

MODEL 9400

400Vp-p Four Channel Signal Amplifier



- High voltage output to 400Vp-p ($\pm 200V$)
- Output current to 50mA
- Full power bandwidth from DC to $>500kHz$
- Slew rate to $400V/\mu s$
- Monitor Outputs for each channel
- Precise signal amplification for multiple applications
- Compatible with any of the Tabor waveform generators
- Special unipolar mode for MEMS engine drivers

Model 9400 was designed as a general purpose, wide band and high voltage amplifier however, with specific applications in mind. It has four channels built in a small case size to save space and cost but without compromising bandwidth and signal integrity.

Solve Common Problems

Model 9400 can output signals from $-200V$ to $+200V$ with continuous currents up to 50mA per channel. The output is driven from a 0.1W source and, with some degradation of its bandwidth, can drive capacitive loads up to 1nF, while maintaining its full amplitude range. Model 9400 has a rear-panel monitor output that divides the main output signal by 100 for applications that require monitoring of the output signal with low voltage sensors.

Modes of Operation

The 9400 has two modes of operation. The first is normal mode where each channel amplifies and outputs bipolar signals with a gain of x50. In this mode, the input signal is amplified and delivered to the output

terminals without modification of its original properties, except its amplitude level. Using this mode of operation, each channel can be used separately to amplify a unique signal.

The second mode of operation is the unipolar mode where the signal is applied to one input, rectified, amplified and output through two separate outputs. Using this mode, the amplifier is converted to a one-input, two-output system, specifically designed to operate the up/down and right/left actuators of a typical MEMS micro engine, as well as for other applications requiring the precise conversion of bipolar to unipolar signals.

Target Applications

The amplifier case was designed to stack on top or below other Tabor products. It can also be mounted alongside a Tabor generator in a standard 19" rack. The waveform-amplifier combo is an ideal solution for virtually any high-voltage, wide bandwidth application.

Safety

Safety played a major role during the design of the Model 9400. The high voltage path to the amplifier circuit is blocked by a front panel mechanical switch and accidental application of high power to the UUT is prevented by a safety latch. The 9400 will output high voltage signals only after the safety latch has been lifted and the high voltage switch flipped to ON position. In emergency situations, one can hit the protective latch to immediately remove the high voltage power from the output terminals. As an additional visual safety feature, a red light glows on the front panel whenever the high voltage is turned on.

MODEL 9400

400Vp-p Four Channel Signal Amplifier

Specification

CONFIGURATION

Channels:	
Single-ended:	4 separate inputs and 4 single-ended outputs, bipolar voltage span
Unipolar:	2 separate input, each having two output channels with 180° phase offset, unipolar voltage outputs

INPUT CHARACTERISTICS

Connectors:	Front panel BNCs
Impedance:	1M
Coupling:	DC
Amplitude Level:	8Vp-p ($\pm 4V$ peaks)
Frequency Range:	
Full Power	DC to 500 kHz
Unipolar Mode	DC to 200kHz
Max. Output Current:	50mA per channel

OUTPUT CHARACTERISTICS

GENERAL

Connectors:	Front panel BNCs
Source Impedance:	0.1
Load impedance:	Resistive, recommended for full power bandwidth spec, load resistance limited by the output current ; Capacitive, up to 100pF has minimal effect on bandwidth, 1nF reduces the full power bandwidth to 100kHz
Coupling:	DC
Protection:	Short-circuit, 10 seconds
Gain:	x50, fixed
Polarity:	Output normal; half wave rectified
Amplitude:	
Full Power	400Vp-p ($\pm 200V$)
Unipolar Mode	0 to +200V

SQUARE WAVE CHARACTERISTICS

Transition Time:	<1 μ s
Aberrations:	<10%

SINE WAVE CHARACTERISTICS

Bandwidth:	-3dB
Small Signal	1.5MHz, at 20Vp-p
Large Signal	500kHz, at 400Vp-p
Accuracy:	(2% of full-scale amplitude range + 50mV), Square wave at 1kHz
THD:	
10 Hz to 50 kHz	<0.1%
50 kHz to 200 kHz	<0.8%

