ATE ELECTRONICS s.r.l.

POWER RESISTORS

ATE ELECTRONICS s.r.l.

History & Tradition

ATE is a company with a solid presence in the power resistors market for over half a century.
Since 1970, we have built and maintained the trust of our customers, which remains our main source of inspiration.
ATE currently operates with two production facilities and a dedicated Research and Development area.

Headquarter:

Via Ugo Scaletta, 13
10094 Giaveno (TO) – ITALY

4.800mq

Production Plant:

Via Sangano, 36/38
10090 Trana (TO) – ITALY

24.000 mq

Innovation Center:

Via Parco Alto Milanese, 1
21052 Busto Arsizio (VA) – ITALY

1.600 mq

ATE constantly strives to improve its products and services and it is always ready to support customers and distributors all over the world.

To reach the highest possible standard in terms of high-tech, reliability, fast delivery and excellent quality-price ratio is our main goal.
Our customer's loyalty has always been the main inspiration since 1970.

ATE has been one of the first Italian companies to be certified quality management system and operates today under a quality management system certified UNI EN ISO 9001 and environmental UNI EN ISO 14001.

All ATE products and processes are made in Italy and in compliance to RoHS, MIL & CECC.

ATE ELECTRONICS s.r.l.

ATE Electronics products set:

CS axial wire wound resistors (2W to 15W), thanks to raw materials of very high quality and reliability, can replace with better performance resistors in ceramic glaze.

Symmetry resistors SR (10W & 13W) for voltage divider and discharge of electrolytic.

Aluminum housed RB series (10W to 250W) can supply in small dimensions high power with lower operating temperature.

CS and RB series can be supplied on request in **special versions** (fuse resistors, high pulse overload, non-inductive...) and with custom leads (high insulation voltage terminals, faston, screw).

Thick film resistor PR (100W to 800 W) for snubber and filter applications due to their low parasitic inductance.

HVB & HVBW resistors (0,6 kW to 1,2 kW) thanks to high-quality materials and robust construction, provide reliable performance at working voltages up to 4.5 kVAC / 6.4 kVDC. The IP65 protection degree makes them suitable for harsh industrial environments.

WHHB resistors (5 kW to 25 kW) are designed for demanding applications, ensuring high reliability at working voltages up to 4.7 kVAC / 6.6 kVDC. Liquid cooling and IP00/IP65 protection guarantee stable performance in heavy-duty operating conditions

WHBS resistors (6 kW to 100 kW) are designed for high-demand applications, ensuring reliable operation at working voltages up to 1 kVAC / 1.4 kVDC. Liquid cooling and IP00/IP66 protection guarantee stable performance under heavy operating conditions.

WHDN resistors (40 kW to 1,450 kW) are designed for extreme power applications, ensuring reliable operation at working voltages up to 1 kVAC / 1.4 kVDC. Liquid cooling and IP65/IP66 protection guarantee consistent performance in harsh industrial environments.

WHBSA resistors (19 kW to 253 kW) are designed for demanding industrial applications, ensuring reliable operation at working voltages up to 1 kVAC / 1.4 kVDC. Liquid cooling and IP65/IP66 protection (IP67/IP69K on request) ensure stable performance even in harsh environments.

PCG resistors (1 kW to 6 kW) are designed for industrial applications requiring compact dimensions and reliable performance at working voltages up to 1 kVAC / 1.4 kVDC. Air cooling and IP65 protection make them suitable for harsh operating environments

GRT resistors (3 kW to 32 kW) are designed for industrial applications requiring reliable performance at working voltages up to 1 kVAC / 1.4 kVDC. Air cooling and IP65/IP66 protection ensure dependable operation in harsh environments.

TRV resistors (50 kW to 275 kW) are designed for heavy-duty industrial applications, ensuring reliable performance at working voltages up to 1 kVAC / 1.4 kVDC. Forced air cooling and IP65/IP66 protection guarantee consistent operation in severe environments.

How to order:

Example for CS Series: **5CS** **1K0** **5%**
- **Tolerance**
- **Ohmic value**
- **Type**

Example for PR Series: **PR100** **1K0** **10%**
- **Tolerance**
- **Ohmic value**
- **Type**

Example for RB Series: **RB25** **/1** **1K0** **5%**
- **Tolerance**
- **Ohmic value**
- **Terminal Type (/1=Standard)**
- **Type**

For non-inductive types You have to add the letter "N" after resistor type. Ex.: CSN - RBN

To order CS resistors taped on reel add the suffix "/ 73" after the resistor type. Ex.: 5CS/73 1K0 J
Quantity for reel: 1500x2CS, 1000x3CS, 5CS and 6CS

Tolerances:

K	**10%**	**G**	**2%**
J	**5%**	**F**	**1%**
H	**3%**	**D**	**0.5%** (for values above 1R0)

Cross-Reference ATE Electronics

Competitors	Country	CS	RB	RB /	PR100	PR250	SMD	SR
Arcol	UK	ACS	HS	HS /	FPA100	FPA250	S, SL	-
Ccohm	TW	KNP	AH	-	-	-	-	-
Ebg	USA	-	-	-	HXP200	UXP300	-	-
Huntington	USA	ALSR	TMC	-	-	HPK600	SM	-
Koa	JP	RW	-	-	-	-	-	-
Mcb	FR	-	-	-	RCEC	RCEC	-	-
Ohmite	USA	80	89, HS	-	TGH	TAP600	RW	G
Pec	IN	PIA	PHA	-	-	-	-	PYP
Powertron	DE	UT	-	-	-	-	S/SL	-
Raraohm	KR	PWR	RH	-	TPM	-	-	-
Rcd	USA	100	600	-	-	-	-	-
Res. Online	IN	-	AHR	-	-	-	-	-
Riedon	USA-DE	UT	UAL	-	KP	-	-	-
Royal-Ohm	TT	KNP	PDM	-	-	-	-	-
Tyco / Cgs	USA-PA	ES	HSA	HSX	BDS100	BDS250	SM	YP
Vishay	USA	AC, G, RS	RH, SH	-	RTOP	RPS	WSC	-
Vitrohm	PT	RX	HS	RE	-	-	-	-
Welwin - TT	UK	W	WH	WH /	BHPR	-	-	WPYP
Yageo	TW	-	RE	-	-	-	-	-

Note: The Cross-Reference listed may not be exactly equivalent, but they are good replacements / alternatives.
We recommend to download both datasheets, ATE and direct Competitor, and make a careful comparison.
If You need more information, please contact us at info@ate-electronics.com

Wirewound resistors silicone coated
2 W to 15 W

WIREWOUND RESISTORS SILICONE COATED 2 W TO 15 W

These resistors meet or exceed the requirements of MIL-PRF-26 H specifications.

ELECTRICAL SPECIFICATIONS

- Ohmic values: E24 Series. For out of range or not standard ohmic values, consult ATE Technical Dept.
- Tolerance: Standard 5%. Available on request up to 1% (for values >R047).
- Temperature coefficient: Typical values: ±100 to ±30 ppm from R10 to Rmax Consult factory for special applications
- Dielectric strength: 500 Vdc 2CS to 6CS
  700 Vdc 7CS to 12CS
- Insulation resistance : 1000 MΩ minimum.
  100 MΩ after moisture test
- Overload: 5s at 10 times rated power
  5s at 5 times rated power 2CS and 3CS
- Non inductive: Models of equivalent physical and electrical specifications are also available with non inductive Ayrton-Perry winding

MECHANICAL SPECIFICATIONS

- Terminal strength: 10 lb. pull test.
- Solderability: Continuous, satisfactory coverage when tested in accordance to MIL-PRF-26 H.
- Vibrations test: According IEC EN61373 par. 8, 9 and 10 ref. EN60068-2-64: 2008 and EN60068-2-27: 2009

MATERIALS

- Core: Ceramic steatite or alumina centerless ground
- Resistive element: Copper-nickel alloy or nickel-chrome alloy with specific temperature coefficient
- End caps: Stainless steel
- Coating: Special high temperature silicone
- Standard terminals: LF tinned copper or LF tinned copperweld Point of measure: L + 20mm

DERATING

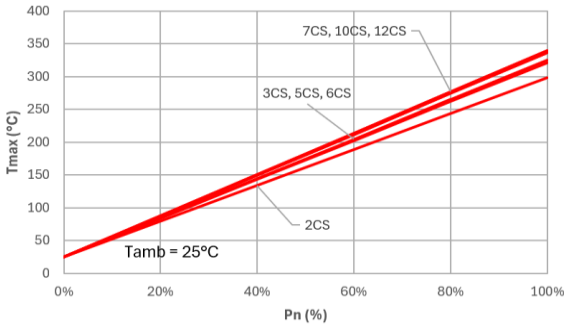
These resistors can be used in a temperature range from -55°C to +350°C
To use these components in applications with working temp. higher +25°C You have to make a power reduction with linear derating from nominal power to zero at 350°C

FEATURES

Easy replacement of vitreous enamel resistors with no cost increase and no performance loss.
The whole assembly is coated with multi-layer silicone coating to give maximum wire protection from -55°C to +350°C.
Performance improvement is obtained by close tolerance, very low temperature coefficient and excellent stability in operation under severe environmental conditions.
High level reliability due to ceramic core chemically inert and centerless ground for uniformity, selected wire element and completely welded construction terminal to terminal.

