FUTEK
ADVANCED SENSOR TECHNOLOGY, INC.

Quick Start Guide

CSG110

Strain Gauge Universal Amplifier

Sensor Solutions Source
Load · Torque · Pressure · Multi-Axis · Calibration · Instruments · Software

www.futek.com

Getting Help

TECHNICAL SUPPORT

For more CSG110 support, please visit: http://www.futek.com/csg/support.aspx

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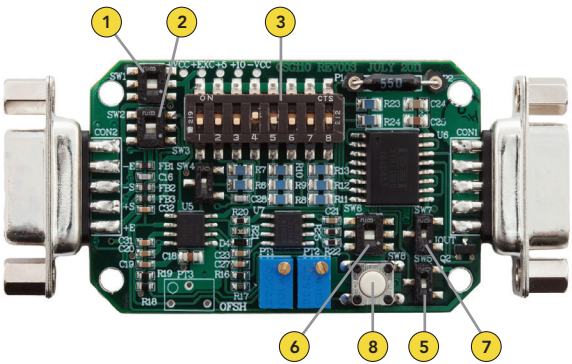
FEMALE

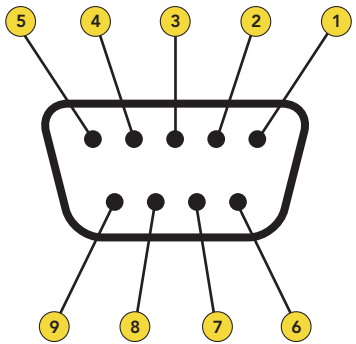


MALE

CSG110 Sensor Side Connections

IMPORTANT NOTE: Do not connect the device to the power supply when the power supply is already on.

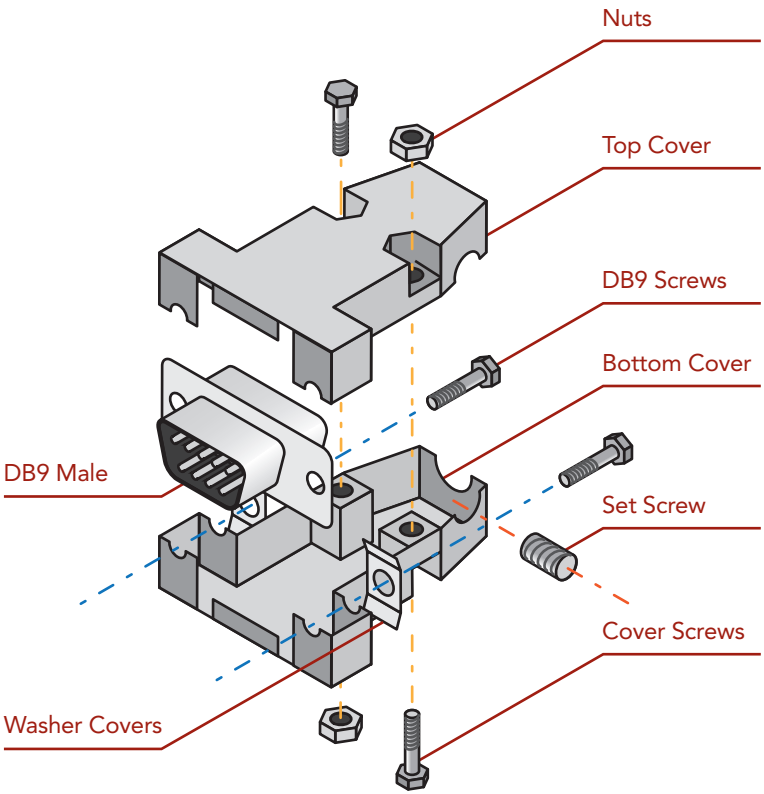
FEMALE DB9 SENSOR SIDE	
PIN #	**WIRING CODE**
1	+ EXCITATION[1]
2	+ SIGNAL
3	– SIGNAL
4	– EXCITATION[1]
5	GROUND
6	GROUND
7	GROUND
8	GROUND
9	GROUND



[1] For 6 wire sensors connect +SENSE to +EXCITATION and –SENSE to –EXCITATION or ground. **Note:** Shielding can be connected to any available ground. All grounds are connected together and pass through the CSG110.

