

# Instrumentation Amplifiers

Kyowa's instrumentation amplifiers are connected to widely used several strain-gage transducers such as load cells, pressure transducers etc. and enable us to monitor various physical quantities such as weight, force, pressure, displacement and torque. Besides they provide several output signals for control such as analog, comparator, BCD, RS-232C, and CC-Link.

A weighing system with load cells built-in, or a system with pressure transducers built-in, are incorporated into various machine tools, or industrial robots which are used in steelmaking, cement, foods, pharmaceutical and chemical, for the purposes of measurement, monitoring or control on various tests.

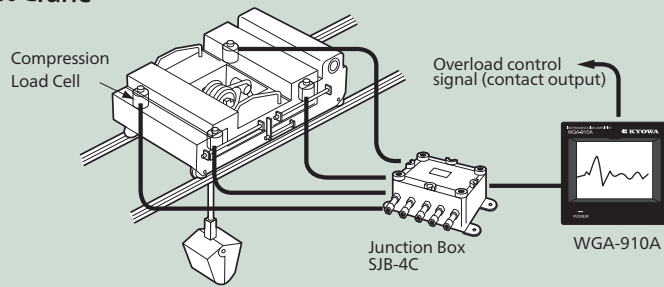
Recent trends toward labor saving, quality assurance and safety management have increasingly accelerated applications of Kyowa's instrumentation amplifiers in various industrial fields.



## ■ Load Cell Applied Systems

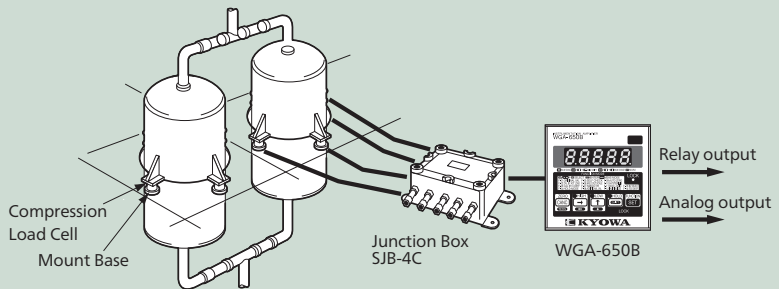
### ● Controlling the Load of a Bucket Crane

Receiving loads from a hoisting mechanism using multiple load cells, the system detects the total weight, and then measures the real load after subtracting the tare. Since WGA series outputs analog signal to an external meter, a hoisting load is monitored. In addition, high& low limit signals let you know overload and it makes the system suitable for safety management.



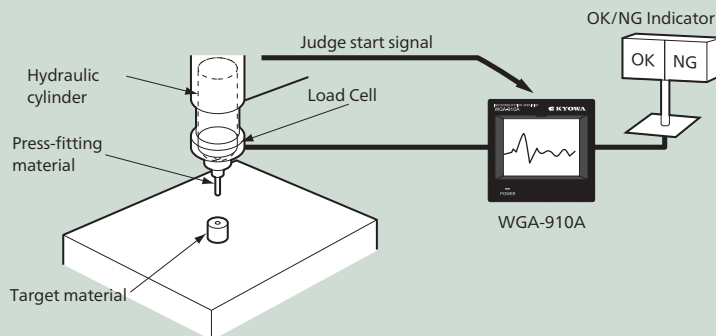
### ● Monitoring Contents of Tanks

Weighing contents of each tank enables automation and labor saving on mixing work. Three or four load cells are usually mounted on each tank. Output signals are summed with a junction box and then amplified. Relay output is used to monitor the amount of material in each tank.



### ● Measuring Press-fit Load

In the automotive parts industry, a compression load cell and an instrumentation amplifier are used to measure and judge the load given through press-fitting air conditioning parts. The instrumentation amplifier provides a peak hold function and outputs the judgment signal to the OK/NG indicator after comparing each measured value with the reference value. The system is applied to similar press-fitting processes in other industries.



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Outline

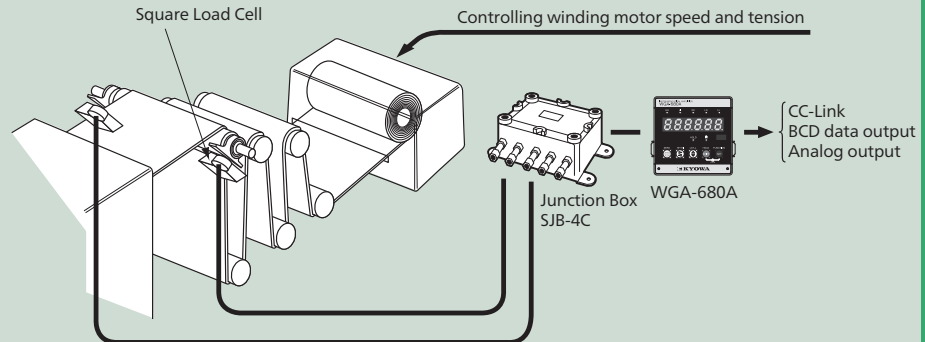
Amplifier

Checker

Other

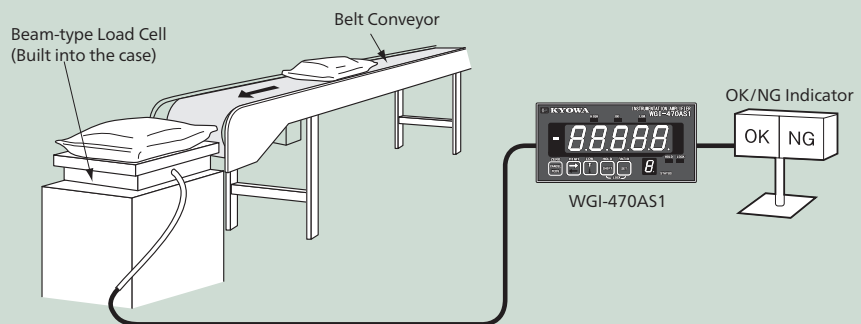
●Controlling Cloth Tension

In the textile industry, for the quality control, square load cells and instrumentation amplifiers are used to measure cloth tension and to make the tension uniform. The same system is widely used for the production process for rolled steel, metal, paper, film and tape.



●Measuring Flour Weight

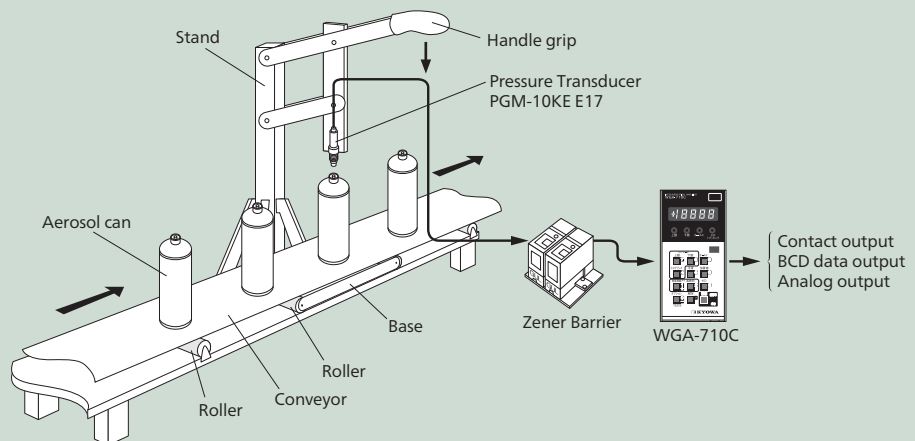
In the flour industry, load cells and instrumentation amplifiers are used to weigh the bagged material for the purpose of judging whether the weight is as specified. The result is output to an OK/NG indicator. Since the beam-type load cell is highly accurate and thin, it is suitable as a sensor for the system. The same system is used for weighing bagged materials in the fields of feedstuff, cement, and foods.



■Pressure Transducer Applied System

●Quality Control of products

In this system, a pressure transducer detects the pressure of gas which is sealed in a container, and a WGA-710C instrumentation amplifier measures the detected signal and then compares it with the preset value for OK/NG judgement.



Outline









Amplifier

Checker

Other

# Instrumentation Amplifier Selection Chart

Industrial instrumentation amplifiers are lightweight, compact, multi-functional and moderately priced for measurement of physical quantities such as load, pressure, displacement, torque and acceleration in combination with strain-gage transducers, etc. They are available in different models to enable selection of an optimum one for each individual measurement purpose and are used not only for measurement but also for control and judgment.

	Models	Features	Pages
High-speed Multi-function Waveform Indicator	Instrumentation Amplifier <b>WGA-910A</b>  TEDS CC-Link	<ul style="list-style-type: none"> <li>●Sampling speed: 4000 times/s</li> <li>●Indication: -99999 to 99999, waveform, color LCD</li> <li>●Comparators: 4 points</li> <li>●Available output: BCD, DA, RS-232C, RS-485, BCD &amp; DA, CC-Link</li> <li>●Touchscreen</li> <li>●TEDS compliant</li> <li>●Data saved in the SD card</li> </ul>	3-107
General-purpose High-speed Indicator	Instrumentation Amplifier <b>WGA-680A</b>  TEDS CC-Link	<ul style="list-style-type: none"> <li>●Sampling speed: 4000 times/s</li> <li>●Indication: -99999 to 99999, 3 colors</li> <li>●Comparators: 4 points</li> <li>●Available output: BCD, DA, RS-232, RS-485, CC-Link</li> <li>●TEDS compliant</li> </ul>	3-110
Load Indicator	Instrumentation Amplifier <b>WGA-650B</b> 	<ul style="list-style-type: none"> <li>●Sampling speed: 4 times/s</li> <li>●Indication: -1999 to 19999</li> <li>●Comparators: 2 points</li> <li>●Available output: BCD, DA</li> </ul>	3-112
General-purpose Indicator	Instrumentation Amplifier <b>WGA-710C</b>  TEDS	<ul style="list-style-type: none"> <li>●Sampling speed: 15 times/s</li> <li>●Indication: -9999 to 9999</li> <li>●Comparator: 2 points (Optional 8 points)</li> <li>●Available output: BCD, DA, RS-232C, conditioner, isolated conditioner</li> <li>●TEDS compliant</li> <li>●Applicable for remote sensing</li> </ul>	3-113
General-purpose Indicator	Instrumentation Amplifier <b>WGI-400A</b>  TEDS	<ul style="list-style-type: none"> <li>●Sampling speed: 50 times/s</li> <li>●Indication: -9999 to 9999</li> <li>●Comparator: 2 points</li> <li>●Available output: BCD, DA, RS-232C, RS-485</li> <li>●TEDS compliant</li> </ul>	3-115
General-purpose Indicator	Instrumentation Amplifier <b>WGI-470AS1</b>  TEDS	<ul style="list-style-type: none"> <li>●Sampling speed: 2000 times/s</li> <li>●Indication: -99999 to 99999</li> <li>●Comparators: 2 points</li> <li>●Available output: BCD, DA, RS-232C, RS-485</li> <li>●TEDS compliant</li> </ul>	3-116
High-speed Calculation	4-channel Instrumentation Amplifier <b>WGC-140A</b> 	<ul style="list-style-type: none"> <li>●Channels: Max. 4</li> <li>●Disconnection check function</li> <li>●Analog output</li> <li>●Output points: 5 (Signals of 4 channels and the total)</li> <li>●Voltage: ±10 V</li> <li>●Frequency response: 150 Hz</li> </ul>	3-117
Indicator for Voltage, Current and Pulse	Indicator for Voltage-output Type Sensor <b>WD-100A</b>  NEW	<ul style="list-style-type: none"> <li>●Channels: 2(Analog and pulse each)</li> <li>●Sampling speed: 100 times/s</li> <li>●Indication: -99999 to 99999, full color display</li> <li>●Available output: DA, pulse</li> </ul>	3-118



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	Models	Features	Pages
For building into equipment	Carrier Type Instrumentation Amplifier <b>WGA-120A</b> 	<ul style="list-style-type: none"> <li>●Carrier type</li> <li>●Analog output                             <ul style="list-style-type: none"> <li>· Voltage: <math>\pm 10</math> V</li> <li>· Current: 4 to 20 mA</li> <li>· Frequency response: 500 Hz</li> </ul> </li> </ul>	3-121
For building into equipment	Instrumentation Amplifier <b>WGA-100B</b> 	<ul style="list-style-type: none"> <li>●Analog output                             <ul style="list-style-type: none"> <li>· Voltage: <math>\pm 10</math> V</li> <li>· Current: 4 to 20 mA</li> <li>· Frequency response: 500 Hz</li> </ul> </li> </ul>	3-121
For building into equipment	Instrumentation Amplifier <b>WGA-101A</b> 	<ul style="list-style-type: none"> <li>●Monitor terminals on the front panel</li> <li>●Analog output                             <ul style="list-style-type: none"> <li>Voltage: <math>\pm 10</math> V</li> <li>Current: 4 to 20 mA</li> </ul> </li> </ul>	3-123
For building into equipment	Instrumentation Amplifier <b>WGA-200A series</b> 	<ul style="list-style-type: none"> <li>●Analog output                             <ul style="list-style-type: none"> <li>Voltage: <math>\pm 10</math> V</li> <li>Current: 4 to 20 mA</li> </ul> </li> <li>●Frequency response: 1, 10, 30, 100, 200, or 500 Hz</li> <li>●Indication: Analog meter, digital display</li> <li>●Applicable for sensing sensors</li> </ul>	3-120
Handy Type Indicator Sensor Checker	Compact Digital Indicator <b>WDS-190AS1E/191AS1E</b>  WDS-190AS1E 	<ul style="list-style-type: none"> <li>●Sampling speed: 50 times/s</li> <li>●Indication: -99999 to 99999</li> <li>●TEDS compliant</li> </ul>	3-124
Handy Type Indicator Sensor Checker	Sensor Checker <b>WDS-500BE</b>  	<ul style="list-style-type: none"> <li>●Sampling speed: 2 times/s</li> <li>●TEDS compliant</li> <li>●Measures I/O resistance.</li> <li>●Measures insulation resistance.</li> </ul>	3-125
Simple Strain Generators	<b>CAB-E</b> 	<ul style="list-style-type: none"> <li>●Palm-size</li> </ul>	3-126
Junction Boxes	<b>SJB-C/D</b> <b>JBS-C</b>  SJB-4D  JBS-4C	<ul style="list-style-type: none"> <li>●Connectable units: 1 or 4</li> </ul>	3-127

Note: In rare cases, measuring range may be exceeded due to initial unbalance generated when a pressure transducer or a displacement transducer is used in combination with an instrumentation amplifier WGA series. In such cases, please contact us.



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Amplifier

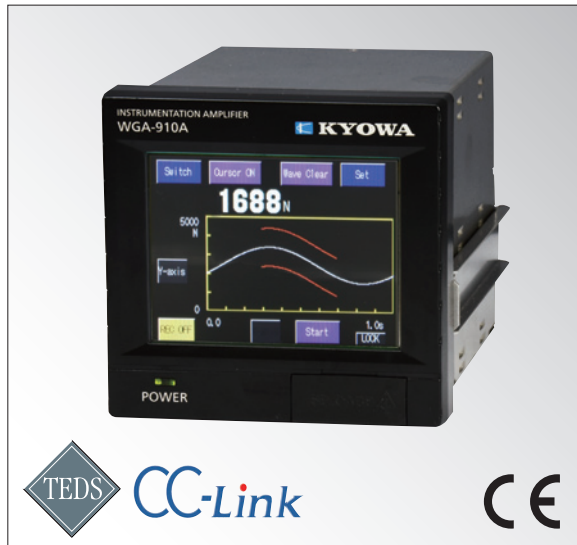
Checker

Other

# WGA-910A

## Instrumentation Amplifier

● For building into equipment



### Visual check of transition of load and pressure

- Waveform comparators
- Various hold functions
- Absolute pressure measurement by numeric value registering calibration
- SD card available
- High-speed sampling: 4000 times/s

The WGA-910A is an instrumentation conditioner that employs a touchscreen. It is capable of monitoring pressure changes in press machine and press-fitting process by indicating the wave forms, and visually verifying changes in physical quantities such as the load, pressure and so on which are difficult to capture with just numerical figures.

