Strain Amplifier

Dynamic Strain Measuring Instruments

AC Bridge Type : AS3503 / AS3603 / AS3703 / AS3803 / AS3903
DC Bridge Type : AS2503 / AS2603





A&D Company, Ltd.

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New features added on superior basic performance ! Achieved more accurate and reliable measurements !

The new AS3000 Series of Strain Amplifiers inherit the excellent performance of the previous models equipped with unique Bridge Check function, Cable Length Compensation function, and Noise Resistant design, and newly added Auto-Range function and E-terminal Switching function, enabling shorter measurement preparation time, highly accurate and high-quality strain measurement. While maintaining compatibility with the previous model, operability has been greatly improved, and settings for each function have been simplified for ease-of-use. Including a noise resistant type, two models with a response frequency of 5 kHz have been added, resulting five models in the lineup .

AC Bridge Type for General-purpose - AS3503 / AS3603 / AS3703



Isolated between input/output and power supply system! Aids strain measurement with reliable quality!

The AS3503/AS3603/AS3703 are AC strain amplifiers with high sensitivity, high stability and low noise, and suitable for measurement using strain gauges.
AS3603 responsivity: DC to 2 kHz, AS3503 responsivity: DC to 5 kHz, AS3703 responsivity: DC to 10 kHz. All are highly stable and low noise products. The balance circuit is equipped with an automatic capacitance elimination function, allowing the capacitance balance to be adjusted at any time.

Features

●High sensitivity【AS3603】
Sensitivity ±10 V output at ±200 x 10^{-6} strain input (when BV = 2 V)

●High responsivity
DC to 5 kHz【AS3503】
DC to 10 kHz【AS3703】

●Various functions with excellent operability.
Bridge Check, Cable Length Compensation, Auto-range and Auto-balance can be executed by the touch of a button.

●Operable even under severe temperature conditions.
Temperature stability (Zero Point) Within ±0.1 × 10^{-6} strain/°C
Temperature stability (Sensitivity) Within ±0.02%/°C
Operating temperature range: -10°C to 50°C

AC Bridge Type with Noise Resistant - AS3803 / AS3903



Isolated between input/output and power supply system! Noise-resistant design for harsh environments!

The AS3803/AS3903 are isolated between input/output and power supply systems, respectively, and are equipped with Noise-resistant circuits that excel in Common-mode Noise Elimination. As a result, it is possibe to reduce the effect of noise generated by Common Mode Voltage from power lines, high power equipment, etc., as well as noise generated when thyristors and power transistors are opened and closed, and to obtain an output with a high SN ratio even in an environment where noise is easily mixed in. Suitable for sites where Common Mode Noise is a concern, such as heavy electrical equipment, steel, heavy industry, plants, and railway vehicles.

Features

●High sensitivity【AS3803】
Sensitivity ±10 V output at ±200 x 10^{-6} strain input (when BV = 2 V)

●High responsivity
DC to 5 kHz【AS3903】

●Noise resistant design
Uses our unique circuit method that is resistant to Common-mode Noise rejection.

●Various functions with excellent operability.
Bridge Check, Cable Length Compensation, Auto-range, and Auto-balance can be executed by the touch of a button.

●Operable even under severe temperature conditions.
Temperature stability (Zero Point) Within ±0.1 × 10^{-6}strain/°C
Operating temperature range: -10°C to 50°C

■DC Bridge Type of Wide Bandwidth AS2503 / Isolated Type AS2603



Excellent Non-linearity and High Response Frequency ! High Precision DC Strain Amp!

The AS2000 series is suitable for high-precision measurement with strain gauge transducers (load, pressure, torque, acceleration, etc.). The bridge power supply uses a constant voltage power supply of 2 V to 10 V DC, and it has high voltage sensitivity and excellent non-linearity, and so highly accurate measurement is possible using a wide variety of strain gauge transducers.
The high response frequency of DC to 500 kHz【AS2503】also enables high-speed strain measurement such as impacts.

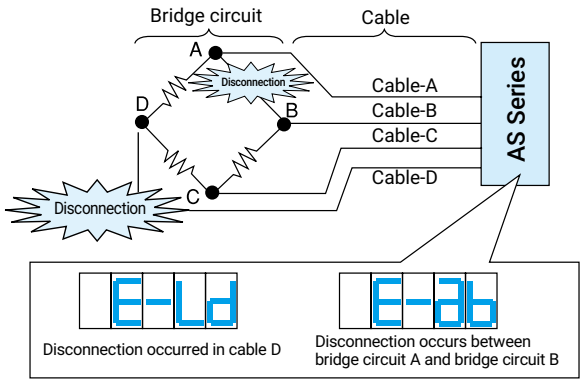
Features

- **Wide bandwidth**
  Response frequency DC to 500 kHz【AS2503】
- **High input impedance, excellent non-linearity**
  Ensures input impedance 10 MΩ, non-linearity ±0.01%/FS. Highly accurate measurement is possible even with transducers with high resistance.【AS2503】
- **Prevents erroneous operation**
  Each setting key can be locked (except for CAL)
- **Input/output isolation ideal for system applications【AS2603】**
  Isolation circuits are used between input/output and power supply.
- **Loaded with various filters (high-pass/low-pass filters)**
- **Can be used as a voltage amplifier.**
  Can be used as a high precision voltage amplifier with a maximum gain of 10,000 times【AS2503】or 5,000 times【AS2603】.

■Functions

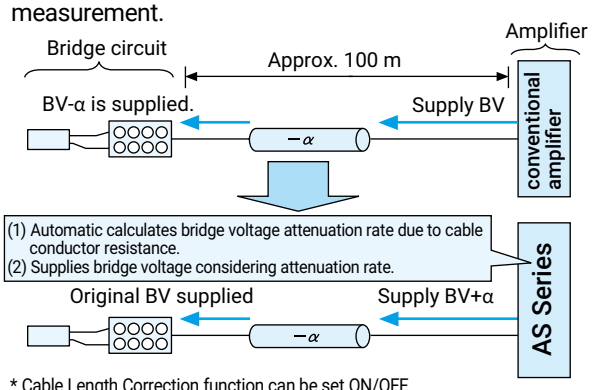
■ Bridge Check function

The "Bridge Check" function automatically detects disconnections, shorts, and cable breaks at each circuit of the bridge. The easy detection of disconnected or short-circuited wires reduces measurement preparation time and helps prevent problems with the input section.



