

(28) [SCV]

Contents:	To set comparator values
Format:	SCVa, ±xxxxxx<CR>
Parameter:	a, ±xxxxxx

Comparator value: -99999 to 99999 (count)
The value includes the decimal point. When the value has no decimal point, it is filled with "0s" from the head.

Comparator

1: [HI] comparator (comparator1)
2: [LO] comparator (comparator2)
3: [HH] comparator (comparator3)
4: [LL] comparator (comparator4)

Return value format: ok<CR><LF>

Description and others: Corresponding to the SAVE command [/M].

Reading command: PRR051 [HI] comparator (comparator-1)

Return value: ±xxxxxx<CR><LF>

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

Reading command: PRR052 [LO] comparator (comparator-2)

Return value: ±xxxxxx<CR><LF>

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

Reading command: PRR053 [HH] comparator (comparator-3)

Return value: ±xxxxxx<CR><LF>

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

Reading command: PRR054 [LL] comparator (comparator-4)

Return value: ±xxxxxx<CR><LF>

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

(29) [SCV]

Contents:	To set hysteresis
Format:	SCV0, xxxxxx<CR>
Parameter:	xxxxxx

Hysteresis: 0 to 99999
The value includes the decimal point. When the value has no decimal point, it is filled with "0s" from the head.

Return value format: ok<CR><LF>

Description and others: Corresponding to the SAVE command [/M].

Reading command: PRR050

Return value: xxxxxx<CR><LF>

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

(30) [SCF]

Contents:	To set comparator functions	
Format:	SCFa, 0, c, 0, 0<CR>	
Parameter:	a, 0, c, 0, 0	
	Comparator 1: [HI] comparator (comparator1) 2: [LO] comparator (comparator2) 3: [HH] comparator (comparator3) 4: [LL] comparator (comparator4)	High / Low limit assignment 0: High limit 1: Low limit
Return value format:	ok<CR><LF>	
Description and others:	Corresponding to the SAVE command [/M].	

Reading command:	PRR055	[HI] comparator (comparator1)
Return value:	0, c, 0, 0<CR,LF>	"High limit" or "Low limit"
Reading command:	PRR056	[LO] comparator (comparator2)
Return value:	0, c, 0, 0<CR,LF>	"High limit" or "Low limit"
Reading command:	PRR057	[HH] comparator (comparator3)
Return value:	0, c, 0, 0<CR,LF>	"High limit" or "Low limit"
Reading command:	PRR058	[LL] comparator (comparator4)
Return value:	0, c, 0, 0<CR,LF>	"High limit" or "Low limit"

2-7-5. Others

(31) Response of the undefined command

Contents:	Response of the undefined command
Return value format:	ng<CR><LF>

(32) Communication error

Contents: The following items appear.

Error response	Framing error	Parity error	Overflow error
ERROR A			✓
ERROR B		✓	
ERROR C		✓	✓
ERROR D	✓		
ERROR E	✓		✓
ERROR F	✓	✓	
ERROR G	✓	✓	✓

2-7-6. Binary code (RS-485 only)

[1] To establish communication

Format: `<ENQ>xx<CR>`

 Device ID (2 digits)

Return value format: `<ACK>xx<CR><LF>`
 Device ID
 (No responding when the device ID does not match.)

[2] To open communication

Format:	<EOT><CR>
Return value format:	None

3. TEDS FUNCTION

3-1. OUTLINE OF PRODUCT

The WGA-680A-01, WGA-680A-02, WGA-680A-03 WGA-680A-11, WGA-680A-12, and WGA-680A-13 are able to execute the appropriate sensitivity registrations automatically by connecting the TEDS-compatible transducers. These products are able to connect up to 4 transducers. All transducers should be the same standards.

MEMO

The TEDS data sensitivity registration loads the excitation voltage, rated capacity, and rated output from the transducer's TEDS data, automatically register the excitation voltage, sensitivity, and decimal point position.

3-2. TEDS SPECIFICATION

	Specification
Compatible Transducer	Should have the information according to IEEE template No. 33, cable length should be 30 m or less.
Interface	Compatible with IEEE1451.4 Mixed Mode Transducer Interface Class 2
Calibration Function	Automatic sensitivity registration by reading TEDS data

3-3. TO CONNECT

Connect the TEDS signals of transducers to the (+) and (-) of the terminal block.
(Cable colors are KYOWA's standard color codes.)

(+) : TEDS(+) (Yellow)
(COM) : TEDS (COM) (Blue)

NOTE

Be sure to connect correct cables since the TEDS signals have polarity. When connecting wrong cables, the "E-03" appears when loading data. Transducers will not be damaged in case you have connected wrong polarity.

3-4. TO OPERATE

The sensitivity registrations has 3 methods.
Each operational description is described as follows.

