Vitreous Wirewound Resistors with Lugs

FEATURES

- Lugs with various termination styles suitable for soldering or bolt connection
- Excellent pulse load capability
- Adjustable type (E) available
- Non inductive type (Ni) available
- Non-flammable and enhanced humidity protection
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT
HALOGEN FREE

The GWS series, with completely welded construction, is the perfect choice for high continuous power dissipation up to 500 W with the option for adjustable (GWS E) and non-inductive (GWS Ni) types. The components of this series are well suited for harsh environments and exhibit a long lifetime. With their high pulse power capability, they are the ideal choice as inrush current limiters. Typical applications include but are not limited to drive systems, power supplies, frequency inverters, AC and DC filters, and snubber resistors. For a given application, requirements of ohmic value, rated power, peak voltage, pulse shape, pulse duration, termination style, and environmental conditions may be submitted to recommend the most suitable product.

APPLICATIONS

- Inrush current limiter
- Capacitor charge / discharge
- Snubber resistor
- Brake resistor
- Filter resistor

TECHNICAL SPECIFICATION

TYPE / VARIANT	DIN SIZE	RATED DISSIPATION P_{40}	RESISTANCE RANGE (1)	RESISTANCE TOLERANCE	OPERATING VOLTAGE $U_{max.}$	TEMPERATURE COEFFICIENT
GWS 15	8 x 45	15 W	4.3 Ω to 20 kΩ	± 5 %, ± 10 %	250 V	+100 ppm/K to +180 ppm/K
			30 Ω to 15 kΩ	± 3 %		
			220 Ω to 20 kΩ	± 2 %		
GWS 15 E		10 W	4.3 Ω to 620 Ω	± 5 %, ± 10 %		
GWS 15 Ni			5.1 Ω to 910 Ω			
GWS 20	10 x 50	20 W	3.6 Ω to 30 kΩ	± 5 %, ± 10 %	300 V	
			180 Ω to 30 kΩ	± 2 %		
GWS 20 E		15 W	4.3 Ω to 1.0 kΩ	± 5 %, ± 10 %		
GWS 20 Ni			5.1 Ω to 1.3 kΩ			
GWS 25	13 x 55	25 W	3.6 Ω to 39 kΩ	± 5 %, ± 10 %		
			30 Ω to 20 kΩ	± 3 %		
			91 Ω to 39 kΩ	± 2 %		
GWS 25 E		18 W	5.1 Ω to 1.3 kΩ	± 5 %, ± 10 %		
GWS 25 Ni			6.8 Ω to 1.8 kΩ			
GWS 35	13 x 62	30 W	5.1 Ω to 47 kΩ	± 5 %, ± 10 %	400 V	
			56 Ω to 47 kΩ	± 2 %		
GWS 35 E		22 W	6.8 Ω to 1.6 kΩ	± 5 %, ± 10 %		
GWS 35 Ni			8.2 Ω to 2.4 kΩ			
GWS 50	16 x 63	40 W	3.3 Ω to 62 kΩ	± 5 %, ± 10 %		
			33 Ω to 24 kΩ	± 3 %		
			100 Ω to 62 kΩ	± 2 %		
GWS 50 E		30 W	8.2 Ω to 2.0 kΩ	± 5 %, ± 10 %		
GWS 50 Ni			10 Ω to 3.0 kΩ			

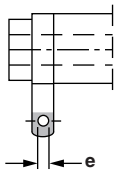
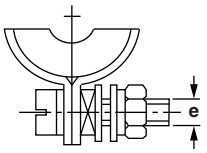
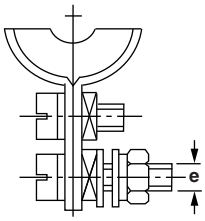
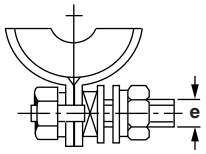
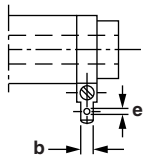
TECHNICAL SPECIFICATION

