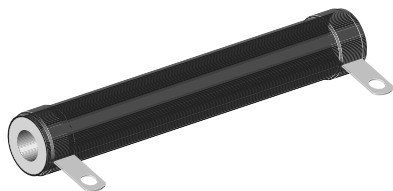




## Wirewound Resistors, Industrial Power, Tubular (HL), Non-Inductive Tubular (NHL)

**Note**

\* This datasheet provides information about parts that are RoHS-compliant and / or parts that are non-RoHS-compliant. For example, parts with lead (Pb) terminations are not RoHS-compliant. Please see the information / tables in this datasheet for details.

**FEATURES**

- High temperature silicon coating
- Complete welded construction
- Available in non-inductive styles (model NHL) with Ayrton-Perry winding
- Tight tolerance of 5 % for values above 1 W
- 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\***  
Available

**HALOGEN  
FREE**  
Available

**GREEN**  
(5-2008)  
Available

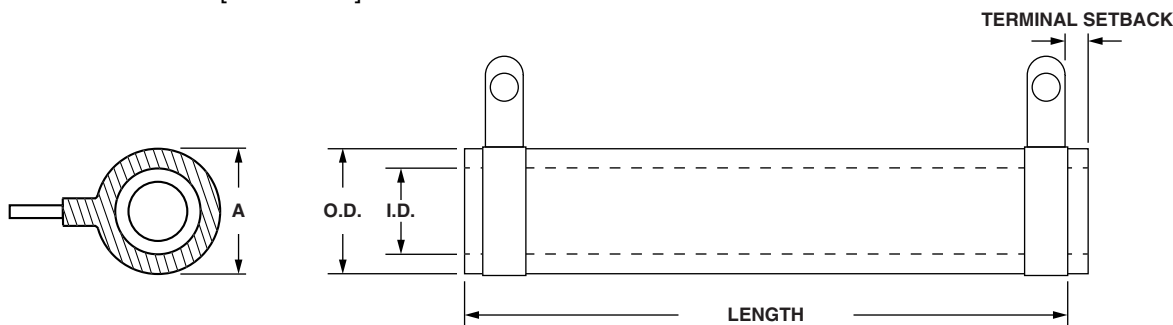
**STANDARD ELECTRICAL SPECIFICATIONS**

GLOBAL MODEL	HISTORICAL MODEL	POWER RATING $P_{25^{\circ}\text{C}}$ W	RESISTANCE RANGE $\Omega$ $\pm 5\%$	RESISTANCE RANGE $\Omega$ $\pm 10\%$	WEIGHT (typical) g
HL011 NHL011	HL-11 NHL-11	11	1.0 to 70K 1.0 to 4.7K	0.10 to 70K 1.0 to 4.7K	10.50
HL012 NHL012	HL-12 NHL-12	12	1.0 to 58K 1.0 to 3.9K	0.10 to 58K 1.0 to 3.9K	6.69
HL015 NHL015	HL-15 NHL-15	15	1.0 to 60K 1.0 to 4.3K	0.10 to 60K 1.0 to 4.3K	8.64
HL020 NHL020	HL-20 NHL-20	20	1.0 to 95K 1.0 to 6.8K	0.10 to 95K 1.0 to 6.8K	12.57
HL025 NHL025	HL-25 NHL-25	25	1.0 to 115K 1.0 to 8.8K	0.10 to 115K 1.0 to 8.8K	20.72
HL026 NHL026	HL-26 NHL-26	26	1.0 to 170K 1.0 to 11.8K	0.10 to 170K 1.0 to 11.8K	15.34
HL050 NHL050	HL-50 NHL-50	50	1.0 to 112K 1.0 to 21.5K	0.10 to 112K 1.0 to 21.5K	42.08
HL051 NHL051	HL-51 NHL-51	51	1.0 to 124K 1.0 to 22.9K	0.10 to 124K 1.0 to 22.9K	51.96
HL060 NHL060	HL-60 NHL-60	60	1.0 to 145K 1.0 to 27.2K	0.10 to 145K 1.0 to 27.2K	65.64
HL065 NHL065	HL-65 NHL-65	65	1.0 to 170K 1.0 to 31.4K	0.10 to 170K 1.0 to 31.4K	64.82
HL080 NHL080	HL-80 NHL-80	80	1.0 to 190K 1.0 to 38.3K	0.10 to 190K 1.0 to 38.3K	121.58
HL100 NHL100	HL-100 NHL-100	100	1.0 to 260K 1.0 to 48.5K	0.10 to 260K 1.0 to 48.5K	91.37
HL120 NHL120	HL-120 NHL-120	120	1.0 to 330K 1.0 to 64.1K	0.10 to 330K 1.0 to 64.1K	183.82
HL130 NHL130	HL-130 NHL-130	130	1.0 to 380K 1.0 to 70.2K	0.10 to 380K 1.0 to 70.2K	192.36
HL160 NHL160	HL-160 NHL-160	160	1.0 to 470K 1.0 to 105K	0.10 to 470K 1.0 to 105K	245.86
HL175 NHL175	HL-175 NHL-175	175	1.0 to 500K 1.0 to 112K	0.10 to 500K 1.0 to 112K	250.80
HL225 NHL225	HL-225 NHL-225	225	1.0 to 645K 1.0 to 121K	0.10 to 645K 1.0 to 121K	309.97

