



**TECHMOR**

---

**SG-1-C**

**STRAIN GAGE AMPLIFIER W/ CAN OUTPUT**

**USER MANUAL**

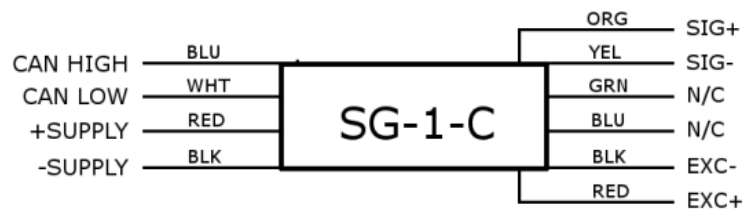
Rev. D 11/21/2020

## Overview

The Techmor SG-1-C is a precision strain-gage amplifier with CAN bus output. The SG-1-C outputs a 5 volt excitation for the strain-gage. The strain-gage amplifier gain, offset and CAN ID of the unit can be changed via CAN bus messages.

## Connections

All connections to the SG-1-C are through the two multi-conductor cables on either end of the enclosure.



## Input

The SG-1-C accepts a four wire strain-gage input. The inputs are accessed via the 6-conductor cable on the “Input” side of the enclosure. The channels are single-ended and share a common ground.

## Electrical

The SG-1-C can be supplied with 6-24V DC via the red and black wires on the 4-conductor cable on the “Power/CAN” side of the enclosure.

|                    |        |    |
|--------------------|--------|----|
| Supply Voltage     | 6 - 24 | V  |
| Current (No Load)  | 50     | mA |
| Excitation Voltage | 5      | V  |

## CAN Bus Message Format

CAN Message Bits

| Message ID | Bits 0-15 | Bits 16-31 | Bits 32-47 | Bits 48-63 |
|------------|-----------|------------|------------|------------|
| 0xXXX(hex) | Output    | n/a        | n/a        | Serial #   |

Note: All Messages are Unsigned 16-bit Words (U16)

## CAN BUS Message Decode

|                               |                    |  |
|-------------------------------|--------------------|--|
| Voltage (after amplification) | 10,000 Counts = 1V |  |
|-------------------------------|--------------------|--|

## Changing Parameters via CAN Messages

The parameters of the SG-1-C can be set by the user by sending special programming messages to the unit. The message format is as follows:.

### Change CAN ID

| Message ID | Bits 0-15 | Bits 16-31 | Bits 32-47                       | Bits 48-63                        |
|------------|-----------|------------|----------------------------------|-----------------------------------|
| 0x7FE      | 0x9269    | 0x0000     | ID to write<br>(0x0 to<br>0x7FC) | Serial # of<br>device to<br>prog. |

### Change 1<sup>st</sup> Stage Gain

| Message ID | Bits 0-15 | Bits 16-31 | Bits 32-47              | Bits 48-63                        |
|------------|-----------|------------|-------------------------|-----------------------------------|
| 0x7FE      | 0x9269    | 0x0008     | Code<br>from<br>Table 1 | Serial # of<br>device to<br>prog. |

### Change 2<sup>nd</sup> Stage Gain

| Message ID | Bits 0-15 | Bits 16-31 | Bits 32-47              | Bits 48-63                        |
|------------|-----------|------------|-------------------------|-----------------------------------|
| 0x7FE      | 0x9269    | 0x0009     | Code<br>from<br>Table 2 | Serial # of<br>device to<br>prog. |

### Change Offset

| Message ID | Bits 0-15 | Bits 16-31 | Bits 32-47              | Bits 48-63                        |
|------------|-----------|------------|-------------------------|-----------------------------------|
| 0x7FE      | 0x9269    | 0x000A     | Code<br>from<br>Table 3 | Serial # of<br>device to<br>prog. |