■ Cable Length Correction function

If the distance between the bridge circuit and the amplifier is long, the bridge voltage will drop due to the conductor resistance of the cable. In the past, remote sensing with a 6-core cable and compensation by numerical setting (cable length, wire diameter, etc.) were used. (Remote sensing was not possible with the AC strain amp using 6-core cable.) This series of products employs a unique automatic compensation circuit to compensate for bridge voltage drops even with 4-core cables, enabling highly accurate strain measurement.



* Cable Length Correction function can be set ON/OFF.
* Do not use with transducers that have a built-in output adjustment resistor.

■ Auto-range function

The “Auto-range function" automatically adjusts the measurement range to the specified output voltage when the calibration value set in the Internal Calibrator is applied. Output voltage can be selected from 5 V, 8 V, and 10 V. Even those unfamiliar with strain amplifiers can easily prepare one for measurement.

■ E-terminal Switching function

The "E terminal switching function" switches the potential of the shield (E terminal) of the sensor cable to the [input COM] or the [GND] of the amplifier, and performs shielding measures suitable for the installation environment of the sensor bridge.
If the E terminal is not connected to the chassis of a tranbsducer, etc., setting the switch to [Input COM] will increase the shielding effect and reduce noise intrusion.

Displays, control knobs and rear panel



Level Meter (for OUTPUT 1)
Monitors Output 1 in high response with 17 dots LED. When overscaling, either end of LED blinks (at-10V or +10V).for waring.

Digital Monitor (for OUTPUT 2)
Monitors Output 2 with digital display as quick reference. (Scale is adjustable with OUTPUT2 ADJ variable resistor.)

Auto-balance (Bridge Check -> Cable Length Compensation ->Auto-range ->Auto-balance)
- One-touch diagnosis and configuration of the entire input system.
- Check the connection of the bridge circuit, cable length correction, and tuto balance is performed after setting range to be the specified output votage when applied CAL seting value,
- Greatly promotes work saving in measurement by reducing measurement preparation time and preventing wire breakage problems.

Range Setting

Setting Mode status (με) LED【AS3000 Series】
CAL Setting Mode: LED turns on / FNC Setting Mode: LED turns off

SELECT knob
Long press: Switching between "CAL Setting Mode" and "FNC Setting Mode" (AS3000 Series)
Turn: Change of setting value
Push: Digit shift of setting value.

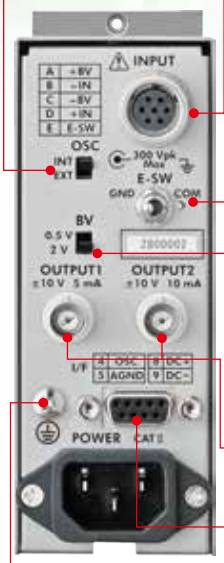
CAL/FNC Setting Value display
CAL Setting Value (με) display
FNC Function Setting Value display

Output Voltage Adjustment (for OUTPUT2)
Continuously variable output voltage from 1 to 1/10 times.

Low-pass/high-pass filters

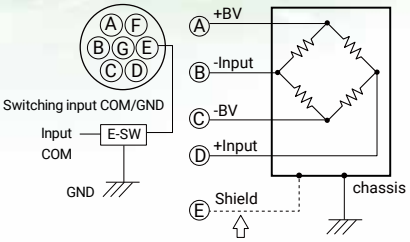
CAL Voltage Application switch

Bridge Voltage Display



Synchronization Switching switch
【AS3000 series】

Input Connector
Connects the plug of the bridge box or transducer.



The chassis of the transducer, etc. may or may not be connected to the E terminal depending on the product.

E-terminal Switch【AS3000 Series】

Bridge Power Switch
【AS3000 Series】: 2 VAC , 0.5 V
【AS2000 Series】: 2 VDC , 3 V , 5 V , 9 V , 10 V
(AS2000 Series is a rotary switch)

Dual output
OUTPUT1 ±10 V ±5 mA
OUTPUT2 ±10 V ±10 mA (adjustable output)

Interface Connector
Auto-balance, CAL Applied Voltage Control, DC Power Input, and Synchronization Signal Connection【AS3000】

Protective grounding terminal
Ground the amplifier with an earth wire when power cable has not a grounding terminal

