

## Cemented Resistors with Ferrules

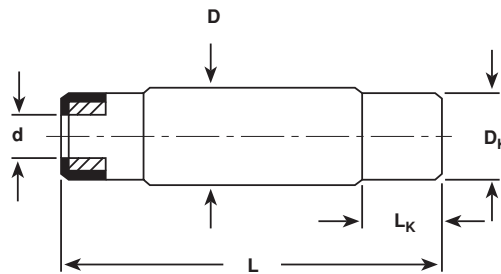


### FEATURES

- Machined caps with inner thread available
- Easy to change when mounted with spring clips (see Mounting Accessories)
- Corrugated ribbon construction aids rapid cooling
- Available in adjustable or non inductive design

STANDARD ELECTRICAL SPECIFICATIONS						
MODEL	POWER RATING $P_{40^{\circ}\text{C}}$ W	LIMITING VOLTAGE V	RESISTANCE RANGE (Ohms)		TOLERANCE $\pm\%$	E-SERIES
			TC-10...-80ppm/K	TC100...180ppm/K		
ZWK 10	10	$\sqrt{P \times R}$	R47 - 8K2	1R5 - 22K	10	E 12
ZWK 10 Ni			5R1 - 8K2	—	5	E 24
ZWK 15	15	$\sqrt{P \times R}$	R24 - 1K5	R56 - 3K9	10	E12
ZWK 15 Ni			1R0 - 1K5	1R0 - 3K9	5	E 24
ZWK 20	20	$\sqrt{P \times R}$	R47 - 12K	1R1 - 33K	10	E 12
ZWK 20 Ni			5R1 - 12K	—	5	E 24
ZWK 40	40	$\sqrt{P \times R}$	R36 - 2K2	R82 - 5K6	10	E 12
ZWK 40 Ni			R75 - 2K2	1R0 - 5K6	5	E 24
ZWK 60	60	$\sqrt{P \times R}$	R75 - 20K	1R6 - 51K	10	E 12
ZWK 60 Ni			R75 - 20K	1R6 - 51K	5	E 24
ZWK 90	90	$\sqrt{P \times R}$	2R0 - 20K	—	2	E 24
ZWK 90 Ni			R56 - 3K3	1R3 - 9K1	10	E 12
ZWK 150	150	$\sqrt{P \times R}$	R56 - 3K3	1R3 - 9K1	5	E 24
ZWK 150 Ni			1R5 - 36K	3R3 - 100K	10	E 12
ZWK 150 Ni			1R5 - 36K	3R3 - 100K	5	E 24
			2R2 - 20K	—	2	E 24
			1R1 - 6K8	2R7 - 18K	10	E 12
			1R1 - 6K8	2R7 - 18K	5	E 24
			1R8 - 47K	4R3 - 130K	10	E 12
			1R8 - 47K	4R3 - 130K	5	E 24
			2R - 47K	—	2	E 24
			1R5 - 8K2	3R3 - 24K	10	E 12
			1R5 - 8K2	3R3 - 24K	5	E 24
			2R7 - 75K	6R2 - 200K	10	E 12
			2R7 - 75K	6R2 - 200K	5	E 24
			2R7 - 75K	—	2	E 24
			2R2 - 13K	5R1 - 36K	10	E 12
			2R2 - 13K	5R1 - 36K	5	E 24
			4R7 - 130K	11R - 360K	10	E 12
			4R7 - 130K	11R - 360K	5	E 24
			4R7 - 130K	—	2	E 24
			3R9 - 24K	9R1 - 62K	10	E 12
			3R9 - 24K	9R1 - 62K	5	E 24

