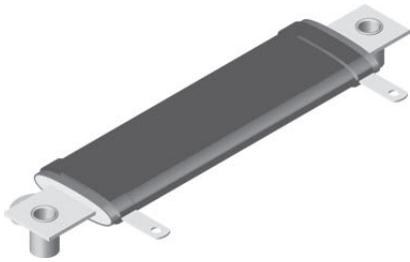


## Wirewound Resistors, Industrial Power, Flat (HL), Miniature Flat (HLM)



### FEATURES

- High temperature silicon coating
- High power to size ratio
- Mounting accommodations ideally suited to high density packaging
- Self-stacking hardware for horizontal or vertical placement
- Withstands high vibration without loosening
- Mounting hardware functions as a heat sink allowing greater heat dissipation and less derating of stacked units
- Available in non-inductive styles (type NHL & NHLM) with Ayrton-Perry winding for lowest reactive components

### TYPE HL FLAT STYLE

STANDARD ELECTRICAL SPECIFICATIONS				
MODEL	POWER RATING $P_{25^{\circ}\text{C}}$ W	RESISTANCE RANGE $\Omega$		WEIGHT (Typical) g
		$\pm 5\%$	$\pm 10\%$	
HL-24 NHL-24	30	1.0 - 11k 1.0 - 1.2k	0.10 - 11k 1.0 - 1.2k	20.14
HL-35 NHL-35	40	1.0 - 26k 1.0 - 3k	0.10 - 26k 1.0 - 3k	30.07
HL-55 NHL-55	55	1.0 - 54k 1.0 - 6.8k	0.10 - 54k 1.0 - 6.8k	51.25
HL-70 NHL-70	70	1.0 - 77k 1.0 - 9.4k	0.10 - 77k 1.0 - 9.4k	60.48
HL-95 NHL-95	95	1.0 - 99.9k 1.0 - 12.4k	0.10 - 99.9k 1.0 - 12.4k	76.51



### TYPE HLM MINIATURE FLAT STYLE

STANDARD ELECTRICAL SPECIFICATIONS				
MODEL	POWER RATING $P_{25^{\circ}\text{C}}$ W	RESISTANCE RANGE $\Omega$		WEIGHT (Typical) g
		$\pm 5\%$	$\pm 10\%$	
HLM-10 NHLM-10	10	1.0 - 15k 1.0 - 1.8k	0.10 - 15k 1.0 - 1.8k	0.41
HLM-15 NHLM-15	15	1.0 - 26k 1.0 - 3.6k	0.10 - 26k 1.0 - 3.6k	0.47
HLM-20 NHLM-20	20	1.0 - 71k 1.0 - 9.8k	0.10 - 71k 1.0 - 9.8k	0.74

