

INSTRUMENTATION AMPLIFIER

With

MULTIPURPOSE INDICATOR

WGI-400A

INSTALLATION & SETUP MANUAL

Thank you for purchasing KYOWA's product WGI-400A Instrumentation Amplifier with Multipurpose Indicator.
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 Manual has been compiled with great care. However, if the need should arise for more information, contact KYOWA or our representatives.

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

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SAFETY PRECAUTIONS

PRIOR TO USE



This Manual describes detailed instructions for installing and setting up the WGI-400A Instrumentation Amplifier with Multipurpose Indicator (hereinafter referred to as the WGI-400A).


For safe use of the WGI-400A, do not forget to read the “Safety Precautions” prior to use.

KYOWA ELECTRONIC INSTRUMENTS CO., LTD. assumes no liability for any damages resulting from user’s failure to comply with the safety precautions.



SAFETY SYMBOLS

For safety operation of the WGI-400A, the following “**WARNING**” and “**CAUTION**” symbols are used in “Safety Precautions” of this 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.

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

The following symbols are used in the WGI-400A to call operator’s attention when operating the product.

Safety Symbols used in the WGI-400A.	
 WARNING	Indicates “Handling Precautions.” This symbol is attached to the WGI-400A 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 WGI-400A, always adopt another proper technical measures for safety.
Or, trouble may occur caused by erroneous output or malfunction of the instrument.
- 2) Installation and wiring work should be conducted more than 3 seconds after the power is cutoff.
Or, electric shock hazard or damage of the product may result.
- 3) Do not forget to put a cover on the terminal board.
Or, electric shock hazard may result.
- 4) Special care should be taken not to use the WGI-400A in environment with inflammable gas or vapor
Or, fire hazard may result.
- 5) If the WGI-400A is faulty, emitting smoke or offensive odor, or producing abnormal sound, immediately turn OFF the power.
Or, electric shock or fire hazard may result.
Contact KYOWA's representatives for repair.
- 6) Do not put water or foreign matters into the WGI-400A. In case if any foreign matters are entered, immediately turn OFF the power.
Or, electric shock or fire hazard may result.
Contact KYOWA's representatives for repair.
- 7) If the power cable is damaged, turn OFF the power and replace the cable with a new one.
Or, electric shock or fire hazard may result.
- 8) Always operate the WGI-400A with power voltage specified in this Instruction Manual.
Or, electric shock or fire hazard may result.
- 9) Do not operate the WGI-400A in environment with excessive moisture, dust or oil dust.
Or, electric shock or fire hazard may result.
- 10) Do not disassemble the WGI-400A.
Or, deterioration or malfunction of the instrument may result.
- 11) When it started thundering, do not touch the WGI-400A or cables.
Or, electric shock hazard may result.
- 12) Always connect the protective ground wire to the protective ground terminal.
Or, electric shock hazard or malfunction of the instrument may result.
- 13) In order to assuredly and immediately cut off the power when failure occurred in the system or in WGI-400A, mount an external breaker, etc.

CAUTION

- 1) Before wiring, always confirm the rated power voltage of the WGI-400A and terminal arrangement. Then, conduct wiring in the correct manner.
- 2) Power consumption of the WGI-400A is maximum 6 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 using the WGI-400A in environment with excessive vibration. If the WGI-400A is operated at a location with excessive vibration or with continuous vibration, it may cause measurement error and/or failure of the instrument.
Take care not to drop it during transportation and avoid applying strong impact.
Or, deterioration of the instrument may result.
- 4) Basically, the WGI-400A is designed to be used by connecting a strain gage transducer to the input terminal. Do not use transducers other than the above or deterioration of the instrument may result.
- 5) Before cleaning the panel, always turn OFF the WGI-400A and gently clean with a soft cloth. Do not use paint thinner, benzene, acetone, kerosene or the like.
- 6) Operate the WGI-400A by conforming to operating environment specified in this Instruction Manual.
Or, malfunction and/or failure of the instrument may result.

