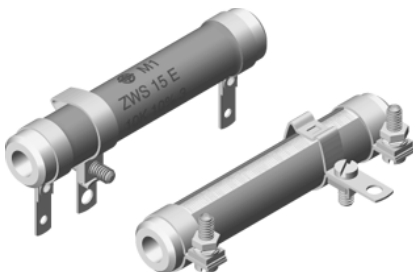


## Cemented Wirewound Resistors with Lugs



### FEATURES

- Complete welded construction
- Ceramic core
- Available in adjustable = "E" or non inductive design = "Ni"
- Lugs with various termination styles for soldering or bolt connection
- Compliant to RoHS directive 2002/95/EC



RoHS  
COMPLIANT

GREEN  
(5-2009)\*\*

STANDARD ELECTRICAL SPECIFICATIONS						
MODEL	VARIANT/ TERMINAL	POWER RATING $P_{40^{\circ}\text{C}}$	LIMITING VOLTAGE	RESISTANCE RANGE <sup>(1)</sup>		TOLERANCE
				TCR - 10 ... - 80 ppm/K	TCR 100 ... 180 ppm/K	
ZWS6	SL	6 W	$\sqrt{P \times R}$	0.82 $\Omega$ to 5.1 k $\Omega$	1.8 $\Omega$ to 13 k $\Omega$	$\pm 10\%$ , $\pm 5\%$
	E SL			2.7 $\Omega$ to 5.1 k $\Omega$	-	$\pm 2\%$
	Ni SL			0.82 $\Omega$ to 130 $\Omega$	1.8 $\Omega$ to 4.7 k $\Omega$	$\pm 10\%$ , $\pm 5\%$
				0.15 $\Omega$ to 910 $\Omega$	0.33 $\Omega$ to 2.4 k $\Omega$	$\pm 10\%$
ZWS8	SL, SS	8 W	$\sqrt{P \times R}$	1 $\Omega$ to 910 $\Omega$	2 $\Omega$ to 2.4 k $\Omega$	$\pm 5\%$
	E SL, E SS			0.68 $\Omega$ to 7.5 k $\Omega$	1.8 $\Omega$ to 20 k $\Omega$	$\pm 10\%$ , $\pm 5\%$
	Ni SL, Ni SS			3.3 $\Omega$ to 7.5 k $\Omega$	-	$\pm 2\%$
				0.62 $\Omega$ to 200 $\Omega$	1.8 $\Omega$ to 6.8 k $\Omega$	$\pm 10\%$ , $\pm 5\%$
ZWS12	SL, SS	12 W	$\sqrt{P \times R}$	0.24 $\Omega$ to 1.3 k $\Omega$	0.56 $\Omega$ to 3.6 k $\Omega$	$\pm 10\%$
	E SL, E SS			1 $\Omega$ to 1.3 k $\Omega$	2 $\Omega$ to 3.6 k $\Omega$	$\pm 5\%$
	Ni SL, Ni SS			0.62 $\Omega$ to 10 k $\Omega$	1.8 $\Omega$ to 27 k $\Omega$	$\pm 10\%$ , $\pm 5\%$
				3 $\Omega$ to 10 k $\Omega$	-	$\pm 2\%$
ZWS15	SL, SS	15 W	$\sqrt{P \times R}$	0.56 $\Omega$ to 270 $\Omega$	1.8 $\Omega$ to 9.1 k $\Omega$	$\pm 10\%$ , $\pm 5\%$
	E SL, E SS			0.33 $\Omega$ to 1.8 k $\Omega$	0.75 $\Omega$ to 5.1 k $\Omega$	$\pm 10\%$
	Ni SL, Ni SS			1 $\Omega$ to 1.8 k $\Omega$	2 $\Omega$ to 5.1 k $\Omega$	$\pm 5\%$
				0.68 $\Omega$ to 12 k $\Omega$	2.2 $\Omega$ to 33 k $\Omega$	$\pm 10\%$ , $\pm 5\%$
