

Senstech SA-011-1500

Mini Signal Amplifier

The Senstech signal amplifier simplifies the evaluation of the sensor signals and makes them less sensitive to interference. The gain is matched to the measuring range of the sensors – either in positive load direction or in both directions, depending on the variant. The amplifier module is available with integrated voltage regulator (supply voltage from 12V, output signal range 0-10V) and without regulator (supply voltage from 2.2V, e.g. suitable for connection to Arduino boards).



Features

- Wide power supply ranges (2.2-18 V or 12-25 V)
- Low power (approx. 1 mA supply current at 3.3 V)
- Rail-to-rail output swing
- Excellent AC and DC performance thanks to an AD627 instrumentation amplifier

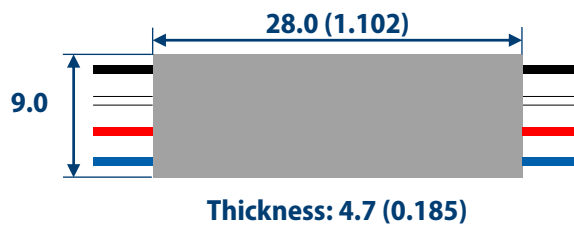
Application Examples

- Suitable for all Senstech force sensors without integrated amplifier
- Connect sensors directly to ADC input pins
- Improve the signal-to-noise ratio when using a long cable (e.g. in vehicles or industrial applications)

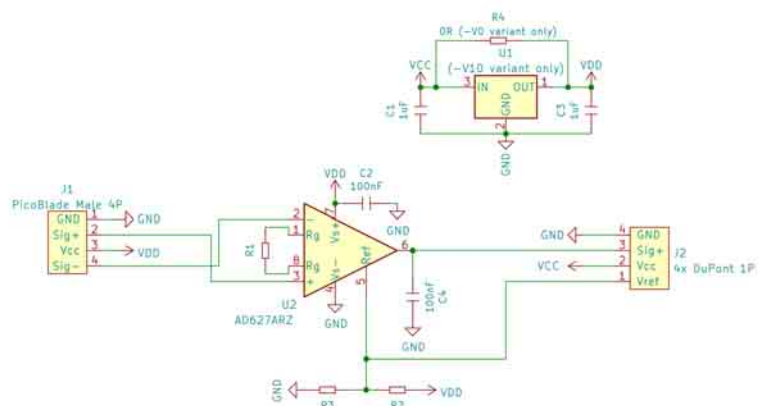


All dimensions in millimeters
(in parentheses: inches)

Dimensions



Circuit Schematic

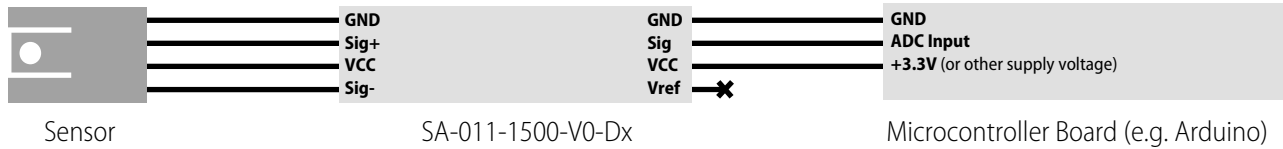


Electrical Interface and Pin Assignment

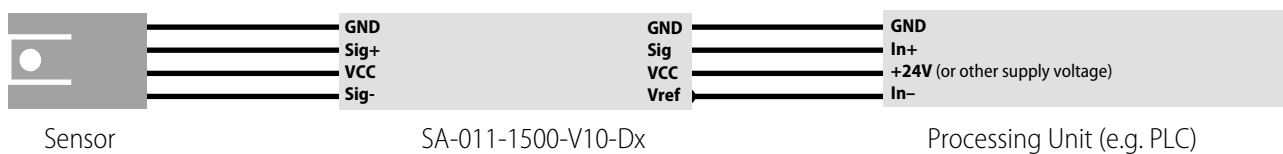
	Sensor side	User side
Wires	Stranded wires, 150 ±15 mm length, 28AWG	
Connector	Male 4P Molex PicoBlade	4x Female 1P «DuPont»
Mating connector	Molex Art.no. 510210400	Any 2.54mm-pitch contact pins
Pin 1: Black	Supply Ground	Supply Ground
Pin 2: White	Sensor signal +	Amplified sensor signal
Pin 3: Red	Internal supply (VDD)	Supply Voltage (VCC)
Pin 4: Blue	Sensor signal -	Reference voltage (Vref)