**DIMENSIONS**

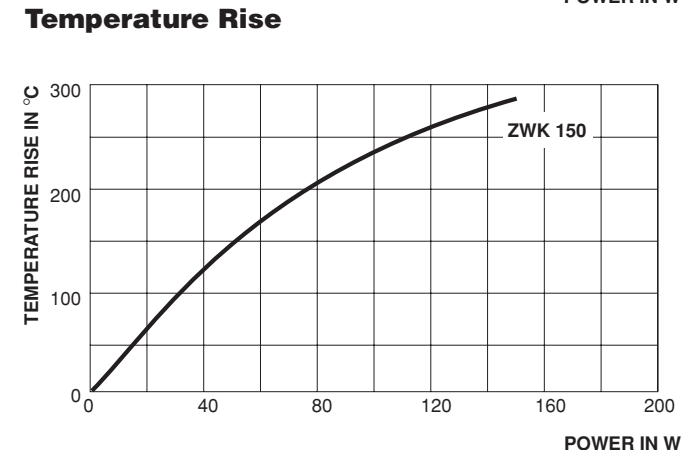
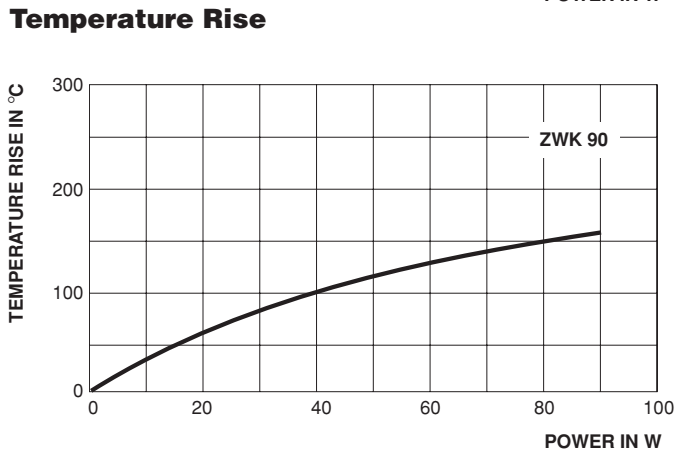
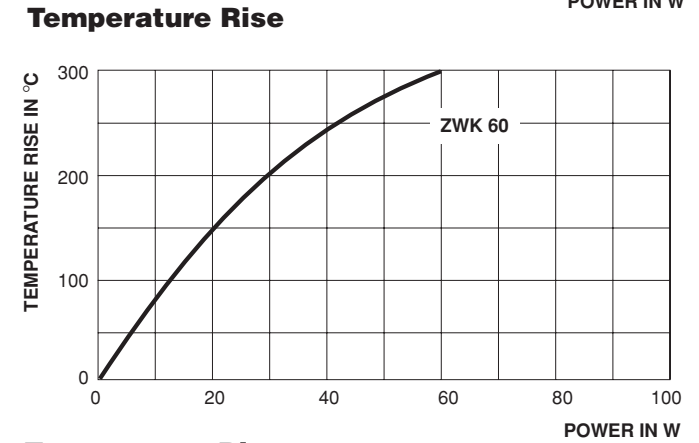
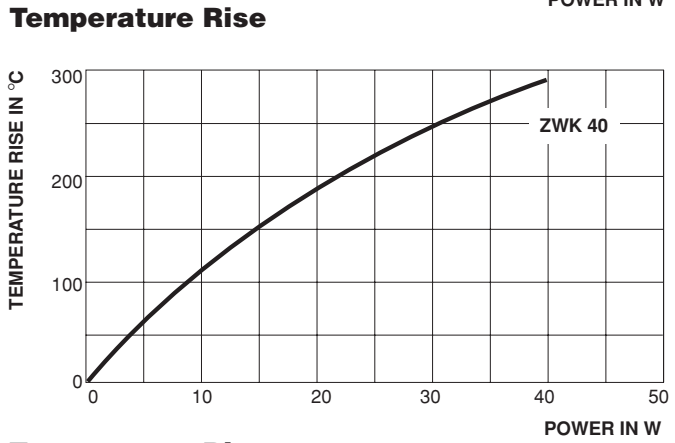