### Models

Models	Types
WGA-910A-0	Standard without option
WGA-910A-1	BCD output
WGA-910A-2	DA output
WGA-910A-3	RS-485
WGA-910A-4	CC-Link
WGA-910A-12	BCD and DA output

### Standard Specifications

<b>WGA-910A-0</b>	
<b>Channels</b>	1
<b>Applicable Transducers</b>	Strain-gage transducers (TEDS compatible sensors connectable)
<b>Compatible Bridge Resistance</b>	87.5 Ω to 1 kΩ (Up to four 350 Ω transducers connected in parallel.)
<b>TEDS Compatible</b>	Interface: Compatible with IEEE1451.4 Mixed Mode Transducer Interface Class 2. Applicable sensors: Should have the information according to IEEE template No. 33. (Cable length: 30 m or less)
<b>Bridge Excitation</b>	10, 2 VDC, selectable
<b>Measuring Range</b>	-3.2 to 3.2 mV/V (Including zero adjustment range)
<b>Zero Adjustment Range</b>	Within measurement range (Not retained when power supply interrupted.)
<b>Nonlinearity</b>	Within ±(0.02% FS + 1 digit)
<b>Stability</b>	Zero point: Within ±0.25 μV <sub>Rm</sub> /per°C Sensitivity: Within ±0.005%/°C
<b>Peak/Bottom Detection</b>	Detecting scheme: Digital hold
<b>Frequency Response</b>	DC to 1 kHz (+1 dB, -2 dB)
<b>Sampling Speed</b>	4000 times/s
<b>AD Resolution</b>	24 bits
<b>Analog Monitor</b>	Voltage output: ±(5 V ±200 mV) (load resistance 5 kΩ or more)
<b>Indicators</b>	3.5-inch TFT color LCD Display area: 70.6 × 59.2 mm, 320 × 240, touchscreen
<b>Indication</b>	Setting range: -99999 to 99999 (Decimal point to be put anywhere.) Update speed Numeric value display: 4 times/s Waveform display: 2 times/s
<b>Calibration Functions</b>	
	Manual calibration: Sensitivity registering calibration, actual load calibration, units
	TEDS auto calibration
	TEDS part calibration: TEDS calibration item
	TEDS operation configuration: TEDS reading operation, Zero during TEDS, TEDS information display, numeric value registering calibration
<b>Smoothing Functions</b>	Analog filter (LPF): 1, 30, 300 Hz, Flat (1 kHz or more) Attenuation: -12 dB/oct. Minimum scale: 1, 2, 5, 10, 20, 50, 100 Moving average: None, 2, 4, 8, 16, 32, 64, 128, 256, 512, 1024, 2048 times
<b>Zero Compensation Function</b>	
	Zero tracking (Auto digital Zero within in the setting range)
	Judging time: 0.00 to 9.99 s
	Compensation range: 0 to 99999
	Zero near zero (Auto zero display)
	Setting zero: 0 to 9
<b>Additional Value</b>	Setting range: ±99999
<b>Original Values (Sensor Output Value)</b>	
	-3.2000 to 3.2000 mV/V (5 digits)
	Accuracy: Within ±0.1% FS
<b>Measurement Condition Numbers</b>	
	32 (16 for control input) of measurement condition file can be saved.
	Capable of switching by the key operation, control input, and communication command.



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<b>Comparator Setting</b>	
Points:	4
Type:	Extra high (HH), high (HI), low (LO), extra low (LL)
If there are 2 hold values, they are assigned as follows.	
Hold value 1:	High 1 (HI1), low 1 (LO1)
Hold value 2:	High 2 (HI2), low 2 (LO2)
Setting range:	±99999
Hysteresis width:	0 to 9999
Using comparator can be set.	
Output logic:	Positive/negative
Comparison speed:	4000 times/s (Normal comparison mode)
<b>Judgment Function</b>	
Point:	1
Type:	OK
<b>Waveform Comparison Setting</b>	
Points:	2
Type:	Wave HI, Wave LO
Set reference waveform, waveform comparison HI, waveform comparison LO, move waveform, comparison area, register waveform	
Waveform comparison logic: Positive/negative	
<b>Waveform Judgment Function</b>	
Point:	1
Type:	Wave OK
<b>Motion Detect</b>	
Motion detect function:	Enable/disable
Motion detect width:	0 to 99999
Motion detect time:	0.01 to 9.99
Motion detect logic:	Positive/negative
<b>Measuring Modes</b>	
Operation mode: Normal, peak hold, block-specified peak hold, time-specified peak hold, bottom hold, block-specified bottom hold, time-specified bottom hold, arbitrary point hold, block peak-bottom hold, time peak-bottom hold, block average hold, time average hold, block inflection hold, time inflection hold, block maximal/minimal hold, time maximal/minimal hold, block peak/average hold, time peak/average hold, block bottom/average hold, time bottom/average hold, block peak/arbitrary hold, time peak/arbitrary hold, block bottom/arbitrary hold, time bottom/arbitrary hold, previous value comparison peak hold, block previous value comparison peak hold, time previous value comparison peak hold, previous value comparison bottom hold, block previous value comparison bottom hold, time previous value comparison bottom hold	
Detect time:	0.01 to 9.99 s
Delay time:	0.00 to 9.99 s
The following settings can be changed according to the operation mode.	
Detection trigger level, detection trigger way, inflection point discrimination time, inflection point discrimination value, extreme value discrimination setting, initial value for compare with measuring value	
Comparison mode: Normal comparison, hold comparison	
Display mode:	Normal display, hold display
<b>Waveform Display</b>	
X axis setting	End point: 0.5, 1.0, 2.0, 5.0, 10.0, 20.0, 50.0, 100.0 s
Y axis setting	Start point: -99999 to 99999
	End point: 250, 500, 1000, 2000, 5000, 10000, 20000, 50000, 100000, 200000
Start mode of waveform, passed level, passed level way, holding time of waveform.	
The WGA displays the waveform of the input variation regardless to the "Operation Modes" setting.	

<b>System</b>	Key lock, setting value initialize, backlight illumination time, language, clock, comparison display color, display stability
<b>Self-check</b>	Memory, channel
<b>Operation Check</b>	Display, touchscreen, control input/output, communication, BCD output, DA output, SD card
<b>Control Input</b>	
Points:	9
Types:	Zero command, hold command, reset command, waveform command, TEDS command, measurement condition select 0 to 3
Signal formats: Open collector (NPN) or non-voltage contact signal (Capacity: 12 VDC, 5 mA or more)	
<b>Control Output</b>	
Points:	16
Types:	HH, HI, OK, LO, LL, healthy, abnormal channel, abnormal memory, SD, communication error
Output type:	Open collector (NPN)
Load capacity:	30 VDC, 20 mA (load resistance)
<b>Communication</b>	
Signal system:	RS-232C, full duplex system
Transmission system:	Asynchronous
Bit configuration	Data bits: 7
	Stop bit: 1
	Parity bit: Odd number
	Flow control: None
	Baud rate: 2400, 4800, 9600, 19200 bps
Transmission mode:	Repeat output, output at hold, Tx and Rx
NOTE: When equipping the optional CC-Link (RS-485), the RS-232C of the standard equipment is disabled. Otherwise, RS-232C is enabled.	
<b>SD Card</b>	
Saving setting value: Saves the all setting values (excluding the calibration value) to the SD card.	
Reading setting value: Reads the all setting values (excluding the calibration value) from the SD card and rewrites those of the WGA to the read one.	
Recording measuring value: Pushing recording key, the WGA records the waveform data to the SD card.	
View waveform file name: Browsing the waveform data, deleting the wave data, and deleting the directory are available.	
Format: Erase all data that are saved in the SD card is available. (Quick format is available.)	
Update: Capable of updating the program version that is saved in the SD card.	
SD card type: SD, SDHC (up to 32 GB)	
<b>Power Supply</b>	100 to 240 VAC, power consumption: 20 VA or less
<b>Dimensions</b>	100 W x 96 H x 135 D mm (Excluding protrusions)
<b>Weight</b>	Approx. 950 g (Excluding options)
<b>Operating Temperature</b>	-10 to 40 °C
<b>Operating Humidity</b>	20 to 85% or less (Non-condensing)
<b>Compliance</b>	Directive 2014/30/EU (EMC)
	Directive 2014/35/EU (LVD)
	Directive 2011/65/EU, (EU)2015/863
	(10 restricted substances) (RoHS)

**Standard Accessories**

CD (Instruction manual, PC software for SD card)

**Optional Accessories**

AC power cable P-23 (For 100 VAC)  
 AC power cable P-28 (For 200 VAC)  
 Wire mount socket 35505-6000-BOM GF (WGA-910A-4)  
 Branch connector (type-Y) 35715-L010-B00 AK (WGA-910A-4)  
 Termination connector 35T05-6M00-BOM GF (WGA-910A-4)



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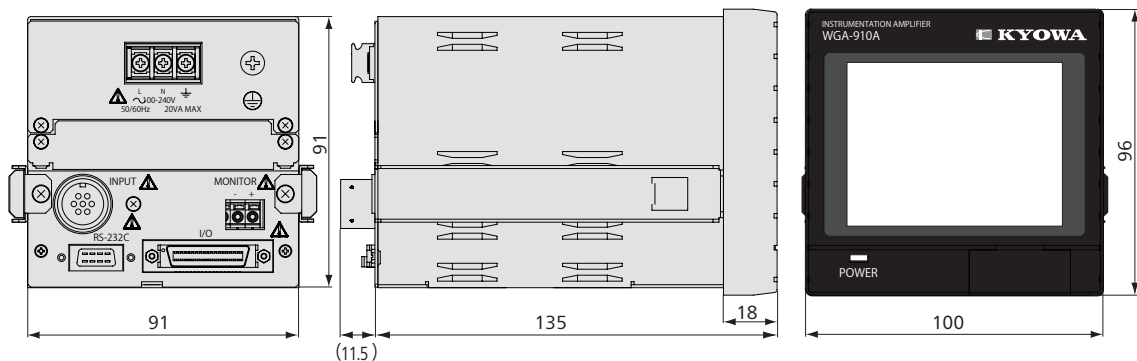


Optional Specifications

<b>■BCD Output (WGA-910A-1)</b>	
<b>Output</b>	BCD data: 20 bits (4 bits × 5 digits) Binary data: 18 bits (Offset binary) Minus sign: 1 bit Over: 1 bit End of Conversion (EOC): 1 bit Output type: Open collector (NPN) Load capacity: 30 VDC, 20 mA (load resistance)
<b>Input</b>	Points: 2 Details: Data hold input Negative logic (Hold at "L") Output prohibit input Negative logic (Hold at "L") Input signal type: Open collector (NPN) or non-voltage contact signal (Capacity: 12 VDC, 5 mA or more)
<b>Setting Content</b>	Transmission speed: Approx. 16, 32, 64, 125, 250, 500, 1000 times/s Polarity logic: EOC logic Data logic: Negative, positive Data type: BCD, binary changeable BCD classification: Hold value 1, hold value 2, measured value
<b>■DA Output (WGA-910A-2)</b>	
<b>Output Voltage</b>	±10 V (load resistance 2 kΩ or more) Arbitrary scaling is available.
<b>Output Current</b>	4 to 20 mA (load resistance 500 Ω or less) 4 to 20 mA output is fixed when the voltage 0 to 10 V is applied.
<b>Insulation Voltage</b>	250 VAC for 1 minute (Output voltage and output current are non-insulated.)
<b>Conversion Speed</b>	4000 times/s
<b>Nonlinearity</b>	±0.1% FS
<b>Setting Content</b>	DA display: Zero disp. (Displayed value when the voltage 0 V is output.) Full disp. (Displayed value when the voltage 10 V is output.) DA classification: Hold value 1, hold value 2, measured value
<b>■RS-485 (WGA-910A-3)</b>	
<b>Signaling System</b>	RS-485 half duplex system
<b>Bit Configuration</b>	Data bits: 7 Stop bit: 1 Parity bit: Odd number
<b>Flow Control</b>	None
<b>Setting Content</b>	Device ID: 1 to 99 (Setting ID to distinguish other units.) Baud rate: 2400, 4800, 9600, 19200 bps (Common with the RS-232C.) Transmission mode: Repeat output, output at hold, Tx and Rx (Common with the RS-232C.)

<b>■CC-Link (WGA-910A-4)</b>	
<b>Version</b>	Ver.1.10
<b>Station Type</b>	Remote device station
<b>Occupied Stations</b>	1 station, 2 stations, 4 stations
<b>Communication Speed</b>	10 Mbps, 5 Mbps, 2.5 Mbps, 625 kbps, 156 kbps
<b>Station Number</b>	1 to 64
<b>Connection Cable</b>	CC-Link Ver.1.10-compliant cable (Shielded, 3-conductor twisted pair cable)
<b>■BCD and DA Output (WGA-910A-12)</b>	
<b>BCD/Binary Output</b>	
<b>Output</b>	BCD data: 20 bits (4 bits × 5 digits) Binary data: 18 bits (Offset binary) Minus sign: 1 bit Over: 1 bit End of Conversion (EOC): 1 bit Output type: Open collector (NPN) Load capacity: 30 VDC, 20 mA (load resistance)
<b>Input</b>	Points: 2 Details: Data hold input Negative logic (Hold at "L") Output prohibit input Negative logic (Prohibition at "L") Input signal type: Open collector (NPN) or non-voltage contact signal (Capacity: 12 VDC, 5 mA or more)
<b>Setting Content</b>	Transmission speed: Approx. 16, 32, 64, 125, 250, 500, 1000 times/s Polarity logic: EOC logic Data logic: Negative, positive Data type: BCD, binary changeable BCD classification: Hold value 1, hold value 2, measured value
<b>DA Output</b>	
<b>Output Voltage</b>	±10 V (load resistance 2 kΩ or more) Arbitrary scaling is available.
<b>Output Current</b>	4 to 20 mA (load resistance 500 Ω or less) 4 to 20 mA output is fixed when the voltage 0 to 10 V is applied.
<b>Insulation Voltage</b>	250 VAC for 1 minute (Output voltage and output current are non-insulated.)
<b>Conversion Speed</b>	2000 times/s
<b>Nonlinearity</b>	±0.1% FS
<b>Setting Content</b>	DA display: Zero disp. (Displayed value when the voltage 0 V is output.) Full disp. (Displayed value when the voltage 10 V is output.) DA classification: Hold value 1, hold value 2, measured value

■ Dimensions



# WGA-680A

● For building into equipment

## Instrumentation Amplifier



### High performance instrumentation amplifier for strain-gage transducers

- High-performance processing (Sampling Speed: 4000 times/s, 24-bit AD converter)
- Substantial comparison and Judgment functions (Extra high, high, OK, low, and extra low)
- Analog output (DA)
- Various optional interfaces (BCD output, RS-232C, RS-485, and CC-Link)
- Numeric data and comparators' LED display in red, green, or orange.

The WGA-680A is compact, moderately priced instrumentation amplifiers which enables direct reading of physical quantities such as loads due to high-speed sampling.

Comparator, hold functions and DA converted signal output are standard equipped.

Suitable for measurement and control of quickly changing phenomena in press-fitting process or press machines.

### Models

Models	Types	Power Supply	TEDS	BCD	RS-232C	RS-485	CC-Link
WGA-680A-00		100 to 240 VAC					
WGA-680A-01			Yes	Yes			
WGA-680A-02			Yes		Yes		
WGA-680A-03			Yes			Yes	
WGA-680A-04							Yes
WGA-680A-10		10 to 30 VDC					
WGA-680A-11			Yes	Yes			
WGA-680A-12			Yes		Yes		
WGA-680A-13			Yes			Yes	
WGA-680A-14							Yes

### Specifications

Channels	1
Applicable Sensors	Strain-gage transducers (4-wire)
Compatible Bridge Resistance	87.5 to 1000 Ω (Up to four 350 Ω transducers connected in parallel.)
Bridge Excitation	10, 2 VDC, selectable
Measuring Range	±3.2 mV/V (Input range including zero adjustment range)
Zero Adjustment Range	Within measurement range (Not retained when power supply interrupted.)
Nonlinearity	Within ±(0.02% FS+1 digit)
Stability	Zero point: Within ±0.25 μV <sub>RM</sub> /°C Sensitivity: Within ±0.01%/°C
Sampling Speed	4000 times/s
AD Resolution	24 bits
Calibration	Actual load calibration, sensitivity registering calibration, and numeric value registering calibration
Smoothing Functions	Analog filters: 10, 30, 100, 300 Hz Attenuation: -12 dB/oct. Moving average: 0, 2, 4, 8, 16, 32, 64, 128, 256, 512, 1024, and 2048 times Min. scale: 1, 2, 5, 10, 20, 50, 100, 200, 500, and 1000 counts
Auto Zero Compensation	Zero Tracking (Auto digital zero in the preset range) Approximated zero compensation: Indication is made zero when the reading is in a preset range of 0 to 9.
Adding Functions	Setting range: ±99999
Original Value Display Functions	±3.2000 mV/V Accuracy: Within ±0.1%FS
Comparator Functions	Points: 4 Patterns: Registers 4 groups of pattern files (comparative values) and enables switching through setting of functions Types: Extra high (HH), high (HI), low (LO), extra low (LL) Setting range: ±99999 Hysteresis: 0 to 99999 Comparison modes: Normal, at hold High low assignment: Enables assigning high or low to each comparator.
Judgment Function	Point: 1 Type: OK
Hold Functions	Digital peak/bottom hold (Without analog peak/bottom hold) Types: Arbitrary point hold, peak hold, bottom hold, peak to peak hold, interval definition peak hold, time specification peak hold, interval definition peak hold, time specification peak hold, interval definition peak to peak hold, time specification peak to peak hold Delay time: 0.00 to 9.99 s Detect time: 0.01 to 9.99 s
Display	Range: ±99999 (Decimal point to be put anywhere.) Indicator: 7-segment LED, character height: 14 mm, colors: Red, green, and orange Update: 0.12, 0.24, 0.49, 0.98, 1.95, 3.90, 7.80, and 15.6 times/s (In normal mode) Modes: Normal/hold Comparators: 5 points (HH, HI, OK, LO, LL) Status: 2 points (HOLD, LOCK)