APPLICATION

Resistors for current limiting, load and discharge in power supplies and power applications.



ATE Type	MIL PRF 26H Type	Rated power (W)	Resistance range (Ω)	Voltage Limit (V)	Temperature rise (°C/W)	Weight (g)	Dimensions		
							D (mm)	L (mm)	d (mm)
2CS	RW69V	3	0,01-5K6	130	91	1,2	5,2 ±0,5	12 ±0,8	0,8
3CS	-	4	0,01-10K	200	74	1,8	6 ±0,5	13 ±0,8	0,8
5CS	RW74U	6	0,01-24K	380	52	3,2	7 ±0,5	22 ±1,6	0,8
6CS	RW67V	7	0,01-27K	435	45	3,8	7 ±0,5	25 ±1,6	0,8
7CS	RW55V	10	0,01-47K	685	30	7	9 ±0,5	35 ±1,6	0,9
10CS	RW68V	13	0,01-68K	940	24	9	9 ±0,5	46 ±1,6	0,9
12CS	RW56V	15	0,01-82K	1100	21	10	9 ±0,5	51 ±1,6	0,9

SYMMETRY RESISTORS AND/OR CAPACITORS DISCHARGE

SPECIFICATIONS

- Tolerance: Standard 5%. On request up to 1%
- Ohmic values: E24 Series
- Temperature coefficient: From ±100 to ±30 ppm from R10 to Rmax
- Dielectric strength: 1000 Vac
- Packing: Strip of 10 pcs or loose pcs 10SRS, in blister
- Vibrations test: According IEC EN61373 par. 8, 9 and 10 ref. EN60068-2-64: 2008 and EN60068-2-27: 2009

APPLICATION

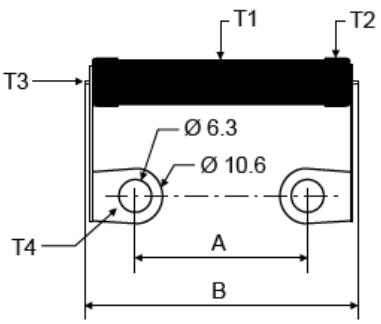
Resistors for voltage dividers and capacitor discharge in power supplies and industrial circuits.

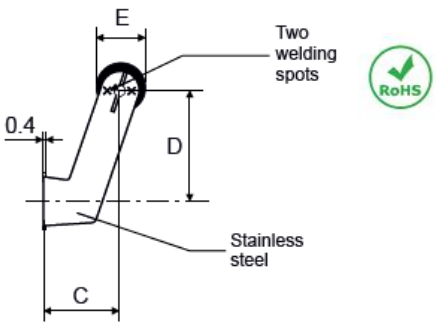
More technical data as 7CS and 10CS standard type

ATE Type	Basic Resistors	A (mm) tol:±1	B (mm) max value	C (mm) tol:±1	D (mm) tol:±1	E (mm) tol:±1	Weight (g)
7SR	7CS	22,2	40	15	21	9,5	9
7SR/B	7CS	22,2	40	10	16	9,5	9
10SR	10CS	31,8	50	15	21	9,5	11
10SR/B	10CS	31,8	50	10	16	9,5	11

ATE Type	MIL-R 26H Type	Rated power (W)	Resistance range (Ω)	Voltage limit (V)
7SR	RW55	10	0,1-47K	685
10SR	RW68	13	0,1-68K	940

ATE Type	Temperature rise at rated power 7SR and 7SR/B	Temperature rise at rated power 10SR and 10SR/B
T1	ΔT = 26 °C/W	ΔT = 21.5 °C/W
T2	ΔT = 16 °C/W	ΔT = 12.3 °C/W
T3	ΔT = 15 °C/W	ΔT = 11.5 °C/W
T4 (capacitor mounted)	ΔT = 1.2 °C/W	ΔT = 1 °C/W





ATE ELECTRONICS s.r.l.

FIXED POWER WIREWOUND RESISTORS ALUMINIUM HOUSED

FEATURES

Extruded aluminium housing provides superior heat conduction.
Housing deep finned for maximum heat dissipation at natural or forced air convection.
Gold anodized finish for maximum resistance to environmental conditions.
Special thermosetting compound with high thermal conductivity.
Winding designed to give maximum core coverage and uniformity for even heat dissipation.
Core centerless ground for maximum winding uniformity.
Marking at top surface for easy identification after mounting.
Complete welded construction terminal to terminal.

APPLICATION

Power resistors for current limiting, loading, and braking in industrial and power applications.

These resistors meet or exceed the requirements of MIL-PRF-18546 G specifications.

ELECTRICAL SPECIFICATIONS

- Ohmic values: E24 Series. For out of range or not standard ohmic values, consult ATE Technical Dept.
- Tolerance: Standard 5%. Available on request up to 1%.
- Temperature coefficient: ±30 ppm R > 20 Ω
  ±50 ppm 1 Ω < R < 20 Ω
  ±100 ppm 0.1 Ω < R < 1 Ω
- Dielectric strength: 1500 Vac for RB10
  2500 Vac for RB25 and RB50
  3500 Vac for RB75, RB101 and RB150
  4500 Vac for RB100 and RB250
- Insulation resistance: 1000 MΩ minimum.
  100 MΩ after moisture test
- Overload: 5s at 5 times rated power
- Non inductive: Models of equivalent physical and electrical specifications are also available with non inductive Ayrton-Perry winding

MECHANICAL SPECIFICATIONS

- Terminal strength: 10 lb. pull test; 3 Nm x RB100 and 4 Nm x RB250 max torque
- Solderability: Satisfactory when tested in accordance with method 208 of MIL-STD-202.
  The use of high temperature solder is recommended when resistors work near the maximum specified ratings.
- Vibrations test: According IEC EN61373 par. 8, 9 and 10
  ref. EN60068-2-64: 2008 and EN60068-2-27: 2009

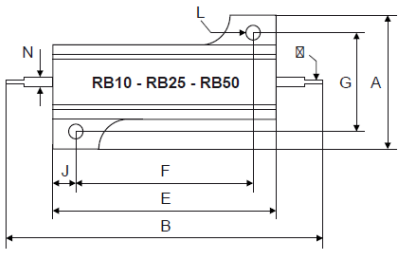
MATERIALS

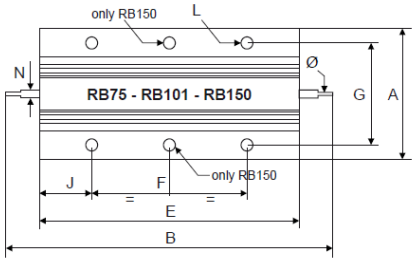
- Core: Ceramic steatite or alumina centerless ground
- Resistive element: Copper-nickel alloy or nickel-chrome alloy with specific temperature coefficient
- End caps: Stainless steel
- Encapsulant: High temperature thermosetting compound
- Housing: Aluminium with hard anodic finish
- Standard terminals: Copperweld RB10 to RB150
  Stainless steel for RB100 and RB250

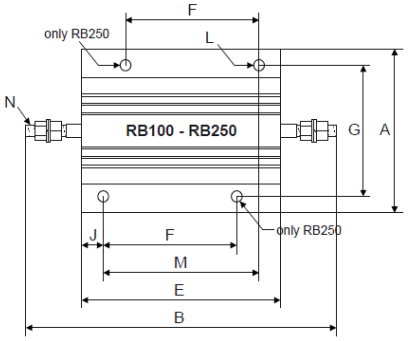
DERATING

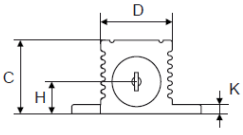
ATE RB resistors have an operating temperature range from -55°C to +250°C
Derating is required for reduced chassis area and for high ambient temperature

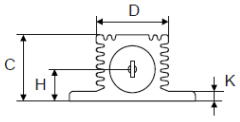
ATE Type	MIL-PRF 18546 G Type	Rated power (W)	Max power no heatsink (W)	Resistance range (Ω)	Voltage limit (V)	Temp. rise with heatsink (°C/W)	Weight (g)	Heatsink dimensions (cm^2 x mm)
RB10	RE65	12	6	0,01 - 10K	265	5,1	6	415x1
RB25	RE70	25	12,5	0,01 - 18K	550	3	14	535x1
RB50	RE75	50	20	0,01 - 68K	1250	1,9	35	930x1,5
RB75	-	75	35	0,01 - 50K	1400	1,1	85	995x3
RB101	-	100	40	0,01 - 68K	1900	1	115	995x3
RB150	-	150	55	0,01 - 100K	2500	1	165	995x3
RB100	RE77	150	75	0,01 - 100K	1900	0,84	500	930x3
RB250	RE80	250	100	0,01 - 120K	2300	0,66	900	930x3

