

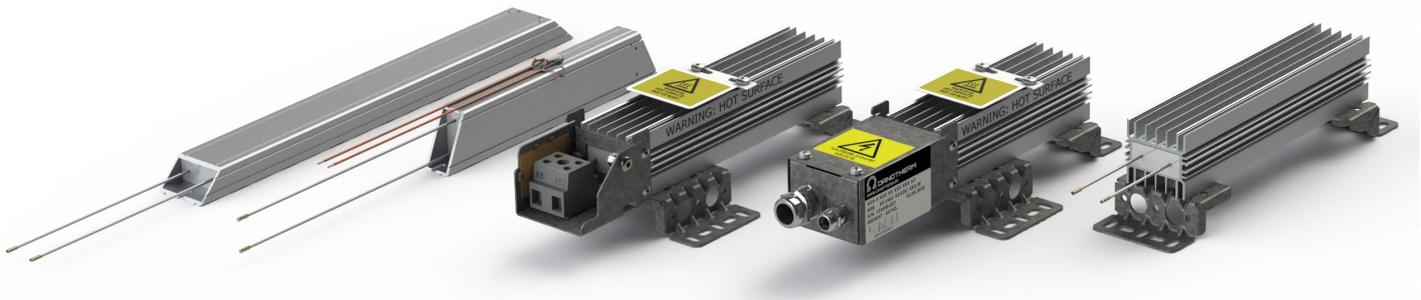
CAH / CAV / CAR

Compact Alpha Power Resistor

70 - 410 W

410W - 4460W @ 5/120s

(2kJ - 22kJ) pulse load



The CAH / CAV and CAR brake resistors with optional **integrated thermal switch** from our medium power range of **ALPHA ALUMINIUM HOUSED COMPACT BRAKE RESISTORS** are electrically insulated and with small dimensions. They can easily be fitted into compact constructions and are especially designed to endure high pulse loads in industrial drive systems.

The steady state power range span from **70W** to **410W** per housing. The pulse load capability is up to 75 times the nominal power for one second every 120 seconds, and 18 times the nominal power for five second every 120 seconds depending on the ohm value and resistor type.

Danotherm has developed **thermal models** for all resistor types and resistor values. By using these models we are able to predict the temperature rises of the resistor wire and on the surface for all possible load applications. We offer our assistance to customers to find the optimum solution.

Thermal simulations

The start for each resistor selection is a power-time graph from your application. For each resistor a (unique) thermal model can be defined. The model is based on the physical properties of the resistor. With the use of simulation software the temperatures of various components of the resistor can be determined. The resistor can be optimized for your application, without over dimensioning, reducing costs and engineering time

Applications

CAH/CAV/CAR compact alpha, aluminium housed, brake resistors are able to withstand repetitive high pulse loads. Applications are brake resistors for elevators, escalators, cranes, winches, conveyor belts or any other industrial small to medium power drive system.

Ingress Protection

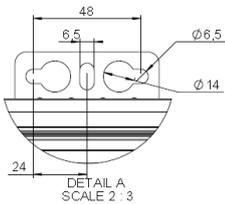
Resistors with connection box type D have IP 21 when the resistor is mounted vertically and IP 20 when they are mounted horizontally. Connection box type K is an open construction and is considered IP00. Cable leads types are IP 54.

Construction

The resistors are designed as follows:
The resistor elements for high resistance types are wire wound on mica support sheets. Lower resistance elements are made with helix wound wire elements mounted in special designed ceramic fixtures. The outer housing is an aluminium profile isolated with micanite sheets on all inner surfaces. The resistor elements are fixed symmetrical in the profile by ceramic insulators. This ensures a symmetric expansion of the resistor and a maximum stability to high load impulses. The aluminium housing with the fixed resistor element is filled with Al₂O₃ or SiO₂. This ensures a minimum change of the resistor surface temperature even if the resistor element reaches its maximum temperature during a pulse load. The standard cables are 300 mm AWG 18 – AWG 14. We can supply cables in specified length and mounted with cable shoes or connectors as required.

Mounting feet

CAR resistors have thermal relieve expansion mounting feet. When a resistor is heated up to its maximum temperature the length increases. The mounting feet are able to relieve this stress. The mounting feet at the cable side are fixed where as the mounting feet at the upper end have the thermal stress relieve.



Mounting feet with thermals stress relieve

Accessories

All types can be fitted with an internal thermal switch (TS). This increases the total length of the resistor with 25mm compared to versions without TS. CAH/CAV can also be offer with external thermal switch that can be clipped on the housing without increasing the length.