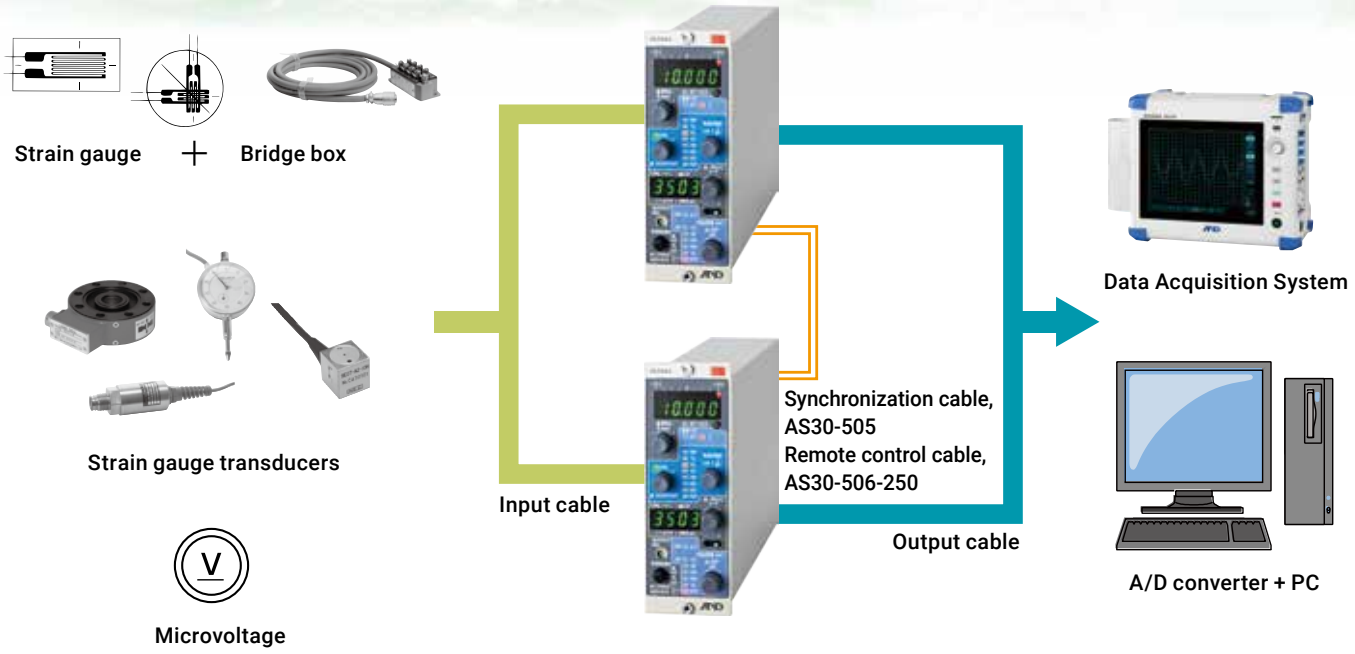
Selection of strain amplifier

Bridge power system	AC strain amplifier (AC bridge type)	DC strain amplifier (DC bridge type)
Recommended sensors	1. Various strain gauges 2. Load, Pressure, Displacement, Acceleration, Torque (Strain gauge type transducers)	1. Strain gauge type transducers for Load, Pressure, Displacement, Acceleration, Torque, etc. 2. Various strain gauges (Impact strain)
Features	Better S/N ratio and higher sensitivity than DC bridge type DC strain amplifiers. Because it is an AC amplifier, it does not include the commercial power supply frequency, which is a major noise source, in the amplification bandwidth, making it extremely resistant to extraneous noise. This amplifier is especially effective for sensors which output with parallel wires, such as strain gauges.	Superior non-linearity and higher response frequency compared to AC bridge type AC strain amplifiers. Mainly used in combination with strain gauge transducers. It can also be used as a voltage amplifier.
Noise	○	×
Sensitivity	○	×
Non-linearity	×	○
Response frequency	×	○

Product		AC Strain Amplifier (Isolated)					DC Strain Amplifier	
Type		General-purpose, low bandwidth type	General-purpose, medium-bandwidth type	General-purpose, wide bandwidth type	Noise-resistant, low bandwidth type	Noise-resistant, medium-bandwidth type	Wide bandwidth type	Isolated type
Model		AS3603	AS3503	AS3703	AS3803	AS3903	AS2503	AS2603
Main Specifications	Bridge power supply: Voltage	AC 0.5V、AC 2V					DC 2, 3, 5, 9, 10 V	
	Bridge power supply: Frequency	5 kHz sine wave	12.5 kHz sine wave	25 kHz sine wave	5 kHz sine wave	12.5 kHz sine wave		
	Voltage sensitivity	At ±200 ×10^{-6} strain ±10 V output (when RANGE=200, FINE = x1, BV = 2 V)	At ±500 ×10^{-6} strain ±10 V output (when RANGE = 500, FINE = x1, BV = 2 V)	At ±500 ×10^{-6} strain ±10 V output (when RANGE = 500, FINE = x1, BV = 2 V)	At ±200 ×10^{-6} strain ±10 V output (when RANGE=200, FINE = x1, BV = 2 V)	At ±500 ×10^{-6} strain ±10 V output (when RANGE = 500, FINE = x1, BV = 2 V)	±1,000 x10^{-6} at strain ±10 V output (when RANGE = 1k, no FINE, BV = 2 V)	±2,000 x10^{-6} at strain ±10 V output (when RANGE = 2k, no FINE,BV = 2 V)
	Response frequency	DC to 2kHz ± 10%	DC to 5kHz ± 10%	DC to 10kHz ± 10%	DC to 2kHz ± 10%	DC to 5kHz ± 10%	DC to 500kHz +1,-3dB	DC to 100kHz +1,-3dB
	Sensitivity stability	Within ± 0.02%/ °C	Within ± 0.02%/ °C	Within ± 0.02%/ °C	Within ± 0.05%/ °C	Within ± 0.05%/ °C	Within ± 0.01%/ °C	Within ± 0.01%/ °C
	Zero-point stability	Within ± 0.1 ×10^{-6} strain/ °C					Within ±1 ×10^{-6} strain/ °C	
	Non-linearity	± 0.1% /FS	± 0.1% /FS	± 0.2% /FS	± 0.1% /FS	± 0.1% /FS	Within ± 0.01%/FS	Within ± 0.05%/FS
	Noise	2.0 ×10^{-6} strain p-p (Input conversion value) at W/B, RANGE = 200, FINE = x1, BV = 2 V	5.0 ×10^{-6} strain p-p (Input conversion value) at W/B, RANGE = 500, FINE = x1, BV = 2 V	7.0 ×10^{-6} strain p-p (Input conversion value) at W/B, RANGE = 500, FINE = x1, BV = 2 V	2.0 ×10^{-6} strain p-p (Input conversion value) at W/B, RANGE = 200, FINE = x1, BV = 2 V	5.0 ×10^{-6} strain p-p (Input conversion value) at W/B, RANGE = 500, FINE = x1, BV = 2 V	80 ×10^{-6} strain p-p (Input conversion value) at W/B, RANGE = 1k, FINE = x1, BV = 2 V	50 ×10^{-6} strain p-p (Input conversion value) at W/B, RANGE = 2k, FINE = x1, BV = 2 V