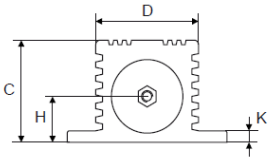












ATE Type	Dimensions													
	A	B	C	D	E	F	G	H	J	K	L	M	N	Ø
RB10	20,4	35	10	11	19	14,3	15,9	5	2,4	2	2,4	-	2	2,2
RB25	27,2	49	14	14	27	18,3	19,8	6,5	4,4	2	3,2	-	2	2,2
RB50	29,2	71	16	16	50	39,7	21,5	7	5,2	2	3,2	-	2	2,2
RB75	47	73	24	27	48	29	37	11,5	9,5	3,5	4,4	-	3	3,2
RB101	47	89	24	27	64	35	37	11,5	14,5	3,5	4,4	-	3	3,2
RB150	47	122	24	27	97	58	37	11,5	19,5	3,5	4,4	-	3	3,2
RB100	71,5	139	44,5	46	89	-	57,1	20	9,6	5	4,8	69,8	M5	-
RB250	76	178	55,6	54	114	76,2	63,5	25,5	7,8	6,3	4,8	98,4	M6	-
Tol.	±0,2	±1	±0,2	±0,2	±0,5	±0,2	±0,2	±0,2	±0,5	±0,2	±0,2	±0,2	±0,2	±0,2

RB25/6
RB50/6

Fixed power wirewound resistors
aluminium housed with large creep distance

FIXED POWER WIREWOUND RESISTORS ALUMINIUM HOUSED WITH LARGE CREEP DISTANCE

These resistors meet or exceed the requirements of MIL - PRF - 18546 G specifications

ELECTRICAL SPECIFICATIONS

- Ohmic values: E24 Series. For out of range or not standard ohmic values, consult ATE Technical Dept.
- Tolerance: Standard 5%. Available on request up to 1%
- Temperature coefficient: From ±100 to ±30 ppm from R10 to Rmax
- Dielectric strength: 3000Vac / 4200Vac peak
- Large creep distance: RB25/6 > 6,5mm RB50/6 > 10mm
- Insulation resistance: 10000 MΩ minimum
  1000 MΩ after moisture test
- Overload: 5s at 5 times rated power
- Non inductive: Models of equivalent physical and electrical specifications are also available with non inductive Ayrton-Perry winding

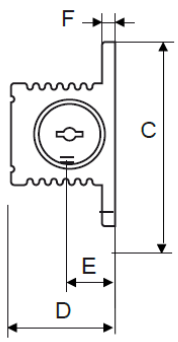
APPLICATION

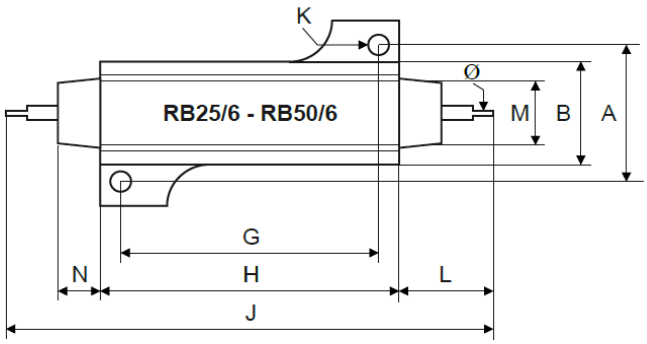
Compact power resistors for current limiting, load, and braking in industrial applications.

More technical data as RB25 / RB50 standard

ATE Type	MIL-PRF 18546 G Type	Rated power (W)	Resistance range (Ω)	Voltage limit (V)	Weight (g)	Heatsink dimensions (cm^2 x mm)
RB25/6	RE70	25	0,01 - 18K	550	13	535x1
RB50/6	RE75	50	0,01 - 68K	1250	32	930x1,5

ATE Type	Dimensions													
	A	B	C	D	E	F	G	H	J	K	L	M	N	Ø
RB25/6	19,8	14	27,7	14	6,5	2	18,3	24	49	3,2	12,5	8	4	2,2
RB50/6	21,5	16	29,2	16	7	2	39,7	46	75	3,2	14,5	10	6,5	2,2
Tol.	±0,2	±0,2	±0,2	±0,2	±0,2	±0,2	±0,2	±0,5	±1	±0,2	±1	±0,5	±0,5	±0,2





FIXED POWER WIREWOUND RESISTORS ALUMINIUM HOUSED WITH FASTON LEADS

These resistors meet or exceed the requirements of MIL - PRF - 18546 G specifications

ELECTRICAL SPECIFICATIONS

- Ohmic values: E24 Series. For out of range or not standard ohmic values, consult ATE Technical Dept.
- Tolerance: Standard 5%. Available on request up to 1%
- Temperature coefficient: From ±100 to ±30 ppm from R10 to Rmax
- Dielectric strength: 2500Vac / 3500Vac peak
- Insulation resistance: 10000 MΩ minimum
  1000 MΩ after moisture test
- Overload: 5s at 5 times rated power
- Non inductive: Models of equivalent physical and electrical specifications are also available with non inductive Ayrton-Perry winding
- Leads: 6.35 mm faston nickel plated steel, spot welding

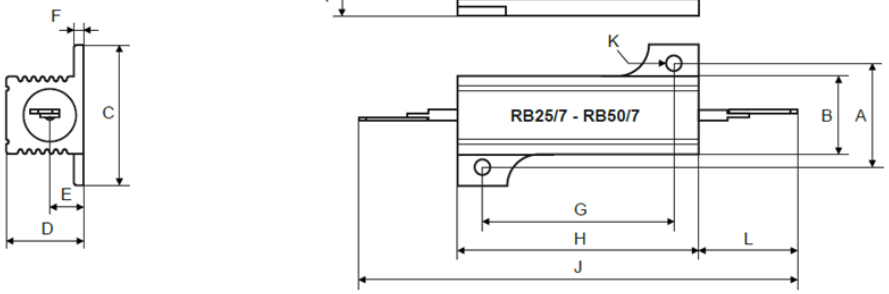
APPLICATION

High-dissipation power resistors for current limiting, load, and braking in heavy-duty industrial applications

More technical data as RB25 / RB50 standard

ATE Type	MIL-PRF 18546 G Type	Rated power (W)	Resistance range (Ω)	Voltage limit (V)	Weight (g)	Heatsink dimensions (cm^2 x mm)
RB25/7	RE70	25	0,01 - 18K	550	13	535x1
RB50/7	RE75	50	0,01 - 68K	1250	32	930x1,5

ATE Type	Dimensions												
	A	B	C	D	E	F	G	H	J	K	L	M	P
RB25/7	19,8	14	27,7	14	6,5	2	18,3	27	69	3,2	21	6,35	7,7
RB50/7	21,5	16	29,2	16	7	2	39,7	50	91	3,2	20,5	6,35	0,2
Tol.	±0,2	±0,2	±0,2	±0,2	±0,2	±0,2	±0,2	±0,5	±2	±0,2	±2	-	±1



FIXED POWER WIREWOUND RESISTORS ALUMINIUM HOUSED WITH SCREW LEADS (TOP)

These resistors meet or exceed the requirements of MIL - PRF - 18546 specifications

ELECTRICAL SPECIFICATIONS

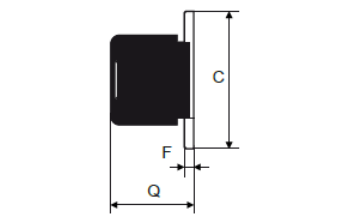
- Ohmic values: E24 Series. For out of range or not standard ohmic values, consult ATE Technical Dept.
- Tolerance: Standard 5%. Available on request up to 1%
- Temperature coefficient: From ±100 to ±30 ppm from R10 to Rmax
- Dielectric strength: 2500Vac / 3500Vac peak
- Insulation resistance: 10000 MΩ minimum
  1000 MΩ after moisture test
- Overload: 5s at 5 times rated power
- Non inductive: Models of equivalent physical and electrical specifications are also available with non inductive Ayrton-Perry winding
- Leads: M4 threaded hole
- Terminal screw tightening torque: 1,5Nm (static)

APPLICATION

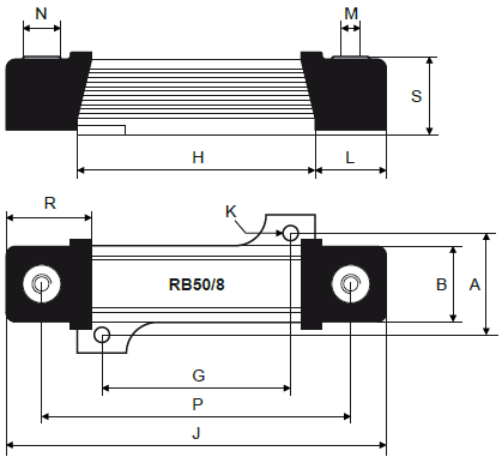
High-power, high-dissipation resistors for current limiting, load, and braking in heavy-duty industrial applications.

