Bulk Metal® Foil Resistor Standard with TCR of 0.3 ppm/°C, High Stability and Accuracy for Laboratory Calibration Standards Direct Plug-In Device for Most DMM'S Available in the Market

INTRODUCTION

A manufacturer of the most precise production-size resistors available, Vishay Foil Resistors (VFR) has experienced the problems presented by virtually all available conventional and specialized secondary standards. Among these are: instrument accuracy, resistance shifts caused by load, temperature or environmental changes, difficulty in measurement of last digits, limitation on usable frequency, size and ease of setting.

From intensive analysis of these problems, VFR has developed a complete new design. With the unequalled combination of the Bulk Metal® Foil resistor's performances, Vishay Foil resistors offer accuracy, stability and versatility never before combined in a secondary standard resistor.

The FSR reduces these major problems to insignificance: accuracy, resistance shift, frequency, and size.

Our Application Engineering department is available to advise and make recommendations.

For non-standard technical requirements and special applications, please contact us via email.

Note

(1) Measured by comparison against Vishay Foil Resistor standards which are traceable to NIST.

FEATURES

- Temperature coefficient of resistance (TCR): To ±0.3 ppm/°C (+15°C to +45°C) (see Table 1)
- Max TCR: 10 to 30 ppm window (see Figure 3)
- Resistance range: 1Ω to 150 kΩ (for higher and lower values, please contact Applications Engineering)
- **Available up to six significant digits (e.g., 9K99962)**
- **Resistance tolerance available for ordering: to ±0.005% (50 ppm)**
- **High accuracy: to 10 ppm (see Table 1)**
- **Stability: ±0.0005% (5 ppm) at 25°C, 12 months**
- **No humidity effect: resistive element hermetically sealed against moisture**
- **Small size and robust construction**
- **Direct plug-in device for most DMM's available in the market**
- **Each unit is supplied with certificate of accuracy(1)**
- **RF shielded case**
- **Four terminal constructions with an additional ground socket**
- **Vishay Foil resistors are not restricted to standard values; specific "as required" values can be supplied at no additional cost or delivery time (e.g., 1K23456 vs. 1K)**
- Thermal stabilization time <1 s (nominal value achieved within 10 ppm of steady state value)
- Electrostatic discharge (ESD) at least to 25 kV
- Rise time: 1 ns effectively no ringing
- Current noise: 0.010 μVRMS/V of applied voltage (<-40 dB)
- Voltage coefficient: 0.1 ppm/V
- Non inductive: 0.08 μH
- Non hot spot design

FIGURE 1—DEMONSTRATION FOR EASE OF INSTALLATION ON DMM

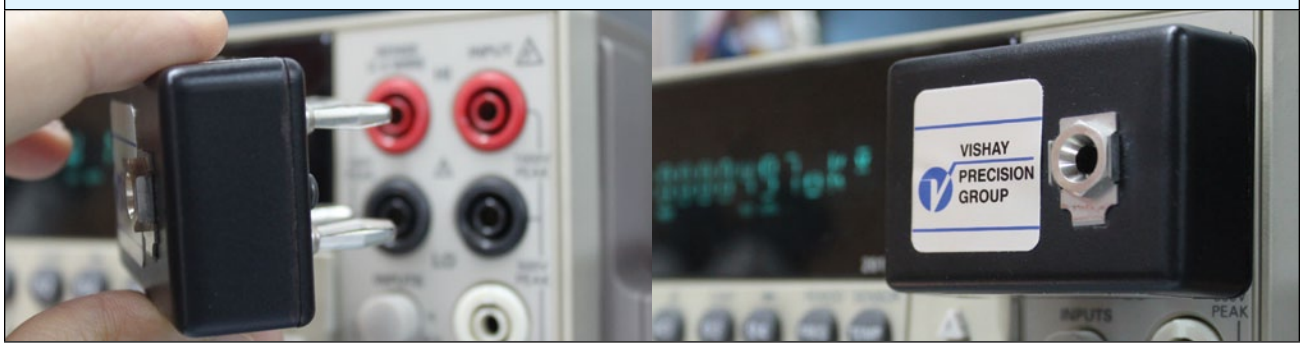


TABLE 1—FSR SPECIFICATIONS[1]					
NOMINAL RESISTANCE VALUE (Ω)	RESISTANCE TOLERANCE [2] (PPM)	ACCURACY (PPM)	TYPICAL TCR (PPM/°C) +15°C TO +45°C	STABILITY AT 25°C, 12 MONTHS (PPM)	MAX. ALLOWED POWER AT 25°C [3] (W)
1–9.9	100	50	±1	5	0.2
10–49.9	100	10	±0.6	5	0.2
50–99.9	50	10	±0.5	5	0.2
100–150K	50	10	±0.3	5	0.2

