

# Wirewound Resistors, Industrial Power, Silicone Coated, Fixed Edgewound Tubular



## FEATURES

- High temperature silicone coating
- Complete welded construction
- Excellent stability in operation (< 3 % change in resistance)
- Material categorization:  
for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**  
**GREEN**  
(5-2008)

## STANDARD ELECTRICAL SPECIFICATIONS

| GLOBAL MODEL | HISTORICAL MODEL | POWER RATING<br>$P_{25^{\circ}\text{C}}$<br>W | RESISTANCE RANGE<br>$\Omega$<br>$\pm 5\%$ | RESISTANCE RANGE<br>$\Omega$<br>$\pm 10\%$ | WEIGHT<br>(typical)<br>g |
|--------------|------------------|-----------------------------------------------|-------------------------------------------|--------------------------------------------|--------------------------|
| FSE0050      | FSE-50           | 50                                            | 1.0 to 3.8                                | 1.0 to 3.8                                 | 18                       |
| FSE0090      | FSE-90           | 90                                            | 0.10 to 5.7                               | 0.10 to 5.7                                | 36                       |
| FSE0100      | FSE-100          | 100                                           | 1.0 to 6.1                                | 0.15 to 6.1                                | 41                       |
| FSE0110      | FSE-110          | 110                                           | 1.0 to 7.4                                | 0.20 to 7.4                                | 49                       |
| FSE0120      | FSE-120          | 120                                           | 1.0 to 8.6                                | 0.1 to 8.6                                 | 54                       |
| FSE0155      | FSE-155          | 155                                           | 1.0 to 12.5                               | 0.1 to 12.5                                | 129                      |
| FSE0240      | FSE-240          | 240                                           | 1.0 to 18                                 | 0.1 to 18                                  | 186                      |
| FSE0300      | FSE-300          | 300                                           | 1.0 to 25                                 | 0.15 to 25                                 | 236                      |
| FSE0375      | FSE-375          | 375                                           | 1.0 to 32                                 | 0.20 to 32                                 | 286                      |
| FSE0420      | FSE-420          | 420                                           | 1.0 to 35.8                               | 0.25 to 35.8                               | 320                      |
| FSE0500      | FSE-500          | 500                                           | 1.0 to 46.2                               | 0.30 to 46.2                               | 381                      |
| FSE0750      | FSE-750          | 750                                           | 1.0 to 81.3                               | 0.35 to 81.3                               | 654                      |
| FSE1000      | FSE-1000         | 1000                                          | 1.0 to 101.6                              | 0.40 to 101.6                              | 817                      |
| FSE1500      | FSE-1500         | 1500                                          | 1.0 to 135.5                              | 0.15 to 135.5                              | 1090                     |

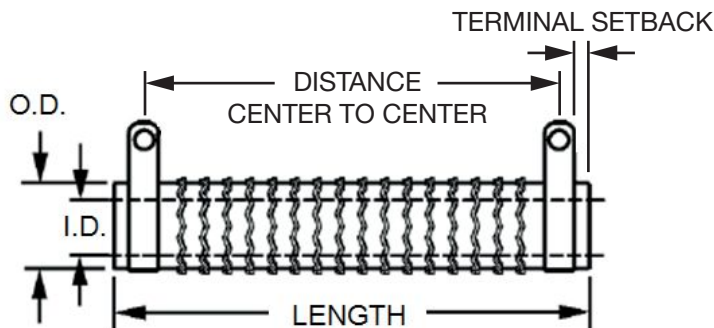
## GLOBAL PART NUMBER INFORMATION

Global Part Numbering example: FSE050021E15R0JE (visit [www.vishay.net](http://www.vishay.net) Vishay Dale parts numbering manual for all options)

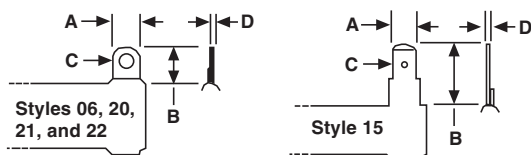
|                                                                          |                                    |                              |                                    |                                 |                                       |                                                                                                               |   |   |   |   |   |   |   |   |   |  |  |
|--------------------------------------------------------------------------|------------------------------------|------------------------------|------------------------------------|---------------------------------|---------------------------------------|---------------------------------------------------------------------------------------------------------------|---|---|---|---|---|---|---|---|---|--|--|
| F                                                                        | S                                  | E                            | 0                                  | 5                               | 0                                     | 0                                                                                                             | 2 | 1 | E | 1 | 5 | R | 0 | J | E |  |  |
| GLOBAL MODEL<br>(7 digits)                                               | TERMINAL DESIGNATION<br>(2 digits) | TERMINAL FINISH<br>(1 digit) | VALUE<br>(4 digits)                | TOLERANCE<br>(1 digit)          | PACKAGING CODE<br>(1 digit)           | SPECIAL<br>(up to 2 digits)                                                                                   |   |   |   |   |   |   |   |   |   |  |  |
| (See Standard Electrical Specifications Global Model column for options) | 06<br>15<br>20<br>21<br>22         | E = Lead (Pb)-free           | R = Decimal<br>1R50 = 1.5 $\Omega$ | J = $\pm 5\%$<br>K = $\pm 10\%$ | E = Lead (Pb)-free cell and bulk pack | (Dash number)<br>From 1 to 99 as applicable<br>91 = 100 style BKT<br>92 = 200 style BKT<br>93 = 300 style BKT |   |   |   |   |   |   |   |   |   |  |  |