ATE Type	MIL-PRF 18546 G Type	Rated power (W)	Resistance range (Ω)	Voltage limit (V)	Weight (g)	Heatsink dimensions (cm^2 x mm)
RB50/8	RE75	50	0,01 - 68K	1250	52	930x1,5

ATE Type	Dimensions															
	A	B	C	D	F	G	H	J	K	L	M	N	P	Q	R	S
RB50/8	21,5	16	29,2	16	2	39,7	50	79,5	3,2	14,5	M4	8	65	17,5	18,5	16,5
Tol.	±0,2	±0,2	±0,2	±0,2	±0,2	±0,2	±0,5	±2	±0,2	±0,5	-	-	±1	±0,5	±0,5	±0,5



Connection screws supplied with the resistor



FIXED POWER WIREWOUND RESISTORS ALUMINIUM HOUSED WITH LARGE CREEP DISTANCE

These resistors meet or exceed the requirements of MIL - PRF - 18546 G specifications

ELECTRICAL SPECIFICATIONS

- Ohmic values: E24 Series. For out of range or not standard ohmic values, consult ATE Technical Dept.
- Tolerance: Standard 5%. Available on request up to 1%
- Temperature coefficient: From ±100 to ±30 ppm from R10 to Rmax
- Dielectric strength: 5000Vac / 7000Vac peak
- Large creep distance: RB106 > 22mm
  RB256 > 25 mm
- Insulation resistance: 10000 MΩ minimum
  1000 MΩ after moisture test
- Overload: 5s at 5 times rated power
- Non inductive: Models of equivalent physical and electrical specifications are also available with non inductive Ayrton-Perry winding

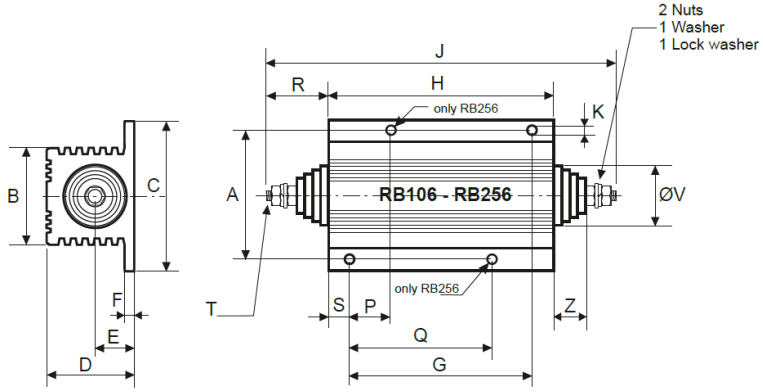
APPLICATION

High-dissipation power resistors for current limiting, load, and braking in heavy-duty industrial applications.

More technical data as RB100 and RB250 standard

ATE Type	MIL-PRF 18546 G Type	Rated power (W)	Resistance range (Ω)	Voltage limit (V)	Weight (g)	Heatsink dimensions (cm^2 x mm)
RB106	RE77	150	0,01 - 100K	1900	500	930x3
RB256	RE80	250	0,01 - 120K	2300	900	930x3

ATE Type	Dimensions												
	A	B	C	D	E	F	G	H	J	K	P	Q	R
RB106	57	46	72	45	20	5	70	89	139	4,8	-	-	25
RB256	64	54	76	56	26	6,3	98	114	178	4,8	22	76	32
Tol.	±0,2	±0,5	±0,5	±0,5	±0,5	±0,5	±0,2	±0,5	±2	±0,2	±0,2	±0,2	±0,2



THICK FILM POWER RESISTORS PR100

FEATURES

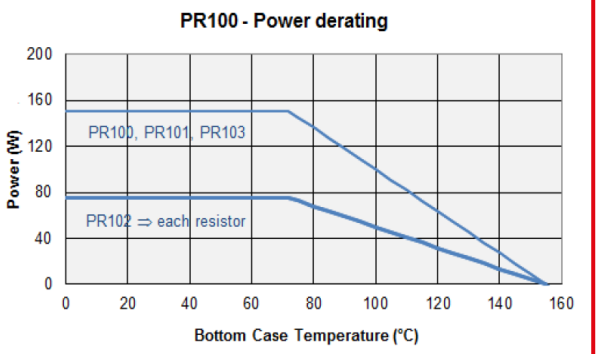
Very good ratio Power / Volume.
Easy mounting and wiring with significant cost advantages.
Non inductive performance for high frequency applications.
One model for power up to 150W.
Suited to UL94-V0 application.
SOT227 configuration.

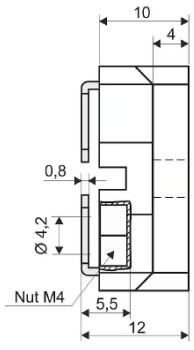
APPLICATION

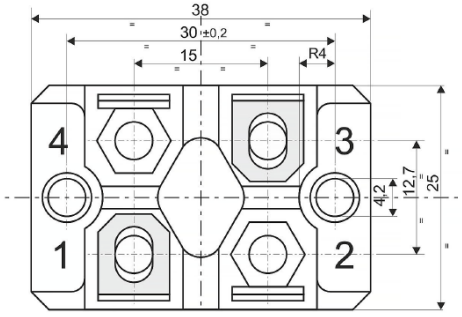
Compact power resistors for current limiting, load, filter and damping in electronic and industrial applications.

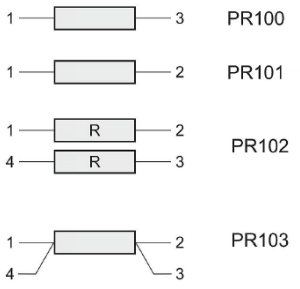
SPECIFICATIONS

Power rating:	100W (PR102 2 x 50W)
Max power not trimmed:	150W (heatsink at 70°C)
Resistance range:	From 1R0 to 1MΩ, E12 series
Tolerance:	Standard 10%, up to 1% on request
Temperature coefficient:	±100 ppm/°C
Max Working Voltage:	1,5 kVac, V = √(P × R)
Work Temperature Range:	From -55°C to +155°C
Dielectric Strength:	2500 Vac
Insulation resistance:	> 105 MΩ at 500V
Partial discharge:	< 80 pC @ 2000 Vac (on request)
Self inductance:	40 nH
Capacitance to heatsink:	< 30 pF
Overload:	2 Pn x 10 s
Thermal resistance:	0.5 °C/W
Heatsink flatness:	0.05 mm Max
Heatsink surface finish:	6.3µm Max
Thermal grease:	required
Max torque for contact:	1.2 Nm (static)
Max torque for mounting:	1.5 Nm (static)
Weight:	18 g (PR100 / PR101) 24 g (PR102 / PR103)
Vibrations test:	According IEC EN61373 par. 8, 9 and 10 ref. EN60068-2-64: 2008 and EN60068-2-27: 2009









Connection and mounting screws supplied with the resistor

THICK FILM POWER RESISTORS PR250

FEATURES

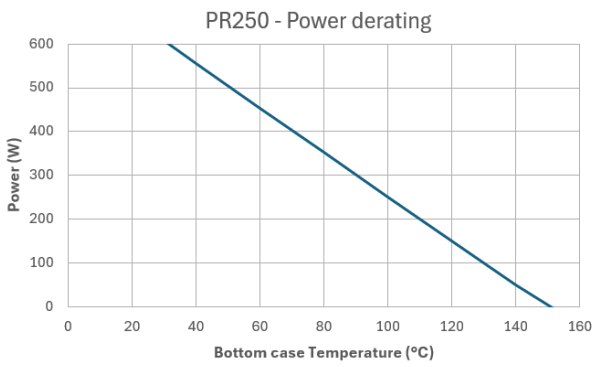
Very good ratio Power / Volume.
Easy mounting and wiring with significant cost advantages.
Non inductive performance for high frequency applications.
One model for power up to 150W.
Suited to UL94-V0 application.
SOT227 configuration.

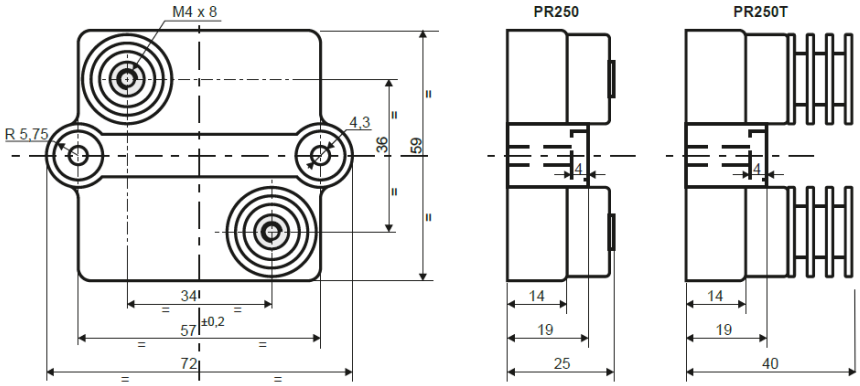
APPLICATION

Compact power resistors for current limiting, load, filter and damping in electronic and industrial applications.