3-4-1. Sensitivity registration by power switch

- Make sure the [LOCK] LED is OFF.
- Press the [FUNCTION] key for 2 seconds. The [F-01] appears and the mode is FUNCTION SELECTING mode.
- Press the [→] key until the [F-14] appears. Press the [SET] key.
- The "0. 0. 1. 0" appears. The left "0" flickers. For details, see "
- Press the [→] key until the cursor moves to the 3rd digit from the left. The 3rd digit from the left indicates sensitivity registration (Allow or Prohibit, at the turning ON the power). Press the [↑] key until the 0. 0. 0. 0 appears.
- Press the [SET] key. The [F-14] appears. Press the [CANCEL] key.
- The product will execute the sensitivity registration automatically after turning ON the power next time. To not execute the sensitivity registration, change the indication "0.0.1.0".
- You are able to set the DIGITAL ZERO function operations when turning ON the power similarly.

3-4-2. Sensitivity registration by key operations

You are able to read the transducer information and execute the sensitivity registration arbitrary.

- Make sure the [LOCK] LED is OFF.
- Press the [TEDS] key + [SHIFT] key for 2 seconds.
- The "rd-*" (*: Indicates the number of transducers which succeeded in connecting.) appears for approx. 5 seconds. Then, the product reads the transducer information and executes the sensitivity registration.

3-4-3. Sensitivity registration by command operations

You are able to execute the TEDS data sensitivity registration from the external devices (PC, etc.) via the RS-232C interface or RS-485 interface.

For details of connection of PC, see "2-1-5. TO CONNECT EXTERNAL DEVICES" and "2-2-5. TO CONNECT EXTERNAL DEVICES."

For details of commands, see [EID] of the "2-7-4. Settings."

3-5. TEDS DATA SENSITIVITY REGISTRATION

a) Initial values

Set transducers in no-read state as same as described in the sensitivity registering calibration, and execute the TEDS function. The product executes the DIGITAL ZERO function automatically to make the indicated value "0 (reference zero-point)."

The product executes the sensitivity registering calibrations automatically and sets the decimal point position.

b) Bridge excitation

The bridge excitation voltage should be the recommended excitation voltage of transducers or less. The product selects the higher value.

Example: Suppose the recommended excitation voltage is 3 V. The bridge excitation voltage is 2 V.

c) Calibration coefficient

The product registers the calibration coefficient, which is obtained by dividing the transducer's rated capacity by that of the rated output.

d) DIGITAL ZERO function

The DIGITAL ZERO function when reading the TEDS data is the same as that of the calibrations.

The DIGITAL ZERO function makes the indicated value "0 (reference zero-point)."

e) Indicated value

The rated capacity appears automatically in 4 digits (including the decimal point).

Example: $5 \text{ [N]} = 5.000$ $50 \text{ [N]} = 50.00$ $500 \text{ [N]} = 500.0$

f) Connecting multiple TEDS transducers

When connecting multiple TEDS transducers (Max. 4) in parallel, calculate the rated capacity (combined) and rated output (combined) as follows.

Rated capacity (combined) : Total sum of rated capacities of transducers

Rated output (combined) : Averaging value of rated output of each transducer. (Value, which is obtained by dividing the total value of transducers with the number of units.)

3-6. TO SET TEDS

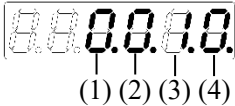
NOTE

DA output and control output are stopped when the instrument is in function selection mode(F-** is displayed) or during function setting.

When applying a load, pay attention to overload and control status.

For details of functions, see "4" in the INSTRUCTION MANUAL.

To read TEDS data, go to the FUNCTION SELECTING mode [F-14].

FUNCTION SELECTING mode	Key operation and WGA-680A-0* movement in SETTING mode	Functional description
F-14 TEDS reading Item	Display the following items (1), (2), (3), (4) (1) RS command 0: Allow (initial value) 1: Prohibit (2) Key operation 0: Allow (initial value) 1: Prohibit (3) When turning ON the power 0: Allow 1: Prohibit (initial value) (4) DIGITAL ZERO function when reading the TEDS data 0: Execute (initial value) 1: Prohibit  Select and change values in items (1), (2), (3), and (4) and press the SET key.	Allows or prohibits the TEDS reading operations. In the factory-configured settings, the reading operations when turning ON the power is "1: Prohibited." Executes or prohibits the DIGITAL ZERO function when reading the TEDS data.

