HVR
Advanced Power Components

High Energy Disk Resistors

Technical Data

- High Surge Energy Rating
- High Voltage Withstand
- Essentially Non-Inductive
- Wide Resistivity Range
- Air / Oil / SF6 Environments
- Single Disc or Modular Assemblies

With the capacity of sustaining energies ranging from Joules to Mega-Joules, at frequencies up to Mega-Hz, HVR *High Energy Disk Resistors* can be used in even the most demanding applications such as electrical transmission, traction, AC/DC drives, pulsed power, dummy loads, induction heating and pulse forming networks.

Disk Size (mm)	D_o (mm)	D_i (type)	Thickness[1] (mm)	Max. Energy[2] (KJ)	Max. Impulse Volts[3] (kV)	Resistance Range (Ω)
032	32	D	25.4	5	18.7	2.0—10K
050	50	C		12	20.4	1.0—3.3K
075	75	A,B,C		25	23.3	0.5—1.0K
112	112	A,B,C		67	26.2	0.2—390
152	152	A,B,C		110	28.3	0.1—100

Notes: [1] Custom thickness available, affects ratings. [2] Single impulse to cause 125°C temperature rise. [3] Standardized for 50Ω resistor in air, 1.2/50μsec pulse width

Ordering Information

W DDD T Y XXX X

W	w/ center bore
D	no center bore

Disk Size (mm)

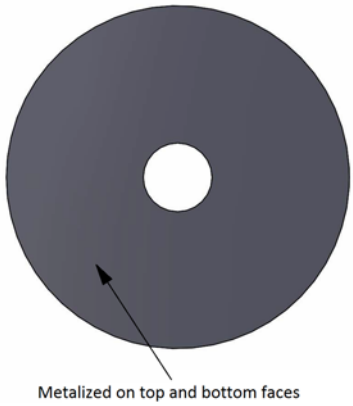
D_i type	Size (mm)
A	26
B	34
C	20
D	11

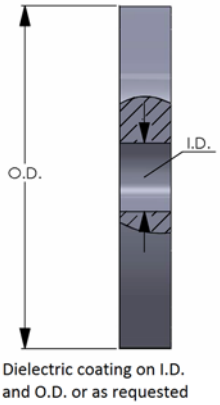
code	Thick. (mm)
8	25.4

Toler.	Value (%)
J	5
K	10
L	20

Resistance=2 digits x n^{th} power
Example: **331** = **33**x10^{1}=330Ω
<10 Ω, R=decimal
Example: **4R7** = 4.7Ω

Configuration





Metallized terminations are flame sprayed onto the opposing flat surfaces. Standard metallized contacts are Aluminum—Please contact HVR APC Engineering for other options.

For non standard configurations, please contact HVR APC Engineering—engineering@hvrapc.com

2090 Old Union Rd. • Tel: 716-693-4700 • Fax: 716-693-4774 • www.hvrapc.com

Power Dissipation

- Heat generated by the ***High Energy Disk Resistors*** is dissipated mainly by **radiation** and **convection** from the exposed surface areas. Within restricted domains, mathematical models may be employed to permit heat transfer estimations.
- Higher power dissipation is achieved using conduction cooling through either one or both mounting surfaces using:
  - ⇒ Air heat sink
  - ⇒ Water cooled heat sink

Radiation and Convection

$$W_a = 0.00026(\Delta T)^{1.4}$$

W_a = Watts/Units Exposed Surface Area ($W.cm^{-2}$)

ΔT = 50°C to 175°C, D_o=1.9 to 15.1 cm, Ambient 25°C

Recommended Operation Temperatures

Disc diameters ≤ 11.2 cm	**≤ 300 °C** (Infrequent Operation)
Disc diameters > 11.2 cm	**≤ 250 °C** (Infrequent Operation)
All Disc diameters	**≤ 150 °C** (Continuous Operation)

Impulse Voltage

- Maximum impulse voltage is a function of:
  - ***Mainly*—Resistance value** and **pulse width**
  - ***Lesser Extent*—Surface temperature** and **dielectric medium**

Resistivity Range—ρ

3Ω cm to 30000Ω cm

$$\rho = R \times A/L$$

R = Resistance value, A = Surface area, L = Length

Temperature Coefficient **-0.05% to –0.15% per °C rise** (depending on Resistivity value)

Voltage Coefficient **-0.5% to –7.5% per kV/cm** (for ρ domain 10Ω cm to 7500Ω cm)

Maximum Working Voltage Withstand per cm of Disk Length (V_{wk})

SF6	$V_{wk} = 8.0 \times \sqrt[1.2]{\text{Log}(R/2.54 \times A/L)}$	**kV/cm**	1.2/50μs Waveform
AIR	$V_{wk} = 4.3 \times \sqrt[1.2]{\text{Log}(R/2.54 \times A/L)}$	**kV/cm**	1.2/50μs Waveform
AIR	$V_{wk} = 3.0 \times \text{Log}(R/2.54 \times A/L)$	**kV/cm**	50/1000μs Waveform
AIR	$V_{wk} = 1.5 \times (\text{Log}(R/2.54 \times A/L))^{1.25}$	**kV/cm**	100/10000μs Waveform