<b>Analog (DA) Output</b>	
Voltage output:	±10 V (Load resistance 2 k Ω or more)
	Arbitrary scaling possible
Current output:	4 to 20 mA (Load resistance 500 Ω or less)
	Corresponds to voltage output of 0 to 10 V.
Conversion speed:	4000 times/s
Nonlinearity:	Within ±0.1%FS
Setting contents:	Display value of zero, display value of full scale
<b>Control Input</b>	
Points:	3
Types:	Zero command, hold command, and reset command
Signal formats:	Non-voltage contact signal or open collector (NPN) (Capacity: 12 VDC, 5 mA or more)
<b>Control Output</b>	
Points:	5
Types:	HH, HI, OK, LO, and LL
Formats:	Open collector (NPN) (30 VDC, 20 mA max.)
<b>Level Test Functions</b>	
Display of arbitrary values possible	
Display additional functions:	Disabled, enabled
Setting range:	±99999
Level test:	ON, OFF
<b>Power Supply</b>	
	See the table.
<b>Dimensions</b>	
	96 W × 96 H × 126 D mm (Excluding protrusions)
<b>Weight</b>	
	Approx. 750 g (Without option)
<b>Operating Temperature</b>	
	-10 to 50°C
<b>Operating Humidity</b>	
	20 to 80% (Non-condensing)
<b>Compliance</b>	
	Directive 2014/30/EU (EMC)
	Directive 2014/35/EU (LVD) (AC model only)
	Directive 2011/65/EU, (EU)2015/863
	(10 restricted substances) (RoHS)

**Standard Accessories**

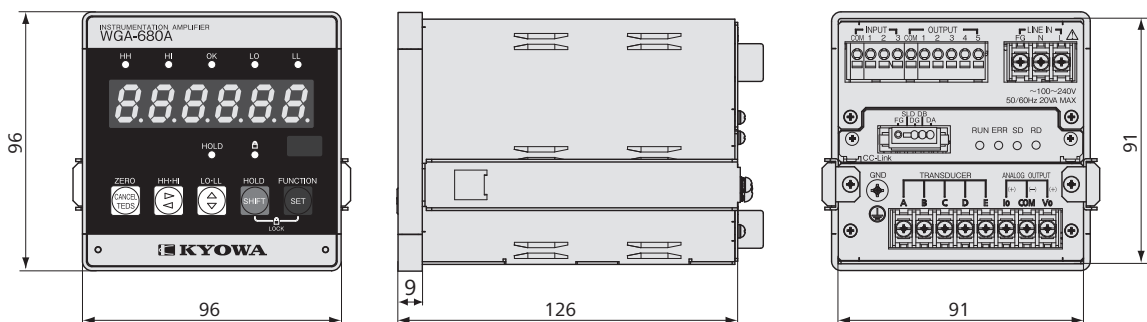
- Instruction manual (CD-R)
- Unit seal
- Screwdriver (-)

**Optional Accessories**

- AC power cable P-23 (For 100 VAC)
- AC power cable P-28 (For 200 VAC)
- Input cable for NDIS4102 (7 pins) connector (6 conductors)
  - U-29 (50 cm)
  - U-30 (1 m)
  - U-31 (2 m)
  - U-32 (5 m)
- Input cable for NDIS4102 (7 pins) connector (4 conductors)
  - U-33 (50 cm)
  - U-34 (1 m)
  - U-35 (2 m)
  - U-36 (5 m)
- Wire mount socket 35505-6000-BOM GF (WGA-680A-04/14)
- Branch connector (type-Y) 35715-L010-B00 AK (WGA-680A-04/14)
- Termination connector 35T05-6M00-BOM GF (WGA-680A-04/14)

<b>Option: BCD Output (Model: WGA-680A-01, WGA-680A-11)</b>	
<b>Output</b>	Data: 20 bits (4-bit×5), POL (Minus polarity), over, EOC (End of Conversion), holding section, detecting section
	Output format: Open collector (NPN) (30 VDC, 20 mA max.)
<b>Input</b>	Points: 2 (Hold, Output prohibited)
	Format: Open collector (NPN) or non-voltage contact signal (Capacity: 12 VDC, 5 mA)
<b>Output Rate</b>	Approx. 15.6, 31.3, 62.5, and 125 times/s
<b>Output Logic</b>	Data logic: Positive logic, negative logic
	EOC logic: Positive logic, negative logic
	Polarity logic: Positive logic, negative logic
<b>Option: RS-232C (Model: WGA-680A-02, WGA-680A-12)</b>	
<b>Signal System</b>	RS-232C full duplex system
<b>Communication Methods</b>	Synchronous
<b>Baud Rate</b>	2400, 4800, 9600, 19200 bps
<b>Bit Configuration</b>	Data bits: 7
	Stop bit: 1
	Parity bit: Odd number
<b>Flow Control</b>	None
<b>Option: RS-485 (Model: WGA-680A-03, WGA-680A-13)</b>	
<b>Signal System</b>	RS-485 half duplex system
<b>Baud Rate</b>	2400, 4800, 9600, 19200 bps
<b>Bit Configuration</b>	Data bits: 7
	Stop bit: 1
	Parity bit: Odd number
<b>Flow Control</b>	None
<b>Device ID</b>	1 to 99
<b>Option: TEDS</b>	
<b>(Model: WGA-680A-01, WGA-680A-02, WGA-680A-03, WGA-680A-11, WGA-680A-12, WGA-680A-13)</b>	
<b>Applicable Transducer</b>	Should have the information according to IEEE template No. 33 (Cable length should be 30 m or less.)
<b>Interfaces</b>	Compatible with IEEE1451.4 Mixed Mode Transducer Interface Class 2
<b>Calibration Function</b>	Automatic sensitivity registration by reading TEDS data
<b>Option: CC-Link (Model: WGA-680A-04, WGA-680A-14)</b>	
<b>Version</b>	1.10
<b>Station Types</b>	Remote device station
<b>Occupied Stations</b>	1, 2, 4
<b>Baud Rate</b>	10 M, 5 M, 2.5 M, 625 k, and 156 k bps
<b>Slave Stations</b>	1 to 64
<b>Connection Cable</b>	CC-Link version 1.10 compliant cables (3-conductor twisted pair shielded cable)

**Dimensions**

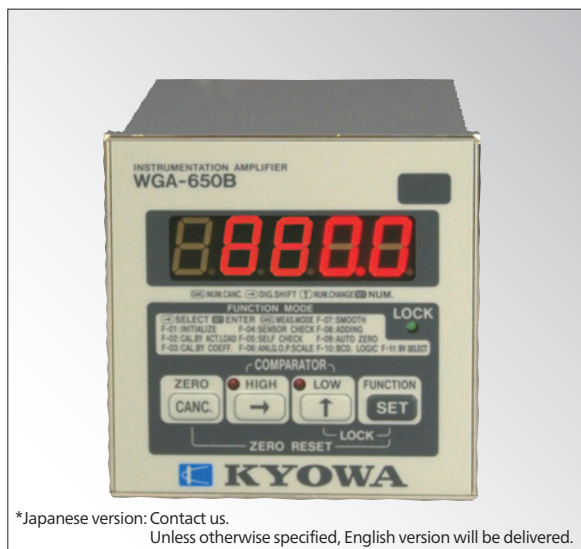


WGA-680A-04

# WGA-650B

● For building into equipment

## Instrumentation Amplifier



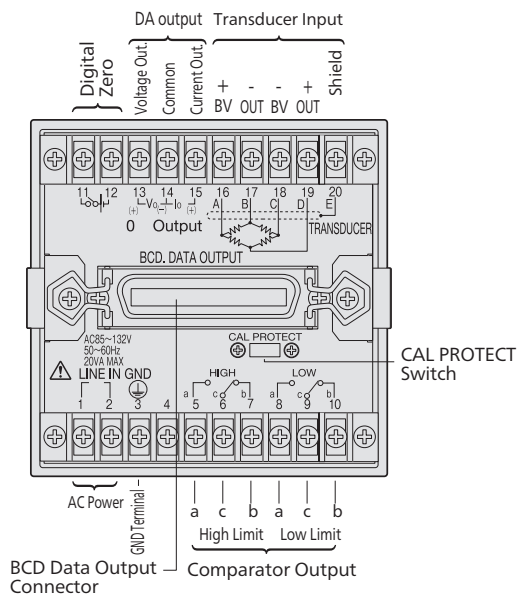
\*Japanese version: Contact us.  
Unless otherwise specified, English version will be delivered.

### Compact Moderate price

- Wide no-load zero adjustment range ( $\pm 2$  mV/V)
- High/low limit comparators (Relay contact output)
- Indicated value is output in a voltage range of 0 to 10 V or in a current range of 4 to 20 mA.
- Indication range -1999 to 19999
- DIN size (96 × 96 mm) ensures easy installation.
- Up to 4 transducers with 350  $\Omega$  bridge resistance connected in parallel.

The WGA-650B is compact, moderately priced instrumentation amplifiers enabling direct reading of physical quantities such as loads etc. in combination with a strain-gage transducer. All operations are performed with front-panel keys including high/low limit comparator keys. While all models in this series provide DA converted signal output, models with additional digital output (BCD) are available.

#### ■ Rear View



WGA-650B-1

#### Models

Types	Models	Power Supply
Standard	WGA-650B-0 M448	100 to 127 VAC
	WGA-650B-0 M449	220 to 240 VAC
With BCD output	WGA-650B-1 M448	100 to 127 VAC
	WGA-650B-1 M449	220 to 240 VAC

#### Specifications

Channels	1
Applicable Transducers	Strain-gage transducers (Bridge resistance of 350 $\Omega$ ) (Up to 4 transducers connectable in parallel)
Measuring Range	0 to 2.5 mV/V (5000 $\times 10^{-6}$ strain)
Bridge Excitation	10 VDC/2 VDC, switchable
No-load Zero Adjustment	$\pm 2$ mV/V Analog adjustment and digital adjustment in combination
Calibration	By inputting a numeric value By applying an actual load
Display	-1999 to 19999 (Decimal point to be put anywhere.) Character height 15.24 mm, red LED
Sampling Speed	4 times/s
Nonlinearity	Within $\pm(0.03\% FS + 1$ digit)
Stability	Zero point: $\pm 0.5 \mu V_{R11} / ^\circ C$ Sensitivity: $\pm 0.0025\% / ^\circ C$
High/Low Limit Comparator	Setting points: 2 (High limit, low limit) Setting range: -1999 to 19999 Contact output: Relay contact output (1 transfer circuit for each point) Contact capacity: 250 VAC, 0.5 A (Resistive load)
Analog Filters	Cutoff frequencies: 1 Hz
Smoothing	Moving averaging times: 2, 4, 8, and 16 Min. scale: 1, 2, 5, 10, 20, 50, and 100
Zero Compensation	Digital zero compensation: Possible with external voltage signals (10 to 30 VDC) Automatic zero compensation: Indication is made zero when the reading is in the setting range for 2 s or more.
Adding Functions	Setting range: -1999 to 19999
Analog (DA) Output	Voltage: 0 to 10 V (Load resistance 2 k $\Omega$ or more) Desired scaling possible Current: 4 to 20 mA (Load resistance 500 $\Omega$ or less) Corresponds to voltage output of 0 to 10 V. Withstand voltage between the output and case: 500 VAC for one minute
BCD Output (WGA-650B-1)	Output mode: Isolated open collector (NPN) BCD output logic selectable Driving capacity: 30 VDC, 20 mA max Output signals: 5-digit BCD value, minus sign, OVER, print command (EOC) Connector: 57-40360 (DDK) or the equivalent
Check Functions	Transducer check, self-check
Input Terminal Board	M3 screw board (applicable crimp-style terminals 1.25-3A and 1.25-3B or the equivalent)
Operating Temperature	-10 to 50 $^\circ C$
Operating Humidity	20 to 85% (Non-condensing)
Power Supply	100 to 127 VAC or 220 to 240 AC, 20 VA or less
Dimensions	96 W $\times$ 96 H $\times$ 139 D mm (Excluding protrusions)
Weight	Approx. 1.3 kg
Panel-cut Dimensions	92 $\times$ 92 mm

**Standard Accessories** AC power cable P-23 (For 100 VAC)  
Instruction manual  
Unit seal

#### Optional Accessories

AC power cable P-28 (For 200 VAC)  
Input cables  
U-33 (50 cm), U-34 (1 m), U-35 (2 m), U-36 (5 m)  
BCD output connector BCD-CONN (57-30360 (DDK) or the equivalent)



Instrumentation Amplifiers

Outline

Amplifier

Checker

Other

# WGA-710C

Wide applications

## Instrumentation Amplifier



\*Japanese version: Contact us.  
Unless otherwise specified,  
English version will be delivered.

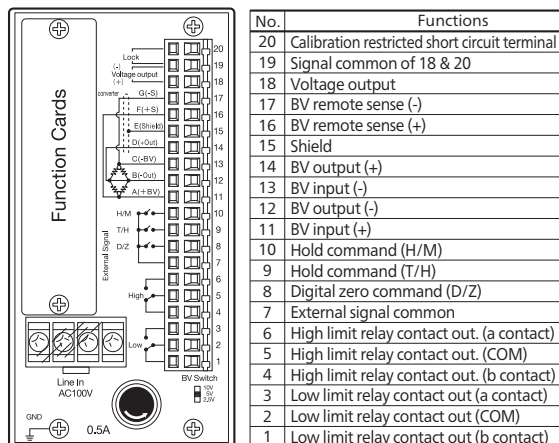
### TEDS-compatible Simple Excellent interference immunity Suitable for industrial measuring instruments

- Key lock to prevent wrong operation
- Suitable excitation voltage for transducer is selectable
- Built-in remote signal detection circuit enables highly accurate measurement

It is a compact, lightweight, multi-functional and moderately priced amplifier with display and it is designed to measure load, pressure, torque and displacement. Using low noise amplifier is helpful to achieve stable measurement. It is easy to conduct setting and control for each function by using keys. Since all setting values are recorded in a nonvolatile memory, it still functions in case of power failure. However, no digital zero data is recorded when using external contact input. It has been widely used in machinery, electric machinery, food and chemistry. Apart from production line control system, it can be broadly used as general purpose instrument for strain-gage transducer.

\*No remote-sensing function can be used simultaneously with TEDS function.

#### ■ Rear Panel



#### Models

Models	Types	Power supply (VAC)	High/low limit Comparators	Peak hold functions	BCD data output	EIA-232-D (RS-232C)	DA Converter	Analog amplifier	8-step comparator
WGA-710C-0E		100	Yes	Yes					
WGA-710C-0 A115E		115	Yes	Yes					
WGA-710C-0 A200E		200	Yes	Yes					
WGA-710C-0 A220E		220	Yes	Yes					
WGA-710C-1E		100	Yes	Yes	Yes				
WGA-710C-1 A115E		115	Yes	Yes	Yes				
WGA-710C-1 A200E		200	Yes	Yes	Yes				
WGA-710C-1 A220E		220	Yes	Yes	Yes				
WGA-710C-2E		100	Yes	Yes		Yes			
WGA-710C-2 A115E		115	Yes	Yes		Yes			
WGA-710C-2 A200E		200	Yes	Yes		Yes			
WGA-710C-2 A220E		220	Yes	Yes		Yes			
WGA-710C-3E		100	Yes	Yes				Yes	
WGA-710C-3 A115E		115	Yes	Yes				Yes	
WGA-710C-3 A200E		200	Yes	Yes				Yes	
WGA-710C-3 A220E		220	Yes	Yes				Yes	
WGA-710C-4E		100	Yes	Yes			Yes		
WGA-710C-4 A115E		115	Yes	Yes			Yes		
WGA-710C-4 A200E		200	Yes	Yes			Yes		
WGA-710C-4 A220E		220	Yes	Yes			Yes		
WGA-710C-5E		100	Yes	Yes				Yes	
WGA-710C-5 A115E		115	Yes	Yes				Yes	
WGA-710C-5 A200E		200	Yes	Yes				Yes	
WGA-710C-5 A220E		220	Yes	Yes				Yes	
WGA-710C-6E		100	Yes	Yes					Yes
WGA-710C-6 A115E		115	Yes	Yes					Yes
WGA-710C-6 A200E		200	Yes	Yes					Yes
WGA-710C-6 A220E		220	Yes	Yes					Yes
WGA-710C-12E		100	Yes	Yes	Yes	Yes			
WGA-710C-12 A115E		115	Yes	Yes	Yes	Yes			
WGA-710C-12 A200E		200	Yes	Yes	Yes	Yes			
WGA-710C-12 A220E		220	Yes	Yes	Yes	Yes			
WGA-710C-14E		100	Yes	Yes	Yes		Yes		
WGA-710C-14 A115E		115	Yes	Yes	Yes		Yes		
WGA-710C-14 A200E		200	Yes	Yes	Yes		Yes		
WGA-710C-14 A220E		220	Yes	Yes	Yes		Yes		

No remote-sensing function can be used simultaneously with TEDS function.