**Table 1**  
**First Stage Gain**

| Code | Gain  | Code | Gain  | Code | Gain  | Code | Gain  |
|------|-------|------|-------|------|-------|------|-------|
| 0000 | 4     | 0020 | 4.503 | 0040 | 5.069 | 0060 | 5.706 |
| 0001 | 4.015 | 0021 | 4.52  | 0041 | 5.088 | 0061 | 5.727 |
| 0002 | 4.03  | 0022 | 4.536 | 0042 | 5.107 | 0062 | 5.749 |
| 0003 | 4.045 | 0023 | 4.553 | 0043 | 5.126 | 0063 | 5.77  |
| 0004 | 4.06  | 0024 | 4.57  | 0044 | 5.145 | 0064 | 5.791 |
| 0005 | 4.075 | 0025 | 4.587 | 0045 | 5.164 | 0065 | 5.813 |
| 0006 | 4.09  | 0026 | 4.604 | 0046 | 5.183 | 0066 | 5.834 |
| 0007 | 4.105 | 0027 | 4.621 | 0047 | 5.202 | 0067 | 5.856 |
| 0008 | 4.12  | 0028 | 4.638 | 0048 | 5.221 | 0068 | 5.878 |
| 0009 | 4.135 | 0029 | 4.655 | 0049 | 5.241 | 0069 | 5.9   |
| 000A | 4.151 | 002A | 4.673 | 004A | 5.26  | 006A | 5.921 |
| 000B | 4.166 | 002B | 4.69  | 004B | 5.28  | 006B | 5.943 |
| 000C | 4.182 | 002C | 4.707 | 004C | 5.299 | 006C | 5.965 |
| 000D | 4.197 | 002D | 4.725 | 004D | 5.319 | 006D | 5.988 |
| 000E | 4.213 | 002E | 4.742 | 004E | 5.339 | 006E | 6.01  |
| 000F | 4.228 | 002F | 4.76  | 004F | 5.358 | 006F | 6.032 |
| 0010 | 4.244 | 0030 | 4.778 | 0050 | 5.378 | 0070 | 6.054 |
| 0011 | 4.26  | 0031 | 4.795 | 0051 | 5.398 | 0071 | 6.077 |
| 0012 | 4.276 | 0032 | 4.813 | 0052 | 5.418 | 0072 | 6.099 |
| 0013 | 4.291 | 0033 | 4.831 | 0053 | 5.438 | 0073 | 6.122 |
| 0014 | 4.307 | 0034 | 4.849 | 0054 | 5.458 | 0074 | 6.145 |
| 0015 | 4.323 | 0035 | 4.867 | 0055 | 5.479 | 0075 | 6.167 |
| 0016 | 4.339 | 0036 | 4.885 | 0056 | 5.499 | 0076 | 6.19  |
| 0017 | 4.355 | 0037 | 4.903 | 0057 | 5.519 | 0077 | 6.213 |
| 0018 | 4.372 | 0038 | 4.921 | 0058 | 5.54  | 0078 | 6.236 |
| 0019 | 4.388 | 0039 | 4.939 | 0059 | 5.56  | 0079 | 6.259 |
| 001A | 4.404 | 003A | 4.958 | 005A | 5.581 | 007A | 6.283 |
| 001B | 4.42  | 003B | 4.976 | 005B | 5.602 | 007B | 6.306 |
| 001C | 4.437 | 003C | 4.995 | 005C | 5.622 | 007C | 6.329 |
| 001D | 4.453 | 003D | 5.013 | 005D | 5.643 | 007D | 6.353 |
| 001E | 4.47  | 003E | 5.032 | 005E | 5.664 | 007E | 6.376 |
| 001F | 4.486 | 003F | 5.05  | 005F | 5.685 | 007F | 6.4   |

**Table 2**  
**Second Stage Gain**

| Code | Gain |
|------|------|
| 0000 | 17.5 |
| 0001 | 25   |
| 0002 | 35   |
| 0003 | 50   |
| 0004 | 70   |
| 0005 | 100  |
| 0006 | 140  |
| 0007 | 200  |