OUTPUT MONITOR CHARACTERISTICS

Connectors:	Rear panel BNCs
Source Impedance:	3k
Load impedance:	1M
Ratio:	100:1, $\pm 10\%$

GENERAL

Voltage Range:	100V/115V/230V
Frequency Range:	47Hz to 63Hz
Power Consumption:	120W
Signal Ground:	Floated to the same level as the source, 250VDC max.
Dimensions:	
With Feet	315 x 102 x 395 mm (WxHxD)
Without Feet	315 x 88 x 395 mm (WxHxD)
Weight:	
Without Package	6.5kg
Shipping Weight	7.5kg
Temperature:	
Operating	0°C to 50°C
Storage	-40°C to 70°C
Humidity:	80% RH, non condensing
Safety:	CE Marked, IEC61010-1
Calibration:	1 years
Warranty ⁽¹⁾:	3 years standard

ORDERING INFORMATION

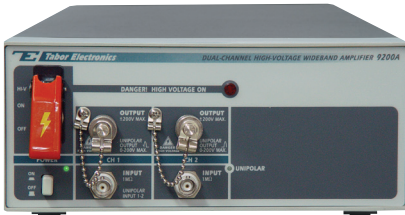
MODEL	DESCRIPTION
9400-50 ^(*)	400Vp-p Four Channel Signal Amplifier

^(*) Custom gain available upon request, however, bandwidth may change.

⁽¹⁾ Standard warranty in India is 1 year.

MODELS 9100A/9200A

400Vp-p Single / Dual Channel Signal Amplifiers



- High voltage output to 400Vp-p ($\pm 200V$)
- Output current to 125mA (9200A: 100mA per channel)
- Full power bandwidth from DC to $>500kHz$
- Slew rate to $400V/\mu s$
- Monitor Outputs for each channel
- Precise signal amplification for multiple applications
- Compatible with any of the Tabor waveform generators
- Special unipolar mode for MEMS engine drivers (9200A)

Model 9100A/9200A was designed as a general purpose, wide band and high voltage amplifier however, with specific applications in mind. It is built in a small case size to save space and cost but without compromising bandwidth and signal integrity.

Solve Common Problems

Model 9100A/9200A can output signals from $-200V$ to $+200V$ with continuous currents up to 125mA (9200A: 100mA per channel). The output is driven from a 0.1W source and, with some degradation of its bandwidth, can drive capacitive loads up to 1nF, while maintaining its full amplitude range. Model 9100A/9200A has a rear-panel monitor output that divides the main output signal by 100 for applications that require monitoring of the output signal with low voltage sensors.

Modes of Operation (9200A only)

The 9200A has two modes of operation. The first is normal mode where each channel amplifies and outputs bipolar signals with a gain of $\times 50$. In this mode, the input signal is amplified and delivered to the output

terminals without modification of its original properties, except its amplitude level. Using this mode of operation, each channel can be used separately to amplify a unique signal.

The second mode of operation is the unipolar mode where the signal is applied to one input, rectified, amplified and output through two separate outputs. Using this mode, the amplifier is converted to a one-input, two-output system, specifically designed to operate the up/down and right/left actuators of a typical MEMS micro engine, as well as for other applications requiring the precise conversion of bipolar to unipolar signals.

Target Applications

The amplifier case was designed to stack on top or below other Tabor products. It can also be mounted alongside a Tabor generator in a standard 19" rack. The waveform-amplifier combo is an ideal solution for virtually any high-voltage, wide bandwidth application.

Safety

Safety played a major role during the design of the Model 9100A/9200A. The high voltage path to the amplifier circuit is blocked by a front panel mechanical switch and accidental application of high power to the UUT is prevented by a safety latch. The 9100A/9200A will output high voltage signals only after the safety latch has been lifted and the high voltage switch flipped to ON position. In emergency situations, one can hit the protective latch to immediately remove the high voltage power from the output terminals. As an additional visual safety feature, a red light glows on the front panel whenever the high voltage is turned on.