Note

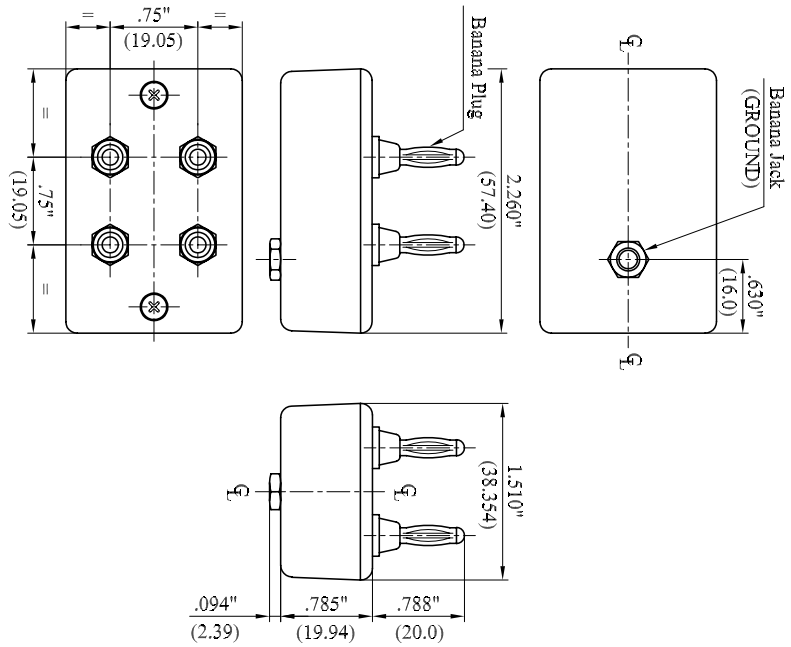
(1) Each unit supplied is within the specified tolerance of the nominal ordered value. In addition, each unit is marked with the actual measured value, such actual measured value being within the specified accuracy of the marked value.

(2) For better tolerances, please contact Application Engineering via email below

(3) Maximum voltage for a given resistance value is calculated using $V = \sqrt{PxR}$

TABLE 2—GENERAL SPECIFICATIONS	
SPECIFICATIONS	PARAMETERS
Body and Cover	High impact polystyrene
Finish	Black textured
Weight	45 grams
Terminals	Nickel Silver
Operating Temperature Range	+15°C to +45°C

FIGURE 2—PHYSICAL DIMENSIONS in Inches (Millimeters)



APPLICATIONS

In addition to the standard applications for decade boxes and secondary standards, the FSR greatly extends the range of usefulness for these instruments due to their high frequency performance (e.g., R&D, incoming and out-going inspection stations, quality control, laboratory, etc.).

Vishay Foil Resistors' secondary standards are used for adjustable, direct reading resistance and are substitution components of: RTD, bridge, attenuators, voltage dividers, multipliers, adjustable feedback resistors (for use with operational amplifiers), ladder (network) elements, etc.

FIGURE 3—TYPICAL TCR CURVES WITHIN 10 PPM WINDOW

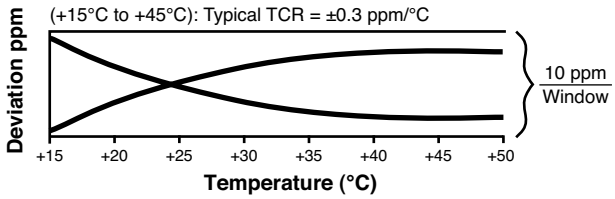


FIGURE 4—TRANSIT CASE (OPTIONAL)

FSR device units can be supplied in a protective, lightweight transit case, shielding the units against potential damage or exposure to changes in temperature during transportation. The protective case can store up to 9 FSR units.

TABLE 3—GLOBAL PART NUMBER INFORMATION (1)

DENOTES PRECISION	VALUE	CHARACTERISTICS
Y	**R** = Ω **K** = kΩ	**0** = standard **1 to 999** = custom

Y	4	0	2	8	0	9	K	9	9	9	6	2	V	0	I

PRODUCT CODE (1)	RESISTANCE TOLERANCE	PACKAGING
4028 = FSR	**V** = ±0.005% **T** = ±0.01%	**I** = individual **C** = transit case

FOR EXAMPLE: ABOVE GLOBAL ORDER Y4028 09K99962 V 0 I:
TYPE: FSR
VALUE: 9K99962Ω
ABSOLUTE TOLERANCE: ±0.005%
TERMINATION: standard
PACKAGING: individual

HISTORICAL PART NUMBER: FSR 9K99962 V I

FSR	9K99962	V	I
MODEL	RESISTANCE VALUE	TOLERANCE	PACKAGING
FSR	9K99962Ω	**V** = ± 0.005 % **T** = ± 0.01 %	**I** = individual **C** = transit case

Note
(1) For non-standard requests, please contact Application Engineering

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