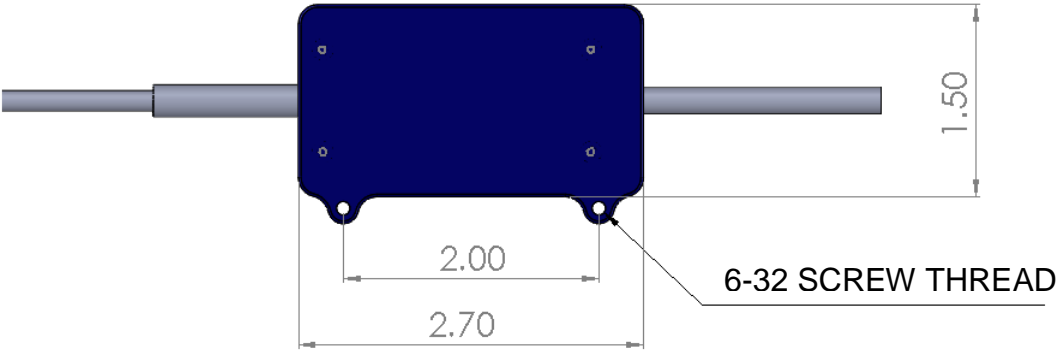
**Table 3**

Offset Voltage

| Code | Code(hex) | Offset(v) | Code | Code(hex) | Offset(v) | Code | Code(hex) | Offset(v) | Code | Code(hex) | Offset(v) |
|------|-----------|-----------|------|-----------|-----------|------|-----------|-----------|------|-----------|-----------|
| 0    | 0x 0000   | 0.000     | 32   | 0x 0020   | 0.625     | 64   | 0x 0040   | 1.250     | 96   | 0x 0060   | 1.875     |
| 1    | 0x 0001   | 0.020     | 33   | 0x 0021   | 0.645     | 65   | 0x 0041   | 1.270     | 97   | 0x 0061   | 1.895     |
| 2    | 0x 0002   | 0.039     | 34   | 0x 0022   | 0.664     | 66   | 0x 0042   | 1.289     | 98   | 0x 0062   | 1.914     |
| 3    | 0x 0003   | 0.059     | 35   | 0x 0023   | 0.684     | 67   | 0x 0043   | 1.309     | 99   | 0x 0063   | 1.934     |
| 4    | 0x 0004   | 0.078     | 36   | 0x 0024   | 0.703     | 68   | 0x 0044   | 1.328     | 100  | 0x 0064   | 1.953     |
| 5    | 0x 0005   | 0.098     | 37   | 0x 0025   | 0.723     | 69   | 0x 0045   | 1.348     | 101  | 0x 0065   | 1.973     |
| 6    | 0x 0006   | 0.117     | 38   | 0x 0026   | 0.742     | 70   | 0x 0046   | 1.367     | 102  | 0x 0066   | 1.992     |
| 7    | 0x 0007   | 0.137     | 39   | 0x 0027   | 0.762     | 71   | 0x 0047   | 1.387     | 103  | 0x 0067   | 2.012     |
| 8    | 0x 0008   | 0.156     | 40   | 0x 0028   | 0.781     | 72   | 0x 0048   | 1.406     | 104  | 0x 0068   | 2.031     |
| 9    | 0x 0009   | 0.176     | 41   | 0x 0029   | 0.801     | 73   | 0x 0049   | 1.426     | 105  | 0x 0069   | 2.051     |
| 10   | 0x 000A   | 0.195     | 42   | 0x 002A   | 0.820     | 74   | 0x 004A   | 1.445     | 106  | 0x 006A   | 2.070     |
| 11   | 0x 000B   | 0.215     | 43   | 0x 002B   | 0.840     | 75   | 0x 004B   | 1.465     | 107  | 0x 006B   | 2.090     |
| 12   | 0x 000C   | 0.234     | 44   | 0x 002C   | 0.859     | 76   | 0x 004C   | 1.484     | 108  | 0x 006C   | 2.109     |
| 13   | 0x 000D   | 0.254     | 45   | 0x 002D   | 0.879     | 77   | 0x 004D   | 1.504     | 109  | 0x 006D   | 2.129     |
| 14   | 0x 000E   | 0.273     | 46   | 0x 002E   | 0.898     | 78   | 0x 004E   | 1.523     | 110  | 0x 006E   | 2.148     |