ZWS20	SL, SS	20 W	$\sqrt{P \times R}$	2.2 $\Omega$ to 12 k $\Omega$	-	$\pm 2\%$
	E SL, E SS			0.68 $\Omega$ to 330 $\Omega$	2.2 $\Omega$ to 11 k $\Omega$	$\pm 10\%$ , $\pm 5\%$
	Ni SL, Ni SS			0.39 $\Omega$ to 2.2 k $\Omega$	0.82 $\Omega$ to 6.2 k $\Omega$	$\pm 10\%$
				1 $\Omega$ to 2.2 k $\Omega$	2.0 $\Omega$ to 6.2 k $\Omega$	$\pm 5\%$
ZWS35	SL, SS, SB, FST	35 W	$\sqrt{P \times R}$	0.62 $\Omega$ to 16 k $\Omega$	1.3 $\Omega$ to 43 k $\Omega$	$\pm 10\%$ , $\pm 5\%$
	E SL, E SS, E SB, E FST			2.7 $\Omega$ to 16 k $\Omega$	-	$\pm 2\%$
	Ni SL, Ni SS, Ni SB, Ni FST			0.62 $\Omega$ to 430 $\Omega$	1.3 $\Omega$ to 15 k $\Omega$	$\pm 10\%$ , $\pm 5\%$
				0.47 $\Omega$ to 2.7 k $\Omega$	1.1 $\Omega$ to 8.2 k $\Omega$	$\pm 10\%$
ZWS50	SL, SS, SB, FST	50 W	$\sqrt{P \times R}$	1 $\Omega$ to 2.7 k $\Omega$	2 $\Omega$ to 8.2 k $\Omega$	$\pm 5\%$
	E SL, E SS, E SB, E FST			1.1 $\Omega$ to 30 k $\Omega$	2.7 $\Omega$ to 82 k $\Omega$	$\pm 10\%$ , $\pm 5\%$
	Ni SL, Ni SS, Ni SB, Ni FST			1.3 $\Omega$ to 30 k $\Omega$	-	$\pm 2\%$
				1.1 $\Omega$ to 750 $\Omega$	2.7 $\Omega$ to 27 k $\Omega$	$\pm 10\%$ , $\pm 5\%$
ZWS100	SS, SSB, SB, FST	100 W	$\sqrt{P \times R}$	0.91 $\Omega$ to 5.1 k $\Omega$	2 $\Omega$ to 15 k $\Omega$	$\pm 10\%$ , $\pm 5\%$
	E SS, E SSB, E SB, E FST			1.3 $\Omega$ to 33 k $\Omega$	3 $\Omega$ to 91 k $\Omega$	$\pm 10\%$ , $\pm 5\%$
	Ni SS, Ni SSB, Ni SB, Ni FST			2.2 $\Omega$ to 33 k $\Omega$	-	$\pm 2\%$
				1.3 $\Omega$ to 910 $\Omega$	3 $\Omega$ to 33 k $\Omega$	$\pm 10\%$ , $\pm 5\%$
ZWS100	SS, SSB, SB, FST	100 W	$\sqrt{P \times R}$	1.1 $\Omega$ to 6.2 k $\Omega$	2.4 $\Omega$ to 16 k $\Omega$	$\pm 10\%$ , $\pm 5\%$
	E SS, E SSB, E SB, E FST			2.7 $\Omega$ to 68 k $\Omega$	6.2 $\Omega$ to 68 k $\Omega$	$\pm 10\%$ , $\pm 5\%$
	Ni SS, Ni SSB, Ni SB, Ni FST			2.7 $\Omega$ to 68 k $\Omega$	-	$\pm 2\%$
				2.7 $\Omega$ to 1.8 k $\Omega$	6.2 $\Omega$ to 68 k $\Omega$	$\pm 10\%$ , $\pm 5\%$
				2.2 $\Omega$ to 13 k $\Omega$	4.7 $\Omega$ to 33 k $\Omega$	$\pm 10\%$ , $\pm 5\%$

