



Universal Strain Gage/Load Cell Amplifier MCR-Strain Gage

Data Sheet 1520C

October 2003

Features

- Accepts all types of strain gage and load cells
- 120 Ω to 20,000 Ω bridge resistance
- 1.25 -12 volt adjustable excitation
- Selectable filter/response time
- 3-way 1,000 volts isolation (2-way for Low Noise version)
- Output options (± 10 , 0-10, ± 5 , 0-5 volts, 4-20 mA)
- Voltage and shunt calibration options

Sensors Supported

- Load cells
- Strain gages
- Torque transducers
- Pressure transducers
- Accelerometers (Piezoresistive)

Description

The DIN-rail mountable MCR-Strain Gage signal conditioner provides everything needed to amplify and condition all varieties of strain gage and load cell sensors and delivers highly accurate signal outputs. The MCR-Strain Gage amplifier includes 1,000 V three-way galvanic isolation between the power supply, input, and output circuits.

The MCR-Strain Gage amplifier provides DIP switch selectable sensor style, filter/frequency response and amplifier gain. Sensors may be connected with a 3, 4 or 6 wire configuration. The module offers an adjustable excitation that provides a stable, low noise voltage. Current limiting and thermal protection is provided for extra protection.



Figure 1. MCR-Strain Gage Module

Maximum resolution of measurement data is achieved with a multi-stage differential amplifier. The module also filters and conditions strain gage signals with four-pole Butterworth low-pass filters utilizing DIP switch selectable cutoff frequencies to accommodate static and dynamic (high speed) applications.

The MCR-Strain Gage amplifier provides outputs for voltage (0-5, 0-10, or ± 5 , ± 10 volts for low noise version) and current loop (4-20 mA) operation. The low noise module is calibrated using either an internal 5 mV precision reference or a shunt resistor across one arm of the strain gage bridge. A built-in relay version is also available to accommodate test and measurement high precision applications. An over voltage alarm LED lights when the signal is outside the ± 10 volt limits of operation alerting the user of any signals exceeding the recommended output rating.

Ordering Information

<u>Part Description</u>	<u>Part Number</u>
MCR-SGA-4/6-DC	56 04 05 8
MCR-Strain Gage Module (ultra low noise version for scientific use)	56 03 00 7

Universal Strain Gage/Load Cell Amplifier - MCR-Strain Gage

Table 1. MCR-SGA-4/6-DC Specifications

Technical Specifications	
Electrical performance: $V_s=24\text{ Vdc}$; $T_c=25^\circ\text{C}$ unless otherwise specified	
Measurement Input/Output	
Bridge resistance	120...20,000 Ω
Excitation voltage	1.25...12 V
Excitation current (short circuit and thermally protected)	100 mA
Amplification range (10 steps)	1...2,000 V/V
Input impedance of amplifier	10 G Ω
Sensor input ranges	0.1...200 mV/V
Amplification trim	90...110%
CMRR at a gain of 1000	110 dB
Zero adjust	0 to +10 V
Filter -3dB cutoff frequency (2 choices)	30/1,000 Hz
Filter cutoff frequency accuracy	5%
Peak-to-peak noise at gain of 1	7 mVp-p
Peak-to-peak noise at gain of 2,000	12 mVp-p
RMS noise at gain of 500	.5 mV _{RMS}
Rise time for 1,000 Hz filter (10-90%)	0.4 ms
Rise time for 30 Hz filter (10-90%)	13 ms
Accuracy	0.01...0.1%
Zero offset temperature drift	0.05%FSO/ $^\circ\text{C}$
Isolation of input, output and power supply grounds	1,000 V
Voltage output (0-5, 0-10) load resistance	1,000 Ω
Current output (4-20 mA) load resistance	525 Ω
Supply voltage (V_s)	11...30 V
Operating current with 350 Ω full bridge at 10 V excitation	78 mA