### ORDERING INFORMATION

HLM-20	10	Z	10 $\Omega$	5%
MODEL	TERMINAL	TERMINAL FINISH	RESISTANCE $\Omega$	TOLERANCE $\pm \%$

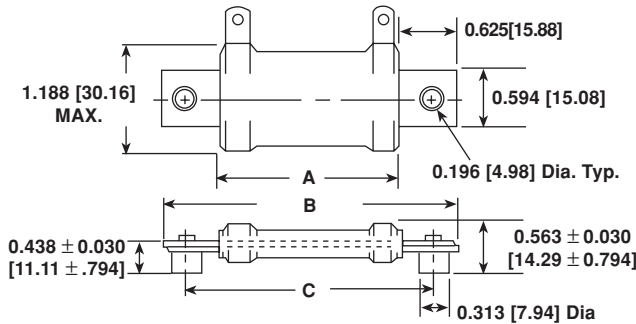


# HL, NHL FLAT and HLM, NHLM

Wirewound Resistors, Industrial Power, Adjustable, Tapped Vishay Dale

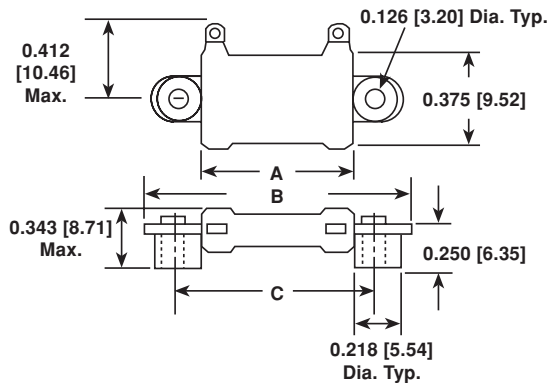
## DIMENSIONS

### TYPE HL FLAT STYLE



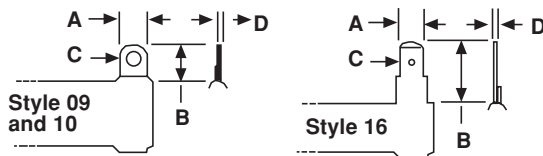
MODEL	DIMENSIONS in inches [millimeters]					
	A ±0.063 [1.59]	B ±0.063 [1.59]	C ±0.031 [0.79]	DISTANCE BETWEEN TERMINALS (Ref.)	TERMINAL DESIGNATION	
					STANDARD	OPTIONAL
HL-24 NHL-24	1.250 [31.75]	2.500 [63.50]	2.000 [50.80]	0.718 [18.24]	09Z	16N
HL-35 NHL-35	2.000 [50.80]	3.250 [82.55]	2.750 [69.85]	1.468 [37.29]	09Z	16N
HL-55 NHL-55	3.500 [88.90]	4.750 [120.65]	4.250 [107.95]	2.968 [75.39]	09Z	16N
HL-70 NHL-70	4.750 [120.65]	6.000 [152.40]	5.500 [139.70]	4.218 [107.14]	09Z	16N
HL-95 NHL-95	6.000 [152.40]	7.250 [184.15]	6.750 [171.45]	5.468 [138.89]	09Z	16N

### TYPE HLM MINIATURE FLAT STYLE



MODEL	DIMENSIONS in inches [millimeters]				
	A ±0.063 [1.59]	B ±0.063 [1.59]	C ±0.016 [0.40]	DISTANCE BETWEEN TERMINALS (Ref.)	STANDARD TERMINAL DESIGNATION
HLM-10 NHLM-10	0.750 [19.05]	1.312 [33.32]	1.000 [25.40]	0.406 [10.31]	10Z
HLM-15 NHLM-15	1.000 [25.40]	1.562 [39.67]	1.250 [31.75]	0.656 [16.66]	10Z
HLM-20 NHLM-20	2.062 [52.37]	2.625 [66.68]	2.313 [58.75]	1.718 [43.64]	10Z

### TERMINAL DIMENSIONS



DIMENSION	DIMENSIONS in inches [millimeters]		
	TERMINAL TYPE		
	TERM 09	TERM 10	TERM 16
A	0.188 [4.76]	0.125 [3.18]	0.188 [4.76]
B	0.500 [12.70]	0.188 [4.76]	0.563 [14.29]
C	0.104 [2.64]	0.063 [1.60]	0.050 [1.27]
D	0.020 [0.51]	0.020 [0.51]	0.020 [0.51]

**TERMINAL FINISH** - Finish for terminal style 16 is limited to nickel plated steel (N), all other terminals will be steel supplied with tinned solder finish (Z).