Historical Part Number example: FSE-500-15-5 %

|                  |                  |           |         |
|------------------|------------------|-----------|---------|
| FSE-500          | 15 $\Omega$      | 5 %       |         |
| HISTORICAL MODEL | RESISTANCE VALUE | TOLERANCE | SPECIAL |

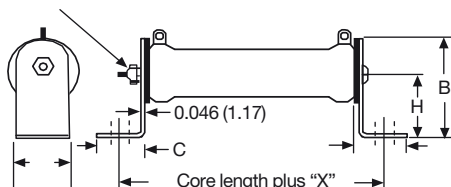
**DIMENSIONS** in inches [millimeters]


| MODEL   | CORE DIMENSIONS               |                             |                             | TERMINAL SETBACK | DISTANCE CENTER TO CENTER (REF.) | TERMINAL DESIGNATION |                             |
|---------|-------------------------------|-----------------------------|-----------------------------|------------------|----------------------------------|----------------------|-----------------------------|
|         | LENGTH<br>± 0.062<br>[± 1.57] | O.D.<br>± 0.031<br>[± 0.79] | I.D.<br>± 0.031<br>[± 0.79] |                  |                                  | STANDARD             | OPTIONAL<br>(QUICK CONNECT) |
| FSE0050 | 2.000<br>[50.8]               | 0.750<br>[19.05]            | 0.500<br>[12.70]            | 0.094<br>[2.39]  | 1.562<br>[39.67]                 | 06                   | 15                          |
| FSE0090 | 4.000<br>[101.6]              | 0.563<br>[14.30]            | 0.313<br>[7.95]             | 0.094<br>[2.39]  | 3.562<br>[90.47]                 | 06                   | 15                          |
| FSE0100 | 3.500<br>[88.90]              | 0.750<br>[19.05]            | 0.500<br>[12.70]            | 0.079<br>[2.01]  | 3.092<br>[78.54]                 | 06                   | 15                          |
| FSE0110 | 4.000<br>[101.6]              | 0.750<br>[19.05]            | 0.500<br>[12.70]            | 0.125<br>[3.18]  | 3.500<br>[88.90]                 | 06                   | 15                          |
| FSE0120 | 4.500<br>[114.3]              | 0.750<br>[19.05]            | 0.547<br>[13.89]            | 0.125<br>[3.18]  | 4.000<br>[101.60]                | 06                   | 15                          |
| FSE0155 | 4.500<br>[114.3]              | 1.125<br>[28.58]            | 0.750<br>[19.05]            | 0.282<br>[7.16]  | 3.311<br>[84.10]                 | 20                   | 15                          |
| FSE0240 | 6.500<br>[165.1]              | 1.125<br>[28.58]            | 0.750<br>[19.05]            | 0.250<br>[6.35]  | 5.561<br>[141.25]                | 20                   | 15                          |
| FSE0300 | 8.500<br>[215.9]              | 1.125<br>[28.58]            | 0.750<br>[19.05]            | 0.267<br>[6.78]  | 7.591<br>[192.81]                | 20                   | 15                          |
| FSE0375 | 10.500<br>[266.7]             | 1.125<br>[28.58]            | 0.750<br>[19.05]            | 0.266<br>[6.76]  | 9.591<br>[243.61]                | 20                   | 15                          |
| FSE0420 | 11.750<br>[288.9]             | 1.125<br>[28.58]            | 0.750<br>[19.05]            | 0.266<br>[6.76]  | 10.843<br>[275.41]               | 20                   | 15                          |
| FSE0500 | 10.500<br>[266.7]             | 1.625<br>[41.275]           | 1.125<br>[28.58]            | 0.266<br>[6.76]  | 9.468<br>[240.49]                | 21                   | -                           |
| FSE0750 | 12.000<br>[304.8]             | 2.500<br>[63.50]            | 1.750<br>[44.45]            | 0.508<br>[12.90] | 10.484<br>[266.29]               | 22                   | -                           |
| FSE1000 | 15.000<br>[381.0]             | 2.500<br>[63.50]            | 1.750<br>[44.45]            | 0.508<br>[12.90] | 13.484<br>[342.49]               | 22                   | -                           |
| FSE1500 | 20.000<br>[508.0]             | 2.500<br>[63.50]            | 1.750<br>[44.45]            | 0.508<br>[12.90] | 18.484<br>[469.49]               | 22                   | -                           |