The WGI-400A is an Instrumentation Amplifier with multipurpose indicator that measures and displays load, weight, pressure, displacement, etc. in physical values by connecting to various strain gage transducers such as load cells, pressure meters, displacement meters, etc.

STANDARD ACCESSORIES

The following accessories are enclosed with the WGI-400A. After unpacking, check all the accessories are correctly prepared.

Unit label	1
Warranty	1
Inspection Report	1
Instruction Manual	1
Installation & Setup Manual	1

Reference: Power cable is not included in the accessories. Customers are required to purchase the power cable applicable for your power supply environment.

Optionals: AC power cable for 100 VAC: P-23 and AC power cable for 200 VAC: P-24

TYPES

The WGI-400A has the following types according to optional functions.

Model Name	No Optionals	BCD Output	RS-232C	RS-485	AC Power Supply	DC Power Supply
WGI-400A-00	○				○	
WGI-400A-01		○			○	
WGI-400A-02			○		○	
WGI-400A-03				○	○	
WGI-400A-10	○					○
WGI-400A-11		○				○
WGI-400A-12			○			○
WGI-400A-13				○		○

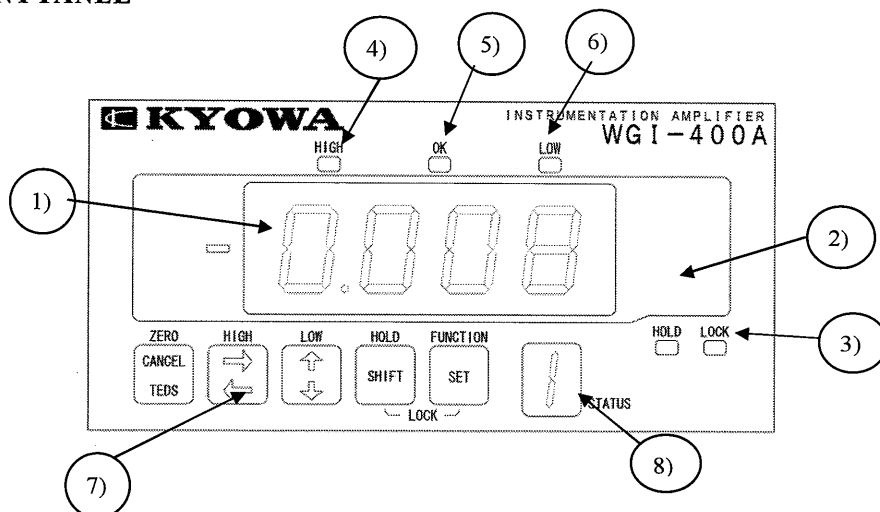
OPERATIONAL RATING

Operational rating and operating environment of the WGI-400A are described in Chapter 3. SPECIFICATIONS.

Always use the WGI-400A within the range of specifications.