TYPE / VARIANT	DIN SIZE	RATED DISSIPATION P_{40}	RESISTANCE RANGE (1)	RESISTANCE TOLERANCE	OPERATING VOLTAGE $U_{max.}$	TEMPERATURE COEFFICIENT
GWS 75	16 x 100	65 W	7.5 Ω to 130 kΩ	± 5 %, ± 10 %	800 V	+100 ppm/K to +180 ppm/K
			15 Ω to 39 kΩ	± 3 %		
			30 Ω to 130 kΩ	± 2 %		
GWS 75 E		45 W	18 Ω to 3.9 kΩ	± 5 %, ± 10 %		
GWS 75 Ni			22 Ω to 6.2 kΩ			
GWS 100	24 x 100	80 W	6.8 Ω to 110 kΩ	± 5 %, ± 10 %	600 V	
			20 Ω to 51 kΩ	± 3 %		
			75 Ω to 110 kΩ	± 2 %		
GWS 100 E		60 W	13 Ω to 5.1 kΩ	± 5 %, ± 10 %		
GWS 100 Ni			24 Ω to 6.8 kΩ			
GWS 220	24 x 165	160 W	13 Ω to 160 kΩ	± 5 %, ± 10 %	1250 V	
			30 Ω to 100 kΩ	± 3 %		
			56 Ω to 160 kΩ	± 2 %		
GWS 220 E		120 W	30 Ω to 10 kΩ	± 5 %, ± 10 %		
GWS 220 Ni			51 Ω to 16 kΩ			
GWS 300	24 x 265	300 W	24 Ω to 300 kΩ	± 5 %, ± 10 %	2500 V	
			51 Ω to 150 kΩ	± 3 %		
			110 Ω to 300 kΩ	± 2 %		
GWS 300 E		200 W	56 Ω to 20 kΩ	± 5 %, ± 10 %		
GWS 300 Ni			100 Ω to 30 kΩ			
GWS 500	34 x 330	500 W	39 Ω to 270 kΩ	± 5 %, ± 10 %	3000 V	
			100 Ω to 240 kΩ	± 3 %		
			75 Ω to 270 kΩ	± 2 %		
GWS 500 E		300 W	100 Ω to 36 kΩ	± 5 %, ± 10 %		
GWS 30/100	34 x 100	150 W	9.1 Ω to 100 kΩ	± 5 %, ± 10 %	1600 V	
			27 Ω to 100 kΩ	± 2 %		
GWS 30/100 E		110 W	22 Ω to 8.2 kΩ	± 5 %, ± 10 %		
GWS 30/133	34 x 133	200 W	13 Ω to 160 kΩ	± 5 %, ± 10 %	2300 V	
			27 Ω to 160 kΩ	± 2 %		
GWS 30/133 E		130 W	36 Ω to 13 kΩ	± 5 %, ± 10 %		

Notes

- The operating temperature range for these resistors is from -55 °C up to 350 °C.

(1) Resistance values are to be selected for ± 10 % from the E12 series, and for ± 5 %, ± 3 % and ± 2 % from the E24 series.

TERMINALS					
	SL	**SS**	**SB**	**SSB**	**FST**
					
TYPE / VARIANT	Lug for soldering	Screw terminal	Terminal with 2 screws, one for electrical, and one for mechanical connection	Terminal with bolt and 2 hexnuts	Fast on terminal with 6.3 mm x 0.8 mm DIN 46244
GWS 15 GWS 15 E GWS 15 Ni	e = 1.5 mm	-	-	-	-
GWS 20 GWS 20 E GWS 20 Ni	e = 2 mm	e = M3 x 16			
GWS 25 GWS 25 E GWS 25 Ni					
GWS 35 GWS 35 E GWS 35 Ni					
GWS 50 GWS 50 E GWS 50 Ni			e = M3 x 16		e = 1.65 mm b = 6.3 mm
GWS 75 GWS 75 E GWS 75 Ni					
GWS 100 GWS 100 E GWS 100 Ni	-	e = M4 x 20	e = M4 x 20	e = M4 x 20	
GWS 220 GWS 220 E GWS 220 Ni					
GWS 300 GWS 300 E GWS 300 Ni					
GWS 500 GWS 500 E					
GWS 30/100 GWS 30/100 E					
GWS 30/133 GWS 30/133 E					

PACKAGING

TYPE	PACKAGING CODE	QUANTITY	FORMAT	DIMENSION OF PACKAGE
All	LX	Variable	Bulk, separately packed with paper	Box size selection according to quantity and product size

