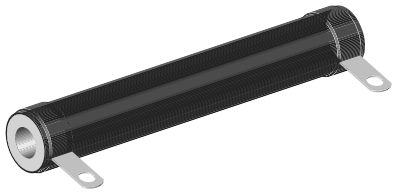
Wirewound Resistors, Industrial Power, Tubular (HL), Non-Inductive Tubular (NHL)



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

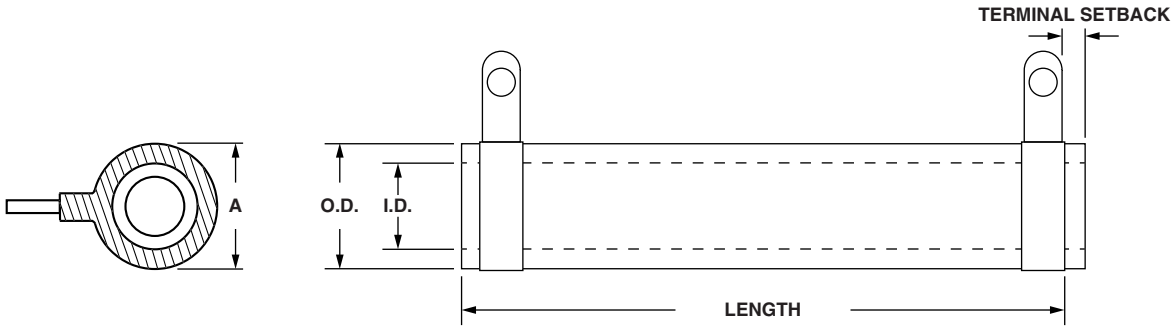
Note
(1) Tin / lead for type "Z", lead (Pb)-free for type "N"

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

For technical questions, contact: ww2dresistors@vishay.com

DIMENSIONS in inches [millimeters]



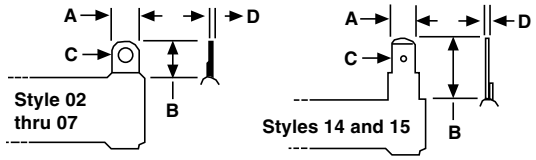
(Includes Coating and Terminal Band)

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).

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

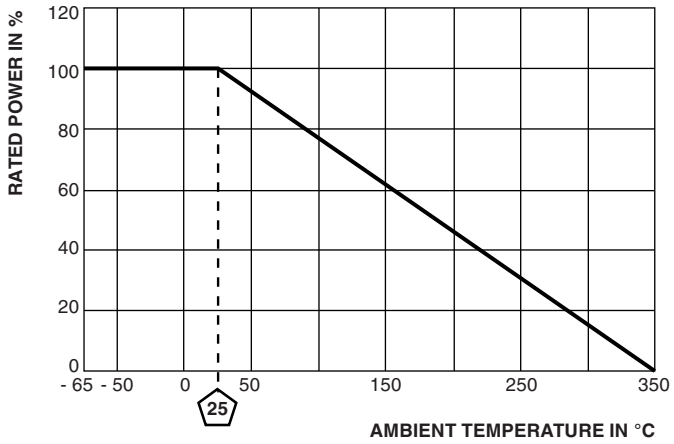
Terminal Bands: steel

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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