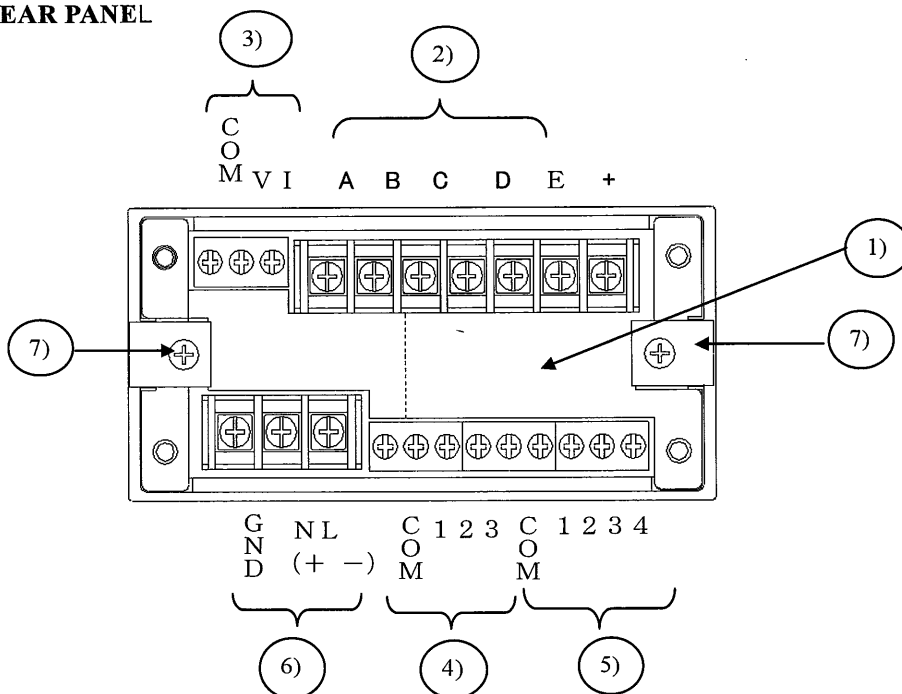
1. PARTS NAMES AND FUNCTIONS

1-1 FRONT PANEL



- | | |
|---------------------------|--|
| 1) Indicator | <ul style="list-style-type: none"> • Displays measured value, various selected functions, and set values. • Normally, it is displayed with measured value according to the output from transducers. However, if error occurs, error message appears. |
| 2) Unit Label | <ul style="list-style-type: none"> • Select the desired unit from the accessory unit label sheet and attach it on this portion. |
| 3) [LOCK] LED | <ul style="list-style-type: none"> • When this [LOCK] LED is lit or flickering, no functions are set. Always turn OFF the [LOCK] LED before setting functions. • However, high/low limit value is displayed even when the [LOCK] LED lit. |
| 4) [HIGH] Limit LED | <ul style="list-style-type: none"> • Lights up when the measured value exceeds the high limit value. • Flickers when the high limit value is displayed. |
| 5) [OK] LED | <ul style="list-style-type: none"> • Flickers when the measured value exceeds the low limit value or lowers the high limit value. |
| 6) [LOW] Limit LED | <ul style="list-style-type: none"> • Lights up when the measured value is less than the low limit value. • Flickers when the low limit value is displayed. |
| 7) Operation Key | <ul style="list-style-type: none"> • A pushbutton switch to operate the WGI-400A. • One key is used together for multiple functions that are automatically switched according to measuring or setting states. |
| 8) Status Indicator | <ul style="list-style-type: none"> • In the measuring state, pattern No. is displayed. • During calibration, minimum-digit numeric value of rated capacity is displayed. |

1-2 REAR PANEL



1) Optional Function: Location of connectors BCD, RS232C, and RS485

2) Connection Terminals of Transducers (Transducer and TEDS)

A: Bridge excitation(+)	Red wire	} KYOWA's standard wire colors
B: Bridge output (-)	White wire	
C: Bridge excitation(-)	Black wire	
D: Bridge output (+)	Green wire	
E: Shield		
+: TEDS (+)		
-: TEDS (-)		

3) Analog Output Terminal (ANALOG OUT)

COM : Common

V: Voltage output terminal

I: Current output terminal

4) Control Output Terminal (OUTPUT)

COM: Common

1: High limit output (HIGH)

2: OK output (OK)

3: Low limit output (LOW)

5) Control Input Terminal (INPUT)

COM: Common

1: Digital Zero command

2: Level test command

3: Pattern select command 1

4: Pattern select command 2

6) Power Input Terminal (POWER)

GND: Ground terminal

N: Power supply input terminal

L: Power supply input terminal

} Connect AC power supply.

+: +Power supply input

-: -Power supply input

} Connect DC power supply. (When DC is optionally)

7) Fitting Metal Used for fixing the WGI-400A to the panel.