4. TROUBLE SHOOTING

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

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

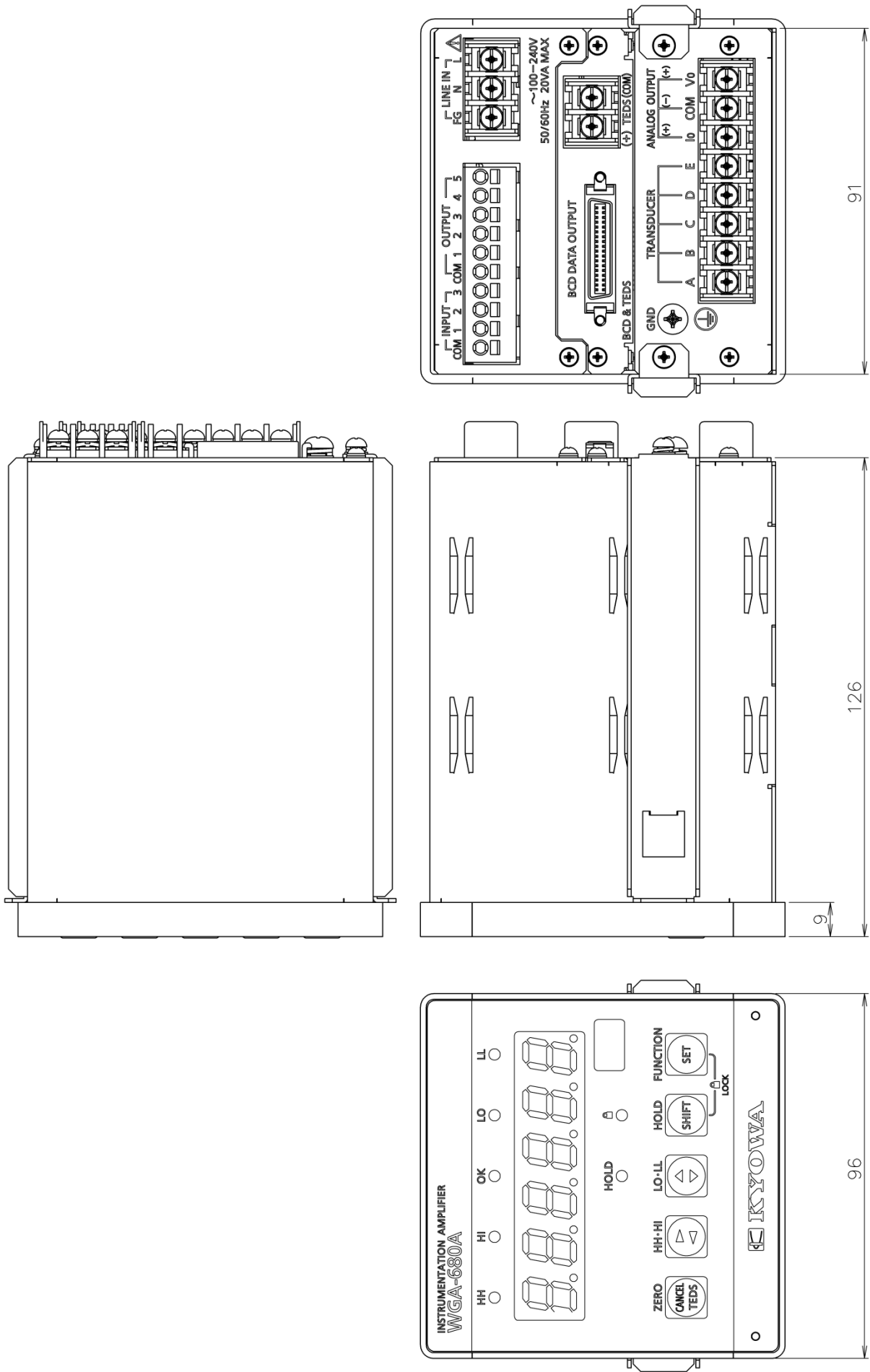
If troubles are not solved despite countermeasures, contact KYOWA or our representative.