Sensor DB9 Assembly

MALE DB9 CONNECTOR (SUPPLIED)



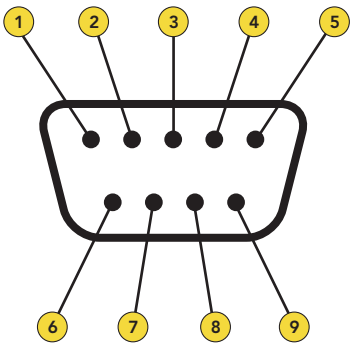
Information about your sensor, including a spec sheet with wiring, can be found on our website (www.futek.com). You can find it by using the search feature to search by the sensor serial number, model number, or item number. Also, a wiring calculator listing the connections to the CSG110 is available at **http://www.futek.com/wirecode.aspx**

CSG110 Power Side Connections

IMPORTANT NOTE: Do not connect the device to the power supply when the power supply is already on.

MALE DB9 POWER SIDE

PIN #	WIRING CODE	CABLE COLOR CODE
9	POWER SUPPLY	RED
8	SIGNAL OUT (VOLTAGE)	GREEN
7	GROUND	ORANGE
6	GROUND	BLACK
5	GROUND	N/A
4	GROUND	N/A
3	GROUND	N/A
2	GROUND	BLUE
1	SIGNAL OUT (CURRENT)[2]	WHITE



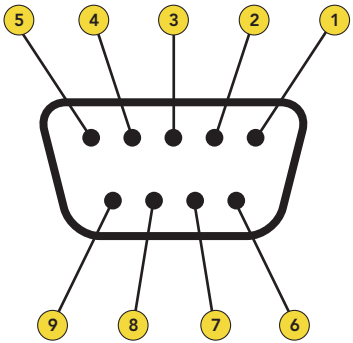
[2] Only available with current output option. **Note:** All grounds are connected together and pass through the CSG110.

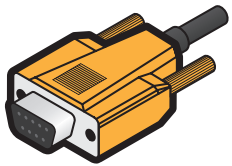
Included Power Side DB9 Cable

IMPORTANT NOTE: Do not connect the device to the power supply when the power supply is already on.

FEMALE DB9 POWER SIDE (SUPPLIED)

PIN #	WIRING CODE	CABLE COLOR CODE
1	SIGNAL OUT (CURRENT)	WHITE
2	RETURN (CURRENT)	BLUE
6	GROUND (POWER)	BLACK
7	RETURN (VOLTAGE)	ORANGE
8	SIGNAL OUT (VOLTAGE)	GREEN
9	SUPPLY POWER	RED
–	SHIELD	N/A





Voltage Setup Steps

IMPORTANT NOTE: Do not connect the device to the power supply when the power supply is already on.

1. Set SW 1 down for 10 VDC excitation or up for 5 VDC excitation. By default the CSG110 is set to 10 VDC at FUTEK.
2. Set the gain DIP switch (SW3) to the appropriate gain level. By default the gain is set with switch 4 up for a 2 mV/V sensor. (Utilize our online gain setting Excel sheet on the FUTEK CSG110 support page to find the appropriate gain DIP switch setting for your sensor's mV/V output.)
3. With the sensor and CSG110 completely connected apply the 14 to 26 VDC power to the CSG110.

Note: Adjusting the Span will affect any system calibrations. Adjusting zero will not affect calibration.