2. CONNECTION

2-1 INSTALLING TO THE PANEL

To install the WGI-400A to the panel, prepare a panel according to the specified panel cut dimensions as shown at the right. Then, install the WGI-400A by referring to the following procedures.

- 1) Cut out the panel by referring to the panel cut dimensions.

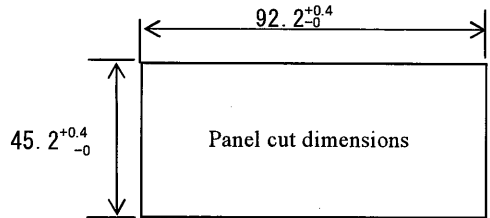
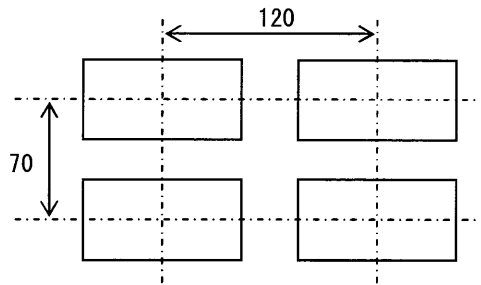
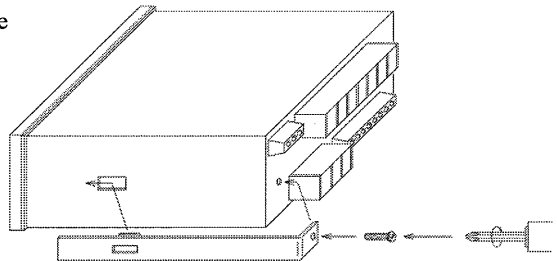


Plate thickness: 0.8 to 5.0



Panel cut position for mounting multiple WGI-400A

- 2) Remove screws of the fitting metals attached on both sides of the WGI-400A and then, pull out the fitting metal.
- 3) Set the WGI-400A into the panel frame.
- 4) Set the fitting metals on both sides of the WGI-400A.



- 5) Tighten the screws and firmly fix the WGI-400A.

2-2 WIRING

Check terminal Nos. on the rear panel described on Page 6 and correctly wire the cables.

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 the press fit terminals having the size equivalent to 1.25-3.
- After completing wirings to the terminal board, do not forget to put a cover on the terminal board.

2-2-2 Connecting Power Supply

- Do not forget to check that power voltage is from 100 to 240 VAC ($\pm 10\%$) and use the cable with pressure proof capacity having more than power supply voltage.
- For DC power supply (Optional), check the DC voltage is from 10 to 30 VDC (8W).



Note: Although the WGI-400A may be operated with power supply voltage exceeding the allowable power voltage range, the operation may not be guaranteed. Always use the WGI-400A within the specified power voltage range.

2-2-3 Connecting Transducers

- Connect transducers to terminals A to E as described in the following.

(Cable colors are KYOWA's standard color codes.)

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

Note: Do not connect the power cable to the TEDS terminal.

- Use as short as possible 4-conductor shield cable (TEDS: 6-conductor cable) for transducer wiring.
In addition, locate the transducer far apart from power lines and wirings interfered with noise.

2-2-4 Connecting Control Input Terminal

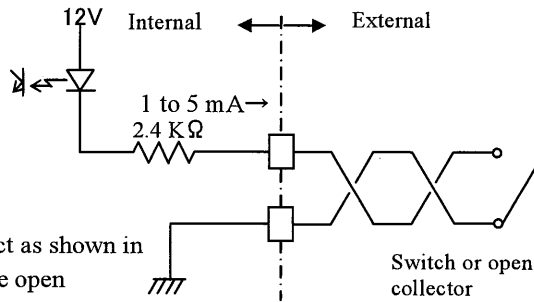
- Connection of control input terminal (INPUT)

is described in the following.

COM: Common

- 1: Digital command
- 2: Level test command
- 3: Pattern select command 1
- 4: Pattern select command 2

- When using the external switch, connect as shown in the right figure. In addition, connect the open collector in the same manner.