| 15   | 0x 000F   | 0.293     | 47   | 0x 002F   | 0.918     | 79   | 0x 004F   | 1.543     | 111  | 0x 006F   | 2.168     |
| 16   | 0x 0010   | 0.313     | 48   | 0x 0030   | 0.938     | 80   | 0x 0050   | 1.563     | 112  | 0x 0070   | 2.188     |
| 17   | 0x 0011   | 0.332     | 49   | 0x 0031   | 0.957     | 81   | 0x 0051   | 1.582     | 113  | 0x 0071   | 2.207     |
| 18   | 0x 0012   | 0.352     | 50   | 0x 0032   | 0.977     | 82   | 0x 0052   | 1.602     | 114  | 0x 0072   | 2.227     |
| 19   | 0x 0013   | 0.371     | 51   | 0x 0033   | 0.996     | 83   | 0x 0053   | 1.621     | 115  | 0x 0073   | 2.246     |
| 20   | 0x 0014   | 0.391     | 52   | 0x 0034   | 1.016     | 84   | 0x 0054   | 1.641     | 116  | 0x 0074   | 2.266     |
| 21   | 0x 0015   | 0.410     | 53   | 0x 0035   | 1.035     | 85   | 0x 0055   | 1.660     | 117  | 0x 0075   | 2.285     |
| 22   | 0x 0016   | 0.430     | 54   | 0x 0036   | 1.055     | 86   | 0x 0056   | 1.680     | 118  | 0x 0076   | 2.305     |
| 23   | 0x 0017   | 0.449     | 55   | 0x 0037   | 1.074     | 87   | 0x 0057   | 1.699     | 119  | 0x 0077   | 2.324     |
| 24   | 0x 0018   | 0.469     | 56   | 0x 0038   | 1.094     | 88   | 0x 0058   | 1.719     | 120  | 0x 0078   | 2.344     |
| 25   | 0x 0019   | 0.488     | 57   | 0x 0039   | 1.113     | 89   | 0x 0059   | 1.738     | 121  | 0x 0079   | 2.363     |
| 26   | 0x 001A   | 0.508     | 58   | 0x 003A   | 1.133     | 90   | 0x 005A   | 1.758     | 122  | 0x 007A   | 2.383     |
| 27   | 0x 001B   | 0.527     | 59   | 0x 003B   | 1.152     | 91   | 0x 005B   | 1.777     | 123  | 0x 007B   | 2.402     |
| 28   | 0x 001C   | 0.547     | 60   | 0x 003C   | 1.172     | 92   | 0x 005C   | 1.797     | 124  | 0x 007C   | 2.422     |
| 29   | 0x 001D   | 0.566     | 61   | 0x 003D   | 1.191     | 93   | 0x 005D   | 1.816     | 125  | 0x 007D   | 2.441     |
| 30   | 0x 001E   | 0.586     | 62   | 0x 003E   | 1.211     | 94   | 0x 005E   | 1.836     | 126  | 0x 007E   | 2.461     |
| 31   | 0x 001F   | 0.605     | 63   | 0x 003F   | 1.230     | 95   | 0x 005F   | 1.855     | 127  | 0x 007F   | 2.480     |