Features		• The high voltage sensitivity of this device makes it effective for measuring minute stresses using a strain gauge. • Input/output isolation is effective for strain measurement in locations with high potential difference between grounds. • Especially suited for low-speed, high-precision micro-stress measurement.	• The high voltage sensitivity of this device makes it effective for measuring minute stresses using a strain gauge. • Input/output isolation is effective for strain measurement in locations with high potential difference between grounds. • The 5 kHz response frequency makes it suitable for relatively high-speed stress measurement.	• The high voltage sensitivity of this device makes it effective for measuring minute stresses using a strain gauge. • Input/output isolation is effective for strain measurement in locations with high potential difference between grounds. • The response frequency is as high as 10 kHz, making it suitable for high-speed stress measurement.	• The high voltage sensitivity of this device makes it effective for measuring minute stresses using a strain gauge. • Input/output isolation is effective for strain measurement in locations with high potential difference between grounds. • The unique noise-resistant design reduces Common Mode Noise and is suitable for high-precision micro-stress measurement with minimal noise due to the measurement environment.	• The high voltage sensitivity of this device makes it effective for measuring minute stresses using a strain gauge. • Input/output isolation is effective for strain measurement in locations with high potential difference between grounds. • The unique noise-resistant design reduces Common Mode Noise and is suitable for high-precision, high-response measurements with minimal noise due to the measurement environment.	• High response frequency makes it suitable for impact strain measurement. • Effective for measurement with small transducers with high response frequency. • As a DC strain amplifier, the voltage sensitivity is high and the bridge voltage can be set high, enabling highly accurate measurement even with low-sensitivity strain transducers. • Non-linearity is excellent.	• Input/output isolation makes it suitable for strain measurement in locations with high potential difference between the grounding locations, as well as for high-precision measurement systems. • High response frequency is effective for impact strain measurement and measurement with small transducers with high response frequency. • The bridge voltage can also be set high, enabling highly accurate measurement with a wide variety of strain transducers.
Measurement by strain gauge		◎					○	
Measurement with strain gauge transducers		◎					◎	
Strain measurement at sites where surge voltage is a concern		○	○	○	◎	◎	△	
Bridge Check Method		Bridge Check function enables determination of cable breaks, breaks on each circuit of the gauge, and short-circuit locations.						
When the distance between the measurement point and the measuring instrument is long		Cable Length Compensation function enables highly accurate measurement by compensating for voltage drop across the bridge voltage.						
Impact strain measurement		×					◎	
Use as a DC amplifier		×					◎	