### Notes

<sup>(1)</sup> Resistance value to be selected for  $\pm 10\%$  tolerance from E12 and for  $\pm 5\%$  and  $\pm 2\%$  from E24

- For available "Mounting Accessories for Resistors", please see: [www.vishay.com/ppg?211015](http://www.vishay.com/ppg?211015)

\*\* Please see document "Vishay Material Category Policy": [www.vishay.com/doc?99902](http://www.vishay.com/doc?99902)



STANDARD ELECTRICAL SPECIFICATIONS						
MODEL	VARIANT/ TERMINAL	POWER RATING $P_{40\text{ °C}}$	LIMITING VOLTAGE	RESISTANCE RANGE (1)		TOLERANCE
				TCR - 10 ... - 80 ppm/K	TCR 100 ... 180 ppm/K	
ZWS150	SS, SSB, SB, FST	150 W	$\sqrt{P \times R}$	4.7 Ω to 130 kΩ	11 Ω to 360 kΩ	± 10 %, ± 5 %
	E SS, E SSB, E SB, E FST				-	± 2 %
	Ni SS, Ni SSB, Ni SB, Ni FST				4.7 Ω to 3.3 kΩ	11 Ω to 120 kΩ
ZWS250	SS, SSB, SB, FST	250 W	$\sqrt{P \times R}$	8.2 Ω to 220 kΩ	9.1 Ω to 62 kΩ	± 10 %, ± 5 %
	E SS, E SSB, E SB, E FST				20 Ω to 620 kΩ	± 10 %, ± 5 %
	Ni SS, Ni SSB, Ni SB, Ni FST				-	± 2 %
ZWS30/100	SS, SSB, SB, FST	75 W	$\sqrt{P \times R}$	2.4 Ω to 62 kΩ	20 Ω to 220 kΩ	± 10 %, ± 5 %
	E SS, E SSB, E SB, E FST				15 Ω to 110 kΩ	± 10 %, ± 5 %
	Ni SS, Ni SSB, Ni SB, Ni FST				5.1 Ω to 180 kΩ	± 10 %, ± 5 %
ZWS30/133	SS, SSB, SB, FST	110 W	$\sqrt{P \times R}$	3.3 Ω to 91 kΩ	5.1 Ω to 56 kΩ	± 10 %, ± 5 %
	E SS, E SSB, E SB, E FST				4.3 Ω to 30 kΩ	± 10 %, ± 5 %
	Ni SS, Ni SSB, Ni SB, Ni FST				2 Ω to 11 kΩ	± 10 %, ± 5 %
ZWS30/133	SS, SSB, SB, FST	110 W	$\sqrt{P \times R}$	3.3 Ω to 2.4 kΩ	7.5 Ω to 240 kΩ	± 10 %, ± 5 %
	E SS, E SSB, E SB, E FST				-	± 2 %
	Ni SS, Ni SSB, Ni SB, Ni FST				7.5 Ω to 82 kΩ	± 10 %, ± 5 %
ZWS30/133	SS, SSB, SB, FST	110 W	$\sqrt{P \times R}$	2.7 Ω to 16 kΩ	6.2 Ω to 43 kΩ	± 10 %, ± 5 %
	E SS, E SSB, E SB, E FST				-	± 2 %
	Ni SS, Ni SSB, Ni SB, Ni FST				6.2 Ω to 43 kΩ	± 10 %, ± 5 %

**Notes**

- (1) Resistance value to be selected for ± 10 % tolerance from E12 and for ± 5 % and ± 2 % from E24
- For available "Mounting Accessories for Resistors", please see: [www.vishay.com/ppg?21010](http://www.vishay.com/ppg?21010)

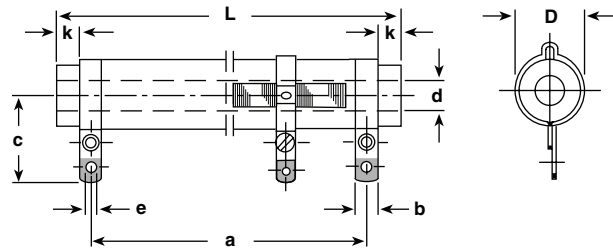
PART NUMBER AND PRODUCT DESCRIPTION																	
Part Number: ZWS006331001KLX000																	
Z	W	S	0	0	6	3	3	1	0	0	1	K	L	X	0	0	0
MODEL	VARIANT/ TERMINAL	TCR/MATERIAL	VALUE	TOLERANCE CODE	PACKAGING CODE	SPECIAL											
<b>ZWS006</b> = ZWS6 <b>ZWS008</b> = ZWS8 <b>ZWS012</b> = ZWS12 <b>ZWS015</b> = ZWS15 <b>ZWS020</b> = ZWS20 <b>ZWS035</b> = ZWS35 <b>ZWS050</b> = ZWS50 <b>ZWS100</b> = ZWS100 <b>ZWS150</b> = ZWS150 <b>ZWS250</b> = ZWS250 <b>ZWSN68</b> = ZWS6/30 <b>ZWSN84</b> = ZWS30/100 <b>ZWSN91</b> = ZWS30/133 <b>ZWSN94</b> = ZWS30/145 <b>ZWSN97</b> = ZWS30/235 <b>ZWSN98</b> = ZWS50/165 <b>ZWSOSM</b> = ZWS10/30  (Note: Ni is also known as SWI)	<b>3</b> = SL <b>4</b> = SS <b>5</b> = SB <b>6</b> = SSB <b>7</b> = FST <b>8</b> = E SL <b>9</b> = E SS <b>A</b> = E SB <b>B</b> = E SSB <b>C</b> = E FST <b>D</b> = Ni SL <b>E</b> = Ni SS <b>F</b> = Ni SB <b>G</b> = Ni SSB <b>H</b> = Ni FST <b>I</b> = GSCH <b>Z</b> = Value overflow (BV)	<b>1</b> = - 10 ... - 80 ppm/K WM 50 Class 1 <b>3</b> = 100 ... 180 ppm/K WM 110 Class 3 <b>0</b> = SWI	<b>3 digit value</b> <b>1 digit multiplier</b> <b>MULTIPLIER</b> <b>7</b> = *10 <sup>-3</sup> <b>8</b> = *10 <sup>-2</sup> <b>9</b> = *10 <sup>-1</sup> <b>0</b> = *10 <sup>0</sup> <b>1</b> = *10 <sup>1</sup> <b>2</b> = *10 <sup>2</sup> <b>3</b> = *10 <sup>3</sup>	<b>G</b> = ± 2.0 % <b>J</b> = ± 5.0 % <b>K</b> = ± 10.0 % <b>0</b> = by BV	<b>LX</b> = Loose pack, without quantity <b>ZX</b> = Special pack (with BV #), without quantity	The 5 digit BV number will be encoded using a 36 character code. This code contains numbers 0...9 and letters A...Z (36 characters total) and allows to encode at least 46 655 five digit BV numbers. <b>000</b> = Standard											
Product Description: ZWS6 SL 3 1K0 10 % LX																	
ZWS6	SL	3	1K0	10 %	LX												
MODEL (1)	VARIANT/ TERMINAL (1)	TCR/MATERIAL (1)	VALUE (1)	TOLERANCE CODE (1)	PACKAGING DESCRIPTION (2)												