#### Specifications

<b>■WGA-710C-0E</b>	
Channels	1
Applicable Transducers	Strain-gage transducers
Compatible Bridge Resistance	87.5 Ω to 10 kΩ (Up to 4 transducers with 350 Ω bridge resistance connected in parallel)
Measuring Range	±3.2 mV/V (±6400 × 10 <sup>-6</sup> strain)
Bridge Excitation	10, 5, 2.5 VDC, switchable
	Remote sensing possible for 120 mA or less
Input Modes	Balanced differential
Input Impedance	10 MΩ or more
Input Terminal Board	Gage clamp type
Sensitivity Adjustment	Automatic by internal calculation (Accuracy within ±0.1%FS)
Display	Max. ±9999 (Decimal point to be put anywhere) Character height 10 mm, red LED Allows least significant digit to be fixed to 0
Sampling Speed	Approx. 15 times/s
Nonlinearity	Within ±(0.03%FS+1digit) (With transducer output 0.5 mV/V)
Stability	Zero point: ±0.25 μV/°C ±0.05%FS per 10% power voltage Sensitivity: ±0.01%/°C ±0.05% FS per 10% power voltage
<b>High/Low Limit Comparators</b>	
	Setting points: 2 (High limit, low limit)
	Response time: 200 ms or less
	Setting range: 0000 to ±9999
	Contact output: relay contact (1 transfer circuit/point)
	Contact capacity: 250 VAC, 0.5 A (Resistive load)
<b>Hold Functions</b>	
	ON/OFF switchover: By panel key or external contact input
	Mode switchover: By panel key
	No hold, point-based hold, peak hold, section-based peak hold, time-based peak hold

<b>Frequency Response</b>	DC to 1 kHz
<b>Digital Zero Functions</b>	Action input: By panel key or external contact input
<b>Adding Functions</b>	Setting range: 0000 to ±9999
<b>Original Value Monitor</b>	Accuracy: Within ±0.1%FS
<b>Zero Tracking Functions</b>	Zero is traced in changing quantities of ±1, 2, 5 counts each for delays of 20, 10 and 5 seconds, 9 ranges in total setting is made by panel keys
<b>Digital Filter Functions</b>	Moving averaging times is 4, 8, 16, 32, 48 or 64, switched by panel keys
<b>TEDS</b>	
<b>Interfaces</b>	Compatible with IEEE1451.4 Mixed Mode Transducer Interface Class2
<b>Applicable Transducers</b>	Should have the information according to IEEE Template No.33 Cable length should be 30 m or less (No remote sensing can be used together with TEDS)
<b>External Signal</b>	D/Z, T/H, H/M, non-voltage contact signal or open collector (NPN)
<b>Operating Temperature</b>	-10 to 40°C
<b>Operating Humidity</b>	80% or less (Non-condensing)
<b>Power Supply</b>	100, 115, 200, 220 VAC (Select one), 20 VA or less, 11 to 30 VDC on request
<b>Dimensions</b>	72 W x 144 H x 188 D mm (Excluding protrusions)
<b>Weight</b>	Approx. 1.9 kg
<b>Panel-cut Dimensions</b>	136x68 mm

**Specifications** (Specify the desired one when ordering)

<b>■WGA-710C-1E with BCD Data Output</b>	
It enables WGA-710C-1E to output indicated values as BCD (binary coded decimal).	
<b>Output Mode</b>	Isolated open collector (NPN)
<b>Driving Capacity</b>	30 VDC, 20 mA
<b>Output Signals</b>	4-digital BCD value, minus sign, OVER signal, print command (EOC); positive or negative logic selected by the switch.
<b>Input Command</b>	BCD hold, output disable, negative logic
<b>Connector</b>	57-40360 (DDK) or the equivalent
<b>Input Mode</b>	Non-voltage contact signal or open collector (NPN)
<b>■WGA-710C-2E with EIA-232-D (RS-232C)</b>	
EIA-232-D (RS-232C) enables this model to transmit indicated data and status signals and write preset high/low limit values to external equipment without digitizing.	
<b>Signal System</b>	RS-232C full duplex system
<b>Transmission Mode</b>	Asynchronous
<b>Baud Rate</b>	4800 bps
<b>Bit Structure</b>	7 data bits, 1 stop bit Odd parity bit
<b>Connector</b>	17-13250-27 (DDK) or the equivalent
<b>■WGA-710C-3E with Analog Amplifier</b>	
This model is designed to amplify and output the analog signal of a transducer to external equipment without digitizing.	
<b>Measuring Range</b>	±3.2 mV/V
<b>Zero Adjustment Range</b>	±2.5 mV/V
<b>Sensitivity Adjustment Range</b>	0.5 to 3.0 mV/V is adjusted to 10 V
<b>Calibration</b>	1 mV/V ±0.1%
<b>Voltage Output</b>	±10 V (Load resistance 2 kΩ or more) Nonlinearity: Within ±0.03% FS
<b>Current Output</b>	4 to 20 mA (Load resistance 350 Ω or less) (Corresponding to voltage output of 0 to 10 V) Nonlinearity: Within ±0.1%FS
<b>Frequency Response</b>	DC to 1 kHz

<b>■WGA-710C-4E with DA Converter</b>	
This model can output an analog signal with the digital indication. Digital zeroing, hold and smoothing functions are provided.	
<b>Output Analog Signal Level</b>	+10 V, 20 mA for the full scale setting on the case
<b>Zero Adjustment Range</b>	Within ±10%FS
<b>Sensitivity Adjustment Range</b>	Within ±10%FS
<b>Nonlinearity</b>	Within ±0.1%FS
<b>Frequency Response</b>	Depends on the sampling cycle (Approx. 15 times/s)
<b>Withstand Voltage</b>	500 VAC for one minute with the case
<b>Voltage Output</b>	0 to 10 V (Load resistance 2 kΩ or more)
<b>Current Output</b>	4 to 20 mA (Load resistance 350 Ω or less) (Corresponding to voltage output of 0 to 10 V)
<b>■WGA-710C-5E with Isolation Analog Amplifier</b>	
This model is designed to amplify and output the analog signal of a transducer to external equipment without digitizing.	
<b>Measuring Range</b>	±3.2 mV/V
<b>Zero Adjustment</b>	±2.5 mV/V
<b>Sensitivity Adjustment</b>	1.0 to 3.0 mV/V is adjusted to 10 V
<b>Calibration</b>	1 mV/V ±0.1%
<b>Withstand Voltage</b>	500 VAC for one minute with the case
<b>Voltage Output</b>	±10 V (Load resistance 2 kΩ or more) Nonlinearity: Within ±0.05%FS
<b>Current Output</b>	4 to 20 mA (Load resistance 350 Ω or less) (Corresponding to voltage output of 0 to 10 V) Nonlinearity: Within ±0.1%FS
<b>Frequency Response</b>	DC to 1 kHz
<b>■WGA-710C-6E with 8-step Comparator</b>	
This model provides 4 sets of high/low limits for comparison. The high/low limit relay (transformer contact) outputs the result of 1 set of high/low limits compared.	
<b>Comparison Points</b>	8 (4 each high/low limits)
<b>Setting Methods</b>	Select from external contact input and set by the panel keys.
<b>Setting Range</b>	0 to ±9999
<b>Output Modes</b>	Isolated open collector (NPN)
<b>Drive Capacity</b>	30 VDC, 20 mA
Note: The relay contact output of the mainframe is selected from external contact input.	
<b>■WGA-710C-12E with BCD Data Output and EIA-232-D (RS-232C)</b>	
This model enables simultaneous use of BCD data output and RS-232C.	
<b>■WGA-710C-14E with BCD Data Output and DA Converter</b>	
This model enables simultaneous use of BCD data output and DA converter.	

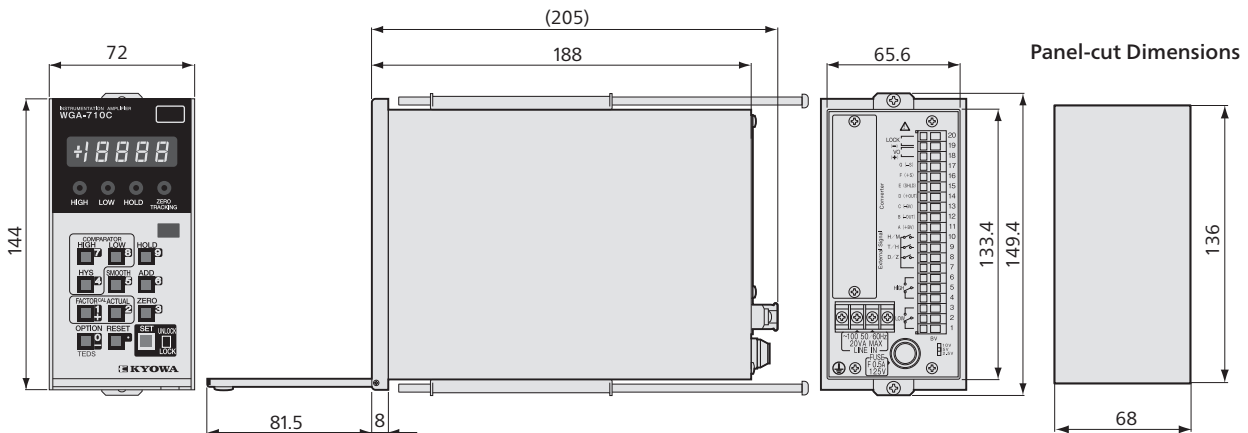
**Standard Accessories**

AC power cable P-23 (For 100 VAC)  
BCD output connector BCD-CONN (57-30360 (DDK) or the equivalent; attached to WGA-710C-1E, 12E, 14E only)  
Spare fuse, miniature screwdriver for terminal board connection, instruction manual, unit seal

**Optional Accessories**

AC power cable P-28 (For 200 VAC)  
Connection cables between WGA-710C and NDIS4102 (7 pins) connector plug  
4-conductor cables U-17 (50 cm), U-18 (1 m), U-19 (2 m), U-20 (5 m), bared at the tip  
Sensor side: Terminated with a connector plug P12-7 (PRC03-12A10-7M10.5)  
6-conductor cables U-25 (50 cm), U-26 (1 m), U-27 (2 m), U-28 (5 m), bared at the tip  
Sensor side: Terminated with a connector plug P12-7 (PRC03-12A10-7M10.5)

**■Dimensions, panel-cut dimensions**



Outline

Amplifier

Checker

Other



<b>Frequency Response</b>	DC to 1 kHz
<b>Digital Zero Functions</b>	Action input: By panel key or external contact input
<b>Adding Functions</b>	Setting range: 0000 to ±9999
<b>Original Value Monitor</b>	Accuracy: Within ±0.1%FS
<b>Zero Tracking Functions</b>	Zero is traced in changing quantities of ±1, 2, 5 counts each for delays of 20, 10 and 5 seconds, 9 ranges in total setting is made by panel keys
<b>Digital Filter Functions</b>	Moving averaging times is 4, 8, 16, 32, 48 or 64, switched by panel keys
<b>TEDS</b>	
<b>Interfaces</b>	Compatible with IEEE1451.4 Mixed Mode Transducer Interface Class2
<b>Applicable Transducers</b>	Should have the information according to IEEE Template No.33 Cable length should be 30 m or less (No remote sensing can be used together with TEDS)
<b>External Signal</b>	D/Z, T/H, H/M, non-voltage contact signal or open collector (NPN)
<b>Operating Temperature</b>	-10 to 40°C
<b>Operating Humidity</b>	80% or less (Non-condensing)
<b>Power Supply</b>	100, 115, 200, 220 VAC (Select one), 20 VA or less, 11 to 30 VDC on request
<b>Dimensions</b>	72 W x 144 H x 188 D mm (Excluding protrusions)
<b>Weight</b>	Approx. 1.9 kg
<b>Panel-cut Dimensions</b>	136x68 mm

**Specifications** (Specify the desired one when ordering)

<b>■WGA-710C-1E with BCD Data Output</b>	
It enables WGA-710C-1E to output indicated values as BCD (binary coded decimal).	
<b>Output Mode</b>	Isolated open collector (NPN)
<b>Driving Capacity</b>	30 VDC, 20 mA
<b>Output Signals</b>	4-digital BCD value, minus sign, OVER signal, print command (EOC); positive or negative logic selected by the switch.
<b>Input Command Connector</b>	BCD hold, output disable, negative logic 57-40360 (DDK) or the equivalent
<b>Input Mode</b>	Non-voltage contact signal or open collector (NPN)
<b>■WGA-710C-2E with EIA-232-D (RS-232C)</b>	
EIA-232-D (RS-232C) enables this model to transmit indicated data and status signals and write preset high/low limit values to external equipment without digitizing.	
<b>Signal System</b>	RS-232C full duplex system
<b>Transmission Mode</b>	Asynchronous
<b>Baud Rate</b>	4800 bps
<b>Bit Structure</b>	7 data bits, 1 stop bit Odd parity bit
<b>Connector</b>	17-13250-27 (DDK) or the equivalent
<b>■WGA-710C-3E with Analog Amplifier</b>	
This model is designed to amplify and output the analog signal of a transducer to external equipment without digitizing.	
<b>Measuring Range</b>	±3.2 mV/V
<b>Zero Adjustment Range</b>	±2.5 mV/V
<b>Sensitivity Adjustment Range</b>	0.5 to 3.0 mV/V is adjusted to 10 V
<b>Calibration</b>	1 mV/V ±0.1%
<b>Voltage Output</b>	±10 V (Load resistance 2 kΩ or more) Nonlinearity: Within ±0.03% FS
<b>Current Output</b>	4 to 20 mA (Load resistance 350 Ω or less) (Corresponding to voltage output of 0 to 10 V) Nonlinearity: Within ±0.1%FS
<b>Frequency Response</b>	DC to 1 kHz

<b>■WGA-710C-4E with DA Converter</b>	
This model can output an analog signal with the digital indication. Digital zeroing, hold and smoothing functions are provided.	
<b>Output Analog Signal Level</b>	+10 V, 20 mA for the full scale setting on the case
<b>Zero Adjustment Range</b>	Within ±10%FS
<b>Sensitivity Adjustment Range</b>	Within ±10%FS
<b>Nonlinearity</b>	Within ±0.1%FS
<b>Frequency Response</b>	Depends on the sampling cycle (Approx. 15 times/s)
<b>Withstand Voltage</b>	500 VAC for one minute with the case
<b>Voltage Output</b>	0 to 10 V (Load resistance 2 kΩ or more)
<b>Current Output</b>	4 to 20 mA (Load resistance 350 Ω or less) (Corresponding to voltage output of 0 to 10 V)
<b>■WGA-710C-5E with Isolation Analog Amplifier</b>	
This model is designed to amplify and output the analog signal of a transducer to external equipment without digitizing.	
<b>Measuring Range</b>	±3.2 mV/V
<b>Zero Adjustment</b>	±2.5 mV/V
<b>Sensitivity Adjustment</b>	1.0 to 3.0 mV/V is adjusted to 10 V
<b>Calibration</b>	1 mV/V ±0.1%
<b>Withstand Voltage</b>	500 VAC for one minute with the case
<b>Voltage Output</b>	±10 V (Load resistance 2 kΩ or more) Nonlinearity: Within ±0.05%FS
<b>Current Output</b>	4 to 20 mA (Load resistance 350 Ω or less) (Corresponding to voltage output of 0 to 10 V) Nonlinearity: Within ±0.1%FS
<b>Frequency Response</b>	DC to 1 kHz
<b>■WGA-710C-6E with 8-step Comparator</b>	
This model provides 4 sets of high/low limits for comparison. The high/low limit relay (transformer contact) outputs the result of 1 set of high/low limits compared.	
<b>Comparison Points</b>	8 (4 each high/low limits)
<b>Setting Methods</b>	Select from external contact input and set by the panel keys.
<b>Setting Range</b>	0 to ±9999
<b>Output Modes</b>	Isolated open collector (NPN)
<b>Drive Capacity</b>	30 VDC, 20 mA
Note: The relay contact output of the mainframe is selected from external contact input.	
<b>■WGA-710C-12E with BCD Data Output and EIA-232-D (RS-232C)</b>	
This model enables simultaneous use of BCD data output and RS-232C.	
<b>■WGA-710C-14E with BCD Data Output and DA Converter</b>	
This model enables simultaneous use of BCD data output and DA converter.	