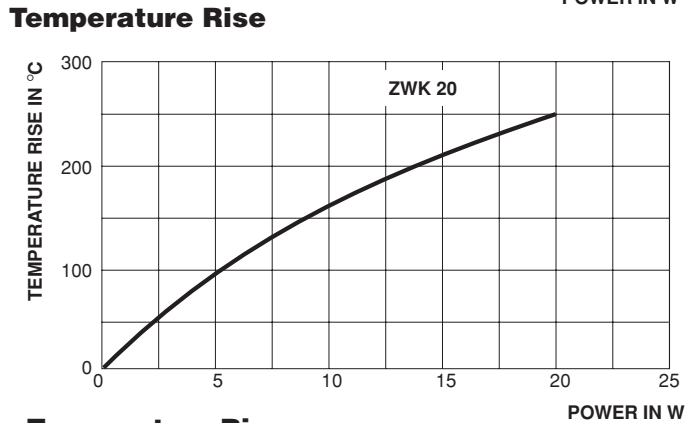
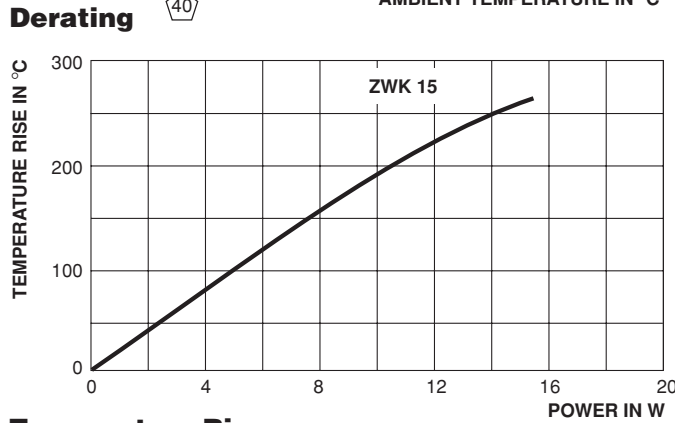
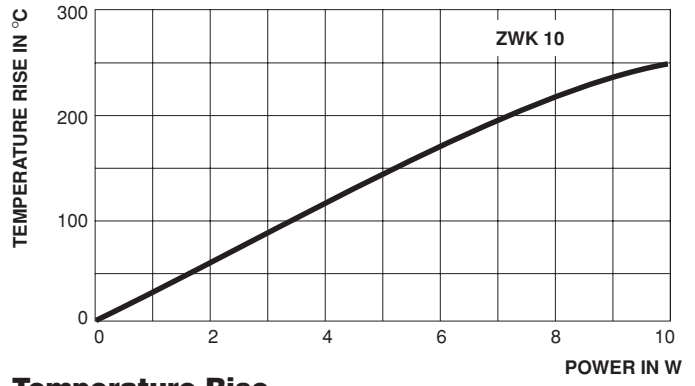
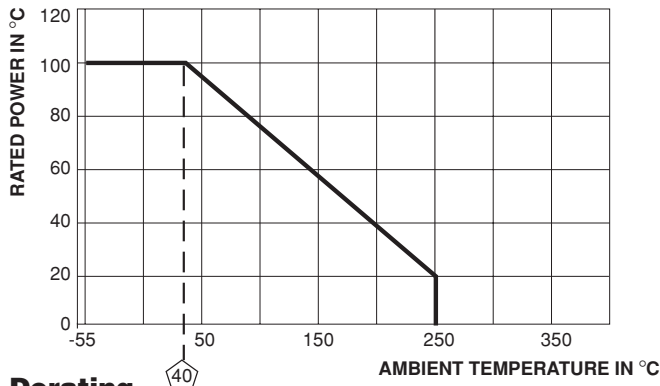