**GLOBAL PART NUMBER INFORMATION**

Global Part Numbering example: NHL10006Z10R00JJ

N	H	L	1	0	0	0	6	Z	1	0	R	0	0	J	J		
GLOBAL MODEL			TERMINAL DESIGNATION			TERMINAL FINISH		RESISTANCE VALUE		TOLERANCE		PACKAGING CODE				SPECIAL	
(see "Standard Electrical Specifications" table above for additional P/N's)			02			E = lead (Pb)-free		R = decimal		J = ± 5.0 %		E = lead (Pb)-free skin pack				(dash number)	
			05					K = thousand		K = ± 10.0 %		J <sup>(1)</sup> = skin pack (J01)				(up to 2 digits)	
			06			Z = tin / lead		10R00 = 10.0 Ω		Note						from 1 to 99	
			07			N = nickel		1K000 = 1 kΩ		(1) Tin / lead for type "Z", lead (Pb)-free for type "N"						as applicable	
			14														
			15														
Historical Part Numbering example: NHL-100-06Z 10 Ω 5 % J01																	
NHL-100			06Z			10 Ω			5 %			J01					
HISTORICAL MODEL			TERMINAL/FINISH			RESISTANCE VALUE			TOLERANCE			PACKAGING					

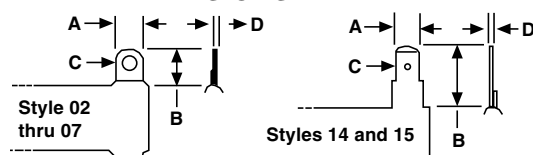
**DIMENSIONS** in inches [millimeters]

(Includes Coating and Terminal Band)