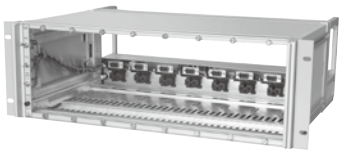
◎: Optimal, ○: Appropriate, △: Not very appropriate, ×: Not appropriate, BV: Bridge supply voltage.

Measurement Diagram





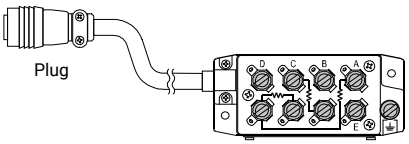
Bench top case
AS16-104 (for 4 units) / AS16-105 (for 6 units) / AS16-106 (for 8 units)



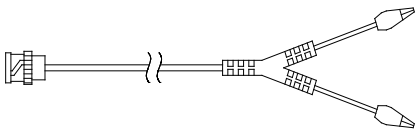
Rack mount case, AS16-107
(for 8 units)



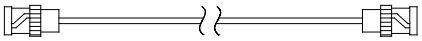
Unit stand, 43721



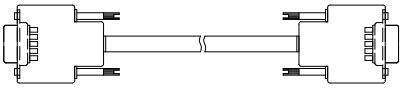
Bridge box
5370A (120 Ω), 5373A (350 Ω)



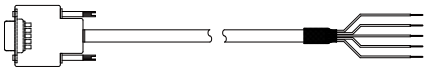
Signal cable, AS30-503
Metal BNC to electrical clips [red (+), black (-)], 2 m long



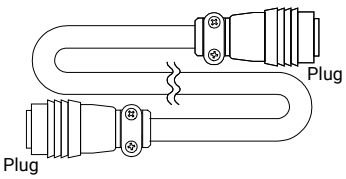
Signal cable, AS30-504
Metal BNC to Metal BNC, 2 m long



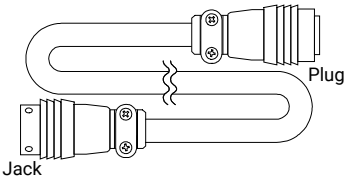
Synchronization cable, AS30-505
D-Sub9pin • plug to D-sub9pin • plug, 1.8m long



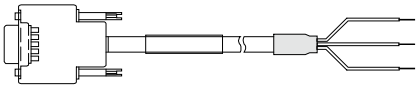
Remote control cable, AS30-506-250
D-Sub9pin·plug to loose end wires (5 wires), 2.5 m long



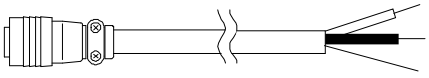
Relay cable, AS30-501-xxx
(Φ 9.6 mm, 4-core shield, length xxx : choose from 1,2,5,10,15,20,25m.long



Extension cable, AS30-502-xxx
(Φ 9.6 mm, 4-core shield, length xxx : choose from 1,2,5,10,15,20,25m.