PART NUMBER AND PRODUCT DESCRIPTION

Part Number: GWS01531009KLX000

G	W	S	0	1	5	3	1	0	0	9	K	L	X	0	0	0

TYPE	VARIANT/ TERMINAL	RESISTANCE	TOLERANCE	PACKAGING	SPECIAL
GWS015 = GWS 15 **GWS020** = GWS 20 **GWS025** = GWS 25 **GWS035** = GWS 35 **GWS050** = GWS 50 **GWS075** = GWS 75 **GWS100** = GWS 100 **GWS220** = GWS 220 **GWS300** = GWS 300 **GWS500** = GWS 500 **GWSN84** = GWS 30/100 **GWSN91** = GWS 30/133	**3** = SL **4** = SS **5** = SB **6** = SSB **7** = FST **8** = E SL **9** = E SS **A** = E SB **B** = E SSB **C** = E FST **D** = Ni SL **E** = Ni SS **F** = Ni SB **G** = Ni SSB **H** = Ni FST	**3 digit value** **1 digit multiplier** MULTIPLIER **7** = $*10^{-3}$ **8** = $*10^{-2}$ **9** = $*10^{-1}$ **0** = $*10^{0}$ **1** = $*10^{1}$ **2** = $*10^{2}$ **3** = $*10^{3}$	**G** = ± 2 % **H** = ± 3 % **J** = ± 5 % **K** = ± 10 %	**LX** = loose pack, without quantity	**000** = standard **3 digit code** = customized version

Product Description: GWS15 SL 10R 10 %

GWS15	SL	10R	10 %
TYPE	VARIANT / TERMINAL	RESISTANCE	TOLERANCE
GWS15 **GWS20** **GWS25** **GWS35** **GWS50** **GWS75** **GWS100** **GWS220** **GWS300** **GWS500** **GWS30/100** **GWS30/133**	**SL** **SS** **SB** **SSB** **FST** **E SL** **E SS** **E SB** **E SSB** **E FST** **NI SL** **NI SS** **NI SB** **NI SSB** **NI FST**	**4R3** = 4.3 Ω **300K** = 300 kΩ	± **2 %** ± **3 %** ± **5 %** ± **10 %**

Note

- The products can be ordered using either the PRODUCT DESCRIPTION or the PART NUMBER.

DESCRIPTION

Vitreous wirewound resistors are best suited for the use in demanding environmental conditions. Their rugged design and durable coating enable these resistors to withstand extreme environmental stress. The vitreous coating is designed for high stability and a long lifetime in humid environments. The coating is resistant to all cleaning chemicals commonly used in the electronic industry.

Production is strictly controlled and follows an extensive set of instructions established for reproducibility. The winding is done with specific materials on a specially developed fine ceramic body (Al_2O_3). The ceramic used meets the highest requirements against mechanical resistance, thermal shocks, dielectric strength, and insulation resistance at high temperatures. With different diameters and turn spacings, a large ohmic value range can be offered. The glaze is fired layer by layer several times at high temperatures (> 600 °C).

The resistors are marked with type, resistance, and tolerance.

Product quality is verified by testing procedures, performed on all individual resistors.

The GWS series meet single lot / date code packaging requirements.

MATERIALS

Vishay acknowledges the following systems for the regulation of hazardous substances:

- IEC 62474, Material Declaration for Products of and for the Electrotechnical Industry, with the list of declarable substances given therein (1)
- The Global Automotive Declarable Substance List (GADSL) (2)
- The REACH regulation (1907/2006/EC) and the related list of substances with very high concern (SVHC) (3) for its supply chain

The products do not contain any of the banned substances as per IEC 62474, GADSL, or the SVHC list, see www.vishay.com/how/leadfree.

Hence the products fully comply with the following directives:

- 2000/53/EC End-of-Life Vehicle Directive (ELV) and Annex II (ELV II)
- 2011/65/EU Restriction of the Use of Hazardous Substances Directive (RoHS) with amendment 2015/863/EU
- 2012/19/EU Waste Electrical and Electronic Equipment Directive (WEEE)

Vishay pursues the elimination of conflict minerals from its supply chain, see the Conflict Minerals Policy at www.vishay.com/doc?49037.

ASSEMBLY

The resistors are available with lug style terminals (SL style) for soldering, multiple screw terminal options (SS style, SB style, or SSB style) for mechanical and electrical fixing, or fast plug terminals (FST style) for assembly / disassembly processes. The terminals of the resistors are completely lead (Pb)-free. The special tin plating used provides compatibility with lead (Pb)-free and lead-containing soldering processes.

3D-Models are available on request, please inquire at ww1resistors@vishay.com.

Different mounting accessories are available for fixing, see the datasheet: www.vishay.com/doc?21015.

In case of the adjustable version, the slider should be only moved after removal of voltage and sufficient loosening of the screw.