TECHNICAL SPECIFICATIONS		
PARAMETER	UNIT	HL, HLM RESISTOR CHARACTERISTICS
Temperature Coefficient	ppm/°C	± 90 for .1Ω to .99Ω; ± 50 for 1Ω to 9.9Ω; ± 30 for 10Ω and above
Dielectric Withstanding Voltage	V <sub>AC</sub>	1000, from terminal to mounting hardware
Short Time Overload	—	10 x rated power for 5 seconds
Maximum Working Voltage	V	$(P \times R)^{1/2}$
Insulation Resistance	Ω	1000 Megohm minimum Dry, 100 Megohm Minimum after moisture test
Operating Temperature Range	°C	- 55 / + 350

## POWER RATING

Vishay HL flat and HLM resistor wattage ratings are based on mounting horizontally to 10" x 10" x .04" [254.0mm x 254.0mm x 1.02mm] steel plate in 25°C ambient with no air flow.

## EXCLUSIVE BRACKET DESIGN

Mounting strap fits snugly through resistor core and is bound against unit by two eccentric spacers. The bracket eliminates expensive cements and improves heat transfer and power handling capabilities.

## MATERIAL SPECIFICATIONS

**Element:** Copper-nickel alloy or nickel-chrome alloy, depending on resistance value

**Core:** Ceramic, steatite

**Coating:** Special high temperature silicone

**Standard Terminals:** Model "Z" terminals are tinned steel

**Terminal Bands:** Steel

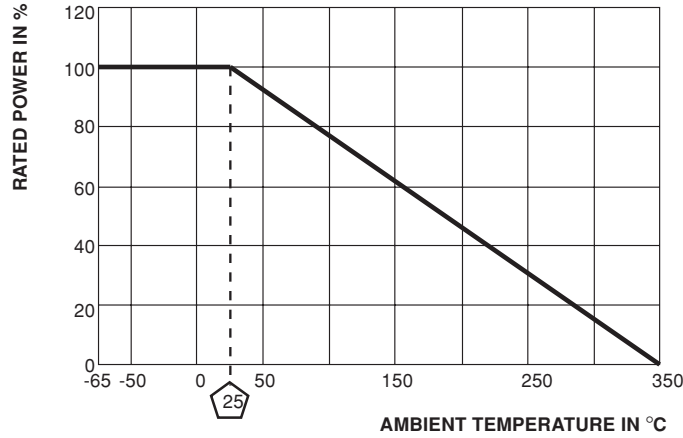
**Part Marking:** DALE, Model, Wattage, Value, Tolerance, Date Code.

## NHL, NHLM NON-INDUCTIVE

Models of equivalent physical and electrical specifications are available with non-inductive (Aryton-Perry) winding. They are identified by adding the letter N to the front of the HL and HLM type designation (NHLM-20, for example). For NHL and NHLM models maximum resistance values are lower, see STANDARD ELECTRICAL SPECIFICATIONS table.



Derating is required for ambient temperatures above 25°C per the following graph.



### Derating

PERFORMANCE		
TEST	CONDITIONS OF TEST	TEST LIMITS
Thermal Shock	Rated power applied until thermally stable, then a minimum of 15 minutes at - 55°C	± (2.0% + 0.05Ω)ΔR
Short Time Overload	10 x rated power for 5 seconds	± (2.0% + 0.05Ω)ΔR
Dielectric Withstanding Voltage	1,000V rms, 1 minute	± (0.1% + 0.05Ω)ΔR
Low Temperature Storage	- 55°C for 24 hours	± (2.0% + 0.05Ω)ΔR
High Temperature Exposure	250 hours at + 350°C	± (2.0% + 0.05Ω)ΔR
Moisture Resistance	MIL-STD-202 Method 106, 7b not applicable	± (2.0% + 0.05Ω)ΔR
Shock, Specified Pulse	MIL-STD-202 Method 213, 100g's for 6 milliseconds, 10 shocks	± (0.2% + 0.05Ω)ΔR
Vibration, High Frequency	Frequency varied 10 to 2,000Hz, 20g peak, 2 directions 6 hours each	± (0.2% + 0.05Ω)ΔR
Load Life	1,000 hours at rated power, + 25°C, 1.5 hours "ON", 0.5 hours "OFF"	± (3.0% + 0.05Ω)ΔR