GLOBAL MODEL	DIMENSIONS in inches [millimeters]								
	A (MAX.)	CORE DIMENSIONS			TERMINAL SETBACK ± 0.31 [± 0.79]	DISTANCE BETWEEN TERMINALS (REF.)	TERMINAL DESIGNATION		BRACKET TYPES <sup>(1)</sup>
		LENGTH ± 0.062 [± 1.59]	O.D.	I.D. ± 0.031 [± 0.79]			STANDARD	OPTIONAL	
HL011	0.469	1.750	0.375	0.188	0.094	1.187	02	-	101, 204, 301
NHL011	[11.91]	[44.45]	[9.53]	[4.76]	[2.38]				
HL012	0.406	1.750	0.313	0.188	0.094	1.187	05	14	101, 204, 301
NHL012	[10.32]	[44.45]	[7.94]	[4.76]	[2.38]				
HL015	0.563	1.500	0.438	0.313	0.094	0.937	02	14	101, 203, 301
NHL015	[14.29]	[38.10]	[11.11]	[7.94]	[2.38]				
HL020	0.563	2.000	0.438	0.313	0.094	1.437	02	14	101, 203, 301
NHL020	[14.29]	[50.8]	[11.11]	[7.94]	[2.38]				
HL025	0.688	2.000	0.563	0.313	0.094	1.312	06	15	101, 203, 301
NHL025	[17.46]	[50.8]	[14.29]	[7.94]	[2.38]				
HL026	0.563	3.000	0.438	0.313	0.094	2.437	02	14	101, 203, 301
NHL026	[14.29]	[76.2]	[11.11]	[7.94]	[2.38]				
HL050	0.688	4.000	0.563	0.313	0.094	3.312	06	15	101, 203, 301
NHL050	[17.46]	[101.6]	[14.29]	[7.94]	[2.38]				
HL051	0.906	3.500	0.750	0.500	0.125	2.75	06	15	102, 206, 303
NHL051	[23.02]	[88.9]	[19.05]	[12.70]	[3.18]				
HL060	0.906	4.000	0.750	0.500	0.125	3.250	06	15	102, 206, 303
NHL060	[23.02]	[101.6]	[19.05]	[12.70]	[3.18]				
HL065	0.906	4.500	0.750	0.500	0.125	3.750	06	15	102, 206, 303
NHL065	[23.02]	[114.3]	[19.05]	[12.70]	[3.18]				
HL080	1.313	4.000	1.125	0.750	0.219	2.812	07	15	103, 205, 303
NHL080	[33.34]	[101.6]	[28.58]	[19.05]	[5.56]				
HL100	0.906	6.500	0.750	0.500	0.125	5.750	06	15	102, 206, 303
NHL100	[23.02]	[165.1]	[19.05]	[12.70]	[3.18]				
HL120	1.313	6.000	1.125	0.750	0.219	4.812	07	15	103, 205, 303
NHL120	[33.34]	[152.4]	[28.58]	[19.05]	[5.56]				
HL130	1.313	6.500	1.125	0.750	0.219	5.312	07	15	103, 205, 303
NHL130	[33.34]	[165.1]	[28.58]	[19.05]	[5.56]				
HL160	1.313	8.000	1.125	0.750	0.219	6.812	07	15	103, 205, 303
NHL160	[33.34]	[203.2]	[28.58]	[19.05]	[5.56]				
HL175	1.313	8.500	1.125	0.750	0.219	7.312	07	15	103, 205, 303
NHL175	[33.34]	[215.9]	[28.58]	[19.05]	[5.56]				
HL225	1.313	10.500	1.125	0.750	0.219	9.312	07	15	103, 205, 303
NHL225	[33.34]	[266.7]	[28.58]	[19.05]	[5.56]				

**Note**

(1) Brackets are available for mounting HL series resistors - see Mounting Hardware section.

**TERMINAL DIMENSIONS****TERMINAL FINISH**

"E" Finish - 100 % Sn coated steel. "Z" Finish - 60/40 SnPb coated steel. "N" Finish - Nickel coated steel. Finish for terminal style 14 and 15 limited to nickel plated steel (N).

DIMENSION	TERMINAL STYLE					
	02	05	06	07	14	15
A	0.188 [4.76]	0.188 [4.76]	0.250 [6.35]	0.375 [9.53]	0.188 [4.76]	0.250 [6.35]
B	0.406 [10.32]	0.438 [11.11]	0.563 [14.29]	0.625 [15.88]	0.563 [14.29]	0.594 [15.08]
C	0.093 [2.36]	0.104 [2.64]	0.166 [4.22]	0.173 [4.39]	0.050 [1.27]	0.065 [1.65]
D	0.020 [0.51]	0.020 [0.51]	0.020 [0.51]	0.020 [0.51]	0.020 [0.51]	0.031 [0.79]



## MOUNTING HARDWARE

Mounting hardware is available for HL resistors, see HL Brackets and Sliders datasheet for more information:  
[www.vishay.com/doc?30279](http://www.vishay.com/doc?30279)