DC power cable, AS30-507
(For an amplifier unit)
D-Sub 9 pin plug to loose end wires(2 wires+Shield), 2 m long



DC power cable, AS30-508
(for benchtop and rackmount cases)
circular connector(female)to loose end wires(2 wires), 2.5 m long

Specifications

AC Bridge Type

Item		AS3603	AS3503	AS3703	AS3803	AS3903
Noise resistant		—			Input noise suppression circuitry	
Number of channels		1 channel/unit				
Bridge resistance		60 ～ 1,000Ω				
Gauge factor		2.00				
Bridge power supply (BV)	Voltage	0.5 VAC, 2 VAC				
	Frequency	5 kHz sine wave	12.5 kHz sine wave	25 kHz sine wave	5 kHz sine wave	12.5 kHz sine wave
Synchronization input/ output signal (OSC)		2.5 VAC				
E-terminal Connection Switching function		The Shield Wire Potential Switching switch (E-SW) can be used to switch the potential of the E-terminal (Shield Wire) of the input cable to the input common (COM) or GND (casing ground potential via protective element).				
Bridge Check (BRC) function		Detects disconnections and shorts in input bridge circuits with bridge resistance of 120 Ω or more and disconnections in input cables, and displays the results on LEDs.Function can be turned ON/OFF by FNC setting.				
Cable Length Compensation (CLC) function		Automatic compensation for bridge power supply voltage drop due to cable length to bridge circuit (bridge resistance 120 Ω or more). Function can be turned ON/OFF by FNC setting.				
Balaning adjustment range(Auto-balance)		Resistance Deviation: ±2% (±10,000 x 10^{-6} strain), capacitance imbalance: Approx. 2,000 pF				
Balancing adjustment accuracy		Within ±0.4 × 10^{-6} strain (RANGE = 200, FINE = x1, BV = 2 V)	Within ±1.0 × 10^{-6} strain (RANGE = 500, FINE = x1, BV = 2 V)	Within ±1.0 × 10^{-6} strain (RANGE = 500, FINE = x1, BV = 2 V)	Within ±0.4 × 10^{-6} strain (RANGE = 200, FINE = x1, BV = 2 V)	Within ±1.0 × 10^{-6} strain (RANGE = 500, FINE = x1, BV = 2 V)
Maximum input range		±200,000 x 10^{-6} strain (RANGE = 20k, FINE = x2.5, BV = 0.5 V)	±500,000 x 10^{-6} strain (RANGE = 50k, FINE = x2.5, BV = 0.5 V)	±500,000 x 10^{-6} strain (RANGE = 50k, FINE = x2.5, BV = 0.5 V)	±200,000 x 10^{-6} strain (RANGE = 20k, FINE = x2.5, BV = 0.5 V)	±500,000 x 10^{-6} strain (RANGE = 50k, FINE = x2.5, BV = 0.5 V)
Voltage sensitivity		±10 V output at ±200 × 10^{-6} strain (RANGE = 200, FINE = x1, BV = 2 V)	±10 V output at ±500 × 10^{-6} strain (RANGE = 500, FINE = x1, BV = 2 V)	±10 V output at ±500 × 10^{-6} strain (RANGE = 500, FINE = x1, BV = 2 V)	±10 V output at ±200 × 10^{-6} strain (RANGE = 200, FINE = x1, BV = 2 V)	±10 V output at ±500 x 10^{-6} strain (RANGE = 500, FINE = x1, BV = 2 V)
Measurement range (RANGE)		200, 500, 1k, 2k, 5k, 10k, 20k (x10^{-6} strain × 2/BV value), OFF	500, 1k, 2k, 5k, 10k, 20k, 50k (x10^{-6} strain × 2/BV value), OFF	500, 1k, 2k, 5k, 10k, 20k, 50k (x10^{-6} strain × 2/BV value), OFF	200, 500, 1k, 2k, 5k, 10k, 20k (x10^{-6} strain × 2/BV value), OFF	500, 1k, 2k, 5k, 10k, 20k, 50k (x10^{-6} strain × 2/BV value), OFF
Measuring range fine adjustment (FINE)		Continuously variable within the RANGE and adjustable with the FINE knob. Variation can be changed in two steps.				
Internal Calibrator (+CAL, -CAL)		Calibration value range: ±1 to 9,999 x10^{-6} strain, calibration value accuracy: ±(0.5% rdg + 0.5 × 10^{-6} strain)				
Auto-range (ARG) function		Automatic adjustment of RANGE and FINE so that the output voltage becomes the specified value when the calibration value set in the Internal Calibrator is applied.Output voltage value (OFF, 5 V, 8 V, 10 V) can be specified by the FNC setting.				
Non-linearity		±0.1%/FS	±0.1%/FS	±0.2%/FS	±0.1%/FS	±0.1%/FS
Frequency characteristic (W/B)		DC to 2 kHz ±10%	DC to 5 kHz ±10%	DC to 10 kHz ±10%	DC to 2 kHz ±10%	DC to 5 kHz ±10%
High-Pass Filter (HPF)		Cutoff frequency: 0.5 Hz, 2-pole Butterworth type (filter drop characteristic -12dB/oct)				
Low-Pass Filter (LPF)		Cutoff frequency: 10, 30, 100, 300, 500 Hz, 4-pole Butterworth type (filter drop characteristics -24dB/oct)	Cutoff frequency: 10, 30, 100, 500, 3 kHz, 4-pole Butterworth type (filter drop characteristics -24dB/oct)	Cutoff frequency: 10, 30, 100, 500, 3 kHz, 4-pole Butterworth type (filter drop characteristics -24dB/oct)	Cutoff frequency: 10, 30, 100, 300, 500 Hz, 4-pole Butterworth type (filter drop characteristics -24dB/oct)	Cutoff frequency: 10, 30, 100, 500, 3 kHz, 4-pole Butterworth type (filter drop characteristics -24dB/oct)
Temperature stability	Sensitivity	Within ±0.02%/°C, Within ±0.2%/24h			Within ±0.05%/°C, Within ±0.2%/24h	
	Zero-point	Within ±0.1 × 10^{-6} strain/° C, ±0.5 × 10^{-6} strain/24h				
Noise		2.0 × 10^{-6} strain p-p input conversion (W/B, RANGE = 200, FINE = x1, BV = 2 V, at 120 Ω bridge)	5.0 × 10^{-6} strain p-p input conversion (W/B, RANGE = 500, FINE = x1, BV = 2 V, at 120 Ω bridge)	7.0 × 10^{-6} strain p-p input conversion (W/B, RANGE = 500, FINE = x1, BV = 2 V, at 120 Ω bridge)	2.0 × 10^{-6} strain p-p input conversion (W/B, RANGE = 200, FINE = x1, BV = 2 V, at 120 Ω bridge)	5.0 × 10^{-6} strain p-p input conversion (W/B, RANGE = 500, FINE = x1, BV = 2 V, at 120 Ω bridge)
Output voltage		OUTPUT1 ±10 V ±5 mA (2 kΩ load or more), OUTPUT2 ±10 V ±10 mA (332 kΩ load or more), Operable at output resistance 0.5 Ω or less, capacitive load up to 0.1 μF.				
Output adjustment		OUTPUT2 ADJ (continuously variable from 1 to 1/10 independently)				
Level indication		17-dot LED display for monitoring OUTPUT1, Green LED in the center lights up within approx. ±100 mV and LEDs on both ends blink at approx. ±10.5V or more				
Digital display		4 1/2 digit digital display for OUTPUT2 monitor, scaling available with OUTPUT2 ADJ. Decimal point position can be changed by FNC setting. Accuracy: Within ±0.05% rdg ±1 count				
Key Lock function		Key lock ON/OFF of the operation panel is possible by pressing the key lock button for about 1 second (excluding the calibration value application switch (+CAL, -CAL))				
Remote function		Rear interface connector: D-SUB, 9P, female, Mounting: #4-40 inch screw +CAL and -CAL input, BAL function [Bridge check (BRC), Line length correction (CLC), Auto range (ARG), Auto balance (resistance balance)], RANGE OFF and KEY LOCK controls are possible by external signal				
Saving of setup values		Save to flash memory				
Vibration resistance		29.4m/s^2 (50 Hz, XYZ each for 10 minutes) and compliant with MIL-STD-810G-514.6				
Withstand voltage		Between input terminals (A, B, C, D, E) and the output, and the case: 1 kV AC for 1 minute Between AC power input and signal input, output, and the case: 1.5 kV AC for 1 minute Between DC power input and signal input: 1 kV AC for 1 minute Between DC power input and signal output, and the case: 500 V AC for 1 minute				
AC power supply		100 to 120 V AC / 200 to 240 V AC (switchable with [AC power supply voltage switch] on the bottom) 12 VA or less when AC240V, 50/60 Hz				
DC power supply		10 to 30 V DC, 6 VA or less				
Operating temperature/humidity		-10°C to +50°C, within 20% to 85% RH, with no condensation				
Storage temperature/humidity		-20°C to +70°C, within 10% to 90% RH, with no condensation				
External dimensions		H143 x W49.5 x D252 mm (excluding projection)				
Weight		Approx. 1.4 kg				