**Notes**

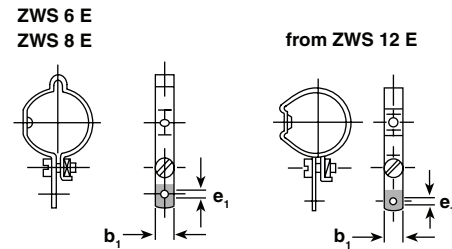
- (1) See "Part Number" above
- (2) See "Packaging Code" above

**DIMENSIONS**

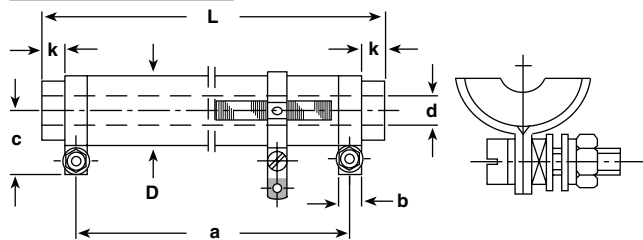
**SL TERMINALS**



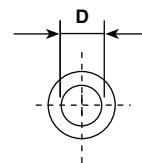
**ADJUSTABLE LUGS**



**SS TERMINALS**



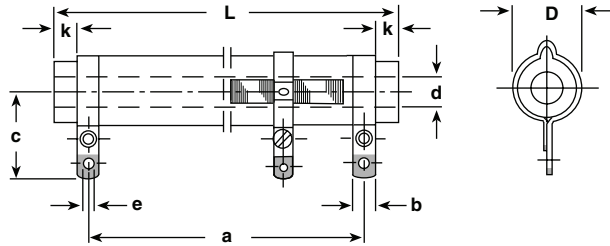
**CORE SECTION**



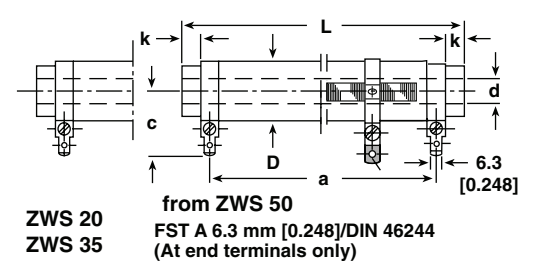
MODEL	DIMENSIONS in millimeters [inches]							
	ZWS 6 ZWS 6 E ZWS 6 Ni		ZWS 8 ZWS 8 E ZWS 8 Ni		ZWS 12 ZWS 12 E ZWS 12 Ni		ZWS 15 ZWS 15 E ZWS 15 Ni	
TERMINAL	SL		SL	SS	SL	SS	SL	SS
DIMENSION D	7.5 ± 0.5 [0.295 ± 0.020]		9.5 ± 0.5 [0.374 ± 0.020]		11.8 ± 0.8 [0.465 ± 0.031]		11.8 ± 0.8 [0.465 ± 0.031]	
L	45 ± 1.5 [1.772 ± 0.059]		50 ± 1.5 [1.969 ± 0.059]		55 ± 1.5 [2.165 ± 0.059]		62 ± 2 [2.441 ± 0.079]	
a	36 [1.417]	39 [1.535]	40 [1.575]	43 [1.693]	44 [1.732]	50 [1.969]	51 [2.008]	
b	4 [0.157]	4 [0.157]	5 [0.197]	4 [0.157]	5 [0.197]	4 [0.157]	5 [0.197]	
b <sub>1</sub>	4 [0.157]	4 [0.157]	4 [0.157]	5 [0.197]	5 [0.197]	5 [0.197]	5 [0.197]	
c	15.5 [0.610]	18 [0.709]	10.5 [0.413]	19 [0.748]	11.5 [0.453]	19 [0.748]	11.5 [0.453]	
d	2.6 [0.102]	3.5 [0.138]	3.5 [0.138]	5.5 [0.217]	5.5 [0.217]	5.5 [0.217]	5.5 [0.217]	
e	1.5 [0.059]	2 [0.079]	M3 × 12	2 [0.079]	M3 × 12	2 [0.079]	M3 × 12	
e <sub>1</sub>	2.8 [0.110]	2.8 [0.110]	2.8 [0.110]	2.8 [0.110]	2.8 [0.110]	2.8 [0.110]	2.8 [0.110]	
k	2.5 [0.098]	3.5 [0.138]	2.5 [0.098]	4 [0.157]	3 [0.118]	4 [0.157]	3 [0.118]	
MASS (g)	5		6.5		11.5		12.5	