SPECIFICATIONS

- Power rating:	250W (heatsink at 100°C)
- Resistance range:	From 1R0 to 1MΩ, E12 series
- Tolerance:	Standard 10%, up to 1% on request
- Temperature coefficient:	±100 ppm/°C
- Max Working Voltage:	5kV, V = √(P × R)
- Work Temp. Range:	From -55°C to +155°C
- Dielectric Strength:	7000 Vac (12000 Vac x PR250T)
- Insulation resistance:	> 105 MΩ at 500V
- Creep distance:	42 mm (65 mm x PR250T)
- Air gap distance:	16 mm (29mm x PR250T)
- Partial discharge:	< 10 pC @ 5000 Vac
- Self-inductance:	80 nH
- Parallel capacitance:	40 pF
- Capacitance to heatsink:	< 120 pF
- Overload:	4 Pn x 10 s
- Thermal resistance:	0.15 °C/W
- Heatsink flatness:	0.05 mm Max
- Heatsink surface finish:	6.3 µm Max
- Thermal grease:	Required > 1W/mk
- Max torque for contacts:	2Nm (static)
- Max torque for mounting:	2Nm (static)
- Weight:	100 g (130 gr for PR250T)
- Options:	For values R039 <R< 1R0 is available Metal Foil type PR500M
- Vibrations test:	According IEC EN61373 par. 8, 9 and 10 ref. EN60068-2-64: 2008 and EN60068-2-27: 2009





"Connection and mounting screws are supplied with the resistor
All dimensions are in mm"

THICK FILM POWER RESISTORS PR254

FEATURES

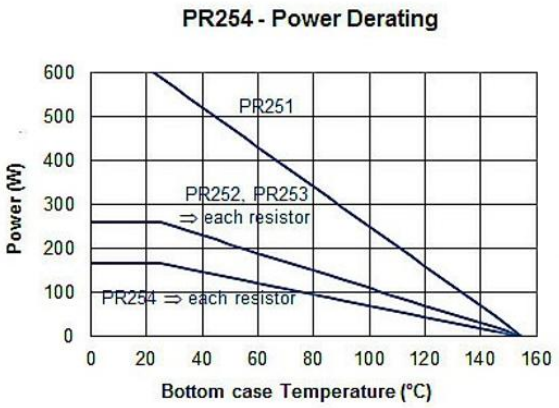
Very good ratio Power / Volume
Easy mounting and wiring with significant cost advantages.
Non inductive performance for high frequency applications.
One model for power applications up to 500W.
Suited to UL94-V0 application.

APPLICATION

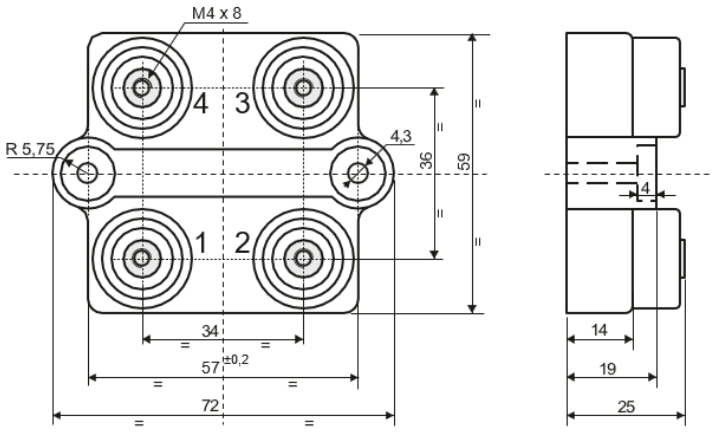
Compact power resistors for current limiting, load, filter and damping in electronic and industrial applications.

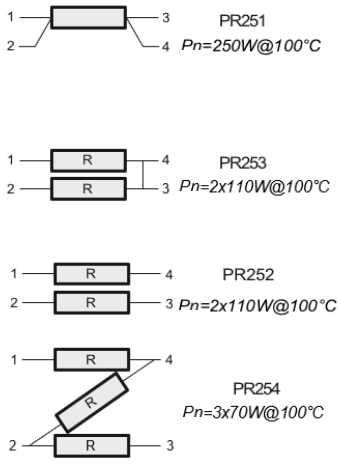
SPECIFICATIONS

- Power rating: 250W (heatsink at 100°C)
- Resistance range: From 1R0 to 1MΩ, E12 series
- Tolerance: Standard 10%, up to 1% on request
- Temperature coefficient: ±100 ppm/°C
- Max Working Voltage: 5kV, V = √(P × R)
- Work Temp. Range: From -55°C to +155°C
- Dielectric Strength: 7000 Vac
- Insulation resistance: > 105 MΩ at 500V
- Creep distance: 42 mm
- Air gap distance: 16 mm
- Partial discharge: < 10 pC @ 5000 Vac
- Self-inductance: 80 nH
- Parallel capacitance: 40 pF
- Capacitance to heatsink: < 120 pF
- Overload: 4 Pn x 10 s
- Thermal resistance: 0.15 °C/W
- Heatsink flatness: 0.05 mm Max
- Heatsink surface finish: 6.3 µm Max
- Thermal grease: Required > 1W/mk
- Max torque for contacts: 2Nm (static)
- Max torque for mounting: 2Nm (static)
- Weight: 125 g
- Vibrations test: According IEC EN61373 par. 8, 9 and 10 ref. EN60068-2-64: 2008 and EN60068-2-27: 2009



PR254





"Connection and mounting screws are supplied with the resistor
All dimensions are in mm"

THICK FILM POWER RESISTORS PR600

FEATURES

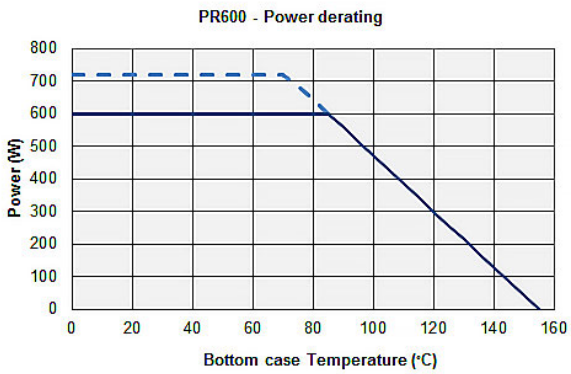
Very good ratio Power / Volume
Easy mounting and wiring with significant cost advantages.
Non inductive performance for high frequency applications.
One model for power applications up to 600W.
Suited to UL94-V0 application

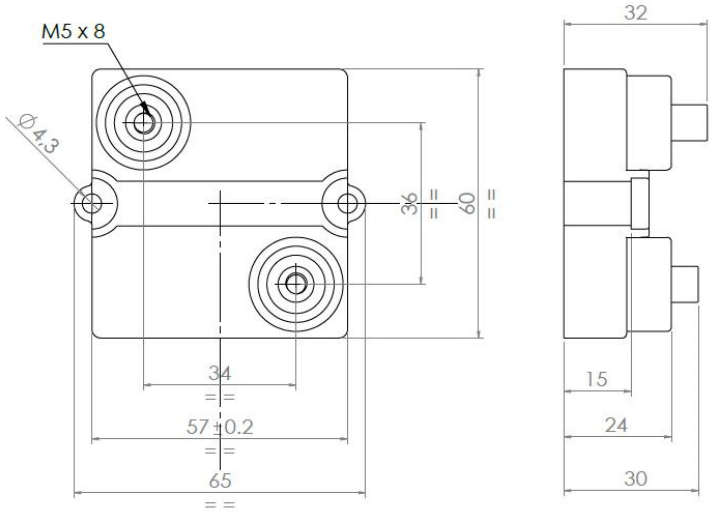
APPLICATION

Compact power resistors for current limiting, load, filter and damping in electronic and industrial applications.