APPLICATION INFORMATION

The power dissipation of the resistor generates a temperature rise with respect to the ambient. The permissible dissipation is derated for temperatures above 40 °C, as shown in the derating diagram, in order to avoid overheating of the resistor. The heat dissipated from the resistor may affect adjacent components, hence proper clearance will be required in order to avoid overheating.

The resistive wire is hermetically encapsulated. All materials used are non-flammable and inorganic according to UL 94-V0.

These resistors do not feature a limited lifetime when operated within the permissible limits. However, resistance value drift increasing over operating time may result in exceeding a limit acceptable to the specific application, thereby establishing a functional lifetime.

RELATED PRODUCTS

In lower continuous power applications and less demanding environmental conditions the cement coated alternative, like the ZWS series might be suitable, see the datasheet:

“Cemented Wirewound Resistors with Lugs”
www.vishay.com/doc?21010

For products according to MIL-PRF-26 with higher continuous voltage, see the datasheet:

www.vishay.com/doc?21005

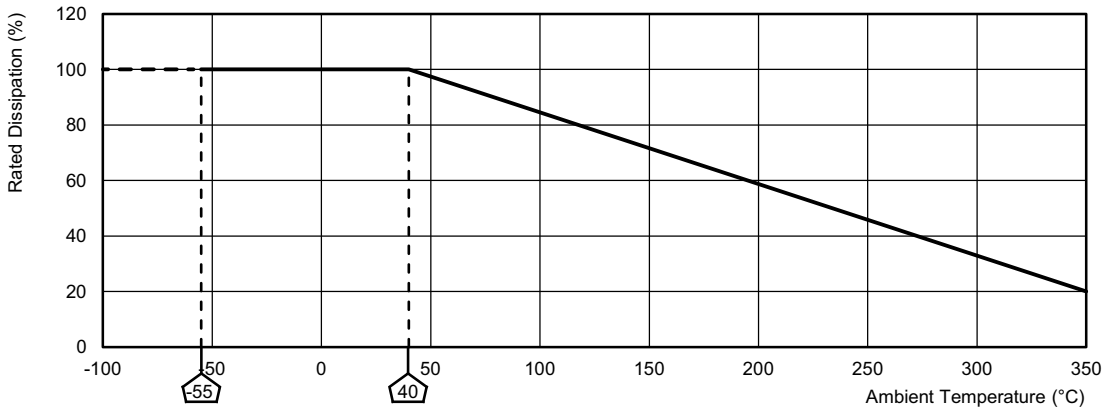
For low ohmic values and rated dissipation up to 1000 W, there is the vitreous coated GBS series, see the datasheet:

“Vitreous Wirewound Resistors with Corrugated Ribbon”
www.vishay.com/doc?21004

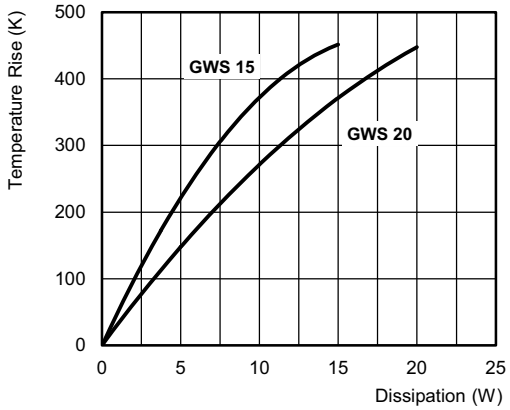
Notes

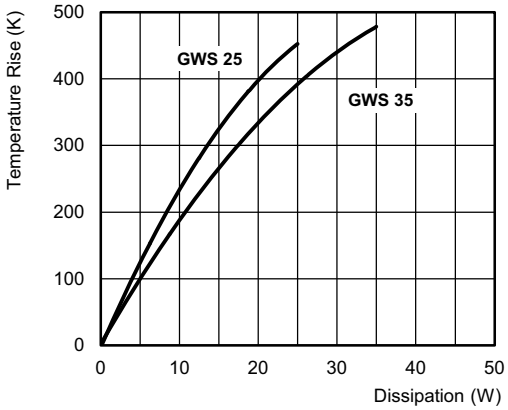
(1) The IEC 62474 list of declarable substances is maintained in a dedicated database, which is available at http://std.iec.ch/iec62474.
(2) The Global Automotive Declarable Substance List (GADSL) is maintained by the American Chemistry Council, and available at www.gadsl.org.
(3) The SVHC list is maintained by the European Chemical Agency (ECHA) and available at http://echa.europa.eu/candidate-list-table.