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

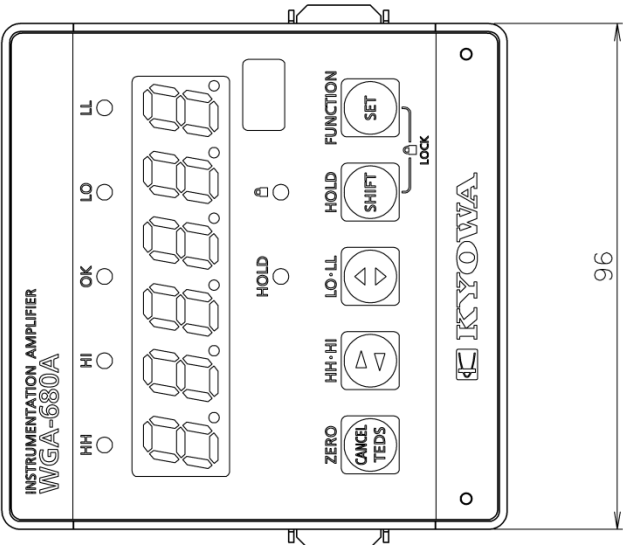
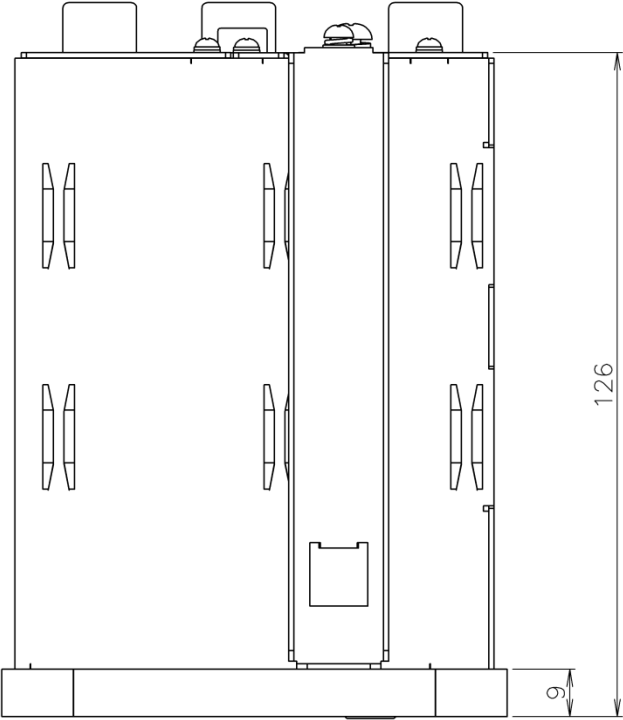
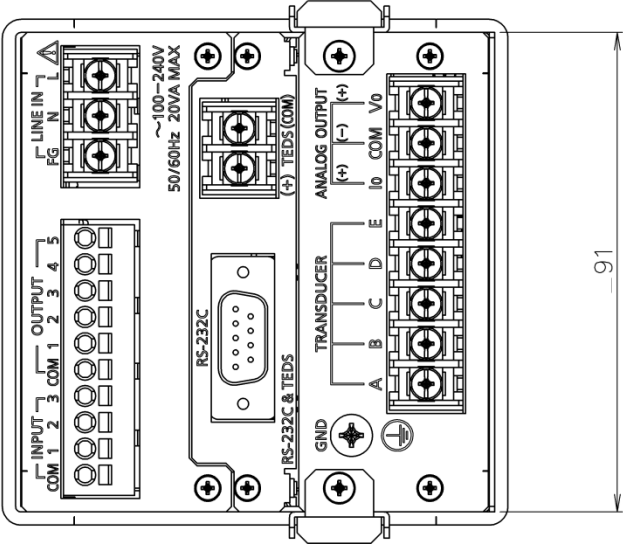
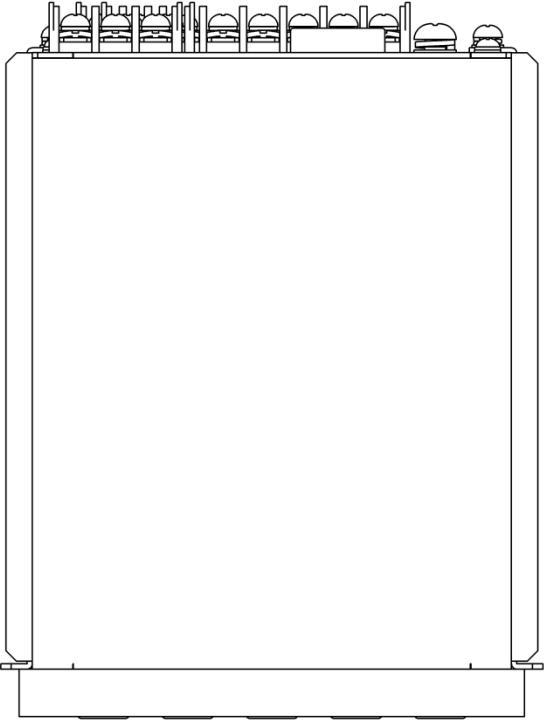
Trouble	Checked Items and Countermeasures
The "E-00" appears on the indicator or the Return value.	● Make sure the calibration settings, by the control commands, are correct. ⇒Set the rated value "10000 or less" per 0.1mV/V.
The "E-03" appears on the indicator or the Return value.	● Make sure the transducer connections are correct. ⇒Correctly wire the (+) and (-) terminals of the TEDS terminal block.
Operation stops and accepts no instruction at all.	● The operation failed due to noise. ⇒Turn OFF the power and turn ON again. If the same phenomenon still generates due to noise, take appropriate countermeasures for removing the noise from operating environment, power supply, etc. For details, see the following "Noisy" part.
The measured value varies.	● For details, see "6" in the INSTRUCTION MANUAL. ● The operation failed due to noise. ⇒Take appropriate countermeasures for removing the noise. For details, see the following "Noisy" part.
The measured value is incorrect.	● Make sure the transducer connections are correct. ⇒Correctly set and connect them. ● Make sure the calibration settings and bridge excitation voltage settings, by the control commands, are correct. ⇒Correctly set them based on the transducer specifications.
Noisy	● For details, see "6" in the INSTRUCTION MANUAL. ● Use the shielded BCD output cables, RS-232C cables and RS-485 cables. Shielded wire must be connected to the GND terminal.