**DIMENSIONS (continued)**

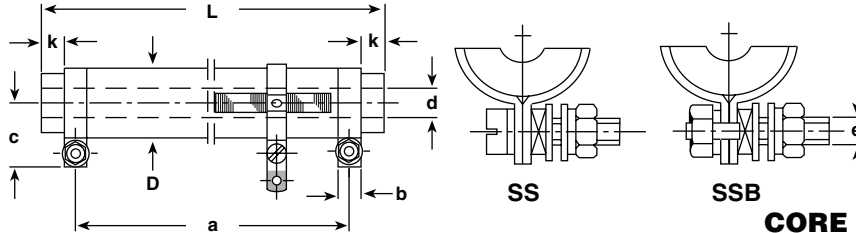
**SL TERMINALS**



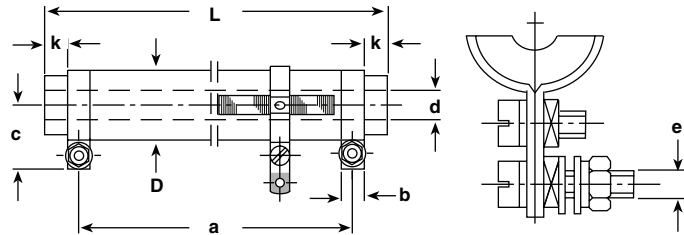
**FST TERMINALS**



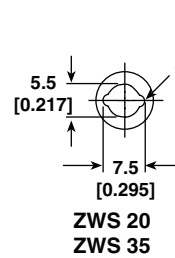
**SS AND SSB TERMINALS**



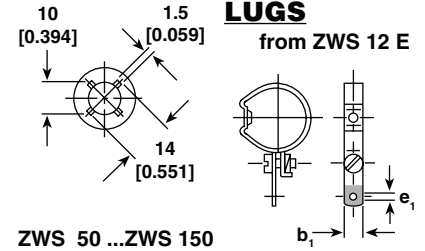
**SB TERMINALS**



**CORE SECTION**



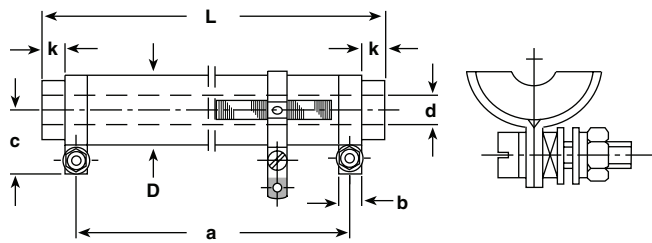
**ADJUSTABLE LUGS**



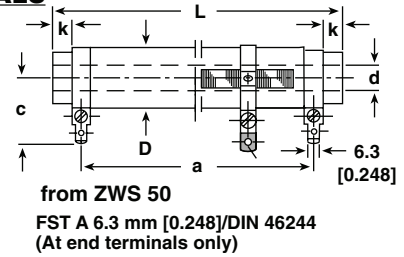
MODEL	DIMENSIONS in millimeters [inches]															
	ZWS 20 ZWS 20 E ZWS 20 Ni				ZWS 35 ZWS 35 E ZWS 35 Ni				ZWS 50 ZWS 50 E ZWS 50 Ni				ZWS 100 ZWS 100 E ZWS 100 Ni			
TERMINAL	SL	SS	SB	FST	SL	SS	SB	FST	SS	SSB	SB	FST	SS	SSB	SB	FST
<b>DIMENSION D</b>	14.8 ± 0.8 [0.583 ± 0.031]				14.8 ± 0.8 [0.583 ± 0.031]				22.3 ± 1.3 [0.878 ± 0.051]				22.3 ± 1.3 [0.878 ± 0.051]			
<b>L</b>	62 ± 2 [2.441 ± 0.079]				100 ± 2 [3.937 ± 0.079]				100 ± 2 [3.937 ± 0.079]				165 ± 2 [6.496 ± 0.079]			
<b>a ± 2</b> [a ± 0.079]	50 [1.969]	51 [2.008]	51 [2.008]	48 [1.890]	86 [3.386]	87 [3.425]	87 [3.425]	84 [3.307]	71 [2.795]				136 [5.354]			
<b>b</b>	4 [0.157]	5 [0.197]	5 [0.197]	6.3 [0.248]	4 [0.157]	5 [0.197]	5 [0.197]	6.3 [0.248]	8 [0.315]	8 [0.315]	8 [0.315]	6.3 [0.248]	8 [0.315]	8 [0.315]	8 [0.315]	6.3 [0.248]
<b>b<sub>1</sub></b>	5 [0.197]	5 [0.197]	5 [0.197]	5 [0.197]	5 [0.197]	5 [0.197]	5 [0.197]	5 [0.197]	5 [0.197]	5 [0.197]	5 [0.197]	5 [0.197]	5 [0.197]	5 [0.197]	5 [0.197]	5 [0.197]
<b>c</b>	20.5 [0.807]	13 [0.512]	23 [0.906]	23.5 [0.925]	20.5 [0.807]	13 [0.512]	23 [0.906]	23.5 [0.925]	18.5 [0.728]	18.5 [0.728]	29.5 [1.161]	27 [1.063]	18.5 [0.728]	18.5 [0.728]	29.5 [1.161]	27 [1.063]
<b>d</b>	5.5 [0.217]	5.5 [0.217]	5.5 [0.217]	5.5 [0.217]	5.5 [0.217]	5.5 [0.217]	5.5 [0.217]	5.5 [0.217]	10 [0.394]	10 [0.394]	10 [0.394]	10 [0.394]	10 [0.394]	10 [0.394]	10 [0.394]	10 [0.394]
<b>e</b>	2 [0.079]	M3 × 12	M3 × 12	-	2 [0.079]	M3 × 12	M3 × 12	-	M4 × 16	M4 × 18	M4 × 16	-	M4 × 16	M4 × 18	M4 × 16	-
<b>e<sub>1</sub></b>	3.2 [0.126]	3.2 [0.126]	3.2 [0.126]	3.2 [0.126]	3.2 [0.126]	3.2 [0.126]	3.2 [0.126]	3.2 [0.126]	3.2 [0.126]	3.2 [0.126]	3.2 [0.126]	3.2 [0.126]	3.2 [0.126]	3.2 [0.126]	3.2 [0.126]	3.2 [0.126]
<b>k</b>	4 [0.157]	3 [0.118]	3 [0.118]	3 [0.118]	5 [0.197]	4 [0.157]	4 [0.157]	4 [0.157]	10.5 [0.413]	10.5 [0.413]	10.5 [0.413]	10.5 [0.413]	10.5 [0.413]	10.5 [0.413]	10.5 [0.413]	10.5 [0.413]
<b>MASS (g)</b>	25				33				80				113			