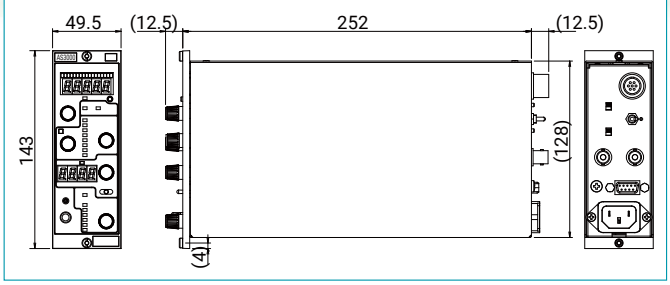
DC Bridge Type

Item	AS2503 (Wide bandwidth type)	AS2603 (Isolated type)
Number of channels	1 channel/unit	
Bridge resistor	60 to 1,000 Ω	
Gauge rate	2.00	
Bridge power supply (BV)	2, 3, 5, 9, 10 VDC	
Bridge Check (BRC) function	Detects disconnections and shorts in the bridge circuit (120 Ω or more) and disconnections in the cable to the input bridge circuit, and displays the results on LEDs. Function can be turned ON/OFF with the setting switch on the bottom.	
Cable Length Compensation (CLC) function	Automatic compensation for bridge power supply voltage drop due to cable length to bridge circuit. Function can be turned ON/OFF with the setting switch on the bottom.	
Equilibrium adjustment range(Auto-balance)	Resistance Deviation: ±2% (±10,000 x 10^{-6} strain)	
Equilibrium adjustment accuracy	Within ±1.0 ×10^{-6} strain (RANGE = 1k, FINE = x1, BV = 2 V)	Within ±2.0 ×10^{-6} strain (RANGE = 2k, FINE = x1, BV = 2 V)
Maximum input range	±125,000 x10^{-6} strain (RANGE = 50k, FINE = x2.5, BV = 2 V)	±250,000 x10^{-6} strain (RANGE = 100k, FINE = x2.5, BV = 2 V)
Voltage sensitivity	± 10 V output at ± 1,000 x10^{-6} strain (RANGE = 1k, FINE = x1, BV = 2 V)	± 10 V output at ± 2,000 x10^{-6} strain (RANGE = 2k, FINE = x1, BV = 2 V)
Measurement range (RANGE)	1k, 2k, 5k, 10k, 20k, 50k (x10^{-6} strain × 2/BV value), OFF	2k, 5k, 10k, 20k, 50k, 100k (x10^{-6} strain × 2/BV value), OFF
Measuring range fine tuning (FINE)	Continuously variable within the RANGE and adjustable with the FINE knob. Amount of variation can be changed in two steps.	
Internal Calibrator (+CAL, -CAL)	Calibration value range ±1 to 9,999 x10^{-6} strain, accuracy ±(0.2% rdg + 0.5 x10^{-6} strain)	
Non-linearity	Within ±0.01%/FS	Within ±0.05%/FS
Frequency characteristic (W/B)	DC to 500 kHz +1, -3 dB	DC to 100 kHz +1, -3 dB
HPF	Cutoff frequency: 0.5 Hz 2-pole Bessel type (filter drop characteristics -12dB/oct)	
Low-Pass Filter	Cutoff frequency: 10, 30, 100, 1k, 30 kHz 4-pole Bessel type (filter drop characteristics -24dB/oct)	
Temperature stability: Zero-point	Within ±1 ×10^{-6} strain/°C, within ±5 ×10^{-6} strain/24h	
Temperature stability: Sensitivity	Within ±0.01%/°C, within ±0.05%/24h	
Noise	80 x10^{-6} strain p-p input conversion (W/B, RANGE = 1k, FINE = x1, BV = 2 V, at 120 Ω bridge) 20 ×10^{-6} strain p-p input conversion (DC to 30 kHz, RANGE = 1k, FINE = x1, BV = 2 V, at 120 Ω bridge)	50 x10^{-6} strain p-p input conversion (W/B, RANGE = 2k, FINE = x1, BV = 2 V, at 120 Ω bridge) 20 × 10^{-6} strain p-p input conversion (DC to 30 kHz, RANGE = 2k, FINE = x1, BV = 2 V, at 120 Ω bridge)
Output voltage	OUTPUT1 ±10 V ±5 mA, OUTPUT2 ±10 V ±10 mA	
Output adjustment	OUTPUT2 ADJ (continuously variable from 1 to 1/10 independently)	
Level indication	17-dot LED display, for monitoring OUTPUT1, green LED in the center lights up within approx. ±100 mV and LEDs on both ends blink at approx. ±10.5V or more	
Digital display	4 1/2 digit digital display, for OUTPUT2 monitor, scaling available with OUTPUT2 ADJ. Decimal point position can be changed by a setting switch on the bottom.	
Key Lock function	Key lock ON/OFF by pressing the key lock button for 1 second	
Remote function	Function of the I/F connector on the back. +CAL and -CAL input, BAL function [Bridge Check (BRC), Cable Length Compensation (CLC), Auto-balance (resistor balance)], KEY LOCK	
Saving of setting values	Save to flash memory	
Vibration resistance	29.4 m/s^2 (50 Hz, XYZ each for 10 minutes) and compliant with MIL-STD-810G-514.6	
Withstand voltage	·Between input terminals (A, B, C, D, E) and the output, and the case: AC 1 kV, for 1 minute【AS2603】 ·Between AC power input and input, output, and the case: AC 1.5 kV, for 1 minute【AS2503,AS2603】 ·Between DC power input and input, output, and the case: AC 500 V, for 1 minute【AS2503】 ·Between DC power input and input: AC 1 kV, for 1 minute【AS2603】 ·Between DC power input and output, and the case: AC 500 V, for 1 minute【AS2603】	
AC power supply	100 to 120 VAC / 200 to 240 VAC (switchable by internal switch) 12 VA or less when AC240V, 50/60 Hz	
DC power supply	10 to 30 VDC, 7 VA or less	
Operating temperature and humidity range	-10°C to +50°C, within 20 to 85% RH, with no condensation	
Storage temperature and humidity range	-20°C to +70°C, within 10 to 90% RH	
External dimensions	H143 x W49.5 x D252 mm (excluding protruding parts)	
Weight	Approx. 1.4 kg	

Dimensions Diagram

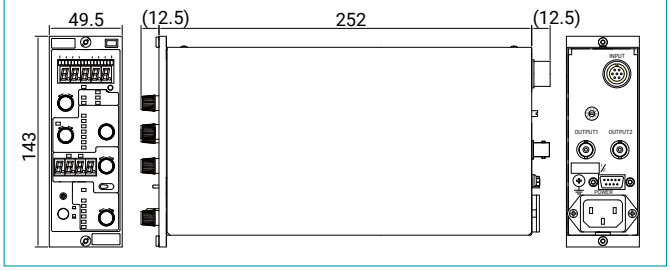
AS3000

Unit:mm



AS2000

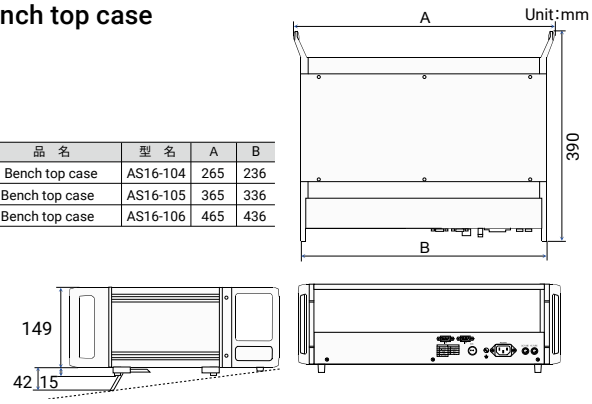
Unit:mm



Bench top case

Unit:mm

品 名	型 名	A	B
4CH Bench top case	AS16-104	265	236
6CH Bench top case	AS16-105	365	336
8CH Bench top case	AS16-106	465	436



Specifications as a voltage amplifier (only items different from strain)