| Code | Code(hex) | Offset(v) | Code | Code(hex) | Offset(v) | Code | Code(hex) | Offset(v) | Code | Code(hex) | Offset(v) |
|------|-----------|-----------|------|-----------|-----------|------|-----------|-----------|------|-----------|-----------|
| 128  | 0x 0080   | 2.500     | 160  | 0x 00A0   | 3.125     | 192  | 0x 00C0   | 3.750     | 224  | 0x 00E0   | 4.375     |
| 129  | 0x 0081   | 2.520     | 161  | 0x 00A1   | 3.145     | 193  | 0x 00C1   | 3.770     | 225  | 0x 00E1   | 4.395     |
| 130  | 0x 0082   | 2.539     | 162  | 0x 00A2   | 3.164     | 194  | 0x 00C2   | 3.789     | 226  | 0x 00E2   | 4.414     |
| 131  | 0x 0083   | 2.559     | 163  | 0x 00A3   | 3.184     | 195  | 0x 00C3   | 3.809     | 227  | 0x 00E3   | 4.434     |
| 132  | 0x 0084   | 2.578     | 164  | 0x 00A4   | 3.203     | 196  | 0x 00C4   | 3.828     | 228  | 0x 00E4   | 4.453     |
| 133  | 0x 0085   | 2.598     | 165  | 0x 00A5   | 3.223     | 197  | 0x 00C5   | 3.848     | 229  | 0x 00E5   | 4.473     |
| 134  | 0x 0086   | 2.617     | 166  | 0x 00A6   | 3.242     | 198  | 0x 00C6   | 3.867     | 230  | 0x 00E6   | 4.492     |
| 135  | 0x 0087   | 2.637     | 167  | 0x 00A7   | 3.262     | 199  | 0x 00C7   | 3.887     | 231  | 0x 00E7   | 4.512     |
| 136  | 0x 0088   | 2.656     | 168  | 0x 00A8   | 3.281     | 200  | 0x 00C8   | 3.906     | 232  | 0x 00E8   | 4.531     |
| 137  | 0x 0089   | 2.676     | 169  | 0x 00A9   | 3.301     | 201  | 0x 00C9   | 3.926     | 233  | 0x 00E9   | 4.551     |
| 138  | 0x 008A   | 2.695     | 170  | 0x 00AA   | 3.320     | 202  | 0x 00CA   | 3.945     | 234  | 0x 00EA   | 4.570     |
| 139  | 0x 008B   | 2.715     | 171  | 0x 00AB   | 3.340     | 203  | 0x 00CB   | 3.965     | 235  | 0x 00EB   | 4.590     |
| 140  | 0x 008C   | 2.734     | 172  | 0x 00AC   | 3.359     | 204  | 0x 00CC   | 3.984     | 236  | 0x 00EC   | 4.609     |
| 141  | 0x 008D   | 2.754     | 173  | 0x 00AD   | 3.379     | 205  | 0x 00CD   | 4.004     | 237  | 0x 00ED   | 4.629     |
| 142  | 0x 008E   | 2.773     | 174  | 0x 00AE   | 3.398     | 206  | 0x 00CE   | 4.023     | 238  | 0x 00EE   | 4.648     |
| 143  | 0x 008F   | 2.793     | 175  | 0x 00AF   | 3.418     | 207  | 0x 00CF   | 4.043     | 239  | 0x 00EF   | 4.668     |
| 144  | 0x 0090   | 2.813     | 176  | 0x 00B0   | 3.438     | 208  | 0x 00D0   | 4.063     | 240  | 0x 00F0   | 4.688     |
| 145  | 0x 0091   | 2.832     | 177  | 0x 00B1   | 3.457     | 209  | 0x 00D1   | 4.082     | 241  | 0x 00F1   | 4.707     |
| 146  | 0x 0092   | 2.852     | 178  | 0x 00B2   | 3.477     | 210  | 0x 00D2   | 4.102     | 242  | 0x 00F2   | 4.727     |
| 147  | 0x 0093   | 2.871     | 179  | 0x 00B3   | 3.496     | 211  | 0x 00D3   | 4.121     | 243  | 0x 00F3   | 4.746     |
| 148  | 0x 0094   | 2.891     | 180  | 0x 00B4   | 3.516     | 212  | 0x 00D4   | 4.141     | 244  | 0x 00F4   | 4.766     |
| 149  | 0x 0095   | 2.910     | 181  | 0x 00B5   | 3.535     | 213  | 0x 00D5   | 4.160     | 245  | 0x 00F5   | 4.785     |
| 150  | 0x 0096   | 2.930     | 182  | 0x 00B6   | 3.555     | 214  | 0x 00D6   | 4.180     | 246  | 0x 00F6   | 4.805     |
| 151  | 0x 0097   | 2.949     | 183  | 0x 00B7   | 3.574     | 215  | 0x 00D7   | 4.199     | 247  | 0x 00F7   | 4.824     |
| 152  | 0x 0098   | 2.969     | 184  | 0x 00B8   | 3.594     | 216  | 0x 00D8   | 4.219     | 248  | 0x 00F8   | 4.844     |
| 153  | 0x 0099   | 2.988     | 185  | 0x 00B9   | 3.613     | 217  | 0x 00D9   | 4.238     | 249  | 0x 00F9   | 4.863     |
| 154  | 0x 009A   | 3.008     | 186  | 0x 00BA   | 3.633     | 218  | 0x 00DA   | 4.258     | 250  | 0x 00FA   | 4.883     |
| 155  | 0x 009B   | 3.027     | 187  | 0x 00BB   | 3.652     | 219  | 0x 00DB   | 4.277     | 251  | 0x 00FB   | 4.902     |
| 156  | 0x 009C   | 3.047     | 188  | 0x 00BC   | 3.672     | 220  | 0x 00DC   | 4.297     | 252  | 0x 00FC   | 4.922     |
| 157  | 0x 009D   | 3.066     | 189  | 0x 00BD   | 3.691     | 221  | 0x 00DD   | 4.316     | 253  | 0x 00FD   | 4.941     |
| 158  | 0x 009E   | 3.086     | 190  | 0x 00BE   | 3.711     | 222  | 0x 00DE   | 4.336     | 254  | 0x 00FE   | 4.961     |
| 159  | 0x 009F   | 3.105     | 191  | 0x 00BF   | 3.730     | 223  | 0x 00DF   | 4.355     | 255  | 0x 00FF   | 4.980     |

**Mechanical Dimensions**



**DIMENSIONS ARE IN INCHES**

# Ordering and Contact Information

## Ordering Information

SG-1-C

## Company Information

Techmor, Inc. designs, markets, and sells advanced test and measurement equipment. Cornelius, North Carolina-based Techmor is the leader in innovation for aerospace, automotive and industrial systems.

Techmor, Inc.  
19911-D North Cove Road  
Cornelius, NC 28031  
Main: +1-704-769-0001  
<http://www.techmor.com>  
[sales@techmor.com](mailto:sales@techmor.com)

## Support Information

For support on Techmor products, contact:  
[info@techmor.com](mailto:info@techmor.com) +1-704-769-0001

Copyright 2020 .

The information contained in this document is proprietary and confidential, and property of Techmor, Inc. Any use of this information, without written consent of Techmor, Inc. is prohibited by law.