Environmental Requirements	
$V_s=24\text{ Vdc}$ unless otherwise specified	
Parameter	
Operating temperature	-25...+70 $^\circ\text{C}$
Storage temperature	-40...+85 $^\circ\text{C}$
Humidity, non-condensing	10 to 90%
Attitude	3,300 meters
Atmosphere	non-flammable, non-corrosive and dust free

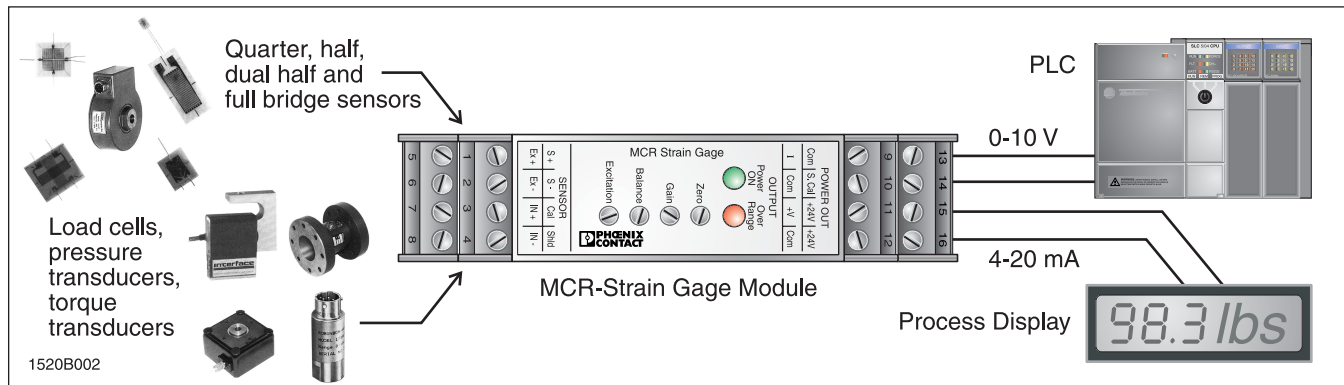
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Table 2. Low Noise Version Specifications

Technical Specifications	
Electrical performance: $V_s=24\text{ Vdc}$; $T_c=25^\circ\text{C}$ unless otherwise specified	
Measurement Input/Output	
Bridge resistance	120...20,000 Ω
Excitation voltage	1.25...11.8 V
Excitation current (short circuit and thermally protected)	100 mA
Amplification range (13 steps)	1...10,000 V/V
Input impedance of amplifier	10 G Ω
Sensor input ranges	0.1...1,000 mV/V
Amplification trim	90...110%
CMRR at a gain of 1,000	110 dB
Zero adjust	-10 to +10 V
Filter cutoff frequency (2 choices)	30/5,000 Hz
Filter cutoff frequency accuracy	5%
RTI noise (0-5 kHz)	2.75 $\mu\text{Vp-p}$
RTO noise (0-5 kHz)	.3 mVp-p
Rise time for 5,000 Hz filter (10-90%)	0.08 ms
Rise time for 30 Hz filter (10-90%)	13 ms
Accuracy	0.01...0.1%
Zero offset temperature drift	0.005%FSO/ $^\circ\text{C}$
Isolation of input, output and power supply grounds	1,000 V
Voltage output (± 10 , 0-10) load resistance	1,000 Ω
Current output (4-20 mA) load resistance	600 Ω
Supply voltage (V_s)	15...30 V
Operating current with 350 Ω full bridge at 10 V excitation	120 mA

Physical Specifications	
Parameter	
Enclosure type	DIN-EN rail mount, Phoenix ME 22.5 base: 0.89" wide, 3.90" high, 4.37" deep
Enclosure size	
Weight	4.7 oz. (0.29 lb)
Terminals	screw terminal type, 12 AWG, Phoenix COMBICON

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Figure 2. Application Example and Connection Example

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