SPECIFICATIONS

- Power rating:	600W @ 85°C Bottom case Temperature For power greater than 600W please consult Technical Dept.
- Resistance Range:	from 1R0 to 1M0
- Resistance Values:	E12 series For out of range or not std. values please contact ATE Electronics Technical Dept.
- Tolerance:	Standard ±10%. Available on request up to ±1%
- Temperature coefficient:	±150 ppm/°C
- Work Temperature Range:	from -55°C to +155°C
- Max Working Voltage:	5kV, V = √(P × R)
- Dielectric strength:	7kVac x 60"
- Insulation resistance:	> 10^5 MΩ at 500V
- Creep distance:	42mm
- Air Gap distance:	16mm
- Partial Discharge:	< 10pC @ 5kVac
- Self Inductance:	80nH
- Parallel Capacitance:	40pF
- Capacitance to heatsink:	< 110pF
- Overload:	1kW x 10"
- Thermal resistance:	0,115°C/W
- Heatsink flatness:	0,05mm max
- Heatsink surface finish:	6,3µm max
- Thermal grease:	Required, λ > 1W/mK
- Max Torque for contacts:	2Nm (static)
- Max Torque for mounting:	2Nm (static)
- Weight:	95g
- Vibrations test:	According IEC EN61373 par. 8, 9 and 10 ref. EN60068-2-64: 2008 and EN60068-2-27: 2009





"Connection and mounting screws are supplied with the resistor
All dimensions are in mm"

THICK FILM POWER RESISTORS PR800

FEATURES

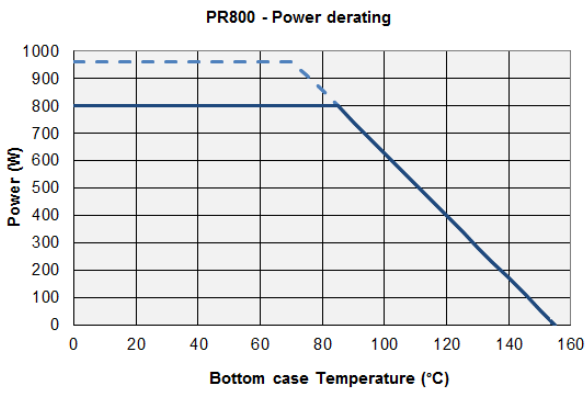
Very good ratio Power / Volume
Easy mounting and wiring with significant cost advantages.
Non inductive performance for high frequency applications.
Materials are UL94-V0 listed

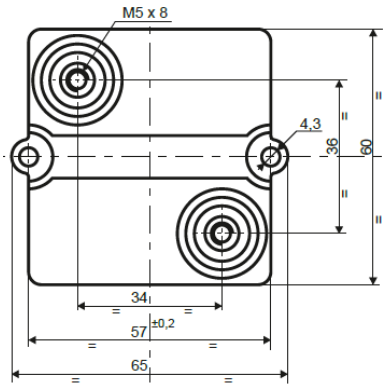
APPLICATION

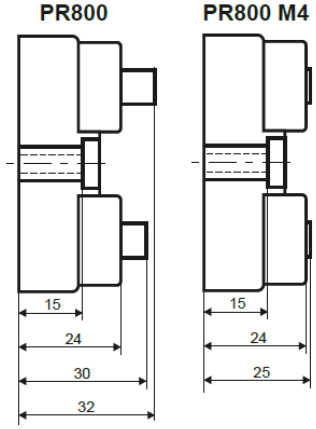
Compact power resistors for current limiting, load, filter and damping in electronic and industrial applications.

SPECIFICATIONS

- Power rating:	800W @ 85°C Bottom case Temperature For power greater than 800W please consult Technical Dept.
- Resistance Range:	from 1R0 to 1M0
- Resistance Values:	E12 series For out of range or not std. values, please contact ATE Electronics Technical Dept.
- Tolerance:	Standard ±10%.
- Temperature coefficient:	±150ppm/°C
- Work Temperature Range:	from -55°C to +155°C
- Max Working Voltage:	5,2kV , V = √(P × R)
- Dielectric strength:	7kVac x 60" (12kVac on request)
- Insulation resistance:	> > 10^5 MΩ at 500V
- Creep distance:	42mm
- Air Gap distance:	16mm
- Partial Discharge:	< 10pC @ 5kVac
- Self Inductance:	80nH (typical)
- Parallel Capacitance:	40pF (typical)
- Capacitance to heatsink:	150pF (typical)
- Overload:	1kW x 10"
- Thermal resistance:	0,11°C/W
- Heatsink flatness:	0,05mm max
- Heatsink surface finish:	6,3µm max
- Thermal grease:	Required, > 1W/mK
- Max Torque for contacts:	2Nm (static)
- Max Torque for mounting:	2Nm (static)
- Weight:	100g
- Vibrations test:	According IEC EN61373 par. 8, 9 and 10 ref. EN60068-2-64: 2008 and EN60068-2-27: 2009







"Connection and mounting screws are supplied with the resistor
All dimensions are in mm"

CONVECTION COOLED RESISTOR ALUMINUM PROFILE & CONVECTION COOLED RESISTOR ALUMINUM PROFILE WELDED

FEATURES

HVB high voltage resistors are mainly used as charge or discharge resistors in high voltage circuits. Anodized aluminum is used for the resistor housing, improving corrosion and wear resistance. The protection rating for the resistor housing is IP65. This excellent protection rating indicates that the resistors withstand solid and liquid contaminants in the operating environment.

APPLICATION

Energy dump resistor (for railway)

PROPERTIES

- Energy dump resistor, Energy values from 150 – 570 kJ (depending on R-value)
- HVBW Integrated AISI304 steel protection grid
- HVB Aluminum housed
- Convection cooled
- HV radox connection cables

General specifications HVB

Energy rating 5s*	HVB 70.400.1	150 kJ - 285 kJ
	HVB 70.400.2	300 kJ - 570 kJ
Resistance Tolerance		± 10%
Temperature Coefficient		100 ppm/K
Working Voltage		4,500 VAC / 6,360 VDC
Dielectric strength @ 50 Hz, 1 min.		10 kV
Insulation Resistance @ 5 kVDC	dried condition	≥20 MΩ
Connection	standard	Radox cable 1000 mm
Protection Degree		IP65
Cooling		natural air cooled
Material Housing		anodised aluminum

General specifications HVBW

Energy rating 5s*	HVBW 70.400.1	150 kJ - 285 kJ
	HVBW 70.400.2	300 kJ - 570 kJ
Resistance Tolerance		± 10%
Temperature Coefficient		100 ppm/K
Working Voltage		4,500 VAC / 6,360 VDC
Dielectric strength @ 50 Hz, 1 min.		10 kV
Insulation Resistance @ 5 kVDC	dried condition	≥20 MΩ
Connection	standard	Radox cable 1000 mm
Protection Degree		IP65
Cooling		natural air cooled
Material Housing		stainless steel AISI316L

WATER COOLED POWER RESISTOR ALUMINUM PROFILE

FEATURES

WHHB aluminum housed resistor has a high working voltage. The active resistor wire is in direct contact with the coolant and must be cooled with de-ionized water with or without glycol. The water in-and outlet is at the rear side, opposite the electrical connectors.

APPLICATION

Filters in HV drives

PROPERTIES

- De-ionized liquid cooled
- Aluminum housed
- 4.7kVAC / 6.6kVDC
- With 50mm2 or 250mm2 connections
- Nominal power depends on ohm value (15-25kW)

General specifications

Nominal power	standard	25 kW
Working voltage		4.7 kVAC / 6.6 kVDC
Dielectric strength @ 50Hz, 1 min.		20 kVAC
Resistance tolerance	standard	± 10%
Overload @ 5 pulse / hour	optional	± 5%
Max. current	50 mm2	160 A
	250 mm2	500 A
Protection degree		IP00 / IP65
Cooling fluid		Deionised water or deionised water-glycol
Conductivity of fluid		≤ 2 µS/cm
Maximum fluid inlet temperature		* 60 °C
ΔT inlet/outlet (recommended)		≤15 K
Pressure drop @ 30L/min.		≤ 0.5 bar
Materials		
Housing (not in contact with fluid)		anodized aluminium
Resistor elements		nickel chrome alloy
Operating pressure		6 bar @ 55 °C
Test pressure		10 bar @ 20 °C

WATER COOLED POWER RESISTOR

FEATURES

WHBS 32 fully welded steel resistor has mica insulated resistor elements. It has a high working voltage. The water in-and outlet is at the rear side of the resistor

APPLICATION

Brake resistor for marine applications (winches, deck machinery)

PROPERTIES

- Power from 3 to 6kW
- Liquid cooled
- Fully steel welded (AISI304)
- Working voltage 1000VAC / 3000VAC
- Integrated heating system
- Standard extra potting against humidity
- Installation and maintenance manuals available

General specifications

Nominal power		3 kW - 6 Kw
Working voltage		1000 VAC - 3000 VAC
Dielectric strength @ 50Hz, 1 min.		10 kVAC
Insulation resistance @ 5000 VDC	dried condition	> 20 MΩ
Overload @ 1s pulse / hour		20 x Pn (depends on Ω value)
Overload @ 5s pulse / hour		10 x Pn (depends on Ω value)
Resistance tolerance	standard	± 10%
	optional	± 5% / ± 3%
Temperature coefficient	20 °C - 400 °C	
Time constant for heating up		60 s
Protection degree		IP00
Maximum liquid inlet temperature		* 60 °C
ΔT inlet/outlet (recommended)		10 K - 20 K
Operating pressure		6 bar @ 55 °C
Test pressure		12 bar @ 20 °C
acc. EN 13445		16 bar @ 20 °C
Pressure drop @ Pn and 20K		0.5 bar
Cooling fluid		fresh water / water-glycol

ATE ELECTRONICS s.r.l.