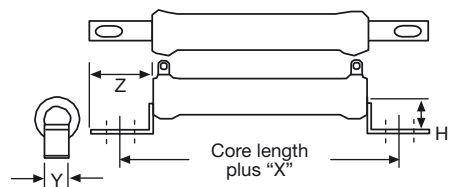
**TERMINAL DIMENSIONS** in inches [millimeters]


| DIMENSIONS           | TERMINAL STYLE   |                  |                   |                  |                  |
|----------------------|------------------|------------------|-------------------|------------------|------------------|
|                      | 06               | 15               | 20                | 21               | 22               |
| A                    | 0.250<br>[6.35]  | 0.250<br>[6.35]  | 0.375<br>[9.53]   | 0.500<br>[12.70] | 0.500<br>[12.70] |
| B                    | 0.500<br>[12.70] | 0.594<br>[15.08] | 0.5625<br>[14.28] | 0.625<br>[15.87] | 0.925<br>[23.49] |
| C<br>(HOLE DIAMETER) | 0.173<br>[4.39]  | 0.065<br>[1.65]  | 0.204<br>[5.18]   | 0.264<br>[6.70]  | 0.264<br>[6.70]  |
| D                    | 0.020<br>[0.51]  | 0.031<br>[0.79]  | 0.032<br>[0.812]  | 0.025<br>[0.64]  | 0.025<br>[0.64]  |

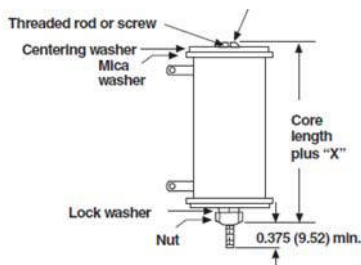
**MOUNTING HARDWARE FOR AVT PRODUCTS** - Dimensions in inches [millimeters]

**91 = 100 Style Horizontal 1 High Bracket**


| BRACKET TYPE | X                | Y                | Z                | H                | MOUNTING SLOT                   | C                | B                |
|--------------|------------------|------------------|------------------|------------------|---------------------------------|------------------|------------------|
| 102          | 1.063<br>[26.99] | 0.750<br>[19.05] | 0.859<br>[21.83] | 1.250<br>[31.75] | 0.219 x 0.438<br>[5.56 x 11.11] | 0.750<br>[19.05] | 1.750<br>[44.75] |
| 103          | 1.063<br>[26.99] | 1.250<br>[31.75] | 1.000<br>[25.40] | 1.500<br>[38.10] | 0.281 x 0.563<br>[7.14 x 14.29] | 0.927<br>[23.55] | 2.125<br>[53.98] |
| 104          | 1.952<br>[49.58] | 2.500<br>[63.50] | 1.478<br>[37.54] | 3.000<br>[76.20] | open slot x<br>0.406<br>[10.31] | 1.375<br>[34.93] | 4.25<br>[107.25] |

**92 = 200 Style Push-In Bracket**


| BRACKET TYPE | X                | H                | Y                | Z                | HOLE (DIA.)                    |
|--------------|------------------|------------------|------------------|------------------|--------------------------------|
| 204          | 0.700<br>[17.78] | 0.578<br>[14.68] | 0.250<br>[6.35]  | 0.500<br>[12.70] | 0.156<br>[3.96]                |
| 206          | 0.846<br>[21.49] | 0.800<br>[20.62] | 0.375<br>[9.53]  | 0.600<br>[15.24] | 0.343 x 0.213<br>[8.71 x 5.46] |
| 207          | 0.700<br>[17.78] | 1.125<br>[28.58] | 0.500<br>[12.70] | 0.687<br>[17.45] | 0.250 x 0.188<br>[6.35 x 4.78] |

**93 = 300 Style Thru-Bolt Bracket**


| BRACKET TYPE | X (APPROXIMATE) | THREAD |
|--------------|-----------------|--------|
| 302          | 0.271 [6.88]    | 10-32  |
| 303          | 0.463 [11.76]   | 1/4-20 |