4. With no load on the sensor adjust the Zero potentiometer until the output voltage is as close to 0 VDC as possible.
5. With a known load placed on the sensor adjust the Span potentiometer to as close to the appropriate output level as possible. For example, 10 VDC for a full load output.
6. Remove the load and reconfirm the zero load output, and then reapply the known load and re-confirm the span output.

FUTEK's online calibration tool allows you to retrieve a summary of your sensor's calibration data: **http://www.futek.com/calibrationData.aspx**

Current Setup Steps

IMPORTANT NOTE: Do not connect the device to the power supply when the power supply is already on.

1. The voltage output of the CSG110 is passed through a current converting phase. This means the prior Excitation and Gain setting steps of the voltage setup must be performed first.
2. The configured voltage output will become the input range for the current conversion phase. Using DIP switches 5, 6, and 7, set the desired current output range.

Continued on page 11

SW5	SW6	SW7	Input Range	Output Range
▼	▼	▼	0–10 V	4–20 mA
▼	▼	▲	0–10 V	5–25 mA
▲	▼	▼	0–10 V	0–16 mA
▲	▼	▲	0–10 V	0–20 mA
▼	▲	▼	0–5 V	4–20 mA
▼	▲	▲	0–5 V	5–25 mA
▲	▲	▼	0–5 V	0–16 mA
▲	▲	▲	0–5 V	0–20 mA

Current Setup Steps

3. With the sensor and CSG110 completely connected apply the 14 to 26 VDC power to the CSG110.
4. With no load on the sensor adjust the Zero potentiometer until the output current is as close to the zero load output level as possible.
5. With a known load placed on the sensor adjust the Span potentiometer to as close to the appropriate output level as possible. For example, 20 mA for a full load output.
6. Remove the load and reconfirm the zero load output, and then reapply the known load and re-confirm the span output.

Note: Adjusting the Span will affect any system calibrations. Adjusting zero will not affect calibration.

DIP Switch Description

DIP Switch 1: Excitation

- The Excitation is the voltage supplied from the CSG110 to the sensor and can be 5 VDC or 10 VDC.
- It is recommended to use a higher excitation, if applicable, as less gain will be needed which will reduce noise.

DIP Switch 2: Polarity

- The polarity switch can be used to change the polarity of the incoming signal to the CSG110.
- For example, if tension is negative it can be made positive through DIP Switch 2.

EXCITATION SW1	
Position	**Excitation**
▲	5 VDC
▼	10 VDC

POLARITY SW2	
Position	**Polarity**
▲	REVERSE
▼	STRAIGHT

DIP Switch Description

DIP Switch 3: Sensitivity (Gain)

- The Sensitivy DIP switch controls the gain needed to obtain the desired output level from the CSG110. For example, ±10 VDC.

SENSITIVITY SW3

Switch	Position	Sensitivity
1	▲	0.5 mV/V
	▼	N/A
2	▲	1 mV/V
	▼	N/A
3	▲	1.5 mV/V
	▼	N/A
4	▲	2 mV/V
	▼	N/A

Switch	Position	Sensitivity
5	▲	2.5 mV/V
	▼	N/A
6	▲	3 mV/V
	▼	N/A
7	▲	4 mV/V
	▼	N/A
8	▲	10 mV/V
	▼	N/A

DIP Switch Description

DIP Switch 5, 6, and 7: Current Setting

- The voltage output from the CSG110 is passed through a current conversion phase. As a result the current output range is based on the voltage output level, (Input Range), from the CSG110.

CURRENT SETTING				
SW5	**SW6**	**SW7**	**Input Range**	**Output Range**
▼	▼	▼	0–10 V	4–20 mA
▼	▼	▲	0–10 V	5–25 mA
▲	▼	▼	0–10 V	0–16 mA
▲	▼	▲	0–10 V	0–20 mA
▼	▲	▼	0–5 V	4–20 mA
▼	▲	▲	0–5 V	5–25 mA
▲	▲	▼	0–5 V	0–16 mA
▲	▲	▲	0–5 V	0–20 mA

Shunt Resistor

Shunt is used to simulate a load on the sensor by using an internal resistor labeled 'RSH' on the CSG110 circuit board.