WATER COOLED POWER RESISTOR

FEATURES

WHBS 16 fully welded steel resistor can have three or six steel tubes of 16mm diameter, welded in a steel tank. The water in-and outlet can be on top of the resistor or at the rear side. The connection can be 'open style' with threaded rods M6, IP00, or the resistor can be fitted with a connection box IP65/IP66

PROPERTIES

- Power from 6 to 230kW
- Liquid cooled
- Fully steel welded (AISI304 or AISI316)
- Working voltage 1000VAC / 1400VDC
- Integrated heating system
- Standard extra potting against humidity
- Standard thermal switch
- Multiple resistors per unit possible
- Vertical execution possible
- Accessories: drain, PT100
- Installation and maintenance manuals available

APPLICATION

Brake resistor for marine applications (winches, deck machinery)

General specifications

Nominal power		6 kW - 200 kW
Working voltage		1000 VAC / 1400 VDC
Dielectric strength @ 50Hz, 1 min.		3,500 VAC
Insulation resistance @ 5000 VDC	dried condition	> 20 MΩ
Overload @ 1s pulse / hour		8 x Pn (depends on Ω value)
Overload @ 5s pulse / hour		4 x Pn (depends on Ω value)
Resistance tolerance	standard	± 10%
	optional	± 5% / ± 3%
Temperature coefficient	20 °C - 400 °C	100 ppm/K
Time constant for heating up		30 s
Protection degree		IP00 / IP65 / IP66
Maximum liquid inlet temperature		* 60 °C
ΔT inlet/outlet (recommended)		10 K - 20 K
Operating pressure		6 bar @ 55 °C
Test pressure		12 bar @ 20 °C
acc. EN 13445		16 bar @ 20 °C
Pressure drop @ Pn and 20K		0.5 bar
Cooling fluid		fresh water / water-glycol
Maximum temperature liquid inlet	without de-rating	* 60 °C
ΔT inlet/outlet (recommended)		10 K - 20 K
Materials		
Tank	standard	AISI 304
	optional	AISI 316
Connection box	standard	AISI 304
	optional	AISI 316
Resistor elements	standard	AISI 304
	optional	AISI 316 & 321, incoloy800 & 825
Drain / air bubble release	optional	
Temperature protection	standard	Thermostat
Normally closed		16 A @ 230 VAC
Temperature sensor PT100	optional	
Air bubble protection	optional	Thermostat
Moisture protection	optional	15 W - 30 W heating cable
Voltage	optional	230 V or 115 V

WATER COOLED HIGH POWER BRAKE RESISTOR

FEATURES

The resistor unit consists of steel resistor elements with a diameter of 16mm which are welded in a flange that is fitted to the tank. The resistor unit is fitted on a flange and is closed with a gasket. The electrical configuration can be single, star/delta or multiple segments. Inside the connection box are the main terminals and the secondary circuits such as box heater, thermal protection circuits and air bubble detection circuit.

APPLICATION

Brake resistor for marine applications (winches, thrusters, propulsion, deck machinery)

PROPERTIES

- Power from 40 to 1450kW
- Liquid cooled
- Fully steel welded (AISI304 or AISI316)
- Working voltage 1000VAC / 1400VDC
- Main DN flange
- Integrated heating system
- Extra potting against humidity
- Standard two thermal switches
- Multiple resistors per unit possible
- Vertical execution possible
- Tank can be opened for maintenance/repair
- Accessories: drain, pressure sensor, PT100
- Installation and maintenance manuals available

General specifications

Power ratings		40 kW - 1450 kW
Working voltage		1000 VAC / 1400 VDC
Dielectric strength @ 50Hz		3,500 VAC
Insulation resistance @ 5000VDC	dried condition	> 20 MΩ
Overload @ 5s pulse / hour		8 x Pn (depends on Ω value)
Overload @ 10s pulse / hour		4 x Pn (depends on Ω value)
Resistance tolerance	standard	± 10%
	optional	± 5% / ± 3%
Temperature coefficient	20 °C - 400 °C	100 ppm/K
Time constant for heating up		30 s
Protection degree		IP65 / IP66
Cooling fluid		fresh water / water-glycol
Maximum temperature liquid inlet	without de-rating	* 60 °C
ΔT inlet/outlet (recommended)		10 K - 20 K
Pressure drop @ Pn and Δ20K		0.3 bar
Materials		
Tank	standard	AISI 304
	optional	AISI 316
Connection box	standard	AISI 304
	optional	AISI 316
Resistor elements	standard	AISI 304
	optional	AISI 316 & 321, incoloy800 & 825
Cable gland	Optional	nickel plated brass / AISI 304
	standard	undrilled plate
Mounting, maintenance and storage instructions		available document
Water temp. Protection		Thermostat
Range (advised 10K + T water out)		0 °C - 150 °C
Contact		Change-over contact
Max. current		16 A
Air bubble protection		Thermostat
Range (advised 180°C)		50 °C - 300 °C
Contact		Change-over contact
Max. current		16 A
Moisture protection	standard	20 W - 30 W heating cable 230 V
Voltage	optional	115 V
Factory acceptance test		
		- Aspect and dimensional Inspection
		- Resistance value
		- Insulation resistance
		- Dielectric strength
		- Pressure test
	optional	Certified Body witness test
PT100 + transducer	optional	
Pressure sensor 4-20mA	optional	
Power ratings		40 kW - 1450 kW
Working voltage		1000 VAC / 1400 VDC
Dielectric strength @ 50Hz		3,500 VAC
Insulation resistance @ 5000VDC	dried condition	> 20 MΩ
Overload @ 5s pulse / hour		8 x Pn (depends on Ω value)
Overload @ 10s pulse / hour		4 x Pn (depends on Ω value)

BRAKE RESISTORS WHBSA

Specially designed for hybrid and full electric bus & truck applications

- Small dimensions, high power density
- Fully welded construction (no gaskets in water circuit)
- Fully insulated, no external live parts
- IP 65
- Low thermal drift, 100ppm/K
- Low noise
- OEM version available

Main characteristics

ELECTRICAL	
Resistance tolerance	± 5%
Temperature coefficient	100 ppm/K
Maximum working voltage	1000VAC
Dielectric strength	3.5kV @ 50Hz, 1 min
Insulation resistance	≥ 20 MΩ @ 5000VDC
MATERIALS	
Resistor elements	AISI 321
Connection box	AISI 304
Support and tank	AISI 304
Cable glands (optional)	Nickel plated
Storage temperature (empty)	-30°C to +90°C
MECHANICAL	
Protection degree	IP65
COOLING	
Recommended ΔT (°C)	≤ 20
Operation pressure (bar)	≤ 3
Test pressure (bar)	4.5 @ 20°C for 1 hour
Pump overrun time (s)	30

FEATURES

WHBSA water cooled brake resistors for bus & truck applications can withstand high brake-power loads. The resistor can withstand the power rating defined as heating power continuously without any degradation. For a 'down hill test' the resistor can endure more than double this power during12 minutes. Overload power compared to heating power is a factor of 3.4 for 10 seconds and3.1 for 15 seconds, with a cycle time of 60 seconds.

APPLICATION

Brake resistor for Buses and Trucks

PROPERTIES

- Power from 19 – 253kW (12 min braking power)
- Liquid cooled
- IP65, optionally IP67
- 3 diameters, 16 variants
- Fully steel welded (AISI304 or AISI316)
- Working voltage 1000VAC / 1400VDC
- Connection with copper bars
- Standard extra potting against humidity
- Standard PT1000
- Accessories: HVIL
- Only for low-pressure systems
- Direct business with large OEM's

WHBSA brake resistors for Bus & Truck applications

Dimensions (excl water connections) L= xxx	mm	WHBSA 100.xxx	WHBSA 150.xxx	WHBSA 200.xxx
Braking power	kW	19 - 32	38 - 160	63 - 253
L	mm	255 - 375	255 - 820	255 - 790
Length overall	mm	L+94	L+96	L+110
Width	mm	155	210	260
Height	mm	143	183	233
Diameter tank	mm	Ø114.3	Ø168.3	Ø219.1
DN size tank	-	DN100	DN150	DN200
Mounting holes (slotted holes)	mm	Ø10.5x15	Ø10.5x15	Ø10.5x15
Mounting holes distance	mm	L-83	L-83	L-83
Water connection acc. DIN 71550	mm	Ø32	Ø32	Ø50
Optional water connection	mm	Ø25	-	Ø32
Connection box material	-	AISI 304	AISI 304	AISI 304
Connection box size	mm	152x132x86	152x132x86	210x210x100
Drain valve ½"	-	Optional	Optional	Optional
Cable glands and hole	-	Optional	Optional	Optional
Pt1000 sensor	-	Standard	Standard	Standard

RESISTORS GROUP IN METALLIC CASE

FEATURES

This resistors group was designed for application such as elevators, cranes, or for braking of big electrical motors.
These types of resistors have some characteristics that make them more suitable to be employed in harsh conditions than the typologies normally used.
These characteristics are:
. Capability to stand up to overload for long time without any damage. The power limits are only indicated to avoid that a too high temperature of the resistor group may damage some objects near the group.
. The protection degree, truly more elevated compared to similar products, allows the use of these groups in these environments in which we found the presence of metallic chips, as well as the possibility of intrusion of implements during maintenance operations.
. The possibility to put in the same case different resistance elements completely insulated among them.

