

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



## FEATURES

- High temperature vitreous coating
- Complete welded construction
- Excellent stability in operation (< 3 % change 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)

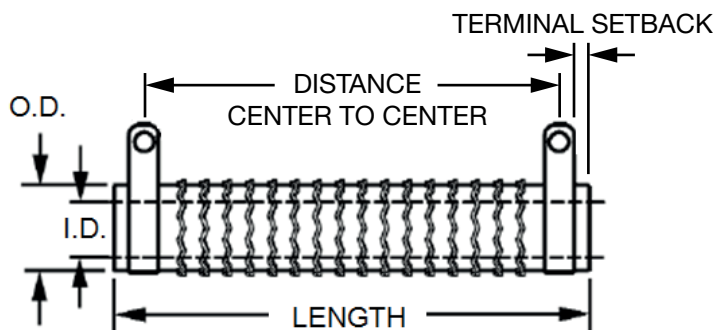
## STANDARD ELECTRICAL SPECIFICATIONS

| 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 |
|--------------|------------------|-----------------------------------------------|-------------------------------------------|--------------------------------------------|--------------------------|
| FVE0050      | FVE-50           | 50                                            | 1.0 to 3.8                                | 1.0 to 3.8                                 | 18                       |
| FVE0090      | FVE-90           | 90                                            | 0.10 to 5.7                               | 0.10 to 5.7                                | 36                       |
| FVE0100      | FVE-100          | 100                                           | 1.0 to 6.1                                | 0.15 to 6.1                                | 41                       |
| FVE0110      | FVE-110          | 110                                           | 1.0 to 7.4                                | 0.20 to 7.4                                | 49                       |
| FVE0120      | FVE-120          | 120                                           | 1.0 to 8.6                                | 0.1 to 8.6                                 | 54                       |
| FVE0140      | HLZ-140          | 140                                           | 0.08 to 9.0                               | 0.08 to 9.0                                | 109                      |
| FVE0155      | FVE-155          | 155                                           | 1.0 to 12.5                               | 0.1 to 12.5                                | 129                      |
| FVE0165      | FVE-165          | 165                                           | 0.35 to 13.0                              | 0.35 to 13.0                               | 91                       |
| FVE0180      | HLZ-165          | 165                                           | 0.35 to 13.0                              | 0.35 to 13.0                               | 91                       |
| FVE0240      | FVE-240          | 240                                           | 1.0 to 18                                 | 0.1 to 18                                  | 186                      |
| FVE0300      | FVE-300          | 300                                           | 1.0 to 25                                 | 0.15 to 25                                 | 236                      |
| FVE0375      | FVE-375          | 375                                           | 1.0 to 32                                 | 0.20 to 32                                 | 286                      |
| FVE0420      | FVE-420          | 420                                           | 1.0 to 35.8                               | 0.25 to 35.8                               | 320                      |
| FVE0500      | FVE-500          | 500                                           | 1.0 to 46.2                               | 0.30 to 46.2                               | 381                      |

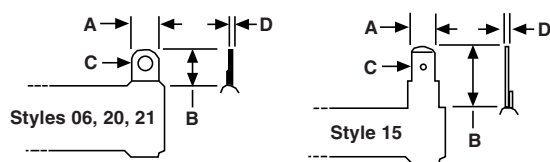
## GLOBAL PART NUMBER INFORMATION

Global Part Numbering example: **FVE030020E15R0JE** (visit [www.vishay.net](http://www.vishay.net) Vishay Dale parts numbering manual for all options)