MODELS 9100A/9200A

400Vp-p Single / Dual Channel Signal Amplifiers

Specification

CONFIGURATION

Channels:	
9100A	1 single-ended output
9200A	
Single-ended:	2 separate inputs and two single-ended outputs, bipolar voltage span
Unipolar:	1 separate input, having two output channels with 180° phase offset, unipolar voltage outputs

INPUT CHARACTERISTICS

Connectors:	Front panel BNCs
Impedance:	1M
Coupling:	DC
Amplitude Level:	8Vp-p ($\pm 4V$ peaks)
Frequency Range:	
Full Power	DC to 500 kHz
Unipolar Mode	DC to 200kHz
Max. Output Current:	
9100A	125mA
9200A	100mA

OUTPUT CHARACTERISTICS

GENERAL

Connectors:	Front panel BNCs
Source Impedance:	0.1
Load impedance:	Resistive, recommended for full power bandwidth spec, load resistance limited by the output current ; Capacitive, up to 100pF has minimal effect on bandwidth, 1nF reduces the full power bandwidth to 100kHz
Coupling:	DC
Protection:	Short-circuit, 10 seconds
Gain:	x50, fixed
Polarity:	Output normal; half wave rectified
Amplitude:	
Full Power	400Vp-p ($\pm 200V$)
Unipolar Mode	0 to +200V

SQUARE WAVE CHARACTERISTICS

Transition Time:	<1 μ s
Aberrations:	<10%

SINE WAVE CHARACTERISTICS

Bandwidth:	-3dB
Small Signal	1.5MHz, at 20Vp-p
Large Signal	500kHz, at 400Vp-p
Accuracy:	(2% of full-scale amplitude range + 50mV), Square wave at 1kHz
THD:	
10 Hz to 50 kHz	<0.1%
50 kHz to 200 kHz	<0.8%

OUTPUT MONITOR CHARACTERISTICS

Connectors:	Rear panel BNCs
Source Impedance:	3k
Load impedance:	1M
Ratio:	100:1, $\pm 10\%$
GENERAL	
Voltage Range:	100V/115V/230V
Frequency Range:	47Hz to 63Hz
Power Consumption:	120W
Signal Ground:	Floated to the same level as the source, 250VDC max.

Dimensions:	
With Feet	315 x 102 x 395 mm (WxHxD)
Without Feet	315 x 88 x 395 mm (WxHxD)
Weight:	
Without Package	6.5kg
Shipping Weight	7.5kg
Temperature:	
Operating	0°C to 50°C
Storage	-40°C to 70°C
Humidity:	80% RH, non condensing
Safety:	CE Marked, IEC61010-1
Calibration:	1 years
Warranty ⁽¹⁾:	3 years standard

ORDERING INFORMATION

MODEL	DESCRIPTION
9100A-50^(*)	400Vp-p Single Channel Signal Amplifier
9200A-50^(*)	400Vp-p Dual Channel Signal Amplifier

(*) Custom gain available upon request, however, bandwidth may change.

⁽¹⁾ Standard warranty in India is 1 year.

MODELS 9100/9200

300Vp-p Single / Dual Channel Signal Amplifiers



- High voltage output to 300Vp-p ($\pm 150V$)
- Output current to 150mA (9200: 100mA per channel)
- Full power bandwidth from DC to >500kHz
- Slew rate to 200V/ μ s
- Low distortion
- Low cost
- Custom Configuration of:
 - Gain
 - Signal Ground

Model 9100/9200 is a Single/Dual Channel, 2U, half-rack size, bench-top power amplifier designed for signal amplification. With unprecedented signal purity, Model 9100/9200 amplifies signals from DC to over 500kHz. The unit has a fixed gain of x15 however the same amplifier is available with custom gain and no signal purity or performance degradation whatsoever.