**DIMENSIONS** (continued)

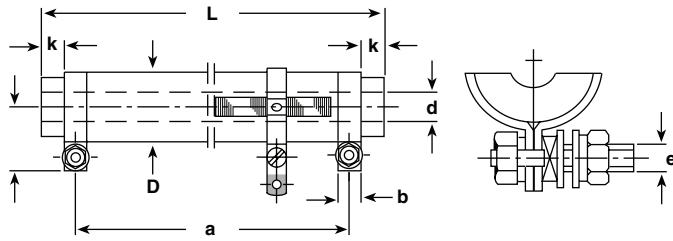
**SS TERMINALS**



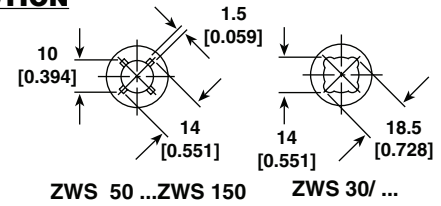
**FST TERMINALS**



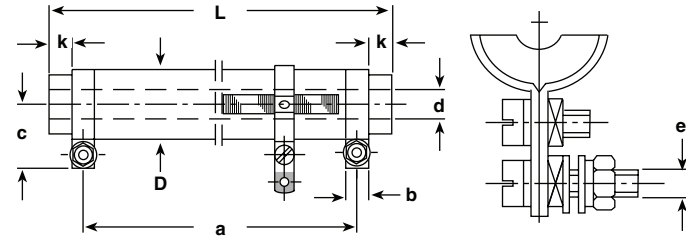
**SSB TERMINALS**



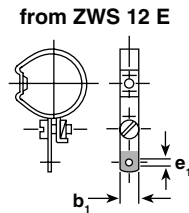
**CORE SECTION**



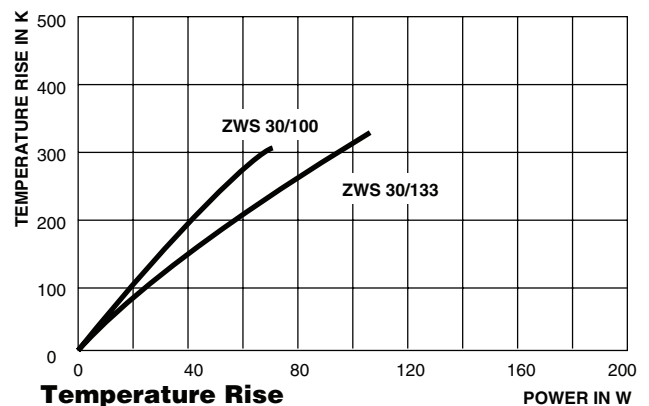