|                                                                                                            |   |                                                          |   |                                                        |   |                                                        |   |                                                       |   |                                                                 |   |                                                                                                                                               |   |   |   |  |  |
|------------------------------------------------------------------------------------------------------------|---|----------------------------------------------------------|---|--------------------------------------------------------|---|--------------------------------------------------------|---|-------------------------------------------------------|---|-----------------------------------------------------------------|---|-----------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|--|--|
| F                                                                                                          | V | E                                                        | 0 | 3                                                      | 0 | 0                                                      | 2 | 0                                                     | E | 1                                                               | 5 | R                                                                                                                                             | 0 | J | E |  |  |
| GLOBAL MODEL<br>(7 digits)<br><br>(see Standard Electrical Specifications Global Model column for options) |   | TERMINAL DESIGNATION<br>(2 digits)<br><br>06<br>15<br>20 |   | TERMINAL FINISH<br>(1 digit)<br><br>E = lead (Pb)-free |   | VALUE<br>(4 digits)<br><br>R = decimal<br>1R50 = 1.5 Ω |   | TOLERANCE<br>(1 digit)<br><br>J = ± 5 %<br>K = ± 10 % |   | PACKAGING CODE<br>(1 digit)<br><br>E = lead (Pb)-free bulk pack |   | SPECIAL<br>(up to 2 digits)<br><br>(dash number) 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: FVE-300-15-5 %                                                             |   |                                                          |   |                                                        |   |                                                        |   |                                                       |   |                                                                 |   |                                                                                                                                               |   |   |   |  |  |
| FVE-300                                                                                                    |   |                                                          |   | 15 Ω                                                   |   |                                                        |   | 5 %                                                   |   |                                                                 |   |                                                                                                                                               |   |   |   |  |  |
| HISTORICAL MODEL                                                                                           |   |                                                          |   | RESISTANCE VALUE                                       |   |                                                        |   | TOLERANCE                                             |   |                                                                 |   | SPECIAL                                                                                                                                       |   |   |   |  |  |

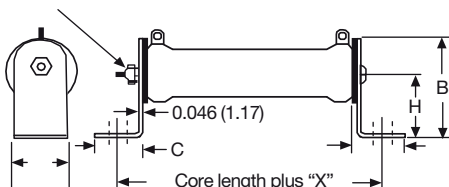
**DIMENSIONS** in inches (millimeters)


| MODEL   | CORE DIMENSIONS    |                             |                             | TERMINAL SETBACK | DISTANCE CENTER TO CENTER (REF.) | TERMINAL DESIGNATION |                          |
|---------|--------------------|-----------------------------|-----------------------------|------------------|----------------------------------|----------------------|--------------------------|
|         | LENGTH             | O.D.<br>± 0.031<br>(± 0.79) | I.D.<br>± 0.031<br>(± 0.79) |                  |                                  | STANDARD             | OPTIONAL (QUICK CONNECT) |
| FVE0050 | 2.000<br>(50.8)    | 0.750<br>(19.05)            | 0.500<br>(12.70)            | 0.094<br>(2.18)  | 1.562<br>(39.67)                 | 06                   | 15                       |
| FVE0090 | 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                       |
| FVE0100 | 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                       |
| FVE0110 | 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                       |
| FVE0120 | 4.500<br>(114.3)   | 0.750<br>(19.05)            | 0.547<br>(13.89)            | 0.125<br>(3.18)  | 3.400<br>(101.60)                | 06                   | 15                       |
| FVE0140 | 4.000<br>(101.6)   | 1.125<br>(28.58)            | 0.750<br>(19.05)            | 0.219<br>(5.56)  | 2.812<br>(71.42)                 | 20                   | 15                       |
| FVE0155 | 4.250<br>(107.95)  | 1.125<br>(28.58)            | 0.750<br>(19.05)            | 0.282<br>(7.16)  | 3.311<br>(84.10)                 | 20                   | 15                       |
| FVE0165 | 6.500<br>(165.1)   | 0.750<br>(19.05)            | 0.750<br>(19.05)            | 0.125<br>(3.18)  | 5.75<br>(146.05)                 | 20                   | 15                       |
| FVE0180 | 6.500<br>(165.1)   | 0.750<br>(19.05)            | 0.750<br>(19.05)            | 0.125<br>(3.18)  | 5.75<br>(146.05)                 | 20                   | 15                       |
| FVE0240 | 6.500<br>(165.1)   | 1.125<br>(28.58)            | 0.750<br>(19.05)            | 0.250<br>(6.35)  | 5.625<br>(142.88)                | 20                   | 15                       |
| FVE0300 | 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                       |
| FVE0375 | 10.500<br>(266.7)  | 1.125<br>(28.58)            | 0.750<br>(19.05)            | 0.266<br>(6.76)  | 9.593<br>(243.66)                | 20                   | 15                       |
| FVE0420 | 11.750<br>(298.45) | 1.125<br>(28.58)            | 0.750<br>(19.05)            | 0.266<br>(6.76)  | 10.843<br>(275.41)               | 20                   | 15                       |
| FVE0500 | 10.500<br>(266.7)  | 1.625<br>(41.28)            | 1.125<br>(28.58)            | 0.267<br>(6.78)  | 9.466<br>(240.44)                | 21                   | -                        |