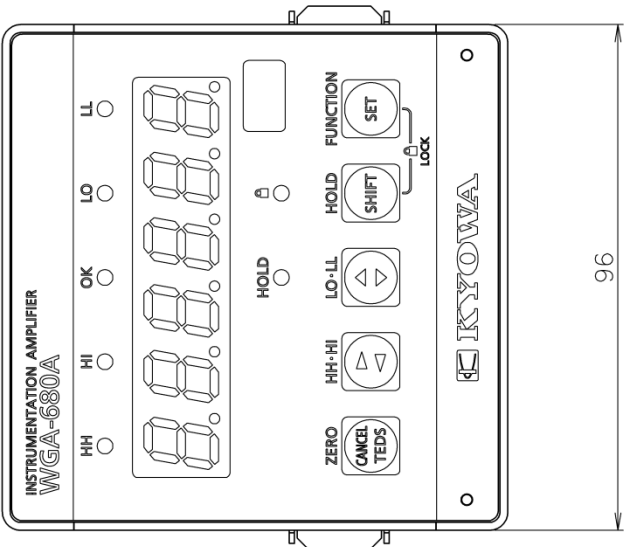
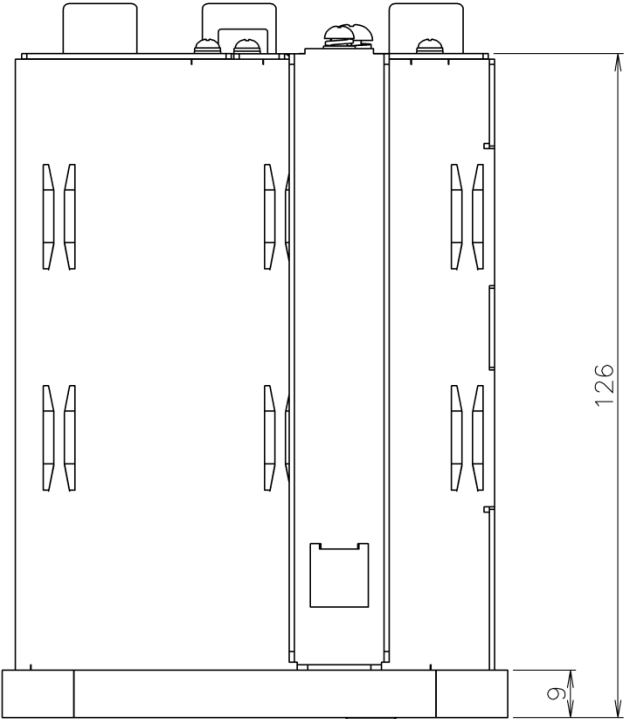
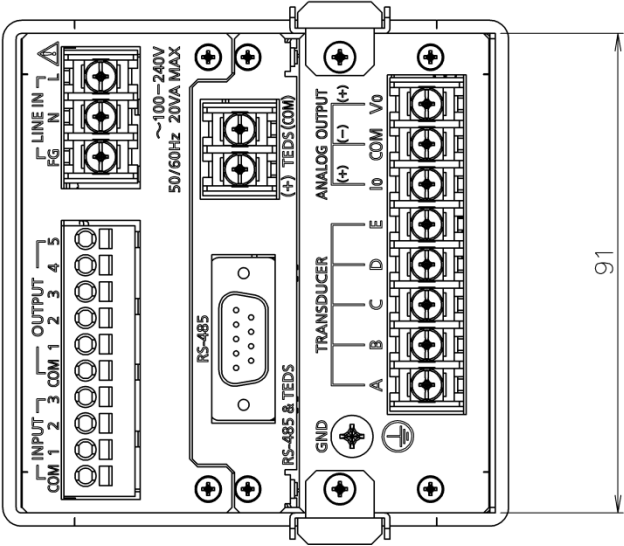
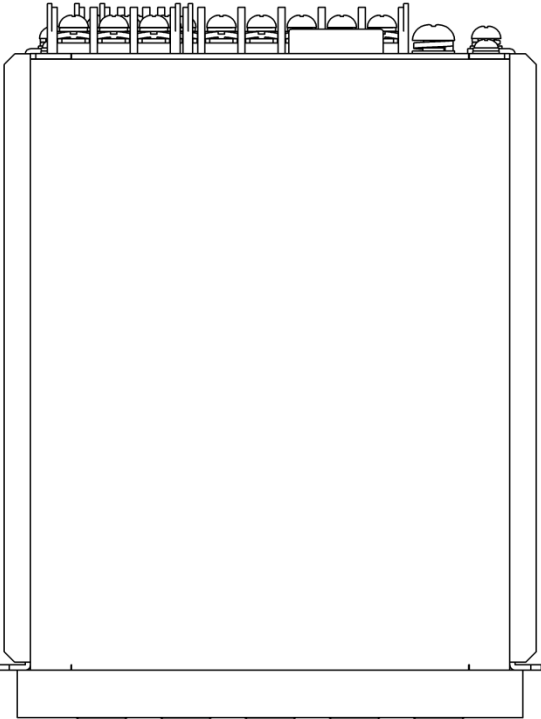
5. OUTSIDE DRAWING

