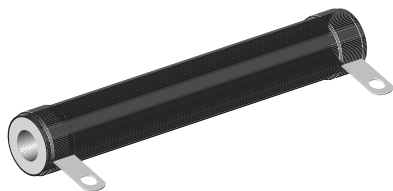




Wirewound Resistors, Industrial Power, Tubular (HL), Non-Inductive Tubular (NHL)

**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



RoHS*
Available

**HALOGEN
FREE**
Available

GREEN
(5-2008)
Available

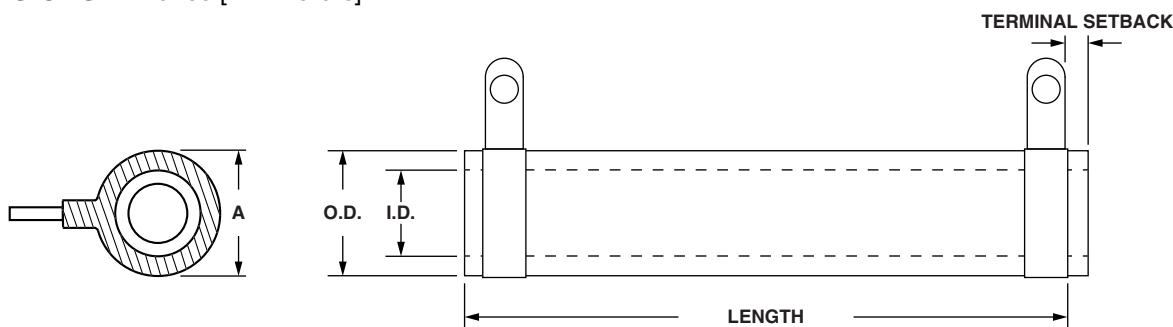
STANDARD ELECTRICAL SPECIFICATIONS

GLOBAL MODEL	HISTORICAL MODEL	POWER RATING $P_{25^{\circ}\text{C}}$ W	RESISTANCE RANGE Ω $\pm 5\%$	RESISTANCE RANGE Ω $\pm 10\%$	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			
NHL100 (see "Standard Electrical Specifications" table above for additional P/N's)		02 05 06 07 14 15		E = lead (Pb)-free Z = tin / lead N = nickel		R = decimal K = thousand 10R00 = 10.0 Ω 1K000 = 1 kΩ		J = ± 5.0 % K = ± 10.0 % Note (1) Tin / lead for type "Z", lead (Pb)-free for type "N"		E = lead (Pb)-free skin pack J ⁽¹⁾ = skin pack (J01)				(dash number) (up to 2 digits) from 1 to 99 as applicable			
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							

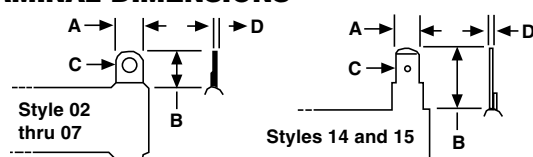
**DIMENSIONS** in inches [millimeters]

(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 ⁽¹⁾
		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

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 _{AC}	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

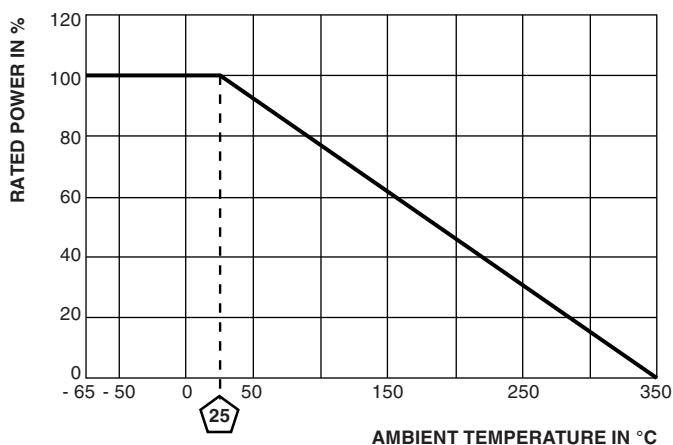
Terminal Bands: steel

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 _{RMS} 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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