Solves Common Problems

Model 9100/9200 operates as an amplifying buffer for signals emitted from waveform, function, or pulse generators. Most of these generators produce signals limited to 20Vp-p into high impedance. Model 9100/9200 can convert these voltages to levels as high as 300Vp-p. The amplifier has a current driving capability of $\pm 150mA$ (9200: $\pm 100mA$ per channel) from a 0.1W source. While the output can drive small capacitive or inductive loads, for full high speed potential it is recommended that the load characteristics should be mainly resistive. Model 9100/9200 can withstand load capacitance and inductance up to 100pF and 0.5mH without any performance deterioration

Ground Level

The advanced power amplifier is supplied with floating input and output connectors allowing flotation from ground level up to 250VDC. The only limitation is that both the input and output grounds must connect to the same level. This capability is extremely important in applications where the amplifying device must reside on the same ground level as its source. The floating capability can be added or removed using a simple, user-accessible, jumper connection.

Target Applications

The amplifier case was designed to stack on top or below other Tabor products. It can also be mounted alongside a Tabor generator in a standard 19" rack. The waveform-amplifier combo is an ideal solution for virtually any high-voltage, wide bandwidth application.

Cost Effective Solution

Model 9100/9200 power amplifier is yet another of Tabor's cost-effective solutions for a full range of high voltage applications.

MODELS 9100/9200

300Vp-p Single / Dual Channel Signal Amplifiers

Specification

CONFIGURATION

Channels:	
9100	1 single-ended output
9200	2 single-ended outputs

INPUT CHARACTERISTICS

No. of channels:	1/2
Connector:	Front panel BNCs
Impedance:	1M Ω , DC coupled
Damage Level:	50Vp-p
Frequency Range:	DC to 500kHz

OUTPUT CHARACTERISTICS

GENERAL

Connector:	Front panel BNCs
Impedance:	0.1 Ω , DC coupled
Protection:	Short-circuit, 10 seconds
Gain:	x15 ⁽²⁾ , fixed
Polarity:	Normal
Amplitude:	0 to 300Vp-p ($\pm 150V$)
Max. Output Current:	
9100	150mA
9200	100mA

SQUARE WAVE CHARACTERISTICS

Transition Time:	< 1.5 μ s
Aberrations:	< 15%

SINE WAVE CHARACTERISTICS

Bandwidth:	-3dB
Small Signal	1MHz, at 20Vp-p
Large Signal	500kHz, at 300Vp-p
Accuracy:	\pm (2% of full-scale amplitude range + 25mV), Square wave at 1kHz
THD:	
10Hz to 10kHz	< 0.1%
10kHz to 200kHz	< 1.2%,

GENERAL

Voltage Range:	100V/115V/230V
Frequency Range:	47Hz to 63Hz
Power Consumption:	60W
Signal Ground:	Floated to the same level as the source, 250VDC max.

Dimensions:	
With Feet	315 x 102 x 395 mm (WxHxD)
Without Feet	315 x 88 x 395 mm (WxHxD)

Weight:	
Without Package	6kg
Shipping Weight	7kg

Temperature:	
Operating	0°C to 50°C
Storage	-40°C to 70°C

Humidity:	80% RH, non condensing
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Safety:	CE Marked, IEC61010-1
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Calibration:	1 years
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Warranty ^(*) :	3 years standard
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ORDERING INFORMATION

MODEL	DESCRIPTION
9100-15-G ⁽¹⁾	300Vp-p Single Channel Signal Amplifier
9200-15-G ⁽¹⁾	300Vp-p Dual Channel Signal Amplifier
Gain:	10 through 20, fixed ⁽²⁾
Signal Ground:	G = Tied to Ground; F = Floated Ground

⁽¹⁾ Standard Configuration

⁽²⁾ Custom gain from x10 to x20 can be ordered however, bandwidth cannot be maintained. Consult the factory before ordering gain above 15.

⁽³⁾ Specification is given for the standard configuration only

^(*) Standard warranty in India is 1 year.