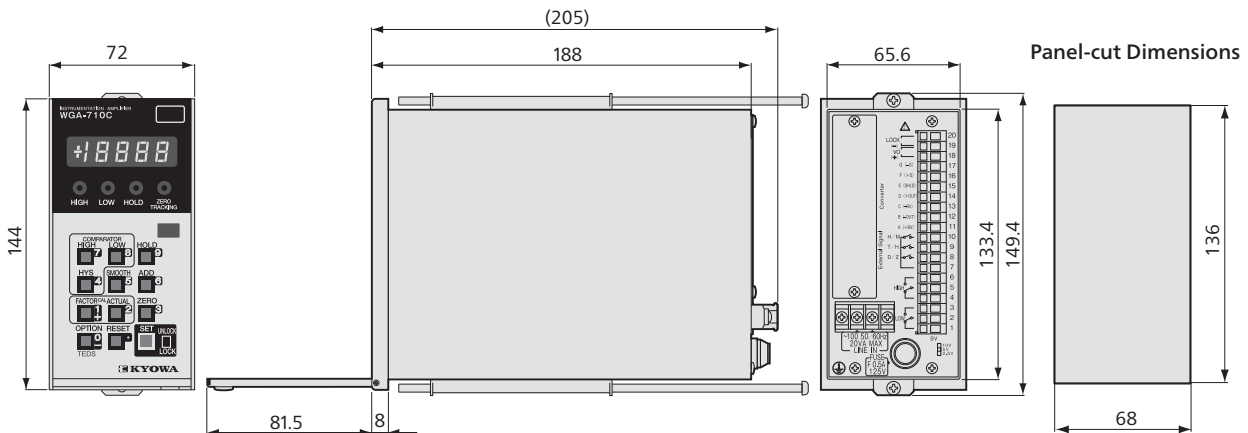
**Standard Accessories**

AC power cable P-23 (For 100 VAC)  
BCD output connector BCD-CONN E (57-30360 (DDK) or the equivalent; attached to WGA-710C-1E, 12E, 14E only)  
Spare fuse, miniature screwdriver for terminal board connection, instruction manual, unit seal

**Optional Accessories**

AC power cable P-28 (For 200 VAC)  
Connection cables between WGA-710C and NDIS4102 (7 pins) connector plug  
4-conductor cables U-17 (50 cm), U-18 (1 m), U-19 (2 m), U-20 (5 m), bared at the tip  
Sensor side: Terminated with a connector plug P12-7 (PRC03-12A10-7M10.5)  
6-conductor cables U-25 (50 cm), U-26 (1 m), U-27 (2 m), U-28 (5 m), bared at the tip  
Sensor side: Terminated with a connector plug P12-7 (PRC03-12A10-7M10.5)

**■Dimensions, panel-cut dimensions**





# WGI-400A

## Instrumentation Amplifier

- Compact & general-purpose
- Wide input range

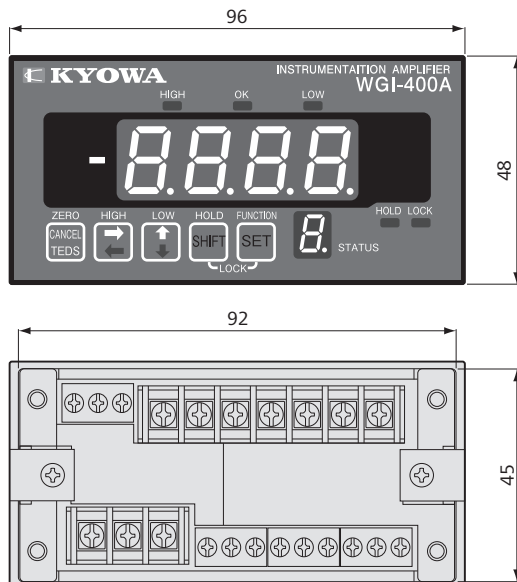


### Compact, 48×96 mm (Front surface) Wide measuring range ±3.2 mV/V

- 3 sensitivity registration modes (Actual load calibration, sensitivity-registered calibration, numerical value-registered calibration)
- Selectable 4 high/low limit patterns in memory
- Level test with desired set-value
- Wide power supply voltage range:  
AC power supply (100 to 240 V)  
DC power supply (10 to 30 V) (Selectable)
- Option: RS-232C, RS-485, BCD output

The WGI-400A is a compact general-purpose moderately priced instrumentation amplifier providing basic functions required for measurement in combination with strain-gage transducers. The wide input range ensures usage without worrying about initial value of transducer. Furthermore, it provides new functions such as switchable relative value memory patterns and preset value-based level test.

#### ■ Dimensions



#### Models

Models	Options	Models	Options
WGI-400A-00E	AC operation with no optional function	WGI-400A-10E	DC operation with no optional function
WGI-400A-01E	AC operation with BCD output	WGI-400A-11E	DC operation with BCD output
WGI-400A-02E	AC operation with RS-232C	WGI-400A-12E	DC operation with RS-232C
WGI-400A-03E	AC operation with RS-485	WGI-400A-13E	DC operation with RS-485

#### Specifications

<b>● Measuring Section</b>	
Channels	1
Applicable Transducers	Strain-gage transducers
Compatible Bridge Resistance	87.5 to 1000 Ω (350 Ω, 4 in parallel connection)
Bridge Excitation	2 VDC (30 mA), 4 VDC (50 mA), switchable
Measuring Range	±3.2 mV/V (Including zero adjustment range)
Sampling Rate	50 times/s
Resolution	64000 counts/input range in both polarities
Calibration Modes	Actual load calibration, sensitivity-registered calibration, numerical value registration calibration
<b>● Display Section</b>	
Display	±9999
	Character height: 14 mm, red LED
	Speed: 50 times/s
Decimal Point	Put to anywhere possible
Zero Adjustment Functions	Any value in the input range is set to digital zero; execution by key operation or control input signal
Smoothing Functions	Minimum scale: 1, 2, 5, 10, 20, 50, and 100 counts Moving average: 0, 2, 4, 8, 16, 32, 64, and 128 times
Auto Zero Compensation	Zero tracking (Auto digital zero in the preset range) Approximated zero compensation (Indication is made zero automatically)
Adding Functions	Setting range: ±9999
Original Value Display Functions	±3.200 mV/V
Level Test	Display of arbitrary values possible
Temperature Stability	Zero point: Within ±0.5 μV <sub>RM</sub> /°C Sensitivity: Within ±0.01%/°C
Nonlinearity	Within ±(0.1% FS ±1 digit)
<b>● Control Input</b>	
Points	4 (ZERO command, level test command, pattern command 1, pattern command 2)
Signal Capacity	12 VDC, 5 mA or more
Input Mode	Open collector (NPN) or non-voltage contact signal
<b>● Control Output</b>	
Points	3 (HI, OK and LO)
Output Mode	Open collector (NPN)
Load Capacity	30 VDC, 20 mA (Resistive load)
Pattern Functions	Registers 4 groups of high/low limit values and enables switching through control signals.
High/Low Limit Comparator	Points: 2 (HIGH, LOW)
Setting Range	±9999
Comparison Speed	50 times/s
Comparison Function	Points: 1 (OK)
<b>● Analog Output</b>	
Outputs either voltage or current.	
Voltage output	±10 V (Load resistance: 2kΩ or more), arbitrary scaling possible
Current output	4 to 20 mA (Load resistance: 500 Ω or less), arbitrary scaling possible
Response Speed	Approx. 0.25 s (10% to 90%)
Nonlinearity	Within ±0.1% FS
Frequency Response	1 Hz (-3 dB ±1 dB)
<b>● Others</b>	
TEDS Function	Automatic sensitivity registration (Key operation, power ON, RS control)
Power Supply	AC operation: 100 to 240 VAC Power consumption: Approx. 6 VA or less DC operation: 10 to 30 VDC ±10% Power consumption: Approx. 8 W or less
Operating Temperature	-10 to 50°C
Operating Humidity	20 to 85%
Dimensions	96 W × 48 H × 144 D mm
Panel-cut Dimensions	92.2 W × 45.2 H mm Panel thickness: 0.8 to 5.0 mm
Weight	Approx. 300 g (AC operation, standard type)

Standard Accessories Instruction manual, unit seal

Optional Accessories AC power cables P-23 (For 100 VAC)  
P-28 (For 200 VAC)  
BCD output cable N-43  
BCD output printer cable N-44



Instrumentation Amplifiers

Outline

Amplifier

Checker

Other

# WGI-470AS1

## Instrumentation Amplifier



### Compact, 48×96 mm (Front surface) High-speed sampling: 2000 times/s

- 2-analog output: Simultaneous voltage and current output, individual scaling
- Peak hold: 5 types of peak hold
- Wide power supply voltage range: 100 to 240 VAC
- 3 sensitivity registrations: actual load calibration, sensitivity registration calibration, numerical value registration calibration
- TEDS function: Automatic sensitivity registration, TEDS file automatic sensitivity registration
- Option: RS-232C, RS-485, BCD output

High-speed, compact, high functionality instrumentation amplifier that incorporates a strain-gage transducer with optimized functionality in a small case.

Capable of wide range of measurement and control tasks such as press load measurement utilizing high-speed digital peak-hold function, load measurement utilizing high resolution, etc.

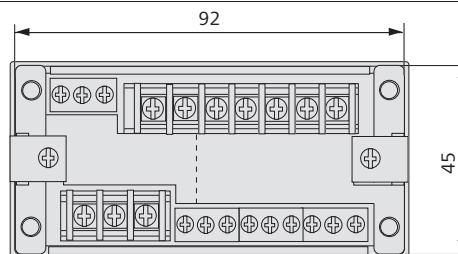
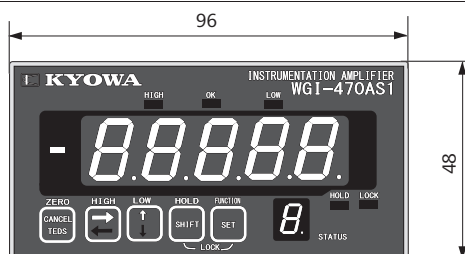
### Models

Models	Options
WGI-470AS1-00	No option
WGI-470AS1-01	BCD output
WGI-470AS1-02	RS-232C
WGI-470AS1-03	RS-485

### Specifications

Channels	1
Applicable Transducers	Strain-gage transducers
Compatible Bridge Resistance	87.5 to 1000 Ω (350 Ω, 4 in parallel connection)
Bridge Excitation	2 VDC, 10 VDC, switchable
Measuring Range	±3.2 mV/V (Including zero adjustment range)
Zero Adjustment Range	Within measuring range (Not retained when power supply interrupted)
Sampling Speed	2000 times/s
Resolution	64000 counts/input range in both polarities
Calibration Functions	Actual load calibration, sensitivity registration calibration, numerical value registration calibration
Display Functions	Main display: 5 digits (±99999), polar LED Sub display: 1 digit (9) Update speed: 0.13, 0.25, 0.51, 1.02, 2.03, 4.07, 8.16, and 16.28 s (Thinning display) Comparative determination: 3 points (HIGH, OK, LOW) Status display: 2 points (HOLD, LOCK)
Nonlinearity	Within ±(0.02%FS±1 digit)
Stability	Zero point: Within ±0.25 μV <sub>RTI</sub> /°C Sensitivity: Within ±0.01%/°C
Smoothing Functions	Minimum scale: 1, 2, 5, 10, 20, 50, and 100 counts Moving average: 0, 2, 4, 8, 16, 32, 64, 128, 256, 512, 1024, and 2048 times Filters: 10, 30, 100 Hz and FLAT
Comparison/Judgment Functions	Comparators: 2 points (HIGH, LOW) Hysteresis: Individual width settings possible Comparison mode: Normal/at hold Judgment: 1 point
Pattern Functions	Registers 4 groups of pattern files (comparative values) and enables switching through setting of functions.
Adding Functions	Settings range: ±99999
Original Value Display Functions	±3.20000 mV/V (6 digits) Accuracy: Within ±0.1%FS
Level Test Functions	Display of arbitrary values possible
Hold Functions	Digital peak hold Arbitrary point hold, peak hold, section definition hold, time specification hold, time specification continuous peak hold
Analog Output	Simultaneous dual output of voltage & current Data update: 2000/s (For simultaneous use of voltage and current, 1000/s) Voltage output: ±10 V, independent arbitrary scaling possible Current output: 4 to 20 mA, independent arbitrary scaling possible Automatic settings with rated capacity fully scaled possible (At sensitivity registration, at automatic sensitivity registration) Nonlinearity: Within ±0.1%FS
TEDS	Automatic sensitivity registration by reading TEDS data Automatic sensitivity registration by reading TEDS files
Control Input	4 points: Zero command, level test command, hold command, reset command
Control Output	3 points: HIGH, OK, LOW
Operating Temperature	-10 to 50°C
Operating Humidity	20 to 85%
Power Supply	100 to 240 VAC, 22 VA or less
Dimensions	96 W × 48 H × 144 D mm
Panel-cut Dimensions	92.2 <sup>+0.4</sup> W × 45.2 <sup>+0.4</sup> H mm Plate thickness 0.8 to 5.0 mm recommended
Weight	Approx. 400 g
Standard Accessories	Unit seal, instruction manual

### ■ Dimensions



Instrumentation Amplifiers

Outline

Amplifier

Checker

Other

# WGC-140A

● Compact multichannel unit

## 4-channel Instrumentation Amplifier

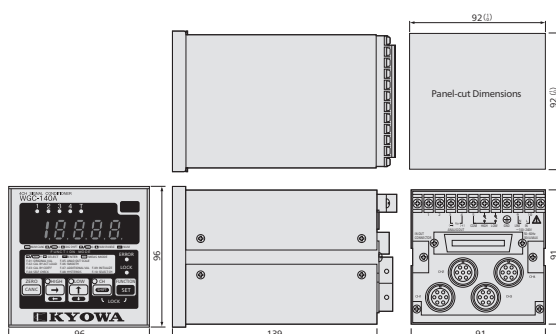


\*English version: Contact us.  
Unless otherwise specified,  
Japanese version will be delivered.

### High-speed processing at 2 ms Compact 4 -channel instrumentation conditioner

- Up to 4 units of 350 Ω strain-gage type transducers connected independently to respective amplifier circuits.
- Circuits are designed to make it difficult for a channel with transducer trouble to affect other channels.
- Switchable indicated value, channel to channel or the total
- Analog voltage output of all channels and the total
- High/low limit comparator for the total value
- High-speed output suitable for control, I/O delay approx. 10 ms
- Sensor check and self-test functions
- Indication range-19999 to 19999 with decimal point anywhere

#### ■ Dimensions



#### Specifications

Channels	Max. 4
Applicable Transducers	Strain-gage transducers
Compatible Bridge Resistance	350 to 1000 Ω
Measuring Range	±3 mV/V (Including tare)
Input LPF	150 Hz
Bridge Excitation	5 VDC
Digital Zero	Set at any point in the measuring range
Calibration	By inputting the value (By every channel) By applying an actual load (By every channel)
Indicator	±19999 (Decimal point to be put anywhere, the same position is applied to all channels.) Character height: 14 mm, red LED Indicated value: Measured value of a channel selected from 1 to 4 Total of measurements of channels 1 to 4
Calculation Speed	2 ms (500 times/s)
Nonlinearity	Within ±0.05% FS
Stability	Zero point: Within ±0.5 μV <sub>RM</sub> /°C Sensitivity: Within ±0.01%/°C
High/Low Limit Comparator	Setting points: 2 (High/low limits of total value) Setting range: ±19999 Max. hysteresis width: 0 to 19999 settable Output modes: Open collector (NPN) Load capacity: 30 VDC, 20 mA (Resistive load) Response speed: 10 ms or less
Smoothing Functions	Minimum scale: Selectable from 1, 2, 5, 10, 20, 50, 100, 200, 500 or 1000 counts Moving averaging functions: Selectable from 2, 4, 8, 16, 32, 64, 128 or 256 times
Adding Functions	Setting range: ±19999
Original Value Measurement	±3 mV/V or more
Control Input	Input signals: 6 (4 calculation channel select commands, 1 each ZERO and CHECK commands) Input modes: Non-voltage contact signal or open collector (NPN) (It should enable application of 12 VDC and current flow of 5 mA.)
Control Output	Output signals: 7 (1 HEALTHY signal, 4 ABNORMAL signals and high/low limit signals) Output modes: Open collector (NPN) Load capacity: 30 VDC, 20 mA (Resistive load)
Analog Output	Output signals: 5 (Signals of 4 channels and the total) Output voltage: ±10 V Withstand voltage: 250 VAC for one minute Resolution: 13 bits Nonlinearity: Within ±0.1% FS Conversion rate: 500 times/s Setting values: Indicated value with 0 V output (±19999) Indicated value with 10 V output (±19999)
Check Functions	Self-test: Tests the program checksum and memory. Transducer test: Checks each channel for the bridge current, over-input and disconnection of transducer cable.
I/O Terminal Board	Transducer input: NDIS4102 (7 pins) connector plugs Power connector, etc.: M3 screw terminal board (Applicable crimp-style terminal V1.25-3 or the equivalent) Data output terminal: Connector 57-40360 (DDK) or the equivalent
Operating Temperature	-10 to 55°C
Operating Humidity	20 to 85% (Non-condensing)
Power Supply	100 to 240 VAC, approx. 30 VA or less
Dimensions	96 W × 96 H × 139 D mm (Excluding protrusions)
Weight	Approx. 1.2 kg
Panel-cut Dimensions	92 × 92 mm

Standard Accessories Instruction manual, unit seal

Optional Accessories AC power cables P-23 (For 100 VAC)  
P-28 (For 200 VAC)



Instrumentation Amplifiers

Outline

Amplifier

Checker

Other

# WD-100A

## Indicator for Voltage-output Type Sensor

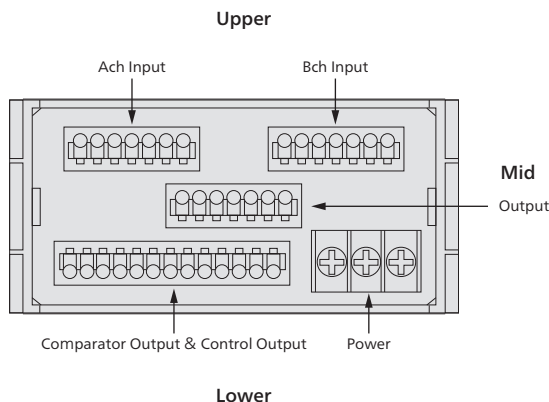


### Displays voltage/current and pulse on single unit

- 2.4-inch full color display
- Measurement Channel: 2 (Analog and pulse each)
- Sampling Rate: 100 times/second max. (Voltage and current)
- Able to place vertically or horizontally depending on what suits best for your needs.