CAH/CAV/CAR without thermal switch

Table A

CAH/CAV CAR	Pn [W] @ 40°C According UL508	max temp. [°C]	R [Ω] min - max	Pulse load [kW] T. amb. = 40°C each 120s				
				duty 1 second [W]	duty 5 second [W]	duty 10 second [W]	duty 20 second [W]	duty 40 second [W]
				Pn [W] @ 40°C According UL508				
CAH / CAV 120 C	70	260	0.15 - 300	1070	410	320	240	170
CAH / CAV 150 C	90	260	0.3 - 600	2420	820	600	435	255
CAH / CAV 165 C	100	265	0.3 - 800	3630	1120	780	540	285
CAH / CAV 210 C	125	270	0.6 - 1200	7030	1800	1120	750	375
CAH / CAV 240 C	145	275	0.7 - 1500	9530	2350	1440	850	435
CAH / CAV 300 C	185	290	1 - 1200	12800	3150	1920	1100	550
CAH / CAV 360 C	220	305	1.2 - 2500	16700	4080	2460	1320	660
CAR 85 C	115	260	0.1 - 300	1090	420	330	250	180
CAR 115 C	150	265	0.25 - 600	2480	860	640	470	330
CAR 130 C	170	265	0.3 - 800	3750	1170	830	600	405
CAR 175 C	225	275	0.5 - 1200	7420	1910	1230	830	570
CAR 205 C	260	285	0.7 - 1400	10200	2540	1590	1050	700
CAR 265 C	335	300	1.0 - 2000	13800	3460	2140	1420	940
CAR 325 C	410	320	1.2 - 2500	18100	4460	2750	1810	1170

Pulse ratings for short pulses depend on the ohm value. Resistors with lower resistance value have more wire than resistors with higher resistance values. The ratings in this table refer to resistors of about 40R.

CAH/CAV/CAR with thermal switch

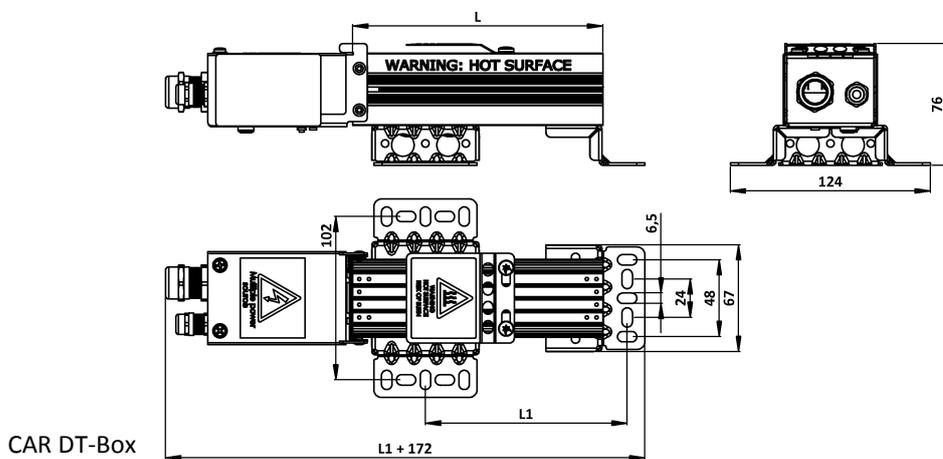
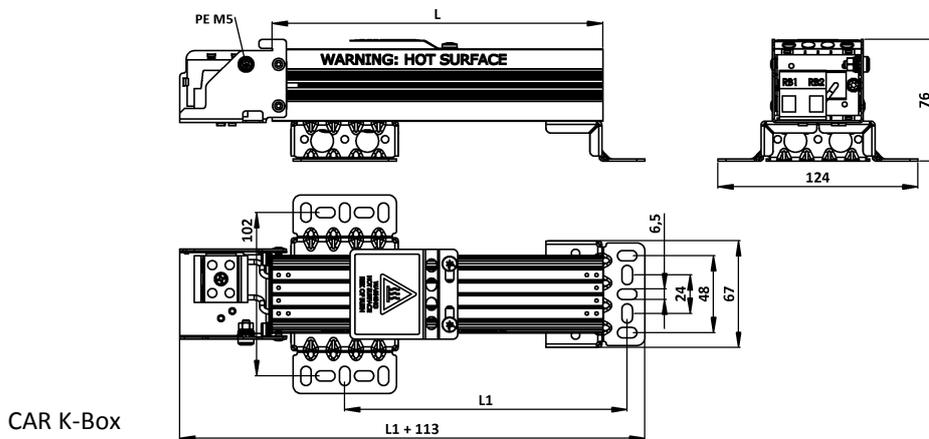
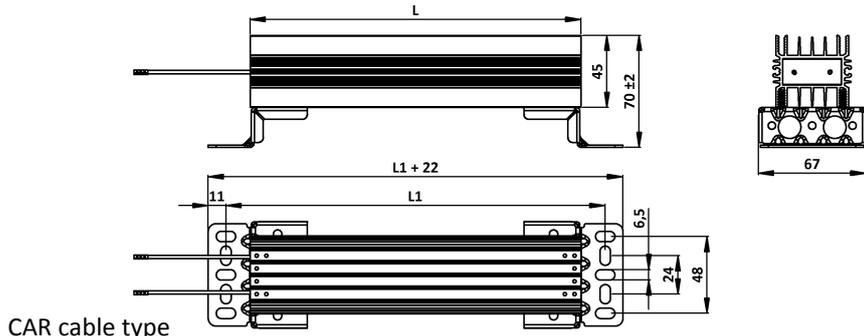
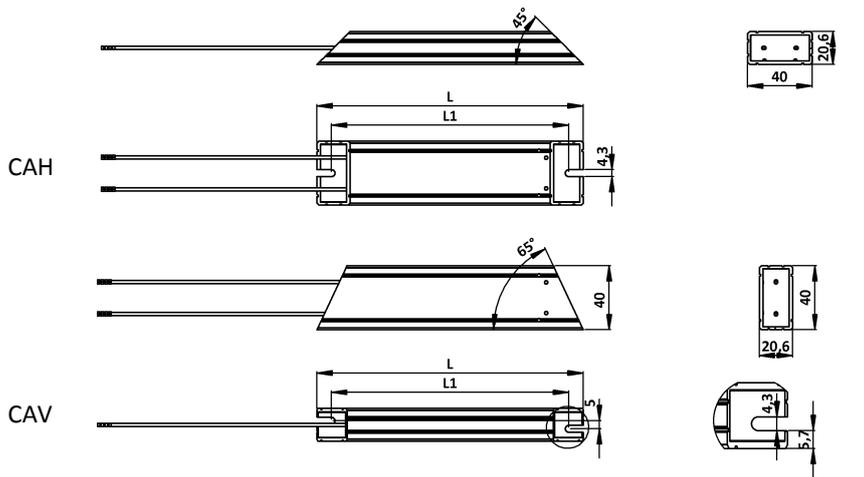
Table B ↓