TECHNICAL SPECIFICATIONS		
PARAMETER	UNIT	HL, NHL RESISTOR CHARACTERISTICS
Temperature Coefficient	ppm/°C	± 30 for 10 Ω and above; ± 50 for 1 Ω to 9.9 Ω; ± 90 for 0.1 Ω to 0.99 Ω
Short Time Overload	-	10 x rated power for 5 s
Dielectric Withstanding Voltage	V <sub>AC</sub>	1000, from terminal to mounting hardware
Maximum Working Voltage	V	$(P \times R)^{1/2}$
Insulation Resistance	Ω	1000 MΩ minimum dry, 100 MΩ minimum after moisture test
Operating Temperature Range	°C	-55 to +350

## MATERIAL SPECIFICATIONS

**Element:** copper-nickel alloy of nickel-chrome alloy, depending on resistance value

**Core:** ceramic, steatite

**Coating:** special high temperature silicone

**Standard Terminals:** model "E" terminals are tinned steel

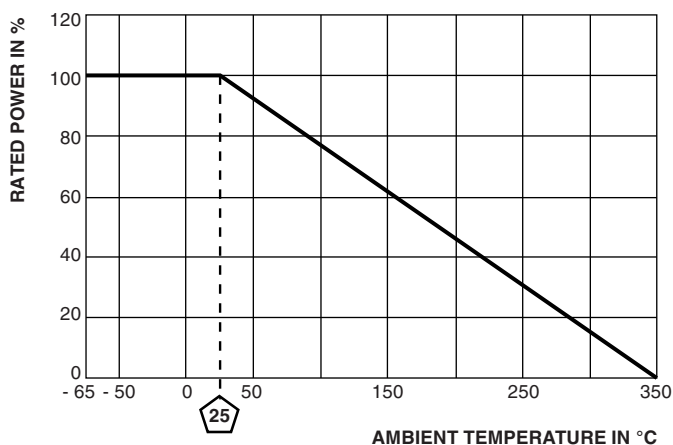
**Terminal Bands:** steel

**Part Marking:** Vishay Dale, model, wattage, value, tolerance, date code

## NHL NON-INDUCTIVE

Models of equivalent physical and electrical specifications are available with non-inductive (Ayrton-Perry) winding. They are identified by adding the letter N to the front of the HL type designation (NHL225 for example). For NHL models maximum resistance values are lower, see Standard Electrical Specifications table.

## DERATING



PERFORMANCE		
TEST	CONDITIONS OF TEST	TEST LIMITS
Thermal Shock	Rated power applied until thermally stable, then a minimum of 15 min at -55 °C	± (2.0 % + 0.05 Ω) ΔR
Short Time Overload	10x rated power for 5 s	± (2.0 % + 0.05 Ω) ΔR
Dielectric Withstanding Voltage	1000 V <sub>RMS</sub> for 1 min	± (0.1 % + 0.05 Ω) ΔR
Low Temperature Storage	-55 °C for 24 h	± (2.0 % + 0.05 Ω) ΔR
High Temperature Exposure	250 h at + 350 °C	± (2.0 % + 0.05 Ω) ΔR
Humidity	75 °C, 90 % to 100 % RH, 240 h	± (5.0 % + 0.05 Ω) ΔR
Load Life	1000 h at rated power, + 25 °C, 1.5 h "ON", 0.5 h "OFF"	± (3.0 % + 0.05 Ω) ΔR
Moisture Resistance	MIL-STD-202 Method 106, 7b not applicable	± (2.0 % + 0.05 Ω) ΔR
Shock, Specified Pulse	MIL-STD-202 Method 213, 100 g's for 6 ms, 10 shocks	± (0.2 % + 0.05 Ω) ΔR
Vibration, High Frequency	Frequency varied 10 Hz to 2000 Hz, 20 g peak, 2 directions 6 h each	± (0.2 % + 0.05 Ω) ΔR



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