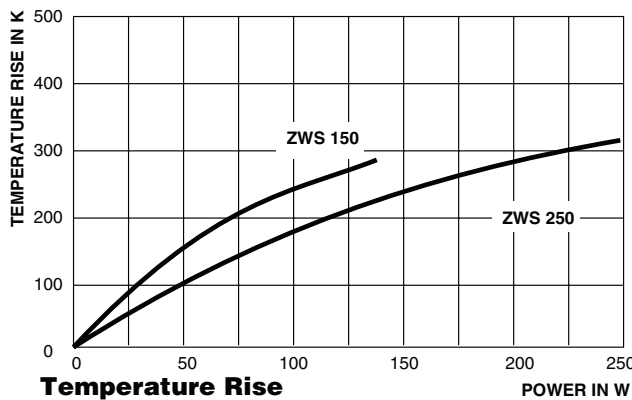
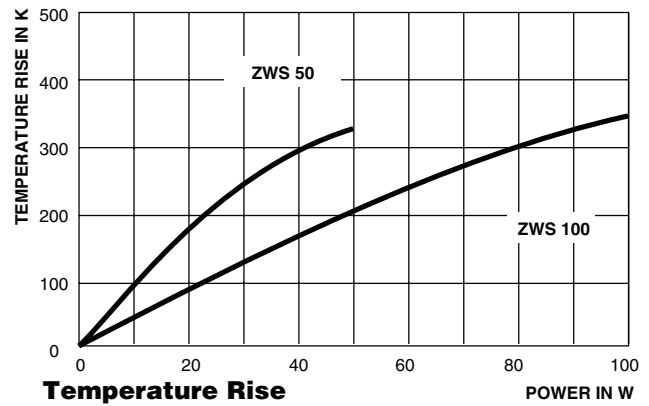
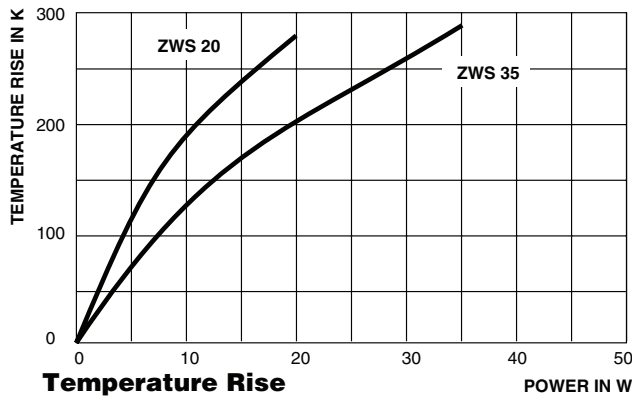
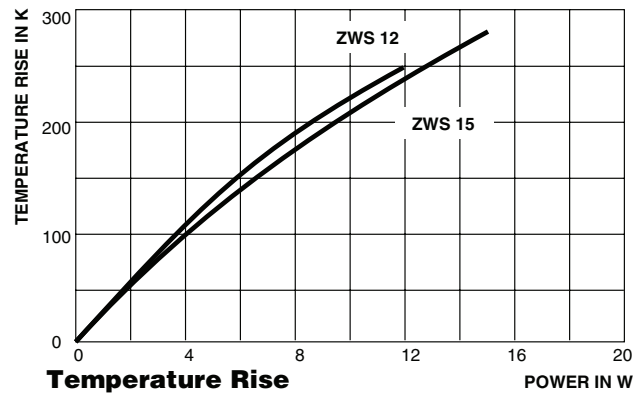
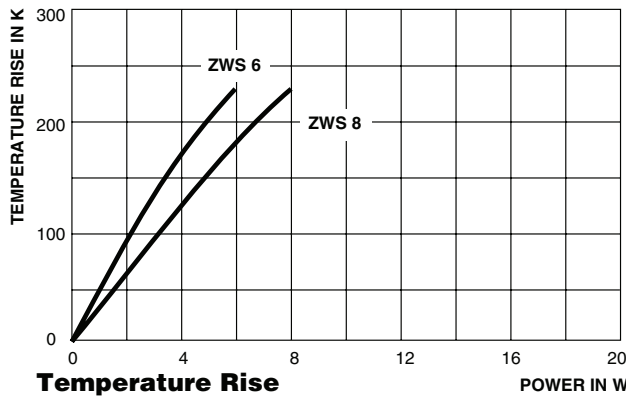
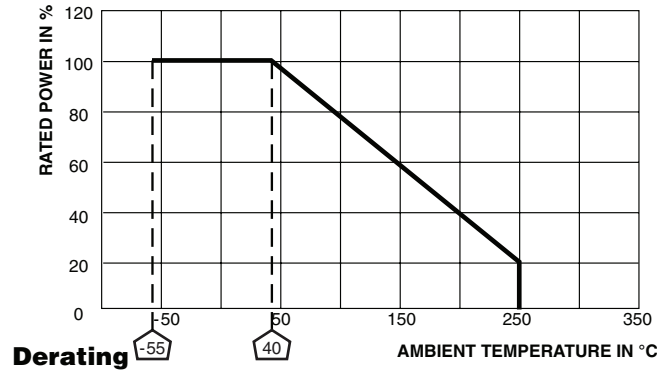
**SB TERMINALS**