The WD-100A is a compact indicator for voltage- and current-output sensors. This compact indicator provides the powerful measurement and control of the phenomenon necessary for torque and other rotary measurements to simultaneously display the voltage, current, and pulse.

#### ■ Rear Panel



### Specifications

■ Basic Specifications	
Measurement Channel	2
Display	2.4 inch TFT LCD
	Ach measurement result
	Bch measurement result
	Calculation result
	Ach and Bch measurement results
	Ach or Bch measurement result and calculation result
Over Warning	OVER or -OVER when display range are exceeded
External Controls	Following 5 functions can be assigned to control terminals (user-configurable).
	① Comparator reset function
	② Totalized value reset function
	③ Measurement prohibited function:
	Measurement prohibited A/B/A&B
	④ Current value hold function:
	Current value hold A/B/A&B
	⑤ Max value hold function: Max value hold A/B/A&B
	⑥ Min value hold function: Min value hold A/B/A&B
	⑦ Digital zero function
	⑧ Pattern change function: Pattern change 1 to 3
	⑨ Display change function
	⑩ Trend hold function
	As follows, only shortcut setting
	⑪ Compare list function
Operating Temperature	-5 to 50°C
Operating Humidity	35 to 85% (No condensation)
Storage Temperature	-10 to 70°C
Storage Humidity	60% or less
Power Supply	24 to 48 VDC ±10%
Power Consumption	6 W max. at 24 VDC, 6.5 W max. at 48 VDC
Sensor Power Supply	12 VDC ±10% 100 mA max.; 24 VDC ±10% 50 mA max.
	*When 2 channel input, allowable current of Ach and Bch together will be above current.
	*1.2 W max. when the combination of 12 VDC and 24 VDC.
Dimensions	96 W × 52 H × 145 D mm
Weight	Approx. 350 g
Withstand Voltage	1500 VAC for 1 minute: Between the power supply terminal - input / external control / comparator output / option output
	1500 VAC for 1 minute: Between the input terminal - external control / comparator output / option output
	3000 VAC for 1 minute: Between enclosures - each terminals
Insulation Resistance	500 VDC 100 MΩ or more between the above terminals
Vibration Tolerance	10 to 55 Hz half amplitude 0.15 mm in X, Y, Z directions for 30 minutes
Protection	IP66 (When mounted on the panel. See outline drawing for coverage.)
Installation Environment	Indoor use
Applicable EN Standard	EN61326-1 (EMS: Industrial installations; EM: Class A)
	"Applies to wire length of 30 m or less"
	EN IEC 63000
Case Material	Polycarbonate (PC), Black UL94V-0

#### ■ Input Specifications

##### Analog Input Measurement for Ach

##### Measurement Range

Measurement range	Input impedance	Maximum allowable input	Accuracy
±5 V	About 1 MΩ	±100 V	±(0.05% of FS + 1 digit)
0 to 5 V			
1 to 5 V			
±10 V			
0 to 10 V	About 10 Ω	±50 mA	
4 to 20 mA			
0 to 20 mA			
±20 mA			

\*Each range can measure up to ±10% FS range. (Internal limit processing with ±10% FS.)  
The full scale in the bipolar input setting considers plus and minus separately. For example, in the case of ±10 V input, limit processing is performed up to ±11 V. (20 V is not treated as FS.)  
Similarly, the accuracy with ±10 V input is also specified as one-sided FS treatment, and the accuracy is calculated as 5 mV (0.05%) ±1 digit.



- Outline
- Amplifier
- Checker
- Other



<b>Conversion Method</b>	$\Delta\Sigma$ conversion method
<b>Input Signal</b>	Single-ended
<b>Sampling Rate</b>	100 times/second max.
<b>Display Updating Period</b>	100 ms
<b>Zero Display</b>	Leading zero suppression
<b>Decimal Point</b>	Arbitrary setting possible
<b>Display Range</b>	-99999 to 99999
<b>Pulse Input Measurement for Bch</b>	
<b>Frequency Range</b>	0.01 Hz to 250k Hz
<b>Input Signal</b>	Open collector (NPN/PNP), voltage pulse, totem pole output (complementary output), AC pulse, proximity sensor
<b>Input Method</b>	Single-phase pulse
<b>Input Level</b>	Open collector Pull up to 12 V or 24 V Logic L level: 1.0 V or less H level: 3.9 to 30 V (Max. allowable voltage $\pm 50$ V) Zero-crossing 60 mV to 40 VAC (Max. allowable voltage 70 V) *AC signal which gets across 0 V.
<b>Input Impedance</b>	Open collector Pull up to 12 V through approx. 10k $\Omega$ (sensor power supply 12 V) Pull up to 24 V through approx. 25k $\Omega$ (sensor power supply 24 V) Pull down to GND through approx. 10k $\Omega$ Logic/Zero-crossing Pull down to GND through approx. 10k $\Omega$ 2 wire Pull down to GND through approx. 900 $\Omega$
<b>Input Pulse Width</b>	1.8 $\mu$ s or more (Both L level and H level)
<b>Measurement Method</b>	Cyclic calculation method
<b>Sampling Rate</b>	10 ms (calculation period)
<b>Display Updating Period (Display)</b>	100 ms
<b>Display Range</b>	0 to 999999
<b>Zero Display</b>	Leading zero suppression
<b>Decimal Point</b>	Arbitrary setting possible
<b>Display Unit Time</b>	Second, minute or hour selectable
<b>Accuracy</b>	$\pm$ (20 ppm reading +1 digit) at 23 $\pm$ 5 $^{\circ}$ C
<b>(Totalized Display)</b>	
<b>Display Range</b>	-999999 to 999999
<b>Zero Display</b>	Leading zero suppression
<b>Decimal Point</b>	Arbitrary setting possible
<b>Totalized Value Reset</b>	Totalized value can be reset to total initial value by external control.
<b>Accuracy</b>	$\pm 0$ (When scaling is "1")
<b>Output Specifications</b>	
<b>Comparator Output</b>	
<b>Open Collector Output</b>	Rated output sink current Max. 50 mA Applied voltage Max. 30 V Output saturation voltage 1.2 V or less at 50 mA Number of outputs: 4 transistor outputs
<b>Control Method</b>	Microcomputer operation method
<b>Setting Range</b>	Pulse input: -999999 to 999999 Analog input: -99999 to 99999
<b>Hysteresis</b>	1 to 999999 digit for each setpoints
<b>Comparison Operation</b>	According to sampling rate (circulate period).

**Setting Condition** Condition can be set to AL1 to AL4 independently

- Level judgement mode
  - The alarm is ON when display value exceeds judgement value (over alarm).
  - The alarm is ON when display value underruns judgement value (under alarm).

Over alarm (Upper limit judgement)

Comparison condition	Judgement result
Display value > AL1 judgement value	AL1
Display value > AL2 judgement value	AL2
Display value > AL3 judgement value	AL3
Display value > AL4 judgement value	AL4

Under alarm (Lower limit judgement)

Comparison condition	Judgement result
AL1 judgement value > Display value	AL1
AL2 judgement value > Display value	AL2
AL3 judgement value > Display value	AL3
AL4 judgement value > Display value	AL4

● Zone judgement mode

- The alarm is ON when display value between upper and lower judgement values (inside of zone alarm)
- The alarm is ON when display value out of upper and lower judgement values (outside of zone alarm)

Inside of zone alarm

Comparison condition	Judgement result
AL1 zone upper limit $\geq$ Display value $\geq$ AL1 zone lower limit	AL1
AL2 zone upper limit $\geq$ Display value $\geq$ AL2 zone lower limit	AL2
AL3 zone upper limit $\geq$ Display value $\geq$ AL3 zone lower limit	AL3
AL4 zone upper limit $\geq$ Display value $\geq$ AL4 zone lower limit	AL4

Outside of zone alarm

Comparison condition	Judgement result
Display value $\geq$ AL1 zone upper limit or AL1 zone lower limit > Display value	AL1
Display value $\geq$ AL2 zone upper limit or AL2 zone lower limit > Display value	AL2
Display value $\geq$ AL3 zone upper limit or AL3 zone lower limit > Display value	AL3
Display value $\geq$ AL4 zone upper limit or AL4 zone lower limit > Display value	AL4

**Comparison Formula Memory** 8 pattern memory

**Pulse Output** Bch (pulse input) totalizer-synchronous output function, one pulse output per input pulse.

**Output Type** Open collector output NPN type  
**Rated Output** 30 VDC 20 mA max.  
**Output Range** 400 Hz max.  
 (Pulse width is selectable, 1 ms is the minimum width.)

**Analog Output**

**Conversion Method** DA conversion method  
**Resolution** 13 bit equivalent  
**Scaling** Digital scaling  
**Output Objective** An item can be selected from source displayable values

**Response Speed** 25 ms or less (0 $\rightarrow$ 90% response)

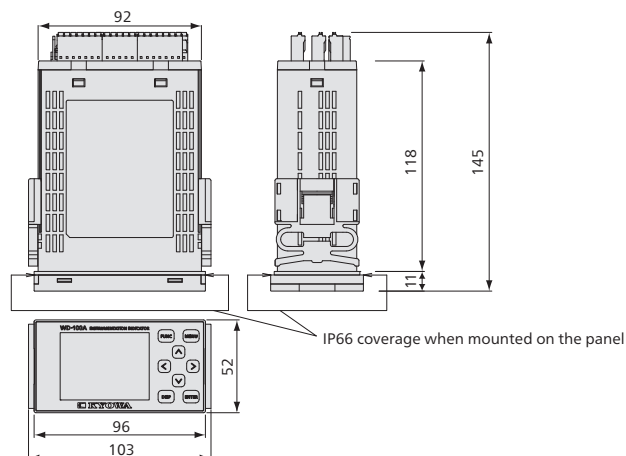
**Specifications by Types**

Output type	Load resistance	Accuracy (23 $\pm$ 5 $^{\circ}$ C, 35 to 85%)	Ripple
0 to 10 V $\pm 10$ V 1 to 5 V	2 k $\Omega$ or more	$\pm$ (0.1% of FS)	$\pm 50$ mV <sub>P-P</sub>
0 to 20 mA 4 to 20 mA	550 $\Omega$ or less		$\pm 25$ mV <sub>P-P</sub> *Load resistance 250 $\Omega$ (20 mA output)

**Optional Accessories**

- AC Adapter for 24 VDC supply UNI324-2410-CT
- AC Power Cable for 24 VDC supply UNI324-2410-CV-CT
- Output and power supply cable (24VDC) with BNC plug for TPS TE-57CV-24V-BNC
- Output and power supply cable (24VDC) with bared tip for TPS TE-57CV-24V

**Dimensions**





# WGA-200A Series

- Moderate price
- Multi-functional

## Instrumentation Amplifier



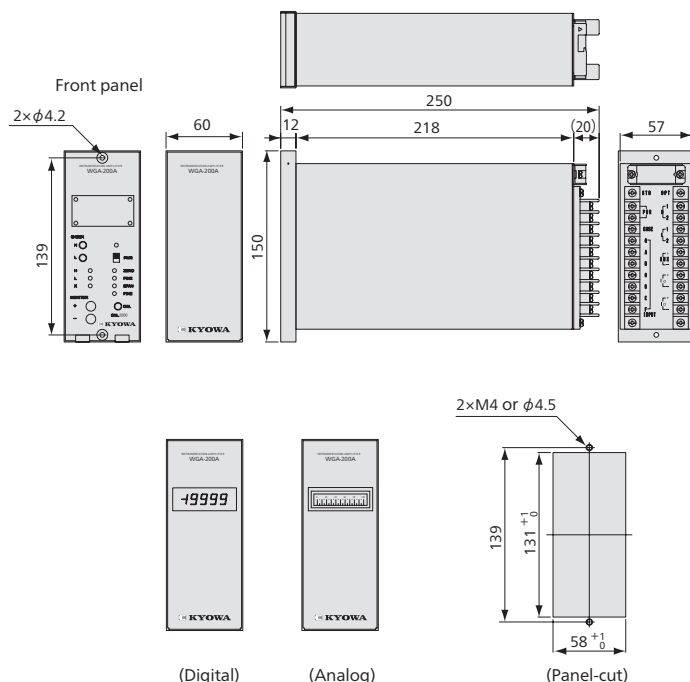
Note: Incompatible with TEDS-installed transducers.

### Moderate price Suitable to be used in industrial equipment

- Multi-functional and versatile
- Voltage output, current output, and remote-sensing are standard features.
- Compact, robust, dustproof and drip proof

WGA-200A series signal amplifier is combined with strain-gage transducers and suitable to measure load, pressure, torque and displacement. It is compact, lightweight with high performance and moderate price. Suitable for industrial equipment.

#### ■ Dimensions, panel-cut dimensions



#### Specifications

Channels	1
Applicable Transducers	350 Ω strain-gage transducers (Up to 4 transducers with 350 bridge resistance connected in parallel)
Bridge Excitation	10, 4, 2 VDC (Select one) Remote sensing possible
Initial Adjustment	ZERO ±1.5 mV/V 18-turn trimmer (Tare weight compensation) FINE Sensitivity SPAN 1/1 to 1/100 18-turn trimmer
Adjustment Monitor	Use the monitor in the front of the panel
Rated Output	Voltage ±10 V (At C=1 mV/V and E=10 VDC) Isolation output (-5 V to 10 V) Current 4 to 20 mA (Corresponding voltage output 0 to 10 V)
Calibration	0.25, 0.5, 1, 1.5, 2 mV/V (Select one)
Frequency Response	DC to 1, 10, 30, 100, 200, 500 Hz (Select one)
Operating Temperature	-10 to 50°C
Operating Humidity	85% or less (Non-condensing)
Power Supply	100 VAC or 200 VAC (Select one)
Dimensions	60×150×250 mm (Excluding protrusions)
Weight	Approx. 1.5 kg

Optional Accessories AC power cable P-23 (For 100 VAC), P-28 (For 200 VAC)

See the item selection table to choose the desired functions  
Note: The above spec. is when Bridge Excitation = 10 V.

Rated output is proportional to the bridge excitation

#### Models

Power Supply	Calibration	Frequency Response	Voltage Output	Current Output	Comparator**	Monitor	Bridge Excitation	Additional Functions	Content Code
S	C	F	V	A	L	M	E	T	
	0.25 mV/V	DC to 1 Hz			None	None	10 VDC	None	0
100 to 120 V	0.5 mV/V	DC to 10 Hz	Non-isolated	Non-isolated	1-step model B			Auto zero balancing	1
	1 mV/V	DC to 30 Hz	Isolated**	Isolated**	2-step model B	Analog 50×18	2 VDC	Peak hold	2
220 to 240 V	1.5 mV/V	DC to 100 Hz			3-step model B				3
	2 mV/V	DC to 200 Hz			1-step model M		4 VDC	Auto zero balancing Peak hold	4
		DC to 500 Hz			2-step model M	Digital (10000)			5
					3-step model M				6

Note: Please add number specified in the above table to the end of the product model according to SCFVALMET sequence in your order.

For example: WGA-200A-121112000

The combination V and A = 2 is not applicable.

When V = 2, T may not be 2 or 4.

When A = 2, T may not be 2 or 4.

\*1 Contact capacity of comparator  
250 VAC 1A

50 VDC (Resistance load)

After power-on, when model B is below the setting value, it is 「OFF」

After power-on, when model M is below the setting value, it is 「ON」

\*2 500 VDC for 1 minute



Instrumentation Amplifiers

Outline

Amplifier

Checker

Other

# WGA-120A

- Compact, moderate price
- Output changeable: Voltage and current

## Carrier Type Instrumentation Amplifier



### Robust against inverter noise due to the bridge excitation with carrier wave.

The WGA-120A is a compact, lightweight and affordably priced carrier instrumentation amplifier that is suitable for measurement of load, pressure, torque or displacement in combination with a strain-gage transducer. While available in a manual or auto balance version, it enables easy switchover of bridge excitation, sensitivity adjustment range, calibration value or frequency response by changing jumper connections.