MODEL	DIMENSIONS in millimeters [inches]		
	ZWK 10 ZWK 10 Ni	ZWK 15 ZWK 15 Ni	ZWK 20 ZWK 20 Ni
D	12 ± 0.8 [0.484 ± 0.031]	15 ± 0.8 [0.602 ± 0.031]	15 ± 0.8 [0.602 ± 0.031]
L	51 ± 1.3 [2.008 ± 0.051]	61 ± 1.5 [2.402 ± 0.059]	81 ± 2 [3.189 ± 0.079]
D <sub>k</sub>	11 [0.433]	14 [0.551]	14 [0.551]
L <sub>k</sub>	10 [0.394]	13 [0.512]	13 [0.512]
d	4.5 [0.177]	5.5 [0.217]	5.5 [0.217]

MODEL	DIMENSIONS (CONT'D..) in millimeters [inches]			
	ZWK 40 ZWK 40 Ni	ZWK 60 ZWK 60 Ni	ZWK 90 ZWK 90 Ni	ZWK 150 ZWK 150 Ni
D	22 ± 1 [0.866 ± 0.039]	22 ± 1 [0.866 ± 0.039]	22 ± 1 [0.866 ± 0.039]	22 ± 1 [0.866 ± 0.039]
L	101 ± 2.5 [3.976 ± 0.098]	121 ± 3 [4.764 ± 0.118]	166.5 ± 4.2 [6.555 ± 0.165]	266.5 ± 6.7 [10.492 ± 0.264]
D <sub>k</sub>	21 [0.827]	21 [0.827]	21 [0.827]	21 [0.827]
L <sub>k</sub>	16 [0.63]	16 [0.63]	16 [0.63]	16 [0.63]
d	10 [0.394]	10 [0.394]	10 [0.394]	10 [0.394]

**ORDERING INFORMATION**

ZWK	100		3	100R	± 5%
MODEL	SIZE	SET FREE FOR DRAWN CAPS OR ADD "M4" FOR MACHINED CAPS WITH INNER THREAD M4	CLASS	RESISTANCE VALUE Ω	TOLERANCE ± %



**Temperature Rise**

**Temperature Rise**



**PULSE HANDLING FOR SHORT PULSES** (less than 100 milliseconds)

For single pulses up to 100 milliseconds duration time the following energy resistance chart can be used to calculate the energy a resistor can handle. Look to the resistance value or the next higher value of the model you need and follow this row to the energy per ohm column to the left. The energy per ohm value multiplied by the resistance value is the energy the resistor can handle for 100 milliseconds. This energy divided by .1 ms is the power the resistor can handle for 100 milliseconds. For the power the resistor can handle for 10 milliseconds needed divide the energy by .01. The maximum pulse power is limited at 625 x rated power.

Do not use this chart for ZWK...ni styles. For more information and assistance please contact factory.