**ADJUSTABLE LUGS**



MODEL	DIMENSIONS in millimeters [inches]															
	ZWS 150 ZWS 150 E ZWS 150 Ni				ZWS 250 ZWS 250 E ZWS 250 Ni				ZWS 30/100 ZWS 30/100 E ZWS 30/100 Ni				ZWS 30/133 ZWS 30/133 E ZWS 30/133 Ni			
TERMINAL	SS	SSB	SB	FST	SS	SSB	SB	FST	SS	SSB	SB	FST	SS	SSB	SB	FST
DIMENSION D	22.3 ± 1.3 [0.878 ± 0.051]				32.3 ± 1.5 [1.28 ± 0.059]				32.3 ± 1.5 [1.28 ± 0.059]				32.3 ± 1.5 [1.28 ± 0.059]			
L	265 ± 4 [10.433 ± 0.079]				330 ± 5 [12.992 ± 0.197]				100 ± 2.5 [3.937 ± 0.098]				133 ± 3 [5.236 ± 0.118]			
a	236 [9.291]				280 [11.024]				85 [3.346]				118 [4.646]			
b	8 [0.315]	8 [0.315]	8 [0.315]	6.3 [0.248]	8 [0.315]	8 [0.315]	8 [0.315]	6.3 [0.248]	8 [0.315]	8 [0.315]	8 [0.315]	6.3 [0.248]	8 [0.315]	8 [0.315]	8 [0.315]	6.3 [0.248]
b <sub>1</sub>	5 [0.197]	5 [0.197]	5 [0.197]	5 [0.197]	8 [0.315]	8 [0.315]	8 [0.315]	8 [0.315]	8 [0.315]	8 [0.315]	8 [0.315]	8 [0.315]	8 [0.315]	8 [0.315]	8 [0.315]	8 [0.315]
c	18.5 [0.728]	18.6 [0.732]	29.5 [1.161]	27 [1.063]	23.5 [0.925]	23.5 [0.925]	35 [1.378]	31.5 [1.24]	23.5 [0.925]	23.5 [0.925]	35 [1.378]	31.5 [1.24]	23.5 [0.925]	23.5 [0.925]	35 [1.378]	31.5 [1.24]
d	10 [0.394]	10 [0.394]	10 [0.394]	10 [0.394]	20 [0.787]	20 [0.787]	20 [0.787]	20 [0.787]	14 [0.551]	14 [0.551]	14 [0.551]	14 [0.551]	14 [0.551]	14 [0.551]	14 [0.551]	14 [0.551]
e	M4 × 16	M4 × 18	M4 × 16	-	M4 × 16	M4 × 18	M4 × 16	-	M4 × 16	M4 × 18	M4 × 16	-	M4 × 16	M4 × 18	M4 × 16	-
e <sub>1</sub>	3.2 [0.126]	3.2 [0.126]	3.2 [0.126]	3.2 [0.126]	4.2 [0.165]	4.2 [1.654]	4.2 [1.654]	4.2 [0.165]	4.2 [0.165]	4.2 [0.165]	4.2 [0.165]	4.2 [0.165]	4.2 [0.165]	4.2 [0.165]	4.2 [0.165]	4.2 [0.165]
k	10.5 [0.413]	10.5 [0.413]	10.5 [0.413]	10.5 [0.413]	21 [0.827]	21 [0.827]	21 [0.827]	21 [0.827]	3.5 [0.138]	3.5 [0.138]	3.5 [0.138]	3.5 [0.138]	3.5 [0.138]	3.5 [0.138]	3.5 [0.138]	3.5 [0.138]
MASS (g)	194				375				167				212			





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