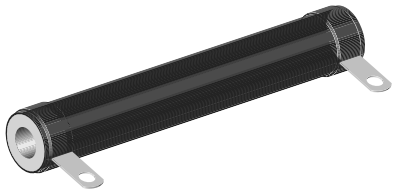
Wirewound Resistors, Industrial Power, Tubular (HL), Non-Inductive Tubular (NHL)



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

Pb-free Available
e3
RoHS* Available
HALOGEN FREE Available
GREEN (5-2008) Available

STANDARD ELECTRICAL SPECIFICATIONS

GLOBAL MODEL	HISTORICAL MODEL	POWER RATING $P_{25\,°C}$ W	RESISTANCE RANGE Ω ± 5 %	RESISTANCE RANGE Ω ± 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 %	**E** = lead (Pb)-free skin pack **J** (1) = skin pack (J01)	(dash number) (up to 2 digits) from **1 to 99** as applicable

Note
(1) Tin / lead for type "Z", lead (Pb)-free for type "N"

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

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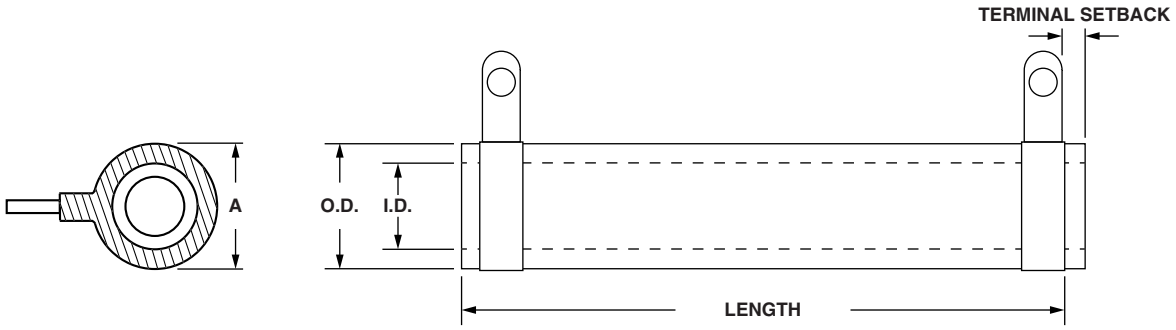
DIMENSIONS in inches [millimeters]



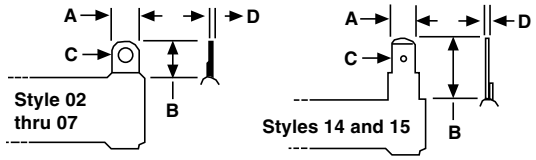
(Includes Coating and Terminal Band)