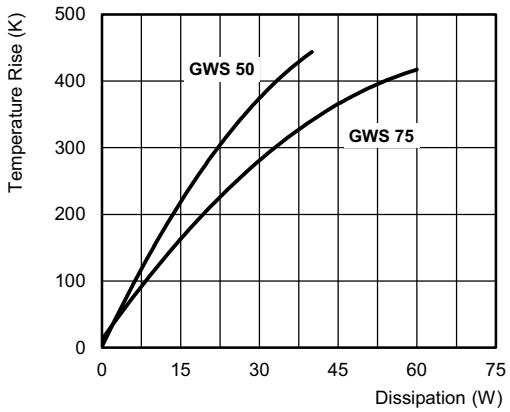
DERATING

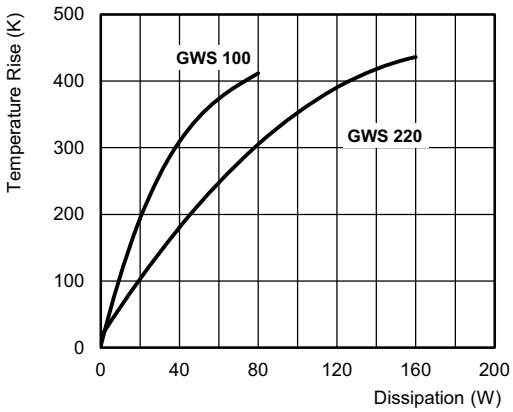


TEMPERATURE RISE

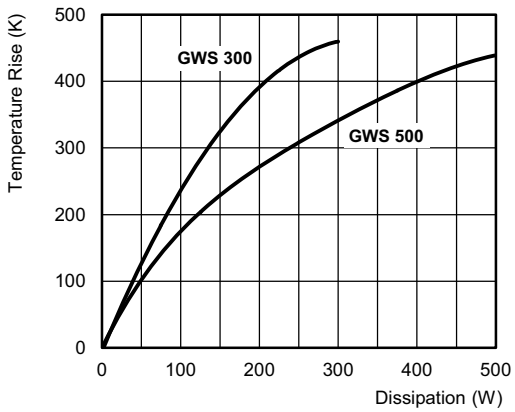


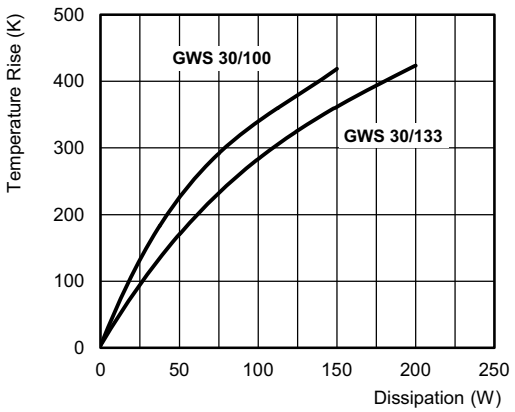






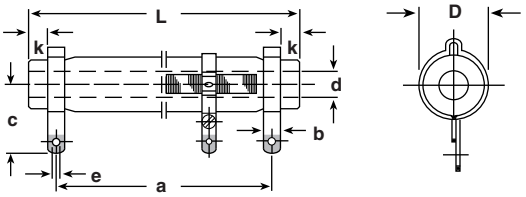
TEMPERATURE RISE





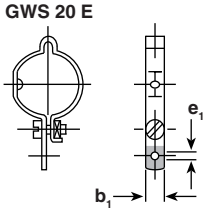
DIMENSIONS AND MASS for GWS 15, GWS 20, GWS 25, and GWS 35