#### Input range for output of ±10 V

Sensitivity Switch	Bridge Excitation (V <sub>rms</sub> )	Input Range (mV/V)	
		Sensitivity Adjustment	
		x1	to x0.4
×2000	1	±5	to ±12.5
	2	±2.5	to ±6.25
	5	±1	to ±2.5
×4000	1	±2.5	to ±6.25
	2	±1.25	to ±3.125
	5	±0.5	to ±1.25
×10000	1	±1	to ±2.5
	2	±0.5	to ±1.25
	5	±0.2	to ±0.5

#### Models

Models	Power Requirements	Power Supply	Power Consumption	Balance Adjustment
WGA-120A-00	DC	10.5 to 15 VDC	3.5 W or less	Manual
WGA-120A-01	100 VAC	90 to 110 VAC	6.5 VA or less	
WGA-120A-02	200 VAC	180 to 220 VAC	6.5 VA or less	
WGA-120A-03	240 VAC	216 to 264 VAC	6.5 VA or less	Automatic
WGA-120A-10	DC	10.5 to 15 VDC	3.5 W or less	
WGA-120A-11	100 VAC	90 to 110 VAC	6.5 VA or less	
WGA-120A-12	200 VAC	180 to 220 VAC	6.5 VA or less	
WGA-120A-13	240 VAC	216 to 264 VAC	6.5 VA or less	

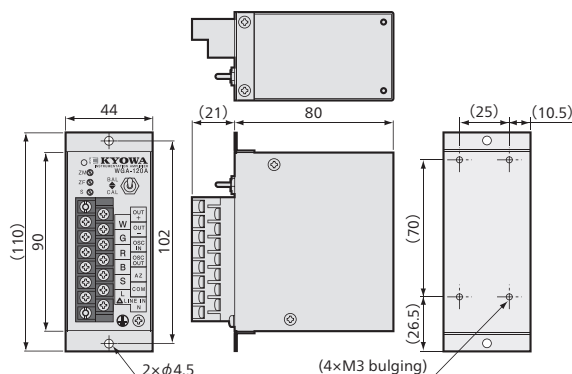
#### Specifications

Channels	1	
Applicable Transducers	Strain-gage transducers	
Compatible Bridge Resistance	87.5 to 1000 Ω (Up to four 350 Ω transducers connected in parallel. Bridge excitation is limited to 2 or 1 V <sub>rms</sub> for transducers with bridge resistance less than 175 Ω.)	
Bridge Excitation	5, 2, 1 V <sub>rms</sub> , square wave (Switchable by changing internal jumper connection)	
Input Range	See table on left.	
Rated Output	Voltage: ±10 V (Load resistance: 2 k Ω or more) Current: 4 to 20 mA (Load resistance: 500 Ω or less, voltage output: 0 to 10 V) (Switchable by changing internal jumper connection)	
Zero Adjustment Range	Within ±1.5 mV/V, manual balance or auto balance by selecting model.	
Sensitivity Adjustment Range	×2000, ×4000, ×10000 (Switchable by changing internal jumper connection) Adjustable between ×0.4 and ×1.0 by the trimmer.	
Calibration	Calibration by the parallel resistance method 0.25 mV/V or 0.05 mV/V at 350 Ω bridge resistance (Switchable by changing internal jumper connection)	
Frequency Response	10, 30, 100, or 500 Hz (Switchable by changing internal jumper connection)	
Nonlinearity	Within ±0.1%FS	
SN Ratio	53dB <sub>p-p</sub> or more [Conditions] Sensitivity: ×10000, ×0.5 (Adjustment by the trimmer) Frequency response: 500 Hz Bridge resistance: 120 Ω Bridge excitation: 2 V <sub>rms</sub>	
Stability	Temperature	Zero point: Within ±0.2 μV <sub>rms</sub> /°C Sensitivity: Within ±0.05%/°C
	Time	Zero point: Within ±0.5 μV <sub>rms</sub> /8 h Sensitivity: Within ±0.2%/8 h
	[Conditions]	Sensitivity: ×10000, ×1.0 (Adjustment by the trimmer) Bridge resistance: 120 Ω Bridge excitation: 2 V <sub>rms</sub>
Operating Temperature	-10 to 50°C	
Operating Humidity	20 to 85% (Non-condensing)	
Power Supply	See table above.	
Dimensions	44 W × 90 H × 80 D mm (Excluding protrusions)	
Weight	DC power supply model: Approx. 350 g AC power supply model: Approx. 450 g	
Panel-cut Dimensions	45.0 × 93.4 mm	

Standard Accessories Instruction manual

Optional Accessories AC power cable P-23 (For 100 VAC)  
P-28 (For 200/240 VAC)  
DIN rail mounting fixture EDP-70

#### Dimensions



Terminal screw: M3



DIN rail mounting fixture EDP-70



Outline

Amplifier

Checker

Other

# WGA-100B

## Instrumentation Amplifier

- Compact, moderate price
- Simultaneous output of voltage and current signals



**Compact, lightweight, moderately priced, high performance Simultaneous output of voltage and current signals**

- Bridge excitation, sensitivity, calibration value and frequency response are switchable.
- Auto balance function provided (WGA-100B-10/11/12)

The WGA-100B is a compact, lightweight and moderately priced instrumentation amplifier suitable for measurement of load, pressure, torque and displacement in combination with strain-gage transducers. Available in 2 types: manual balance and auto balance, the WGA-100B is easily changed in the bridge excitation, sensitivity, calibration value and frequency response by changing jumper connection. Simultaneous output of voltage and current signals is possible, no need for switchover.

### Models

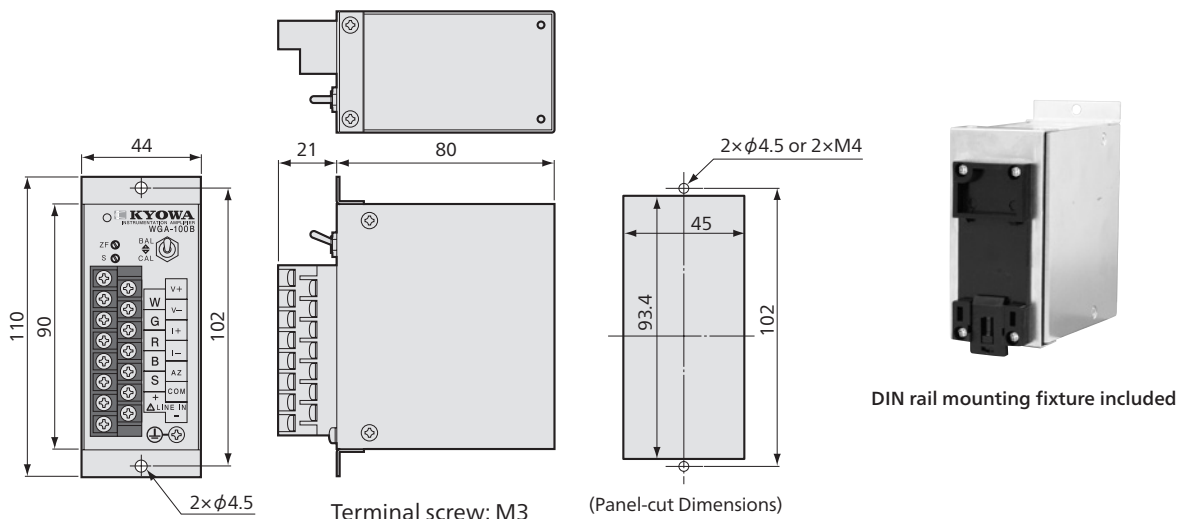
Models	Power Supply	Balance Adjustment
WGA-100B-00	10 to 30 VDC, 200 mA or less	Manual
WGA-100B-01	100 VAC, 50 mA or less	
WGA-100B-02	200 VAC, 40 mA or less	
WGA-100B-10	10 to 30 VDC, 200 mA or less	Automatic (Also possible with external contact)
WGA-100B-11	100 VAC, 50 mA or less	
WGA-100B-12	200 VAC, 40 mA or less	

### Specifications

Channels	1
Applicable Transducers	Strain-gage transducers
Compatible Bridge Resistance	87.5 Ω to 350 Ω (Bridge excitation is limited to 5 V for transducers with bridge resistance 175 Ω or less.)
Bridge Excitation	10 or 5 VDC (Switchable by changing internal jumper connection)
Rated Output	Voltage: ±10 V Current: 4 to 20 mA (Corresponding to voltage output of 0 to 10 V)
Zero Adjustment Range	±1.5 mV/V, by trimmer or auto balance
Sensitivity Adjustment Range	×1000 or ×4000 (Switchable by changing internal jumper connection) Adjustable between ×1/1 and ×1/4 by the trimmer
Calibration	0.25, 0.5 or 1.0 mV/V (Switchable by changing internal jumper connection)
Frequency Response	10, 30, 100 or 500 Hz (Switchable by changing internal jumper connection) -12 dB/oct.
Nonlinearity	±0.02% FS
Stability	Zero point: ±0.7 μV/°C Sensitivity: ±0.01%/°C
Operating Temperature	-10 to 50°C
Operating Humidity	20 to 85% (Non-condensing)
Power Supply	See table above.
Dimensions	44 W × 90 H × 80 D mm (Excluding protrusions)
Weight	470 g or less
Panel-cut Dimensions	45.0 × 93.4 mm

- Standard Accessories** Instruction manual
- Optional Accessories** AC power cables P-23 (For 100 VAC)  
P-28 (For 200 VAC)  
DIN rail mounting fixture H-11223

### ■ Dimensions, panel-cut dimensions



Instrumentation Amplifiers

Outline

Amplifier

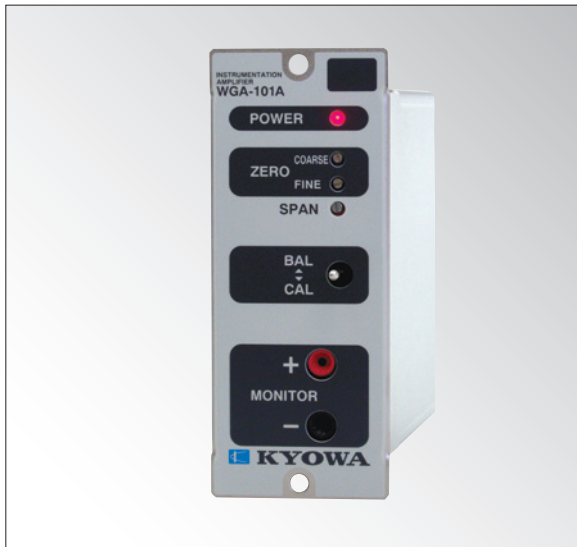
Checker

Other

# WGA-101A

- Compact
- Suitable for panel mounting

## Instrumentation Amplifier

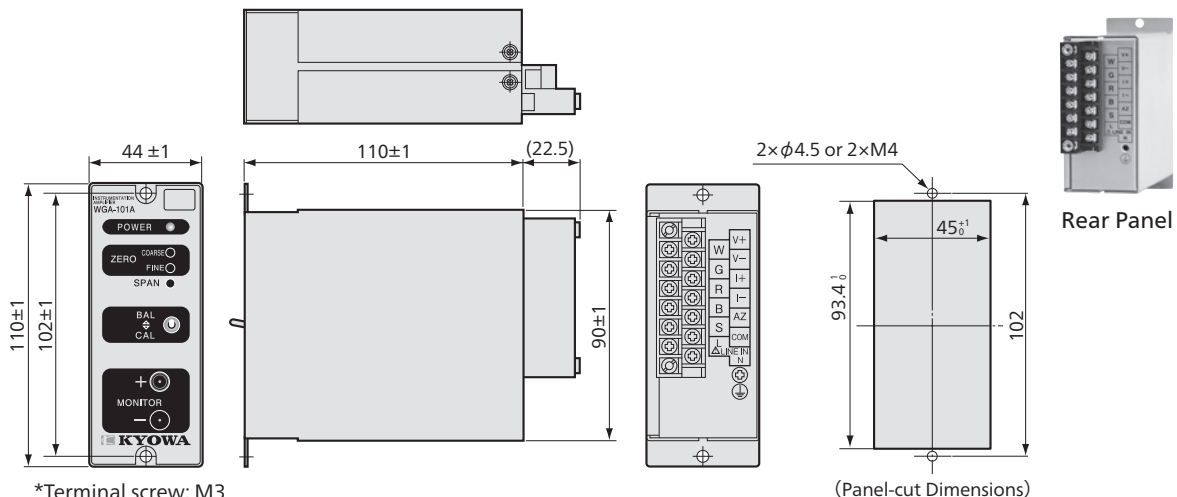


**Compact, lightweight, moderately priced, high performance and easy operation**  
**Simultaneous output of voltage and current signals**

- Bridge excitation, sensitivity, calibration value and frequency response are switchable.
- Auto balance function provided (WGA-101A-10/11/12)

The WGA-101A is a compact, lightweight and moderately priced instrumentation amplifier suitable for measurement of load, pressure, torque and displacement in combination with strain-gage transducers. Available in 2 types: manual balance and auto balance, the WGA-101A is easily changed in the bridge excitation, sensitivity, calibration value and frequency response by changing jumper connection. In addition, the WGA-101A provides simultaneous output of voltage and current signals and has the monitor terminals which facilitate monitoring voltage signals even after it is incorporated into equipment.

### ■ Dimensions, panel-cut dimensions



### Models

Models	Power Supply	Balance Adjustment
WGA-101A-00	10 to 30 VDC, 3.5 W or less	Manual
WGA-101A-01	100 VAC, 5 VA or less	
WGA-101A-02	200 VAC, 8 VA or less	
WGA-101A-10	10 to 30 VDC, 3.5 W or less	Automatic (Also possible with external contact)
WGA-101A-11	100 VAC, 5 VA or less	
WGA-101A-12	200 VAC, 8 VA or less	

### Specifications

Channels	1
Applicable Transducers	Strain-gage transducers
Compatible Bridge Resistance	87.5 Ω to 1000 Ω (Bridge excitation is limited to 5 or 2 V for transducers with bridge resistance 175 Ω or less)
Bridge Excitation	10, 5 or 2 VDC (Switchable by changing internal jumper connection)
Rated Output	Dual output Voltage: ±10 V (Load resistance 2 kΩ or more) Current: 4 to 20 mA (Load resistance 500 Ω or less) (Corresponding to voltage output of 0 to 10 V)
Zero Adjustment Range	±1.5 mV/V, by trimmer or auto balance
Sensitivity Adjustment Range	×1000 or ×4000 (Switchable by changing internal jumper connection) Adjustable between ×1/1 and ×1/4 by the trimmer
Calibration	0.25, 0.5 or 1.0 mV/V (Switchable by changing internal jumper connection)
Frequency Response	10, 30, 100 or 500 Hz (Switchable by changing internal jumper connection) Attenuation: -12 dB/oct.
Nonlinearity	Within ±0.02% FS
Stability	Zero point: Within ±0.5 μV <sub>RTI</sub> /°C Sensitivity: Within ±0.01%/°C
Operating Temperature	-10 to 50°C
Operating Humidity	20 to 85% (Non-condensing)
Power Supply	See table above.
Dimensions	44 W × 90 H × 110 D mm (Excluding protrusions)
Weight	650 g or less
Panel-cut Dimensions	45.0 × 93.4 mm

**Standard Accessories** Instruction manual

**Optional Accessories** AC power cables P-23 (For 100 VAC)  
P-28 (For 200 VAC)



Instrumentation Amplifiers

Outline

Amplifier

Checker

Other



# WDS-190AS1E/191AS1E

## Compact Digital Indicator

●Direct read out of physical values



**Suitable for simple measurement and checking of load, pressure or displacement transducer.**

- Backlight enables usage even in dark places.
- Displays data in 5 digits, units, status, and low power.
- Measures 2.5 Hz phenomena at 50 Hz sampling speed.
- WDS-191AS1E records data in CSV format.
- Powered by 2 AA batteries
- Lightweight

The Compact Digital Indicators display and record the output data of strain-gage transducers, such as load cells, pressure transducers, displacement transducers, and torque transducers etc.