Input Connection Diagram

2-2-5 Connecting Control Output Terminal

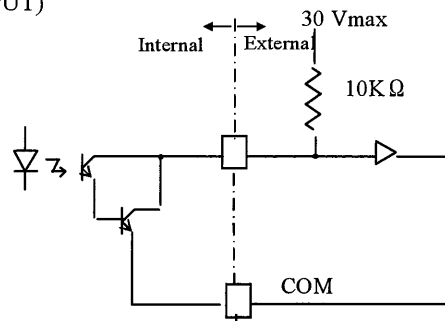
- Connection of control output terminal (OUTPUT)

is described in the following.

COM: Common

- 1: High limit output (HIGH)
- 2: OK output (OK)
- 3: Low limit output (LOW)

- Connect by referring to the right figure.



Output Connection Diagram

2-2-6 Connecting Analog Output Terminal

- Connection of analog output terminal (ANALOG OUTPUT) is described in the following.

COM: Common

V: Voltage output terminal (± 10 V)

I: Current output terminal (4 to 20 mA)

- Always set the current output to load resistance 500Ω or less and voltage output to $2 \text{ k}\Omega$ or more.

Reference: Countermeasures against noise for control input/output and analog output terminals

- For more than 1-m long wiring, use twisted cable.
- For more than 3-m long wiring, use 2-conductor shield cable and connect the shield cable to the ground terminal.

2-2-7 Connecting BCD Output (Optional Function)

When using BCD output equipped WGI-400A-01 (or WGI-400A-11).

Pin No. and Signal Name (Connector and Cable)

Signature

A side (Cable)			B side (Cable)		
No.	Signal Name	No.	Signal Name	Cable Color	
A11	Data 1	B1	Data 2	Red	
A2	Data 4	B2	Data 8	Gray	
A3	Data 10	B3	Data 20	Gray	
A4	Data 40	B4	Data 80	Gray	
A5	Data 100	B5	Data 200	Green	
A6	Data 400	B6	Data 800	Gray	
A7	Data 1000	B7	Data 2000	Gray	
A8	Data 4000	B8	Data 8000	Gray	
A9	POL (- Polarity)	B9	OVER	Gray	
A10	EOC (End of Conversion)	B10	ENABLE (Output prohibited)	Green	
A11	N.EOC (EOC logic reverse)	B11	(Connection prohibited)	Gray	
A12	(Connection prohibited)	B12	(Connection prohibited)	Gray	
A13	(Connection prohibited)	B13	(Connection prohibited)	Gray	
A14	(Connection prohibited)	B14	(Connection prohibited)	Gray	
A15	(Connection prohibited)	B15	(Connection prohibited)	Green	
A16	(Connection prohibited)	B16	(Connection prohibited)	Gray	
A17	COM	B17	COM	Gray	
A18	COM	B18	COM	Gray	

Equivalent circuit of signals shall be equivalent with control output. However, ENABLE (Output prohibit) is equivalent with control input.

Note: (1) Connection prohibited terminals are used for adjusting the product on KYOWA's side. Do not connect anything on the customers' side.

(2) Cable colors described in the above table are in the case when the accessory 'BCD output cable for WGI-400A N-43' is used.

Applicable connector: Equivalent to 8822E-036-171-F (KEL CORP. made)

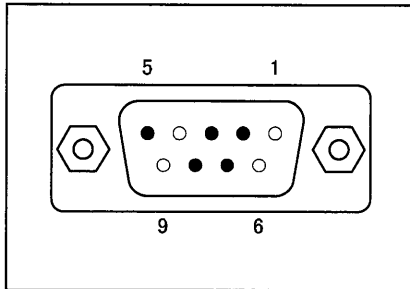
Accessory: BCD output cable for WGI-400A N-43

Cable length 2 m, Cutoff at the end

2-2-8 Connecting RS Output (Optional Function)

When using RS-232C interface equipped WGI-400A-02 and WGI-400A-12.