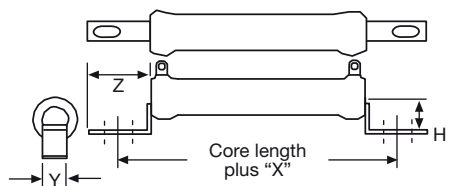
**TERMINAL DIMENSIONS** in inches (millimeters)


| DIMENSIONS        | TERMINAL STYLE   |                  |                   |                  |
|-------------------|------------------|------------------|-------------------|------------------|
|                   | 06               | 15               | 20                | 21               |
| A                 | 0.250<br>(6.35)  | 0.250<br>(6.35)  | 0.375<br>(9.53)   | 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) |
| C (HOLE DIAMETER) | 0.173<br>(4.39)  | 0.065<br>(1.65)  | 0.204<br>(5.18)   | 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)  |

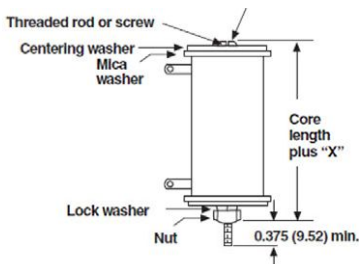
**MOUNTING HARDWARE FOR FVE PRODUCTS** - Dimensions in inches (millimeters)

**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) |

**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**

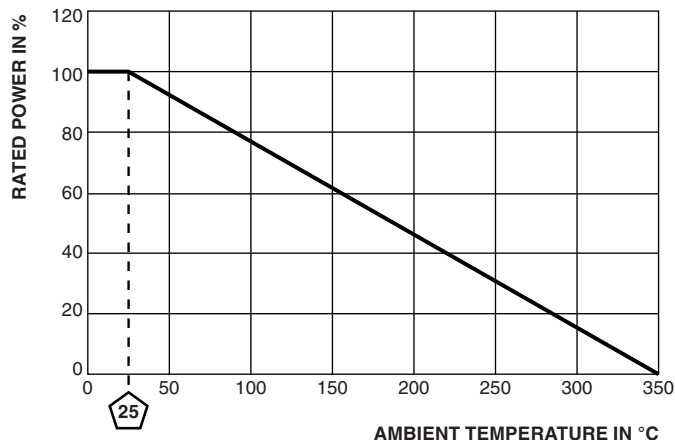
| GLOBAL MODEL | AVAILABLE BRACKET TYPES BY MODEL         |                                |                                  |
|--------------|------------------------------------------|--------------------------------|----------------------------------|
|              | 91 = 100 STYLE HORIZONTAL 1 HIGH BRACKET | 92 = 200 STYLE PUSH-IN BRACKET | 93 = 300 STYLE THRU-BOLT BRACKET |
| FVE0050      | 102                                      | 206                            | 302                              |
| FVE0090      | 102                                      | 204                            | 302                              |
| FVE0100      | 102                                      | 206                            | 302                              |
| FVE0110      | 102                                      | 206                            | 302                              |
| FVE0120      | 102                                      | 206                            | 302                              |
| FVE0140      | 103                                      | 205                            | 303                              |
| FVE0155      | 103                                      | 207                            | 302                              |
| FVE0165      | 102                                      | 206                            | 303                              |
| FVE0180      | 102                                      | 206                            | 303                              |
| FVE0240      | 103                                      | 207                            | 302                              |
| FVE0300      | 103                                      | 207                            | 303                              |
| FVE0375      | 103                                      | 207                            | 303                              |
| FVE0420      | 103                                      | 207                            | 303                              |
| FVE0500      | 103                                      | -                              | 302                              |

**TECHNICAL SPECIFICATIONS**

| PARAMETER                              | UNIT             | RESISTOR CHARACTERISTICS                                                                |
|----------------------------------------|------------------|-----------------------------------------------------------------------------------------|
| Power Rating                           | W                | 50 to 500                                                                               |
| Resistance Range                       | $\Omega$         | 0.10 to 46.2                                                                            |
| 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 vitreous enamel                                  |
| 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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