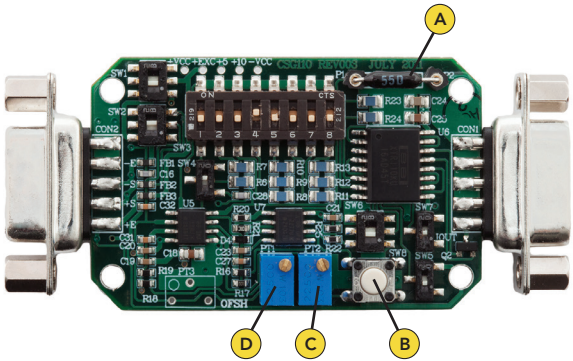
The resistor will be connected to the –Excitation and –Signal of the sensor when the shunt button is pressed.

The internal resistor can be removed and replaced.

To perform a shunt, press the white SHUNT button with no load on the load cell.

Calibrating using Shunt:

1. The Shunt can be used in calibration by adjusting the Span Potentiometer while holding the shunt button.
2. Adjust the output voltage from the CSG110 until the output is as close to the appropriate value for the shunt.



A Shunt Resistor

B Shunt

C Span

D Zero

The online Shunt calculator on the FUTEK website can be used to calculate an estimated result from a shunt resistance, or to calculate a resistance needed for a certain sensor output value when shunted. **http://www.futek.com/shuntcalc.aspx**

Specifications

VERSIONS		
ITEM #	**BANDWIDTH**	**OUTPUT**
FSH01449	1 kHz	±5 VDC, ±10 VDC, 0–20 mA, 4–20 mA, 0–16 mA , 5–25 mA
FSH03546[3]	1 kHz	±5 VDC, ±10 VDC
QSH00602[4]	10 kHz	±5 VDC, ±10 VDC, 0–20 mA, 4–20 mA, 0–16 mA , 5–25 mA
QSH01498[5]	25 kHz	±5 VDC, ±10 VDC, 0–20 mA, 4–20 mA, 0–16 mA , 5–25 mA
FSH03676	1 kHz	0–2.5-5 VDC , 0–5–10 VDC, 0–10–20 mA, 4–12–20 mA

[3] For FSH03546: Min. Power Supply is 12.5 VDC
[4] Only for sensitivity of 1 mV/V or greater
[5] Only for sensitivity of 1.5 mV/V or greater

Specifications

ENVIRONMENT				
PARAMETER	**MIN**	**TYPICAL**	**MAX**	**UNIT**
Operating Temperature	32		158	°F
	0		70	°C
Storage Temperature	–40		185	°F
	–40		85	°C

Relative Humidity: 95% at 100°F (39°C)
IP Rating: IP31

Specifications

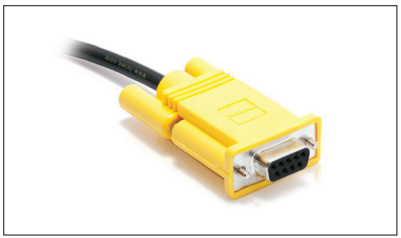
ELECTRICAL SPECIFICATIONS				
PARAMETER	**MIN**	**TYPICAL**	**MAX**	**UNIT**
Power Supply[6]	14		26	VDC
Current Dissipation[7]		30		mA
Output Impedance (voltage)		<1		Ohms
Output Impedance (current)			700	Ohms
Sensor Impedance	100			Ohms
Bandwidth	1000		25000	Hz
Common Mode Rejection Ratio	120			dB

[6] Minimum power supply varies for OEM models
[7] No load applied (input or output)