5-1.WGA-680A-01: BCD/TEDS OPTION



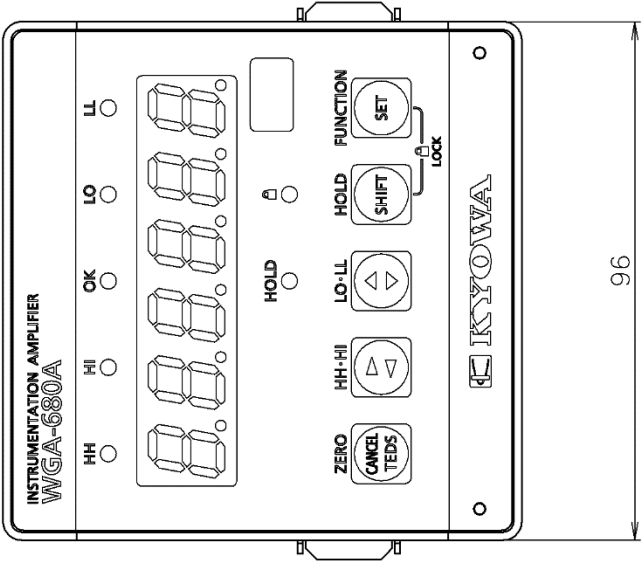
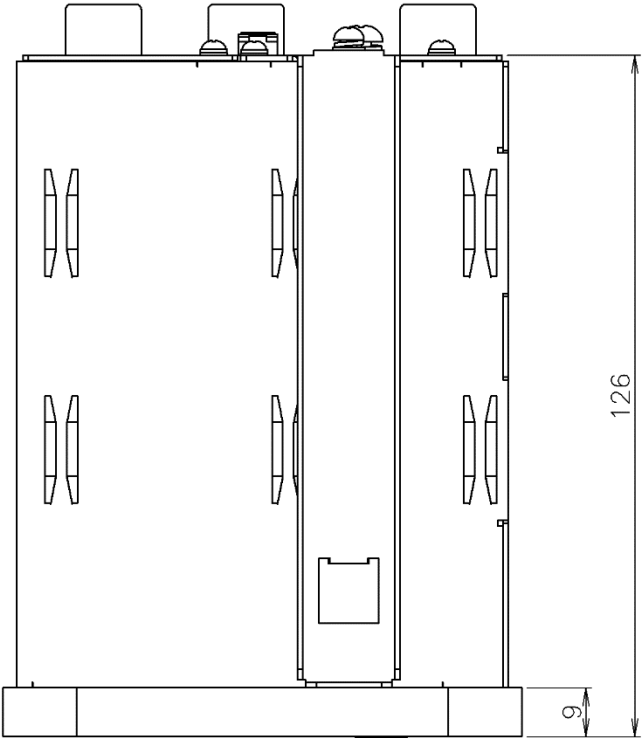
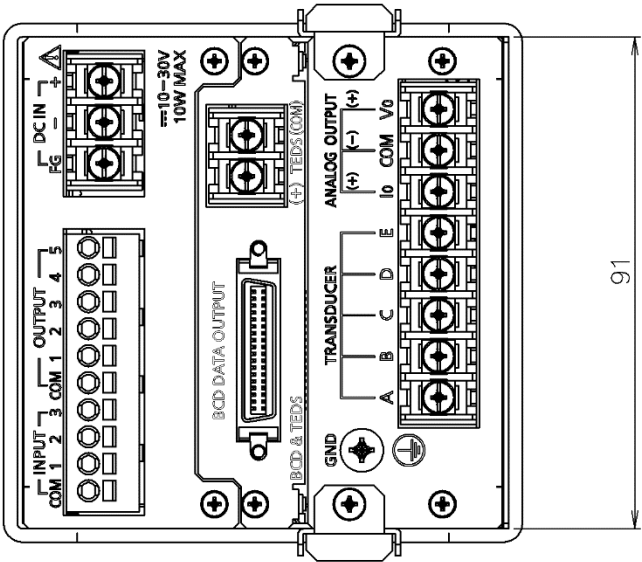
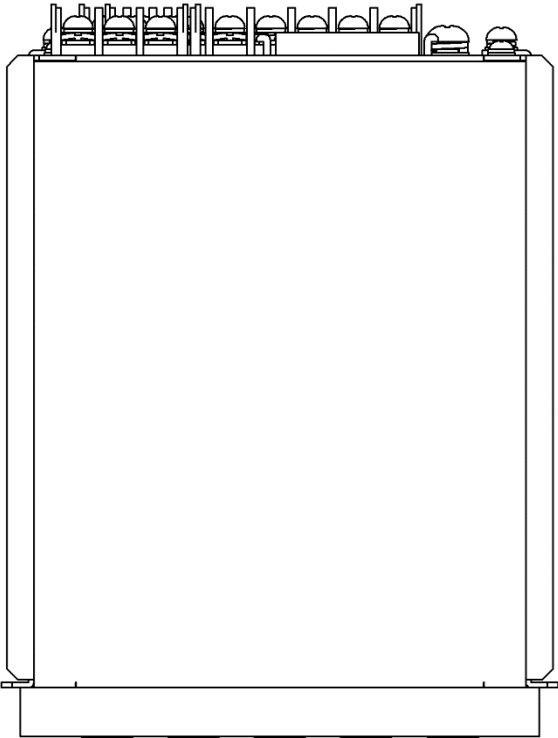
5-2.WGA-680A-02: RS-232C/TEDS OPTION