PRODUCTS WITH SL TERMINALS

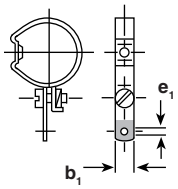


ADJUSTABLE LUGS

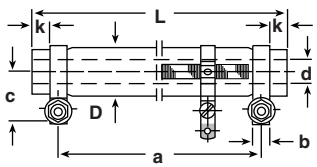
GWS 15 E
GWS 20 E

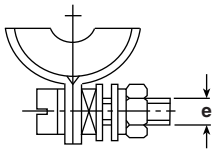


GWS 25 E
GWS 35 E

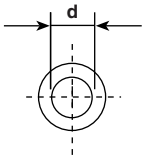


PRODUCTS WITH SS TERMINALS





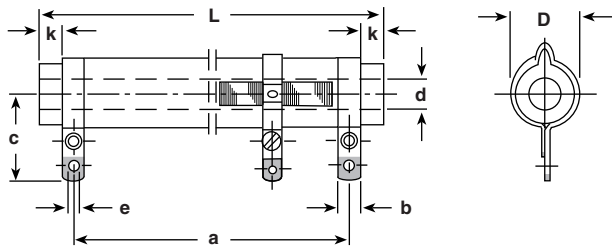
CORE SECTION



TYPE / VARIANT	TERMINAL	D (mm)	L (mm)	a (mm)	b (mm)	b_1 (mm)	c (mm)	d (mm)	e (mm)	e_1 (mm)	k (mm)	MASS (g)
GWS 15 GWS 15 E GWS 15 Ni	SL	7.5 ± 0.5	45.0 ± 1.5	36.0 ± 2.0	4.0	4.0	15.5	2.6	1.5	2.8	2.5	6
GWS 20 GWS 20 E GWS 20 Ni	SL	9.5 ± 0.5	50.0 ± 1.5	39.0 ± 2.0	4.0	4.0	18.0	3.5	2.0	2.8	3.5	8
	SS			40.0 ± 2.0	5.0	4.0	10.5	3.5	M3 x 16	2.8	2.5	
GWS 25 GWS 25 E GWS 25 Ni	SL	11.8 ± 0.8	55.0 ± 1.5	43.0 ± 2.0	4.0	5.0	19.0	5.5	2.0	2.8	4.0	13
	SS			44.0 ± 2.0	5.0	5.0	11.5	5.5	M3 x 16	2.8	3.0	
GWS 35 GWS 35 E GWS 35 Ni	SL	11.8 ± 0.8	62.0 ± 2	50.0 ± 2.0	4.0	5.0	19.0	5.5	2.0	2.8	4.0	15
	SS			51.0 ± 2.0	5.0	5.0	11.5	5.5	M3 x 16	2.8	3.0	

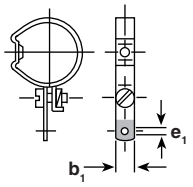
DIMENSIONS AND MASS for GWS 50, GWS 75, and GWS 100