1) Connector Pin and Signal Name



Pin No.	Signal Name
1	N.C.
2	RXD (Receive Data)
3	TXD (Transmit Data)
4	N.C.
5	SG
6	N.C.
7	CTS (Clear To Send)
8	RTS (Request To Send)
9	N.C.

2) Signal Specifications

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

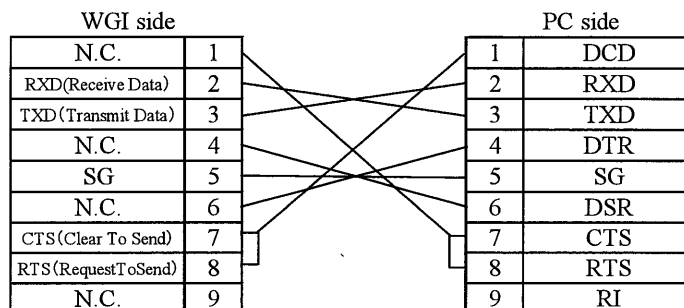
Receive delimiter: CR
 Transmit delimiter: CR + LF

The above settings are default values.

3) Connecting to External Devices

(1) Connection

For connecting external devices to the PC, use commercially available RS cross cable (reversible type).



Note: Do not forget to turn OFF both the WGI-400A and external device before connecting to the PC.
Or, the WGI-400A may not operate correctly or cause damage.

(2) Setting External Devices

Set external devices by referring to the WGI-400A signal specifications.

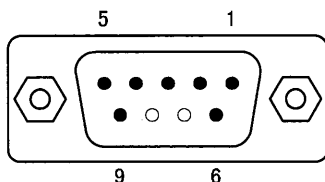
Note: The WGI-400A is not compatible with XON/XOFF control and send brake signal.

2-2-9 Connecting RS-485 Output (Optional Function)

When using RS-485 interface equipped WGI-400-03 and WGI-400-13.

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

1) Connector Pins and Signal Names



Pin No.	Signal Name
1	+(Non-reversing output)
2	+(Non-reversing output)
3	-(Reversing output)
4	-(Reversing output)
5	SG
6	Terminator
7	N.C.
8	N.C.
9	Terminator

2) Signal Specifications

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

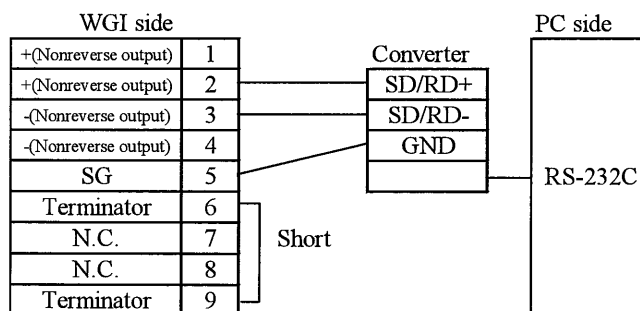
Receive delimiter: CR
 Transmit delimiter: CR + LF

The above settings are default values.

3) Connecting to External Devices

(1) Connection

- For connecting external devices to the PC, use RS-485 ↔ RS-232C converter (Following is a recommended converter).
- Short-circuit connector pins Nos. 6 and 9. Then, terminating resistance applied state is obtained.
- Set the converter switch to DTE.
- Pin Nos. 1 and 2 as well as 3 and 4 are the same functions. Correctly connect the wires.



Recommended converter: SI-30 (RS-485 ↔ RS-232C converter) LINEEYE CORP. made

Note: Do not forget to turn OFF both WGI-400A and external devices before connecting to the PC.
Or, the WGI-400A may not operate correctly or cause damage.