Item	AS2503	AS2603
Input impedance	Approx. 10 MΩ + approx. 10 MΩ (at DC)	
Zero adjustment range (Auto-balance)	± 10 mV (input conversion value) (BV = 2 V), includes Auto-balance and fine tuning.	
Equilibrium adjustment accuracy	Within ± 1 μV (input conversion value), (RANGE = 1k, FINE x1, BV = 2 V)	Within ± 2 μV (input conversion value) (RANGE = 2k, FINE x1, BV = 2 V)
Measurement range	± 125 mV (RANGE = 50k, FINE = x2.5, BV = 2 V)	± 250 mV (RANGE=100k, FINE =x2.5, BV = 2 V)
Gain	x10,000 (RANGE = 1k), x5,000 (2k), x2,000 (5k), x1,000 (10k), x500 (20k), x200 (50k), FINE = x1	x5,000 (RANGE = 2k), x2,000 (5k), x1,000 (10k), x500 (20k), x200 (50k), x100 (100k), FINE = x1
Gain accuracy	± 0.1%	
Common Mode Rejection Ratio (CMRR)	70 dB or better (50, 60 Hz) at 1 k Ω balanced input	100 dB or more (50, 60 Hz) at 1 k Ω balanced input
Maximum allowable input voltage	± 8 VDC or AC peak	
Allowable Common Mode input voltage	± 5 VDC or AC peak	± 300 VDC or AC peak
Internal Calibrator	Setting value: ± 0.01 to 99.99 mV (± 0.01 to 59.99 mV when BV = 2 V) Accuracy: ± (0.2% rdg + 5 μV)	
Non-linearity	Within ± 0.01%/FS	Within ± 0.05%/FS
Temperature stability: Zero-point	Within ± 1 μV/° C, within ± 5 μV/24h	
Temperature stability: Sensitivity	Within ± 0.01%/° C, within ± 0.05%/24h	
Noise	80 μV p-p input conversion (W/B, RANGE = 1k (x10,000), FINE = x1, BV = 2 V) 20 μV p-p input conversion (DC to 30 kHz, RANGE = 1k, FINE = x1, BV = 2 V)	50 μV p-p input conversion (W/B, RANGE = 2k (x5,000), FINE = x1, BV = 2 V) 20 μV p-p input conversion (DC to 30 kHz, RANGE = 2k, FINE = x1, BV = 2 V)

[Main Unit]

Product	Model	Specifications
AC Strain Amplifier	AS3603	General-purpose, low bandwidth, isolated type, DC to 2 kHz (carrier wave 5 kHz)
	AS3503	General-purpose, medium-bandwidth, isolated type, DC to 5 kHz (carrier wave 12.5 kHz)
	AS3703	General-purpose, wideband, isolated type, DC to 10 kHz (carrier wave 25 kHz)
	AS3803	Noise-resistant, low bandwidth, isolation type, DC to 2 kHz (carrier wave 5 kHz)
	AS3903	Noise-resistant, medium-bandwidth, isolated type, DC to 5 kHz (carrier wave 12.5 kHz)
DC Strain Amplifier	AS2503	Wideband type, DC to 500 kHz, constant voltage type
	AS2603	Isolated type, DC to 100 kHz, constant voltage type

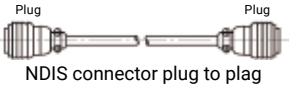
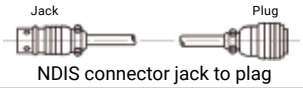
AS3000 Standard Accessories	Signal cable, Screwdriver for adjustment, AC power cable, Instruction manual, Quick guide sticker
AS2000 Standard Accessories	Signal cable, Screwdriver for adjustment, Time-lag fuse, AC power cable, Instruction manual

Note: If 4 to 20 mA output is required, the voltage output of OUTPUT2 can be changed to current output. (Please contact our sales staff.)

[Option]

Product	Model	Details
Bridge box (120 Ω)	5370A	120 Ω , with approx. 3 m cable
Bridge box (350 Ω)	5373A	350 Ω , with approx. 3 m cable
Bench top case	AS16-104	4 channels, approx. 3.0 kg, with AC power cable and panel fixing screws
	AS16-105	6 channels, approx. 3.7 kg, with AC power cable and panel fixing screws
	AS16-106	8 channels, approx. 4.4 kg, with AC power cable with panel fixing screws
Rack mounted case	AS16-107	8 channels, approx. 4.5 kg, with AC power cable with panel fixing screws
Blank panel	AL13-318	For 1 slot
Unit stand	43721	For 1 unit
Fixing knurled screws	43537-010	10 pcs/set, compatible with AS, AL and AG amplifiers

[Cable]

Product	Model	Details		
DC power cable	AS30-507	For unit, D-sub 9pin to loose cable end (2 wires), 2 m long		
	AS30-508	For case, circular connector (female) to loose cable end (2 wires), 2.5 m long		
Signal cable	AS30-504	Metal BNC to Metal BNC *1), impedance 50 Ω , 2 m long		
	AS30-503	Metal BNC *1) to electrical clips [red (+), black (-)], impedance 50 Ω ,2 m long		
	0311-2057	Metal BNC *1) to electrical clips [red (+), black (-)], impedance 50 Ω , 2 m long		
	0311-5200	Metal BNC *1) to Isolated BNC, impedance 50 Ω , 2 m long		
Synchronization cable	AS30-505	Cable for synchronization between units or cases. D-Sub 9pin plug to D-sub 9 pin plug, 1.8m long		
Remote control cable	AS30-506-250	Control cable for unit or case D-Sub 9 pin plug to loose cable end (5 wires), 2.5 m long		
Relay cable *2)	AS30-501-001	AVAS30-501-001	Φ 9.6mm, 4core shielded, length 1m	 NDIS connector plug to plag
	AS30-501-002	AVAS30-501-002	Φ 9.6mm, 4core shielded, length 2m	
	AS30-501-005	AVAS30-501-005	Φ 9.6mm, 4core shielded, length 5m	
Extension cable *2)	AS30-502-001	AVAS30-502-001	Φ 9.6mm, 4core shielded, length 1m	 NDIS connector jack to plag
	AS30-502-002	AVAS30-502-002	Φ 9.6mm, 4core shielded, length 2m	
	AS30-502-005	AVAS30-502-005	Φ 9.6mm, 4core shielded, length 5m	

＊1) Common mode input voltage for metal BNC is ± 42 V (DC or AC peak value)
＊2) Cable lengths of 1 m, 2 m, 5 m, 10 m, 15 m, 20 m and 25 m are available. (Please contact our sales staff.)

[Other]

Product	Model	Standards
Traceability chart	AZ-TRB-AV	
Calibration certificate	AZ-KENSA-AS	Calibration certificate with inspection data

Product	Model	Standards
Instruction Manual	AZ-MANUAL1-EX	For AS3000 series
Instruction Manual	AZ-MANUAL1-EX	For AS2000 series

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