MICRO MEASUREMENTS
A VPG Brand

# Specifications and Selection Charts

Fixed resistors have two primary uses in strain gage circuits: shunt calibration of strain-measuring instrumentation, and bridge completion. For shunt calibration, a fixed resistor is temporarily shunted across a bridge arm to produce a known resistance change in the bridge circuit. The resulting instrument indication is then compared to the calculated strain corresponding to the resistance change. For bridge-completion applications, a fixed resistor may be used in the adjacent arm of the bridge to complete the external half-bridge circuit when a single strain gage is connected in a quarter-bridge arrangement.

In each of these applications, the accuracy of the strain measurement is affected, directly or indirectly, by the accuracy and stability of the fixed resistor(s) used in the circuit. It is important, therefore, that only precision, high-stability resistors be selected for these purposes.

**Standard S-Type**

**Wire Wound**


**Hermetic**

| PRECISION RESISTOR SPECIFICATIONS | | |
|---|---|---|
| **STANDARD S-TYPE (PREFIX "S")** | **WIRE WOUND (PREFIX "W")** | **HERMETIC (PREFIX "H")** |
| Noted for long-term stability and low temperature-coefficient-of-resistance. Used for shunt calibration (below 100,000 Ω) and bridge completion.<br><br>**Size:**<br>0.295 x 0.320 x 0.10 in<br>(7.5 x 8.1 x 2.5 mm).<br><br>**Temperature Coefficient:**<br>±0.6 ppm/°F; +32° to +140°F<br>(±1 ppm/°C; 0° to +60°C).<br><br>**Stability:**<br>25 ppm/year max. drift.<br><br>**Wattage:**<br>0.3 at +75°F (+24°C).<br><br>**Leadwires:**<br>22 AWG tinned copper.<br><br>**Construction:**<br>Encapsulated in epoxy case for use in normal laboratory environment. | For high-value shunt resistance requirements (above 100,000 Ω).<br><br>**Size:**<br>0.25 in dia. x 0.75 in long<br>(6.4 x 19.1 mm).<br><br>**Temperature Coefficient:**<br>±12 ppm/°F; +32° to +140°F<br>(±20 ppm/°C; 0° to +60°C).<br><br>**Stability:**<br>30 ppm/year max. drift.<br><br>**Wattage:**<br>0.3 at +75°F (+24°C).<br><br>**Leadwires:**<br>20 AWG tinned copper.<br><br>**Construction:**<br>Noninductive windings. Encapsulated for use in normal laboratory environment. | Best long-term stability under adverse environmental conditions. Premium resistors used for bridge completion where highest accuracy and stability are required.<br><br>**Size:**<br>0.4 in square x 0.15 in thick<br>(10 x 4 mm).<br><br>**Temperature Coefficient:**<br>±0.6 ppm/°F; +32° to +140°F<br>(±1 ppm/°C; 0° to +60°C).<br><br>**Stability:**<br>5 ppm/year max. drift.<br><br>**Wattage:**<br>0.25 at +75°F (+24°C).<br><br>**Leadwires**:<br>22 AWG tinned copper.<br><br>**Construction:**<br>Hermetically sealed in metal case. Excellent long-term stability. |

Specifications and Selection Charts

| SHUNT-CALIBRATION RESISTORS | | | | |
|---|---|---|---|---|
| | ORDER NO. | RESISTANCE IN OHMS | TOLERANCE IN % | EQUIVALENT MICROSTRAIN |
| FOR 120 Ω GAGE CIRCUIT | W-599880-02 | 599,880 | ±0.02 | 100 |
| | W-119880-02 | 119,880 | ±0.02 | 500 |
| | S-59880-01 | 59,880 | ±0.01 | 1,000 |
| | S-29880-01 | 29,880 | ±0.01 | 2,000 |
| | S-19880-01 | 19,880 | ±0.01 | 3,000 |
| | S-14880-01 | 14,880 | ±0.01 | 4,000 |
| | S-11880-01 | 11,880 | ±0.01 | 5,000 |
| | S-5880-01 | 5,880 | ±0.01 | 10,000 |
| FOR 350 Ω GAGE CIRCUIT | W-349650-02 | 349,650 | ±0.02 | 500 |
| | W-174650-02 | 174,650 | ±0.02 | 1,000 |
| | S-87150-01 | 87,150 | ±0.01 | 2,000 |
| | S-57983-01 | 57,983 | ±0.01 | 3,000 |
| | S-43400-01 | 43,400 | ±0.01 | 4,000 |
| | S-34650-01 | 34,650 | ±0.01 | 5,000 |
| | S-17150-01 | 17,150 | ±0.01 | 10,000 |
| FOR 1000 Ω GAGE CIRCUIT | W-999000-02 | 999,000 | ±0.02 | 500 |
| | W-499000-02 | 499,000 | ±0.02 | 1,000 |
| | W-249000-02 | 249,000 | ±0.01 | 2,000 |
| | W-165666-02 | 165,666 | ±0.01 | 3,000 |
| | W-124000-02 | 124,000 | ±0.01 | 4,000 |
| | S-99000-01 | 99,000 | ±0.01 | 5,000 |
| | S-49000-01 | 49,000 | ±0.01 | 10,000 |

The “Equivalent Microstrain” column shows the true compression strain simulated by shunting each calibration resistor across an active strain gage arm of the exact indicated resistance, based on a circuit gage factor setting of 2.000.

| BRIDGE COMPLETION RESISTORS | |
|---|---|
| CIRCUIT AND BRIDGE COMPLETION TOLERANCE ±0.01% | |
| ORDER NO. | RESISTANCE IN OHMS |
| S-50-01 | 50 |
| S-60-01 | 60 |
| S-100-01 | 100 |
| S-120-01 | 120 |
| S-175-01 | 175 |
| S-240-01 | 240 |
| S-350-01 | 350 |
| S-500-01 | 500 |
| S-1000-01 | 1,000 |
| S-2000-01 | 2,000 |
| S-5000-01 | 5,000 |
| H-100-01 | 100 |
| H-120-01 | 120 |
| H-350-01 | 350 |
| H-1000-01 | 1,000 |

**Note:**
Shunt-calibration resistors are chosen to accurately simulate resistance change in a strain gage subjected to specified levels of compressive strain. Strain indicators generally produce a linear output with a fully active half-bridge or full-bridge input circuit, and will be slightly in error when a single active arm is used. The same nonlinearity occurs whether the gage is actually strained in compression or simulated by shunting the gage with the corresponding calibration resistor. See Tech Note TN-514, “Shunt Calibration of Strain Gage Instrumentation.”

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