Application Circuits

Single-ended operation: The amplifier output is connected to a single, unipolar ADC input pin. In this configuration, the reference voltage is not required. This is the recommended configuration for the **-V0-** variants (without voltage regulator). The supply voltage (VCC) also serves as the ADC reference voltage. When using this configuration with the **-V10-** variants, fluctuations in VCC will cause measuring errors.



Differential operation: The amplifier outputs «Sig» and «Vref» can be connected to a differential analog input. This is the recommended configuration for the **-V10-** variants. The output signal against Vref will be between 0 and 10 V (-V10-D1) or between -5 and +5 V (-V10-D2), respectively.



Environmental Specifications

	Min	Typ	Max	Units	Notes/Conditions
Temperature range					
- Operation	-40		85	°C	
- Storage	-65		125	°C	
Ambient humidity	0		95	%RH	Non-condensing
Ingress protection		IP65			

Operating Specifications

	Min	Typ	Max	Units	Notes/Conditions
Supply current		1.0		mA	-V0- variants, VCC = 3.3 V
		3.3		mA	-V0- variants, VCC = 12 V
		7.1		mA	-V10- variants, VCC = 12 V
Output voltage offset	-60		60	mV	-D1 variants, VDD = 10 V, Sig+ = Sig- = 5 V
	-30		30	mV	-D2 variants, VDD = 10 V, Sig+ = Sig- = 5 V
	-150		150	mV	-D3 variants, VDD = 10 V, Sig+ = Sig- = 5 V
Thermal shift for output voltage		±50		ppm/°C	-V0- variants
		±150		ppm/°C	-V10- variants
Gain nonlinearity		100		ppm	
Thermal shift for gain		-75		ppm/°C	
Common-Mode Rejection Ratio DC to 60 Hz with 1 kΩ Source Imbalance	77	90		dB	

Variants and Ordering Information

SA-011-1500-Vxx-Dx

Voltage Regulator

Code	Voltage Regulator	Supply Voltage (VCC) Range	Internal Supply Voltage (VDD)
<u>V0</u>	None	2.2 V ... 18 V	Equal to VCC
<u>V10</u>	10 V type	12 V ... 25 V	10.0 ±0.2 V

Signal Range & Amplifier Gain

Code	Sensor Signal Range (Sig+ vs. Sig-)	Single-ended Output Range (Sig vs. GND)	Reference Voltage (Vref vs. GND)	Amplifier Gain	Remarks
<u>D1</u>	0.0 mV/V ... 3.0 mV/V	0.01 V/V ... 0.994 V/V	0.0101 V/V ±5%	328.1 ±5.0	-V0-D1 variant
	0.0 mV ... 30.0 mV	0.1 V ... 9.94 V	0.101 ±0.005 V	328.1 ±5.0	-V10-D1 variant
<u>D2</u>	-3.01 mV/V ... 2.97 mV/V	0.0 V/V ... 0.994 V/V	0.500 V/V ±5%	166.3 ±2.5	-V0-D2 variant
	-30.1 mV ... 29.7 mV	0.0 V ... 9.94 V	5.00 ±0.25 V	166.3 ±2.5	-V10-D2 variant
<u>D3</u>	0.0 mV/V ... 0.979 mV/V	0.01 V/V ... 0.994 V/V	0.0504 V/V ±5%	1005 ±15	-V0-D3 variant
	0.0 mV ... 9.79 mV	0.1 V ... 9.94 V	0.504 ±0.025 V	1005 ±15	-V10-D3 variant

Revision History

Rev.	Date	Comments
1	2023-04-28	Initial release
2	2024-08-16	Added -D3 variants, corrected offset & gain tolerances