PRODUCTS WITH SL TERMINALS

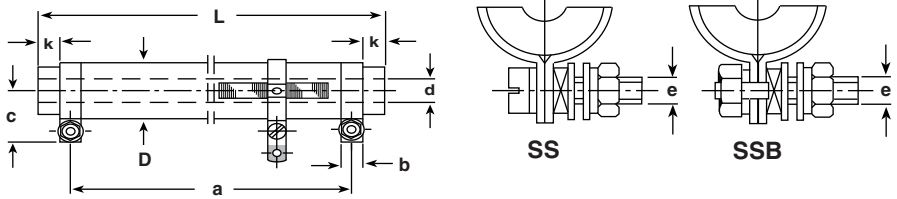


ADJUSTABLE LUGS

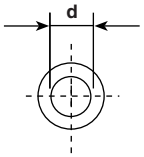
GWS 50 E ... GWS 100 E



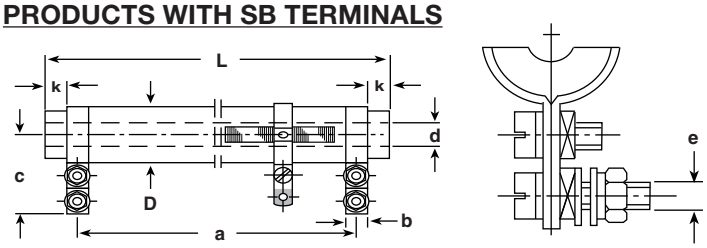
PRODUCTS WITH SS AND SSB TERMINALS



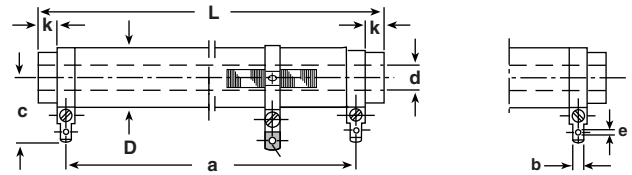
CORE SECTION



PRODUCTS WITH SB TERMINALS



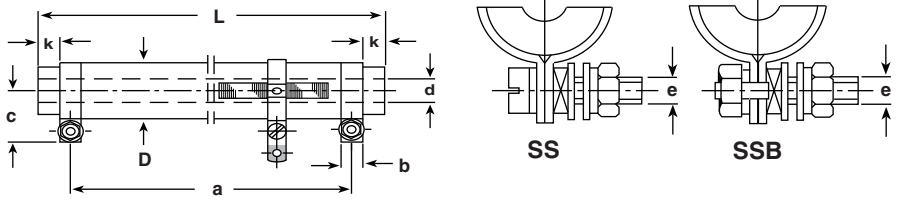
PRODUCTS WITH FST TERMINALS



TYPE / VARIANT	TERMINAL	D (mm)	L (mm)	a (mm)	b (mm)	b_1 (mm)	c (mm)	d (mm)	e (mm)	e_1 (mm)	k (mm)	MASS (g)
GWS 50 GWS 50 E GWS 50 Ni	SL	14.8 ± 0.8	62.0 ± 2.0	50.0 ± 2.0	4.0	5.0	20.5	5.5	2.0	3.2	4.0	25
	SS			51.0 ± 2.0	5.0	5.0	13.0	5.5	M3 x 16	3.2	3.0	
	SB			51.0 ± 2.0	5.0	5.0	23.0	5.5	M3 x 16	3.2	3.0	
	FST			48.0 ± 2.0	6.3	5.0	23.5	5.5	1.65	3.2	3.0	
GWS 75 GWS 75 E GWS 75 Ni	SL	14.8 ± 0.8	100.0 ± 2.0	86.0 ± 2.0	4.0	5.0	20.5	5.5	2.0	3.2	5.0	40
	SS			87.0 ± 2.0	5.0	5.0	13.0	5.5	M3 x 16	3.2	4.0	
	SB			87.0 ± 2.0	5.0	5.0	23.0	5.5	M3 x 16	3.2	4.0	
	FST			84.0 ± 2.0	6.3	5.0	23.5	5.5	1.65	3.2	4.0	
GWS 100 GWS 100 E GWS 100 Ni	SS	22.3 ± 1.3	100.0 ± 2.0	72.0 ± 2.0	8.0	5.0	18.5	10.0	M4 x 20	3.2	10.0	92
	SSB			72.0 ± 2.0	8.0	5.0	18.5	10.0	M4 x 20	3.2	10.0	
	SB			72.0 ± 2.0	8.0	5.0	29.5	10.0	M4 x 20	3.2	10.0	
	FST			72.0 ± 2.0	6.3	5.0	27.0	10.0	1.65	3.2	10.0	

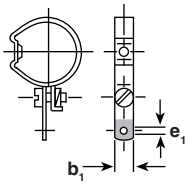
DIMENSIONS AND MASS for GWS 220, GWS 300, and GWS 500