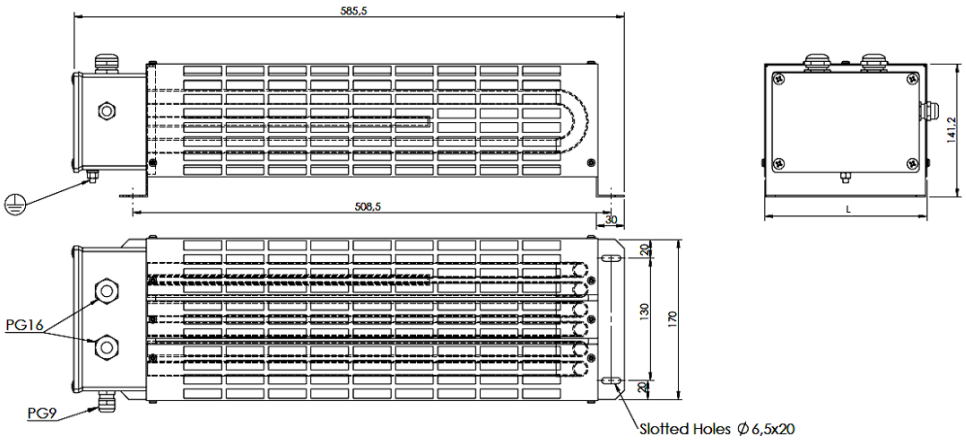
APPLICATION

Brake resistor for small drives

PROPERTIES

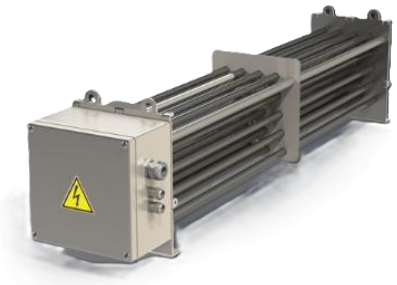
- Nominal power 1 – 6.5 kW
- Integrated AISI304 steel protection grid
- Aluminum connection box
- Natural air cooled
- Economic solution

ATE Type	L	Composed from the following number of elements	Rated Power (kW)	Max Power (kW)	Temperature Coefficient (ppm/°C)	Insulation resistance	Dielectric Strength
PCG 2K0	120	1	1	1,5	100	≥ 200 MΩ @ 5000 VDC	3500 VRMS for 60 sec.
PCG 3K0	120	2	2	3	100	≥ 200 MΩ @ 5000 VDC	3500 VRMS for 60 sec
PCG 4K0	120	3	3	4,5	100	≥ 200 MΩ @ 5000 VDC	3500 VRMS for 60 sec
PCG 5K0	170	3	3,5	5	100	≥ 200 MΩ @ 5000 VDC	3500 VRMS for 60 sec
PCG 6K0	170	4	4	5,5	100	≥ 200 MΩ @ 5000 VDC	3500 VRMS for 60 sec
PCG 8K0	170	5	5	6	100	≥ 200 MΩ @ 5000 VDC	3500 VRMS for 60 sec
PCG 10K0	170	6	6	6,5	100	≥ 200 MΩ @ 5000 VDC	3500 VRMS for 60 sec



Drawing and indicative dimensions

CONVECTION COOLED TUBULAR RESISTOR GROUP



FEATURES

GRT are natural air cooled steel tubes resistors. They can have three, nine, ten or twelve tubes. Welded into a frame. The connection box contains the main terminals and any auxiliary circuits.
The ingress protection degree is IP65. A protection grid is optional.

APPLICATION

- Brake resistor for marine applications (winches, deck machinery)
- For extra harsh environments

PROPERTIES

- Power from 1 to 40kW
- Convection cooled
- Fully welded steel construction (AISI304 or AISI316)
- Working voltage 1000VAC / 1400VDC
- Integrated heating system
- Extra potting against humidity
- Standard one thermal switch
- With 1 / 3 / 6 / 8 / 9 / 10 / 12 / 18 tubes
- Multiple resistors per unit possible

General specifications

Nominal power		3 kW - 32 kW
Working voltage		1000 VAC / 1400 VDC
Dielectric strength @ 50Hz, 1 min.		3,500 VAC
Insulation resistance @ 5000 VDC	dried conditions	> 20 MΩ
Overload @ 5 pulse / hour		10 x Pn (depends on Ω value)
Overload @ 10s pulse / hour		7 x Pn (depends on Ω value)
Resistance tolerance	standard	± 5%
	optional	± 5% / ± 3%
Temperature coefficient		100 ppm/K
Time constant for heating up		
Protection degree		IP65
Cooling		natural air cooled
Configuration	standard	single phase
	optional	delta/star 3 phase
	optional	multiple segments
Thermal protection	standard	thermal switch
Normally closed contact		2 A @ 250 VAC, 50 Hz, cos 0.95
Moisture protection	standard	7.5 W - 30 W heating cable 230 V
Voltage	optional	115 V
Mechanical protection against direct contact with hot elements	optional	protection grid
Materials		
Supporting structure	standard	AISI 304
	optional	AISI 316
Terminal box	standard	AISI 304
	optional	AISI 316
Resistor elements	standard	AISI 304
	optional	AISI 316 & 321, incoloy800 & 825
Factory acceptance test	standard	
		- Aspect and dimensional Inspection
		- Resistance value
		- Insulation resistance
		- Dielectric strength

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VENTILATED RESISTOR GROUP

FEATURES

TRV steel tubes forced air cooled resistors have two or four powerful ventilators as active cooling. The tubes can be made from different alloys to meet the environmental conditions. The framework and connection box are offered in AISI304 and AISI316. Inside the connection box are the main terminals, the cabinet heater and all secondary circuits. Protection degree is IP65 or IP66.

APPLICATION

Brake resistors for cranes in harbors

PROPERTIES

- Nominal power 50 - 275 kW
- Forced air cooled (integrated ventilators)
- AISI304 or AISI316
- Standard two thermal switches
- Standard extra potting
- Standard heating system
- 3 mechanical sizes, 10 different tube arrangements
- Installation and maintenance manuals available

General specifications

Power ratings		50 kW - 275 Kw
Temperature coefficient	20 °C - 400 °C	85 ppm/K
Working voltage		1000 VAC / 1400 VDC
Dielectric strength @ 50Hz		3,500 VAC
Insulation resistance @ 5000VDC	dried condition	>> > 10^5 MΩ
Overload @ 5s pulse / hour		7 x Pn (depends on Ω value)
Overload @ 10s pulse / hour		5 x Pn (depends on Ω value)
Resistance tolerance	standard	± 10%
	optional	± 5% / ± 3%
Electrical circuit configuration	standard	single resistor unit
	optional	star/delta/split configuration
Environmental conditions	temperature range	-20 °C - 40 °C
	altitude	1000 m
Time constant for heating up		60 s
Protection degree		IP65 / IP66
Fans	standard voltage	415 V, 3-phase, 50 Hz
	optional voltage	430 V, 3-phase, 60 Hz
	power	1.5 kW per motor
	protection degree	IP66
	air flow	5000 m3/h per motor
	motor	steel, marine environment painted
ΔT between inlet and outlet air		≈ 50 K
Materials		
Support/panels	standard	AISI 304
	optional	AISI 316L
Connection box	standard	AISI 304
	optional	AISI 316L
Resistor elements	standard	AISI 321
	optional	AISI 304, AISI 316L, incoloy800 & 825
Cable gland	optional	nickel plated brass / AISI 304
	standard	undrilled plate
Moisture protection	standard	100 W - 120 W heating cable 230 V
	optional	115 V
Factory acceptance test	standard	
		- Aspect and dimensional Inspection
		- Resistance value
		- Insulation resistance
		- Dielectric strength
	optional	Certified Body witness test

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Production Plant
Via Sangano, 36/38
10090 **Trana** (TO) - ITALY

Headquarter
Via Ugo Scaletta, 13
10094 **Giaveno** (TO) - ITALY

Innovation Center
Via Parco Alto Milanese, 1
21052 **Busto Arsizio** (VA) - ITALY

OPENING: Monday - Friday 08:00 – 17:00
TELEPHONE: +39.011.937.85.75

EMAIL: info@ate-electronics.com
WEB: www.ate-electronics.com
Linkedin: ATE ELECTRONICS S.R.L. | LinkedIn

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