ENERGY RESISTANCE CHART													
ZWK 10		ZWK 15		ZWK 20		ZWK 40		ZWK 60		ZWK 90		ZWK 150	
ENERGY/Ω [Ws/Ω]	R [Ω]	ENERGY/Ω [Ws/Ω]	R [Ω]	ENERGY/Ω [Ws/Ω]	R [Ω]	ENERGY/Ω [Ws/Ω]	R [Ω]	ENERGY/Ω [Ws/Ω]	R [Ω]	ENERGY/Ω [Ws/Ω]	R [Ω]	ENERGY/Ω [Ws/Ω]	R [Ω]
4.70E - 04	22K	4.69E - 04	33K	4.69E - 04	51K	4.68E - 04	100K	4.68E - 04	130K	4.68E - 04	200K	4.68E - 04	360K
4.71E - 04	16K	4.70E - 04	24K	4.69E - 04	39K	4.68E - 04	75K	4.68E - 04	100K	4.68E - 04	150K	4.68E - 04	270K
8.03E - 04	12K	8.01E - 04	18K	8.00E - 04	27K	7.99E - 04	56K	7.98E - 04	68K	7.98E - 04	110K	7.98E - 04	180K
1.29E - 03	8.2K	1.28E - 03	12K	1.28E - 03	20K	1.28E - 03	39K	1.28E - 03	51K	1.28E - 03	75K	1.28E - 03	130K
1.35E - 03	5.6K	1.34E - 03	8.2K	1.34E - 03	13K	1.34E - 03	27K	1.34E - 03	33K	1.34E - 03	51K	1.34E - 03	91K
2.50E - 03	3.6K	2.49E - 03	5.6K	2.48E - 03	9.1K	2.48E - 03	18K	2.48E - 03	22K	2.48E - 03	33K	2.47E - 03	62K
4.26E - 03	2.7K	4.25E - 03	3.9K	4.24E - 03	6.2K	4.23E - 03	12K	4.23E - 03	15K	4.23E - 03	24K	4.23E - 03	43K
6.85E - 03	2.0K	6.83E - 03	3.0K	6.81E - 03	4.7K	6.80E - 03	9.1K	6.79E - 03	11K	6.79E - 03	18K	6.78E - 03	30K
1.04E - 02	1.5K	1.04E - 02	2.2K	1.03E - 02	3.3K	1.03E - 02	6.8K	1.03E - 02	8.2K	1.03E - 02	13K	1.03E - 02	22K
1.53E - 02	1.1K	1.52E - 02	1.6K	1.51E - 02	2.7K	1.51E - 02	5.1K	1.51E - 02	6.8K	1.51E - 02	10K	1.51E - 02	18K
2.17E - 02	910	2.16E - 02	1.3K	2.16E - 02	2.0K	1.94E - 02	4.7K	1.94E - 02	6.2K	2.14E - 02	9.1K	2.14E - 02	15K
2.98E - 02	680	2.96E - 02	1.0K	2.95E - 02	1.6K	2.15E - 02	3.9K	2.15E - 02	5.1K	2.94E - 02	6.2K	2.93E - 02	11K
4.05E - 02	470	4.02E - 02	680	4.00E - 02	1.1K	2.94E - 02	3.3K	2.94E - 02	4.3K	3.98E - 02	4.3K	3.98E - 02	7.5K
6.89E - 02	330	6.86E - 02	470	6.82E - 02	750	3.99E - 02	2.2K	3.98E - 02	2.7K	6.77E - 02	3.0K	6.77E - 02	5.1K
1.10E - 01	240	1.10E - 01	360	1.09E - 01	560	6.79E - 02	1.5K	6.78E - 02	2.0K	1.08E - 01	2.2K	1.08E - 01	3.9K
1.68E - 01	200	1.67E - 01	270	1.66E - 01	430	1.09E - 01	1.1K	1.08E - 01	1.5K	1.65E - 01	1.6K	1.65E - 01	3.0K
2.47E - 01	150	2.45E - 01	200	2.44E - 01	330	1.66E - 01	820	1.65E - 01	1.1K	2.42E - 01	1.3K	2.41E - 01	2.2K
3.03E - 01	130	3.50E - 01	160	3.47E - 01	270	2.43E - 01	620	2.42E - 01	820	2.92E - 01	1.2K	3.44E - 01	1.8K
3.52E - 01	110	4.80E - 01	130	4.76E - 01	200	3.45E - 01	510	3.45E - 01	680	3.44E - 01	1.0K	4.71E - 01	1.5K
4.84E - 01	91	6.46E - 01	110	6.41E - 01	180	4.73E - 01	390	4.73E - 01	510	4.72E - 01	820	6.35E - 01	1.1K