Specifications

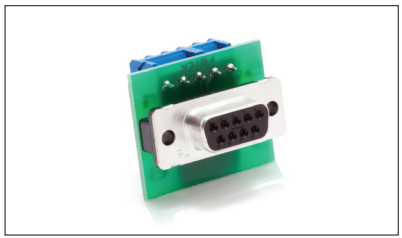
ELECTRICAL SPECIFICATIONS (CONTINUED)				
PARAMETER	**MIN**	**TYPICAL**	**MAX**	**UNIT**
Noise		15		mV p-p
Output Span Range	–10		10	% of Rated Output
Output Zero Range	–10		10	% of Rated Output
Gain Drift with Temperature	–25	X	25	PPM of FSR per degree Celsius
Gain Non-Linearity (Better than)	–0.01	X	0.01	% of FSR
Zero Drift with Temperature	–25	X	25	PPM of FSR per degree Celsius

Related Accessories

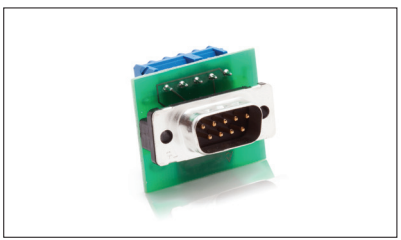


YELLOW MOLDED BOOT (INCLUDED)
Item Number: FSH03219

DB9 MALE WITH HOUSING (INCLUDED)
Item Number: FSH01075

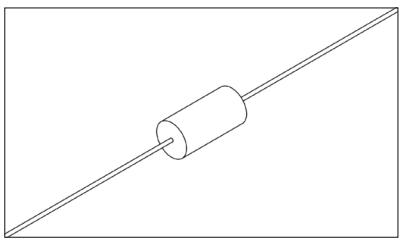


SCREW TERMINAL (FEMALE)
Item Number: FSH02237



SCREW TERMINAL (MALE)
Item Number: FSH02236

POWER SUPPLY KIT
Item Number: FSH03088



SHUNT RESISTOR
Item Number: Visit Website

Troubleshooting Tips

To prevent damage, make sure all connections to the CSG110 are completed before turning on the power to the CSG110.

It is best to troubleshoot the CSG110 and the sensor when both are completely removed from the application and fixtures. Utilizing a voltmeter instead of an instrument or PLC will help narrow down the challenge.

If another CSG110 or sensor is available, a swap may help confirm where the challenge arises.

The CSG110 outputs a consistent high voltage or current.

1. A high non-changing voltage (or current) output from the CSG110 usually indicates an open on the sensor side. Confirm the wiring in the sensor DB9. Also, a resistance check can be done on the sensor connections (±Excitation and ±Signal) to confirm there is no open or short in the sensor. The sensor spec sheet or calibration certificate will list the sensor's bridge resistance.
2. Shorting the ±Signal connections on the CSG110 Sensor Side (pins 2 and 3) with the sensor disconnected should result in 0 VDC output from the CSG110. This can be useful to confirm if the CSG110 is responding to a change in the load.
3. Confirm that the gain level is set appropriately. A high gain may drive the output of the CSG110 to full output.
4. Confirm the sensor has not been overloaded and now has a constant high output. If possible, remove the ±Signal wires from the sensor and confirm the zero output, with a voltmeter, while utilizing the power from the CSG110 to the ±Excitation wires.

Troubleshooting Tips

The CSG110 has no output or low, non-changing output.

1. Confirm the power to the CSG110 is between 14 and 26 VDC.
2. Confirm there is not a short on the sensor side to the CSG110. Using a voltmeter, the resistance can be confirmed in the sensor ±Excitation and ±Signal connections for any possible shorts.
3. When utilizing a current output, the current will only flow positive — which means a negative output from the sensor may result in a non-changing current output from the CSG110, or a slight decrease in the CSG110 output.

Note: See the FUTEK website for an offset CSG110 to shift the zero to accomodate a bidirectional output for current.

For more CSG110 support, please visit:
http://www.futek.com/csg/support.aspx

Notes

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