PRODUCTS WITH SS AND SSB TERMINALS

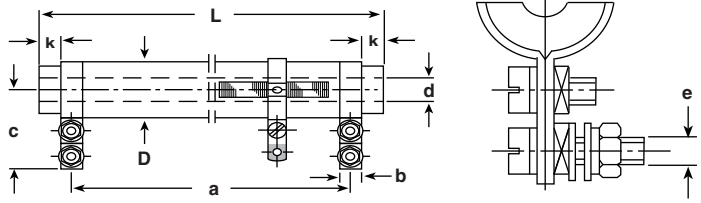


ADJUSTABLE LUGS

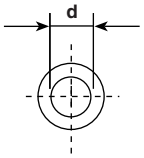
GWS 220 E ... GWS 500 E



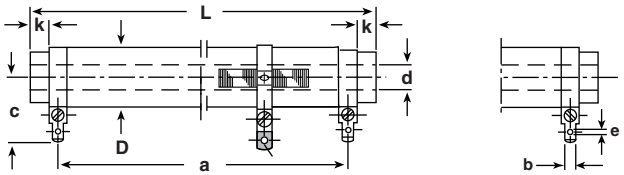
PRODUCTS WITH SB TERMINALS



CORE SECTION



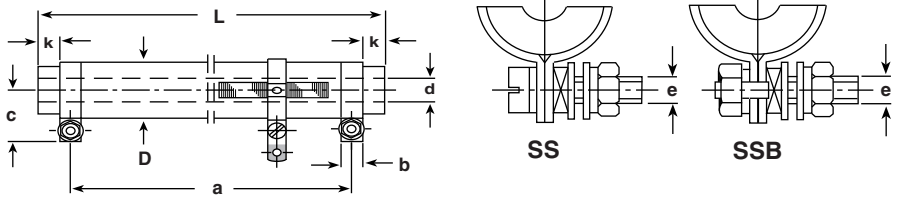
PRODUCTS WITH FST TERMINALS



TYPE / VARIANT	TERMINAL	D (mm)	L (mm)	a (mm)	b (mm)	b_1 (mm)	c (mm)	d (mm)	e (mm)	e_1 (mm)	k (mm)	MASS (g)
GWS 220 GWS 220 E GWS 220 Ni	SS	22.3 ± 1.3	165.0 ± 2.0	136.0 ± 2.0	8.0	5.0	18.5	10.0	M4 x 20	3.2	10.5	135
	SSB				8.0	5.0	18.5		M4 x 20			
	SB				8.0	5.0	29.5		M4 x 20			
	FST				6.3	5.0	27.0		1.65			
GWS 300 GWS 300 E GWS 300 Ni	SS	22.3 ± 1.3	265.0 ± 4.0	235.0 ± 2.0	8.0	5.0	18.5	10.0	M4 x 20	3.2	11.0	238
	SSB				8.0	5.0	18.5		M4 x 20			
	SB				8.0	5.0	29.5		M4 x 20			
	FST				6.3	5.0	27.0		1.65			
GWS 500 GWS 500 E GWS 500 Ni	SS	32.5 ± 1.5	330.0 ± 5.0	280.0 ± 2.0	8.0	8.0	23.5	18.5	M4 x 20	4.2	21.0	425
	SSB				8.0	8.0	23.5		M4 x 20			
	SB				8.0	8.0	35.0		M4 x 20			
	FST				6.3	8.0	31.5		1.65			

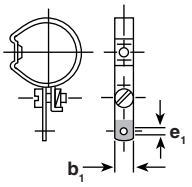
DIMENSIONS AND MASS for GWS 30/100 and GWS 30/133

PRODUCTS WITH SS AND SSB TERMINALS

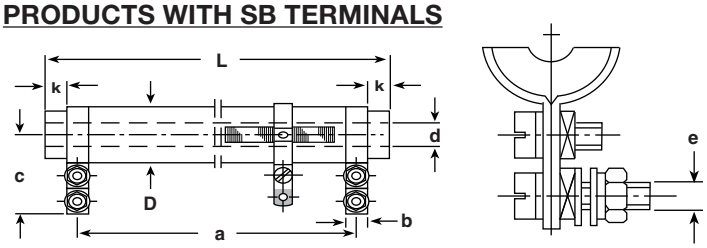


ADJUSTABLE LUGS

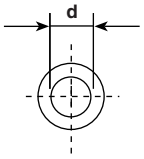
GWS 30/100 E; GWS 30/133 E



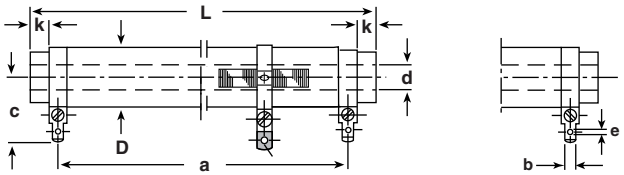
PRODUCTS WITH SB TERMINALS



CORE SECTION



PRODUCTS WITH FST TERMINALS



TYPE / VARIANT	TERMINAL	D (mm)	L (mm)	a (mm)	b (mm)	b_1 (mm)	c (mm)	d (mm)	e (mm)	e_1 (mm)	k (mm)	MASS (g)
GWS 30/100 GWS 30/100 E	SS	32.5 ± 1.5	100.0 ± 2.5	85.0 ± 2.0	8.0	8.0	23.5	14.0	M4 x 20	4.2	3.5	183
	SSB				8.0	8.0	23.5		M4 x 20			
	SB				8.0	8.0	35.0		M4 x 20			
	FST				6.3	8.0	31.5		1.65			
GWS 30/133 GWS 30/133 E	SS	32.5 ± 1.5	133.0 ± 3.0	118.0 ± 2.0	8.0	8.0	23.5	14.0	M4 x 20	4.2	3.5	265
	SSB				8.0	8.0	23.5		M4 x 20			
	SB				8.0	8.0	35.0		M4 x 20			
	FST				6.3	8.0	31.5		1.65			

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