3 SPECIFICATIONS

3-1 SPECIFICATIONS

Model Name	WGI-400A Instrumentation Amplifier with Multipurpose Indicator		
The Number of Measuring Channels	1		
Applicable Sensor	Strain Gage Transducer		
Applicable Bridge Resistor	87.5 to 1000 Ω (350 Ω 4 units parallel connection available)		
Bridge Excitation Voltage	2 VDC (Max 30 mA)/4 VDC (Max 50 mA) selectable		
Input Range	±3.2 mV/V (Zero adjusting range included)		
Non-linearity	Within ±(0.1% FS +1 digit)		
Temperature Stability	Zero point:	Within ±0.5 μVRTI/°C	
	Sensitivity:	Within ±0.01%/°C	
Sampling Speed	50 times/second		
Display	Display range:	±9999	
	Character Height:	14 mm, Red LED	
	Display Speed:	50 times/sec	
Calibration Function	Actual load calibration, Sensitivity registering calibration, and Numeric value registering calibration		
TEDS Function	Automatic sensitivity registration (Key operation, When power ON, RS control)		
Smoothing Function	Minimum scale:	1, 2, 5, 10, 20, 50, and 100 counts	
	Moving average:	2, 4, 8, 16, 32, 64, and 128 times	
Auto Zero Compensation Function	Zero tracking (Auto digital Zero within the setting range) Zero Near Zero (Auto Zero display)		
High/Low Limit Comparator Function ...	The number of points:	2 (HGH and LOW) and 1 (OK) points	
	Setting range:	±9999	
	Comparison speed:	50 times/sec	
Additional Function	Setting range:	±9999	
Original Value Measuring Function	±3.200 mV/V		
Pattern Function	Set 4 sets of high/low limit value.		
	Selectable from external signal.		
Level Test Function	Can display arbitrary value.		
Control Input	The number of points: 4		
		Zero command, Level test command, Pattern command 1, and Pattern command 2	
	Signal Format	Contact point: (Capacity: 12 VDC, 5 mA or more)	

Control Output	The number of points: 3	HIGH, OK, and LOW
	Output Format:	Open collector
	Load capacity:	30 VDC, 20 mA (Resistance load)
Analog Output	Select voltage output or current output	
	Voltage Output:	±10 V (Load resistance 2 kΩ or more) Arbitrarily scaling available
	Current Output:	4 to 20 mA (Load resistance 500 Ω or less) Arbitrarily scaling available
	Response Speed:	Approx. 0.25 sec (10 to 90%)
	Frequency response:	Approx. 1 Hz
	Non-linearity:	Within ±0.1% FS
Power Supply	AC power supply:	100 to 240 VAC ±10%, 50/60 Hz Power consumption 6 VA or less
	DC power supply:	10 to 30 VDC (Custom-ordered) Power consumption 8 W or less
Dimensions	96(W) × 48 (H) × 144 (D) mm (Standard type)	
Weight	Approx. 300 g (Standard type)	

3-2 ENVIRONMENTAL SPECIFICATIONS

Location	Only indoors.	
Rated Altitude	2000 m or less	
Transient Overvoltage	Anti-impulse category II	
	Allowable impulse noise: 1.5 or less	
Operating Temperature Range	-10 to 50 °C (Non-condensing)	
Operating Humidity Range	20 to 85% RH (Non-condensing)	
Vibration	5 to 200 Hz (29.4 m/s ²)	
Protective Construction	Relevant to IP40	
Connection cable length	Input/output signal line, control signal line 30 m or less	
EMC Standard	EN613260 + A1 + A2 + A32 (Class A)	
Safety Standard	EN61010-1/2001 (Installation Category II, Pollution Degree 2)	
Insulation Resistance	100 MΩ (500 VDC)	
Withstand Voltage	Between power supply and input/output	
	2000 VAC	1 minute
	Between power supply and the WGI-400A	
	2000 VAC	1 minute
	Mutually between input and output	
	2000 VAC	1 minute

3-2 OUTSIDE DRAWING

1) Standard model with no optionals.