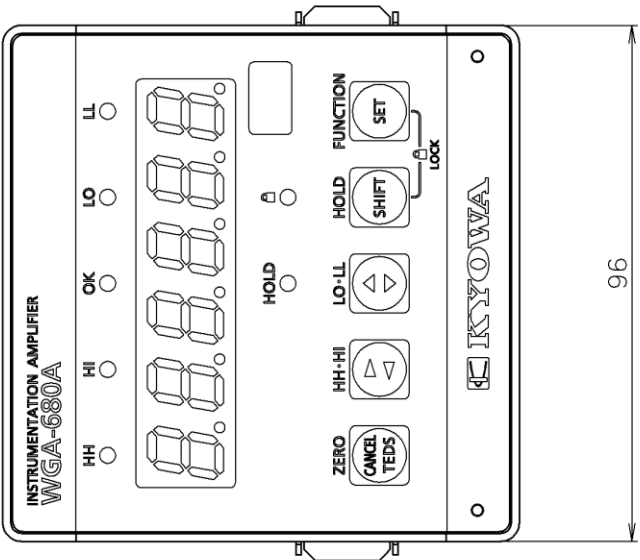
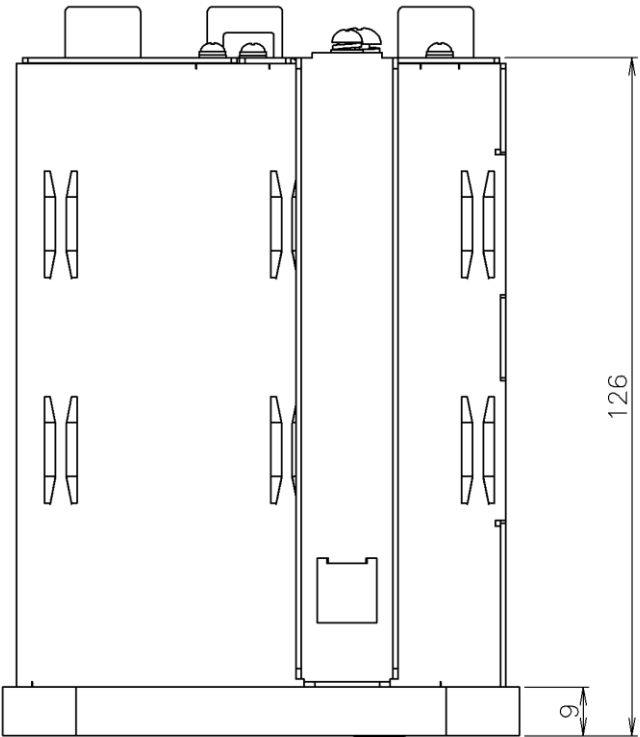
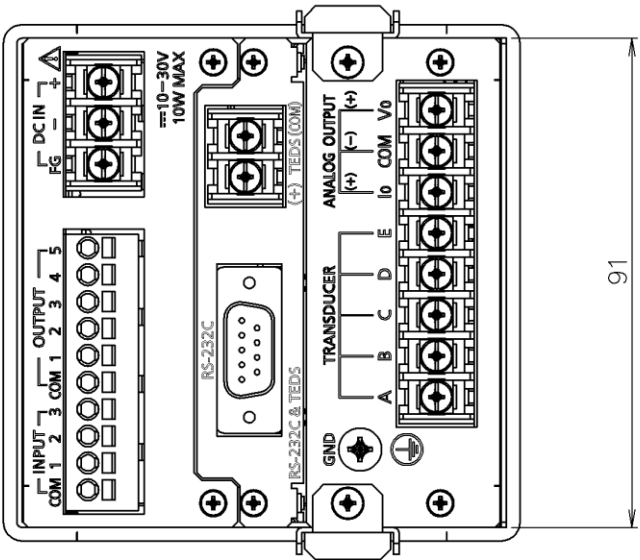
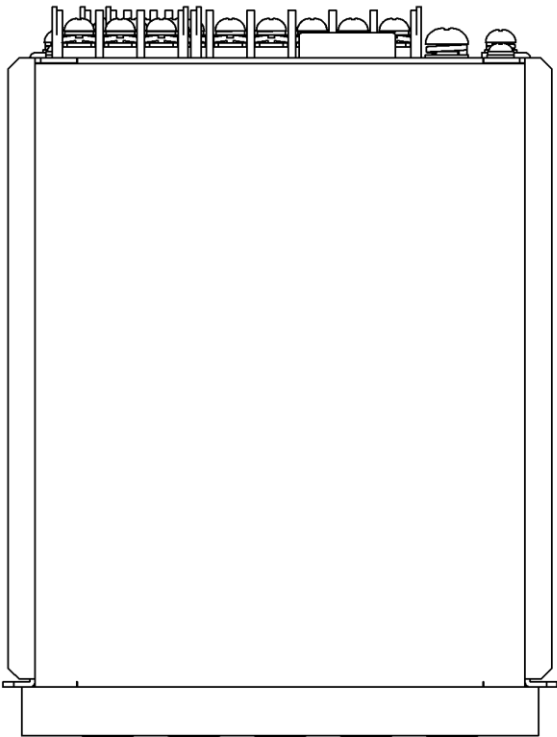
5-4.WGA-680A-11: BCD/TEDS OPTION