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 NHL011	0.469 [11.91]	1.750 [44.45]	0.375 [9.53]	0.188 [4.76]	0.094 [2.38]	1.187	02	-	101, 204, 301
HL012 NHL012	0.406 [10.32]	1.750 [44.45]	0.313 [7.94]	0.188 [4.76]	0.094 [2.38]	1.187	05	14	101, 204, 301
HL015 NHL015	0.563 [14.29]	1.500 [38.10]	0.438 [11.11]	0.313 [7.94]	0.094 [2.38)	0.937	02	14	101, 203, 301
HL020 NHL020	0.563 [14.29]	2.000 [50.8]	0.438 [11.11]	0.313 [7.94]	0.094 [2.38]	1.437	02	14	101, 203, 301
HL025 NHL025	0.688 [17.46]	2.000 [50.8]	0.563 [14.29]	0.313 [7.94]	0.094 [2.38]	1.312	06	15	101, 203, 301
HL026 NHL026	0.563 [14.29]	3.000 [76.2]	0.438 [11.11]	0.313 [7.94]	0.094 [2.38]	2.437	02	14	101, 203, 301
HL050 NHL050	0.688 [17.46]	4.000 [101.6]	0.563 [14.29]	0.313 [7.94]	0.094 [2.38]	3.312	06	15	101, 203, 301
HL051 NHL051	0.906 [23.02]	3.500 [88.9]	0.750 [19.05]	0.500 [12.70]	0.125 [3.18]	2.75	06	15	102, 206, 303
HL060 NHL060	0.906 [23.02]	4.000 [101.6]	0.750 [19.05]	0.500 [12.70]	0.125 [3.18]	3.250	06	15	102, 206, 303
HL065 NHL065	0.906 [23.02]	4.500 [114.3]	0.750 [19.05]	0.500 [12.70]	0.125 [3.18]	3.750	06	15	102, 206, 303
HL080 NHL080	1.313 [33.34]	4.000 [101.6]	1.125 [28.58]	0.750 [19.05]	0.219 [5.56]	2.812	07	15	103, 205, 303
HL100 NHL100	0.906 [23.02]	6.500 [165.1]	0.750 [19.05]	0.500 [12.70]	0.125 [3.18]	5.750	06	15	102, 206, 303
HL120 NHL120	1.313 [33.34]	6.000 [152.4]	1.125 [28.58]	0.750 [19.05]	0.219 [5.56]	4.812	07	15	103, 205, 303
HL130 NHL130	1.313 [33.34]	6.500 [165.1]	1.125 [28.58]	0.750 [19.05]	0.219 [5.56]	5.312	07	15	103, 205, 303
HL160 NHL160	1.313 [33.34]	8.000 [203.2]	1.125 [28.58]	0.750 [19.05]	0.219 [5.56]	6.812	07	15	103, 205, 303
HL175 NHL175	1.313 [33.34]	8.500 [215.9]	1.125 [28.58]	0.750 [19.05]	0.219 [5.56]	7.312	07	15	103, 205, 303
HL225 NHL225	1.313 [33.34]	10.500 [266.7]	1.125 [28.58]	0.750 [19.05]	0.219 [5.56]	9.312	07	15	103, 205, 303

Note

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

TERMINAL DIMENSIONS



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]

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).

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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

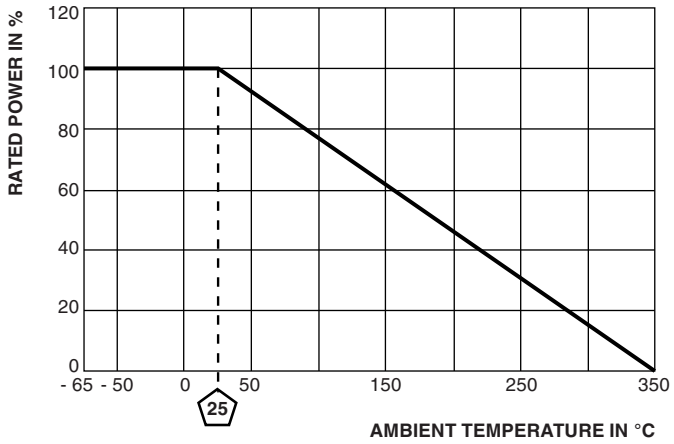
Terminal Bands: steel

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) Δ*R*
Short Time Overload	10x rated power for 5 s	± (2.0 % + 0.05 Ω) Δ*R*
Dielectric Withstanding Voltage	1000 V_{RMS} for 1 min	± (0.1 % + 0.05 Ω) Δ*R*
Low Temperature Storage	-55 °C for 24 h	± (2.0 % + 0.05 Ω) Δ*R*
High Temperature Exposure	250 h at + 350 °C	± (2.0 % + 0.05 Ω) Δ*R*
Humidity	75 °C, 90 % to 100 % RH, 240 h	± (5.0 % + 0.05 Ω) Δ*R*
Load Life	1000 h at rated power, + 25 °C, 1.5 h "ON", 0.5 h "OFF"	± (3.0 % + 0.05 Ω) Δ*R*
Moisture Resistance	MIL-STD-202 Method 106, 7b not applicable	± (2.0 % + 0.05 Ω) Δ*R*
Shock, Specified Pulse	MIL-STD-202 Method 213, 100 *g*'s for 6 ms, 10 shocks	± (0.2 % + 0.05 Ω) Δ*R*
Vibration, High Frequency	Frequency varied 10 Hz to 2000 Hz, 20 *g* peak, 2 directions 6 h each	± (0.2 % + 0.05 Ω) Δ*R*

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