### Models

Models	Option
WDS-190AS1E	—
WDS-191AS1E	With record functions

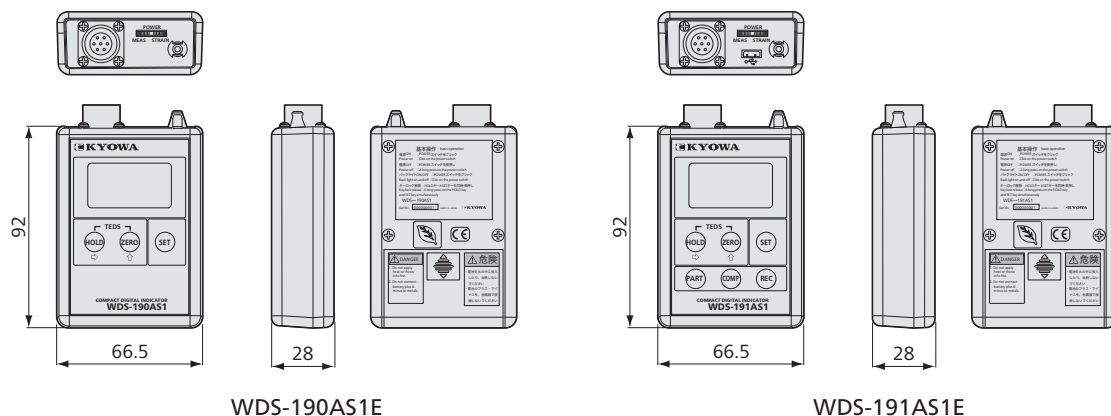
### Specifications

Channels	1
Applicable Transducers	Strain-gage transducers
Compatible Bridge Resistance	60 to 1000 Ω
Bridge Excitation	2 VDC
Measuring Range	±5 mV/V (±10000 × 10 <sup>-6</sup> strain), including zero adjustment range
Digital Zero	Executes digital zero within measuring range
Sampling Speed	Approx. 50 times/s
Calibration Modes	Actual load calibration Sensitivity registering calibration TEDS calibration by TEDS data or calibration files
Indication	LCD 128 × 64 with ON/OFF backlight Range: -99999 to 99999, freely set decimal point Units: Any 1 of 28 units
Indication Accuracy	Within ± (0.05% of reading +5 μm/m)
Indication Modes	Strain mode: Switchable between μm/m and mV/V Range: -9999.9 to 9999.9 Measure mode: Proper engineering units
Smoothing Functions	Moving average: 1, 2, 4, 8, 16, 32, 64, and 128 times Minimum scale: 1, 2, 5, 10, 20, 50, and 100 steps Zero-near-zero: 0 to 9
Peak Hold	Digitally holds a max. value during measurement.
Recording (WDS-191AS1E)	USB 2.0 (Micro USB), CSV file, memory: 2 GB Data is recorded on every pressed key REC, and saved as CSV files including time (Year-month-day and hour-minute-second), part names, count values, units, limit values, ON/OFF. Part names and counts are set freely.
Comparators (WDS-191AS1E)	Upper limit ×1
Power Saving	Auto off by preset time 1 to 99 min and none Backlight off by preset time 1 to 99 s and none
Low Battery	Battery mark lights in 1/1, 1/2, 1/4, and flickers in low battery. Calibration or recording is prohibited when the light flickers.
Operating Temperature	-10 to 40°C
Operating Humidity	20 to 85% (Non-condensing)
Storage Temperature	-10 to 60°C
Power Supply	2 AA-alkaline batteries
Operating Time	72h continuously operates (With alkaline batteries) (When backlight off and 350-ohm transducers at 25 °C)
Dimensions	66.5 W × 92.0 H × 28.0 D mm (Excluding protrusions)
Weight	Approx. 110 g (Excluding batteries)

Standard Accessories 2 AA manganese batteries

Optional Accessories Input cable U-16  
Soft case WDS-500-CASE (With shoulder strap)  
Bridge box DB-120C-2/3

### Dimensions



Instrumentation Amplifiers

Outline

Amplifier

Checker

Other



# WDS-500BE

●Pocket-size checker

## Sensor Checker



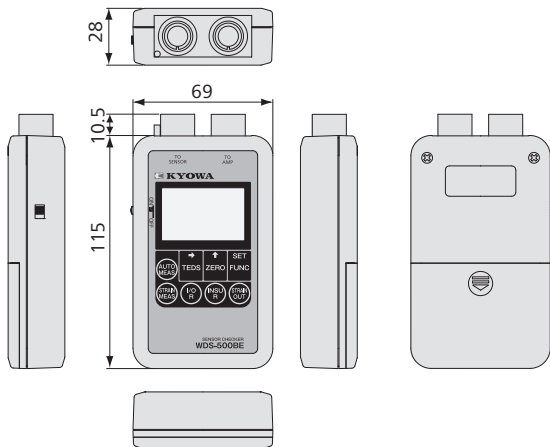
\*Japanese version: Contact us.  
Unless otherwise specified,  
English version will be delivered.



With this pocket-size checker,  
it is easy to check a strain-gage  
transducer and a strain amplifier

- Enables checking of both strain-gage transducers and strain amplifiers.
- Strain, I/O resistance or insulation resistance are measured individually by pressing respective keys.
- All these variables can be measured simultaneously in the automatic mode.
- Able to check an amplifier by measuring the strain output from the amplifier.
- Able to indicate the TEDS information of the TEDS compatible transducers.
- Compact & lightweight, just pocket size
- Powered by 2 AA size batteries.

### ■ Dimensions



WDS-500BE-0

### Models

Models	Connectors
WDS-500BE-0	Round connector (PRC03 female)
WDS-500BE-1	Square connector (3RT01 female)

### Specifications

<b>Applicable Instruments</b>	Strain-gage transducers, strain amplifiers
<b>Display</b>	Black and white dot matrix 100 × 64 dots
<b>Sampling Speed</b>	Approx. 2 times/s
<b>Auto Power OFF</b>	Selectable from 1 to 99 min or none
<b>Low Power Display</b>	Displays BAT when voltage is low
<b>Operating Temperature</b>	-5 to 40°C
<b>Operating Humidity</b>	20 to 85% (Non-condensing)
<b>Power Supply</b>	2 AA size batteries
<b>Continuous Operation</b>	Approx. 8 h (Manganese batteries, for 350 Ω transducer under intermittent Bridge Excitation)
<b>Weight</b>	Approx. 220 g (Including built-in batteries)
<b>Dimensions</b>	69 W × 115 H × 28 D mm (Excluding protrusions)
<b>● Strain Measurement</b>	
<b>Compatible Bridge Resistance</b>	60 to 1000 Ω
<b>Measuring Range</b>	±5 mV/V (±10000 × 10 <sup>-6</sup> strain)
<b>Bridge Excitation</b>	Approx. 2 VDC (Selection between intermittent and continuous impression)
<b>Display Digit</b>	5 digits
<b>Display Accuracy</b>	[mV/V] display: Within ±(0.2% of reading+3 digits) [×10 <sup>-6</sup> strain] display: Within ±(0.2% of reading+5 digits)
<b>Measuring Modes</b>	Strain mode: Where input strain quantity is indicated in mV/V or ×10 <sup>-6</sup> strain; zero compensation possible
<b>● I/O Resistance Measurement</b>	
<b>Measuring Range</b>	0 to 2000 Ω
<b>Accuracy</b>	Within ±(0.2% of reading+5 digits)
<b>Display</b>	Less than 400Ω: 1 decimal place 400Ω or more: 1 decimal place is hidden
<b>Conduction Check</b>	Electronic buzzer sounds when it is 10 Ω or less (Uses strain input / output cable)
<b>● Insulation Resistance Measurement</b>	
<b>Measuring Range</b>	0 to 300 MΩ
<b>Applied Voltage</b>	Approx. 20 VDC
<b>Display Accuracy</b>	Within ±(15% of reading +10 digits)
<b>Insulation Check</b>	Electronic buzzer sounds when less than 100 MΩ (Uses strain input / output cable)
<b>● Strain Output</b>	
<b>Output Range</b>	[mV/V] display: 0.000 to ±5.000 mV/V (0.005 mV/V steps) [×10 <sup>-6</sup> strain] display: 0 to ±10000 × 10 <sup>-6</sup> strain (10 × 10 <sup>-6</sup> strain steps)
<b>Input Bridge Power</b>	12VDC or less
<b>Carrier Frequency Range</b>	1 to 28 kHz
<b>Output Accuracy</b>	
<b>DC Amplifier</b>	[mV/V] display: Within ±(0.5% of set value +0.020) [×10 <sup>-6</sup> strain] display: Within ±(0.5% of set value +0.020)
<b>Carrier Wave Amplifier</b>	[mV/V] display: Within ±(5% of set value +0.020) [×10 <sup>-6</sup> strain] display: Within ±(5% of set value +40)
<b>I/O Resistance</b>	Approx. 350 Ω
<b>● Automatic Measurement Functions</b>	
<b>Check Contents</b>	Simultaneous measurement of Input Strain, I/O Resistance, and Insulation Resistance, then display the result data
<b>● TEDS Information Indication Functions</b>	
<b>Display Contents</b>	Model of transducer, Kyowa original serial number, rated capacity, engineering unit, rated output, input resistance and serial number of TEDS format

\*Not suitable for calibration purpose

- Standard Accessories** 2 AA manganese batteries, instruction manual
- Optional Accessories** Input cable U-16 (4-conductor, terminated with alligator clips)  
Silicon covers:  
WDS-500-COVER-B (Blue)  
WDS-500-COVER-R (Red)  
WDS-500-COVER-Y (Yellow)  
WDS-500-COVER-G (Green)  
WDS-500-COVER-D (Dark gray)  
WDS-500-COVER-L (Light gray)  
Soft case WDS-500-CASE (With shoulder strap)

# CAB-E

## Strain Generator

● For checking strain measuring instruments



CAB-120E

### Compact & lightweight Suitable for checking strain amplifiers

Compact & lightweight device, which generates equivalent strains to check strain measuring instruments. Strain level is set with dials in combination. No power supply is required.

#### Models

Models	I/O Resistance, Accuracy	Excitation Voltage
CAB-120E	120 Ω, -10% to 1%	4 VDC or less
CAB-350E	350 Ω, -10% to 1%	12 VDC or less

#### Specifications

<b>Equivalent Strain</b>	RANGE dials: 4 steps of x-500, x-100, x100 and x500 STRAIN dials: 11 steps of 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10 × 10 <sup>-6</sup> strain
	Generated strain level is determined by setting of both dials.
<b>Accuracy</b>	Within ±(1.5% of setting + 5 × 10 <sup>-6</sup> strain)
<b>Gage Factor</b>	2.0 fixed
<b>I/O Resistance &amp; Accuracy</b>	See table above.
<b>Excitation Voltage</b>	See table above.
<b>Operating Temperature</b>	0 to 45°C
<b>Operating Humidity</b>	20 to 80% (Non-condensing)
<b>Output Connector</b>	NDIS4102 (7 pins) connector
<b>Dimensions</b>	122 W × 70 H × 52 D mm
<b>Weight</b>	Approx. 410 g

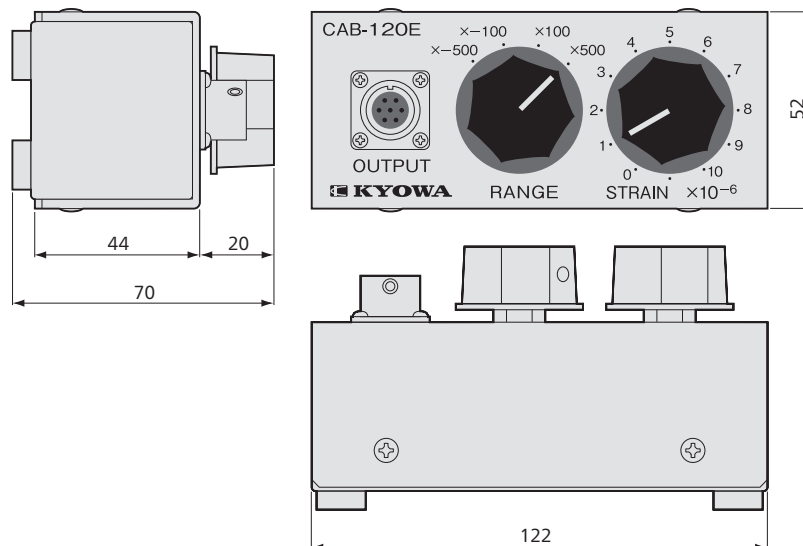
#### Standard Accessories

Connection cable (With NDIS4102 (7 pins) Connector at both ends, 1 m)

#### Notes:

1. Since the CAB-E is designed to be compatible with remote sensing, it mustn't be used for systems such as MCF, CDV cards, DIS, etc. with which F and G terminals of input NDIS4102 (7 pins) connector are used for other purposes.
2. It is not recommended to use for carrier-type strain amplifiers such as DPM series.
3. Since the CAB-E has a special circuit structure, the stated accuracy may not be satisfied depending on measuring instruments under test.
4. The CAB-E is designed for checking and is not for calibration.

#### ■ Dimensions



CAB-120E



Instrumentation Amplifiers

Outline

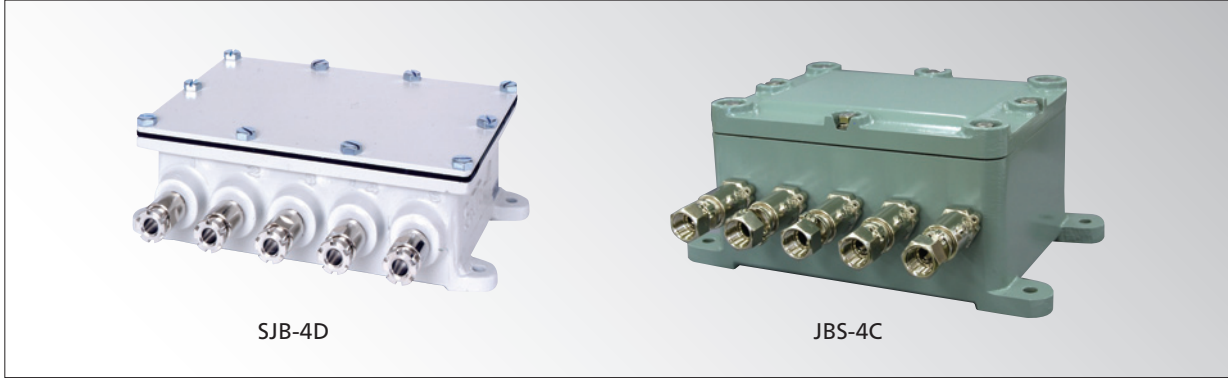
Amplifier

Checker

Other

# SJB-C/D, JBS-C

## Junction Box



SJB-4D

JBS-4C

### Cable extension for load cell and integration of multiple load cell outputs to a single cable

A junction box is used when connecting a load cell and amplifier using an extension cable, or when connecting cables of multiple load cells, weighing a tank or hopper, to an amplifier using a single cable.

The SJB-C/D are designed for general purposes and the JBS-C is for use under hazardous and explosive environments.

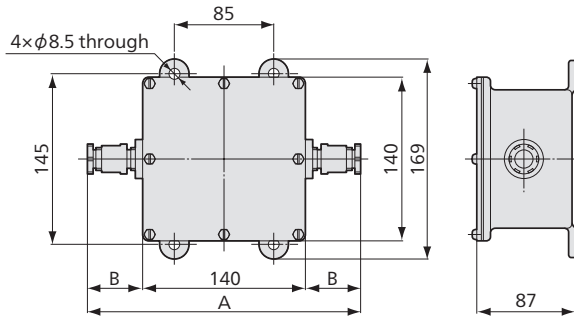
#### Models

Models	Connectable Load Cells	Applicable Cable Diameter	Weight (Approx.)	Remarks
SJB-1C	1	10 to 11 mm (15C)	2.3 kg	4-conductor (0.5 mm <sup>2</sup> ) shielded cable
SJB-4C	4		4.7 kg	
SJB-1D	1	7 to 8 mm (10B)	2.2 kg	4-conductor (0.3 mm <sup>2</sup> ) shielded cable
SJB-4D	4		4.4 kg	
JBS-1C	1	10 to 11 mm (Note)	—	—
JBS-4C	4		10.6 kg	

Note: Please specify the cable diameter.

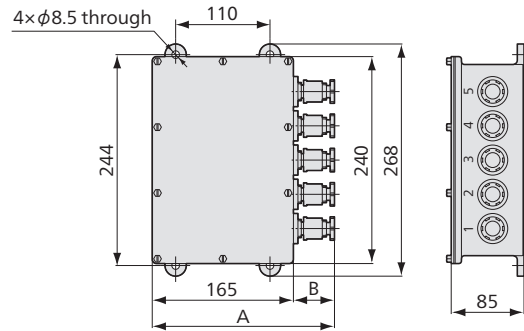
#### Dimensions

##### ● SJB-1C,1D



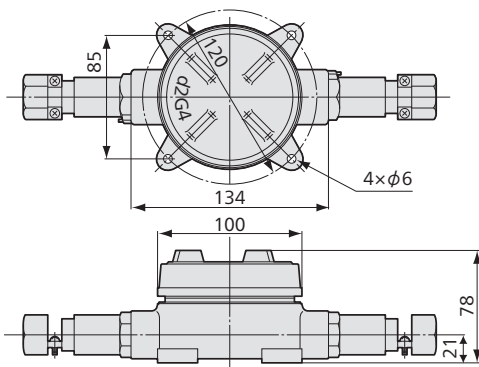
Models	A	B
SJB-1C	234	47
SJB-1D	226	43

##### ● SJB-4C,4D



Models	A	B
SJB-4C	212	47
SJB-4D	208	43

##### ● JBS-1C



##### ● JBS-4C