6.52E - 01	75	8.23E - 01	100	8.14E - 01	160	6.38E - 01	330	6.37E - 01	430	6.36E - 01	620	8.35E - 01	910
8.35E - 01	68	8.51E - 01	91	8.44E - 01	150	8.39E - 01	270	8.38E - 01	360	8.36E - 01	560	1.08E + 00	750
8.60E - 01	62	1.10E + 00	75	1.09E + 00	120	1.09E + 00	220	1.08E + 00	300	1.08E + 00	430	1.38E + 00	680
1.11E + 00	51	1.41E + 00	62	1.40E + 00	100	1.39E + 00	200	1.38E + 00	240	1.38E + 00	360	1.73E + 00	470
1.28E + 00	47	1.77E + 00	47	1.75E + 00	75	1.74E + 00	150	1.73E + 00	180	1.73E + 00	270	2.65E + 00	360
1.42E + 00	43	2.73E + 00	33	2.69E + 00	56	2.67E + 00	110	2.66E + 00	130	2.65E + 00	200	3.87E + 00	240
1.80E + 00	30	4.01E + 00	22	3.95E + 00	36	3.90E + 00	75	3.89E + 00	91	3.88E + 00	150	6.46E + 00	180
2.77E + 00	22	6.72E + 00	16	6.61E + 00	27	6.53E + 00	51	6.50E + 00	68	6.48E + 00	100	1.02E + 01	150
4.08E + 00	15	1.06E + 01	13	1.04E + 01	22	1.03E + 01	43	1.02E + 01	56	1.02E + 01	82	1.34E + 01	120
6.85E + 00	11	1.39E + 01	11	1.26E + 01	20	1.23E + 01	39	1.23E + 01	51	1.22E + 01	75	1.74E + 01	91
1.07E + 01	9.1	1.82E + 01	8.2	1.37E + 01	18	1.35E + 01	33	1.35E + 01	43	1.34E + 01	68	2.49E + 01	68
1.42E + 01	7.5	2.60E + 01	6.8	1.79E + 01	13	1.76E + 01	27	1.75E + 01	33	1.74E + 01	51	3.45E + 01	62
1.86E + 01	5.6	3.62E + 01	5.6	2.55E + 01	11	2.52E + 01	20	2.51E + 01	27	2.50E + 01	39	4.25E + 01	43
2.68E + 01	4.3	4.52E + 01	3.9	3.55E + 01	9.1	3.50E + 01	18	3.49E + 01	22	3.47E + 01	36	6.83E + 01	30
3.70E + 01	3.9	7.27E + 01	3.0	4.41E + 01	6.2	4.32E + 01	12	4.29E + 01	16	4.27E + 01	24	1.04E + 02	24
4.65E + 01	2.7	1.11E + 02	2.2	7.09E + 01	4.7	6.94E + 01	9.1	6.90E + 01	12	6.86E + 01	18	1.52E + 02	18
7.51E + 01	2.0	1.63E + 02	1.8	1.08E + 02	3.6	1.06E + 02	6.8	1.05E + 02	9.1	1.04E + 02	13	2.16E + 02	15
1.13E + 02	1.8	2.31E + 02	1.5	1.59E + 02	2.7	1.55E + 02	5.1	1.54E + 02	6.8	1.53E + 02	10	2.96E + 02	11
1.69E + 02	1.2	3.21E + 02	1.1	2.26E + 02	2.2	2.20E + 02	4.3	2.19E + 02	5.6	2.17E + 02	8.2	4.01E + 02	9.1
2.43E + 02	.91	4.36E + 02	.91	3.10E + 02	1.8	3.02E + 02	3.3	3.00E + 02	4.3	2.98E + 02	6.8	5.26E + 02	7.5
3.33E + 02	.75	5.74E + 02	.75	3.40E + 02	1.6	4.10E + 02	2.7	4.07E + 02	3.6	3.18E + 02	6.2	6.85E + 02	4.7
4.72E + 02	.47	7.74E + 02	.47	4.21E + 02	1.5	5.39E + 02	2.2	5.34E + 02	3.0	4.04E + 02	5.1		
				5.54E + 02	1.2	7.06E + 02	1.5	7.01E + 02	1.8	5.30E + 02	4.3		
				7.37E + 02	.75					6.93E + 02	2.7		