**MOUNTING HARDWARE**

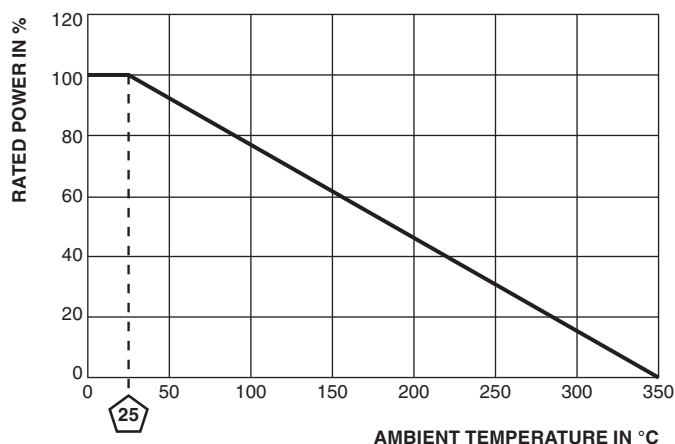
| GLOBAL MODEL | AVAILABLE BRACKET TYPES BY MODEL         |                                |                                  |
|--------------|------------------------------------------|--------------------------------|----------------------------------|
|              | 91 = 100 STYLE HORIZONTAL 1 HIGH BRACKET | 92 = 200 STYLE PUSH-IN BRACKET | 93 = 300 STYLE THRU-BOLT BRACKET |
| FSE0050      | 102                                      | 206                            | 302                              |
| FSE0090      | 102                                      | 204                            | 302                              |
| FSE0100      | 102                                      | 206                            | 302                              |
| FSE0110      | 102                                      | 206                            | 302                              |
| FSE0120      | 102                                      | 206                            | 302                              |
| FSE0155      | 103                                      | 207                            | 302                              |
| FSE0240      | 103                                      | 207                            | 302                              |
| FSE0300      | 103                                      | 207                            | 303                              |
| FSE0375      | 103                                      | 207                            | 303                              |
| FSE0420      | 103                                      | 207                            | 303                              |
| FSE0500      | 103                                      | -                              | 302                              |
| FSE0750      | 104                                      | -                              | 302                              |
| FSE1000      | 104                                      | -                              | 302                              |
| FSE1500      | 104                                      | -                              | 303                              |

**TECHNICAL SPECIFICATIONS**

| PARAMETER                              | UNIT             | RESISTOR CHARACTERISTICS                                                                |
|----------------------------------------|------------------|-----------------------------------------------------------------------------------------|
| Power Rating                           | W                | 50 to 1500                                                                              |
| Resistance Range                       | $\Omega$         | 0.10 to 135.5                                                                           |
| Resistance Tolerance                   | %                | 10                                                                                      |
| Temperature Coefficient                | ppm/°C           | $\pm 260$ for 20 $\Omega$ and above, $\pm 400$ for 1 $\Omega$ to 19.99 $\Omega$         |
| Operating Temperature                  | °C               | -55 °C to 350 °C                                                                        |
| Temperature Rise                       | °C               | 325 °C above an ambient of 25 °C                                                        |
| Maximum Altitude                       | f.a.s.l.         | 10 000                                                                                  |
| Short-Term Overload                    | -                | 10x rated power for 5 s                                                                 |
| Surge Windings                         | -                | Available                                                                               |
| Maximum Working Voltage                | -                | $(P \times R)^{0.5}$                                                                    |
| Insulation Resistance                  | $\Omega$         | 1M                                                                                      |
| Dielectric Voltage                     | V <sub>RMS</sub> | 1000 V <sub>AC</sub>                                                                    |
| Creepage                               | -                | Varies by wattage, see "Terminal Setback" in Dimensions table                           |
| Terminal Sleeves                       | -                | n/a                                                                                     |
| Inductance                             | $\mu$ H          | Varies by wattage and resistance                                                        |
| Non-Inductive Winding                  | -                | n/a                                                                                     |
| Terminal Strength                      | lb               | 10 lbs                                                                                  |
| Electrical or Mechanical Customization | -                | Contact factory: <a href="mailto:ww2dresistors@vishay.com">ww2dresistors@vishay.com</a> |

**MATERIAL SPECIFICATIONS**

|                    |                                                                           |
|--------------------|---------------------------------------------------------------------------|
| Element            | Copper-nickel alloy or nickel-chrome alloy, depending on resistance value |
| Core               | Cordierite, steatite                                                      |
| Coating            | Special high temperature silicone                                         |
| Standard Terminals | Tinned alloy 42                                                           |
| Optional Terminals | Alloy 42                                                                  |
| Terminal Bands     | Alloy 42                                                                  |
| Part Marking       | HEI, model, wattage, value, tolerance, date code                          |

**DERATING**



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