Unit: mm

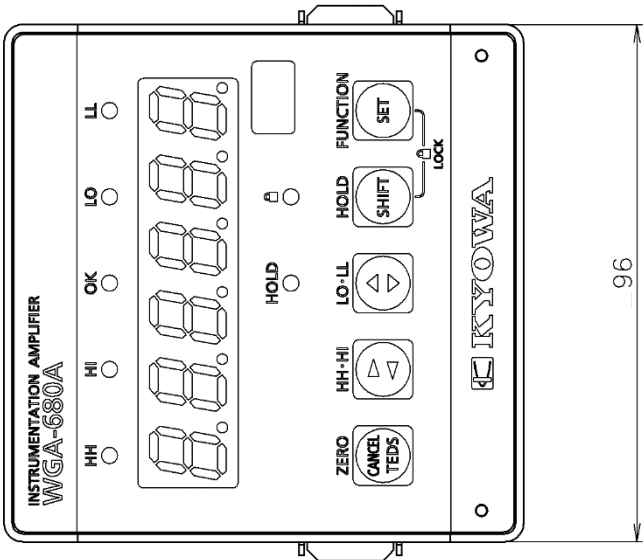
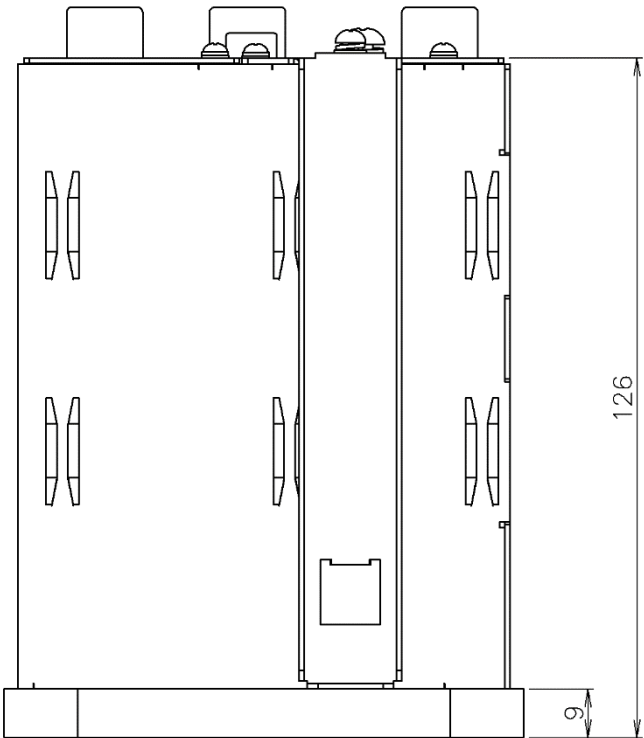
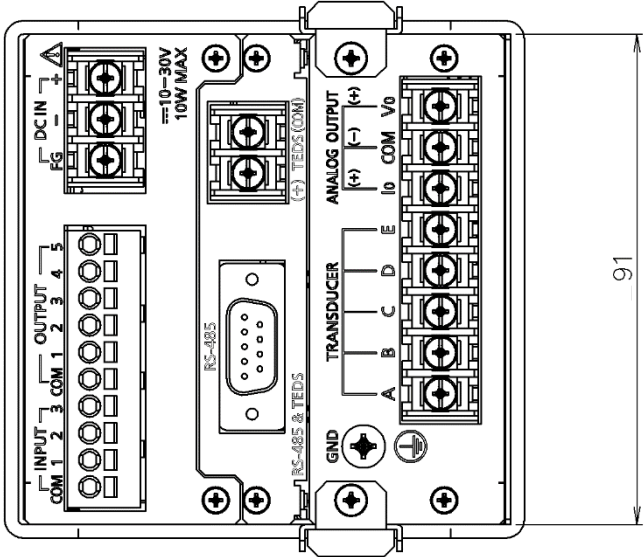
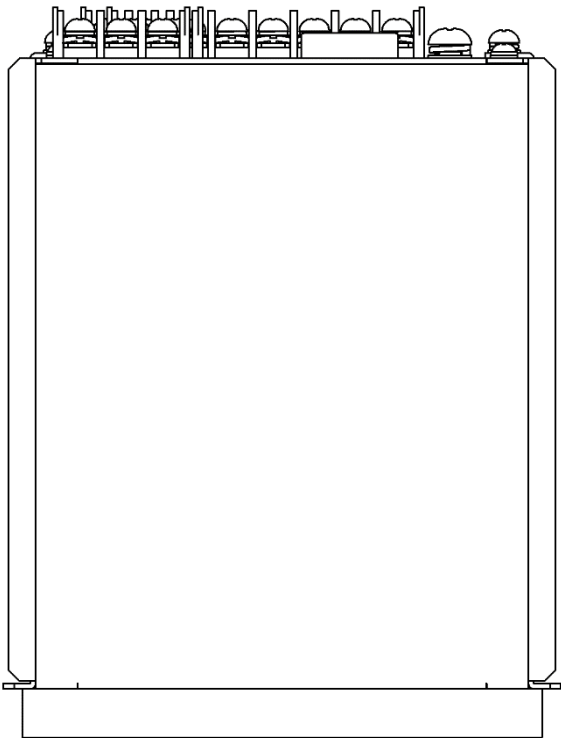


5-5.WGA-680A-12: RS-232C/TEDS OPTION

Unit: mm



Unit:mm





Kyowa Electronic Instruments Co.,Ltd.

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

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