CAH/CAV CAR with Thermal switch	Pn [W] @ 40°C According UL508	max temp. [°C]	R [Ω] min - max	Pulse load [kW] T. amb. = 40°C each 120s				
				duty 1 second [W]	duty 5 second [W]	duty 5 second [W]	duty 10 second [W]	duty 40 second [W]
				Pn [W] @ 40°C According UL508				
CAH / CAV 145 CT	60	210	0.15 - 300	1070	415	325	245	170
CAH / CAV 175 CT	75	210	0.3 - 600	2420	830	610	430	215
CAH / CAV 190 CT	80	215	0.3 - 800	3630	1120	780	460	235
CAH / CAV 235 CT	100	220	0.6 - 1200	7030	1810	1130	580	290
CAH / CAV 265 CT	110	220	0.7 - 1500	9530	2350	1340	670	335
CAH / CAV 325 CT	140	230	1 - 1200	12800	3180	1660	830	415
CAH / CAV 385 CT	165	235	1.2 - 2500	16700	3980	1990	1000	495
CAR 110 C/K/D T	105	210	0.1 - 300	1090	425	335	260	185
CAR 140 C/K/D T	135	210	0.25 - 600	2500	870	650	485	335
CAR 155 C/K/D T	150	215	0.3 - 800	3750	1190	840	610	420
CAR 200 C/K/D T	190	220	0.5 - 1200	7420	1940	1240	850	560
CAR 230 C/K/D T	210	225	0.7 - 1400	10200	2560	1600	1060	630
CAR 290 C/K/D T	265	235	1.0 - 2000	13800	3490	2150	1430	780
CAR 350 C/K/D T	310	250	1.2 - 2500	18100	4500	2760	1810	930

Pulse ratings for short pulses depend on the ohm value. Resistors with lower resistance value have more wire than resistors with higher resistance values. The ratings in this table refer to resistors of about 40R.

Table C ↓

General specifications		
De-rating cable version		Linear: 40°C = Pn to 70°C = 0,85*Pn
De-rating thermal switch version		Linear: 40°C = Pn to 70°C = 0,80*Pn
De-rating vertical mounting		no de-rating
Mounting instructions		It is recommended to keep a distance of 200mm to the nearest object to prevent heating of a neighbour component. If two or more brake resistors are mounted next to each other the distance between these should be 400mm. If this is less then the nominal power needs to be derated.
Cooling		The nominal power of the resistors refers to cooling conditions with Free Natural Air Cooling.
Temperature Coefficient:		< ± 100 ppm
Dielectric strength	cable version	3500 VAC @ 1 minute
	conn. Box	2500 VAC @ 1 minute
Insulation Resistance:		> 20 MΩ / profile
Vibration		Acc. To EN 60068-2-6
	1 - 13 Hz	± 1mm
	13 - 100 Hz	@ ± 0,7G
Corrosive resistance		Acc. EN 60721-2-1: C2 medium
Resistor tolerance		± 10%
Working voltage	standard	UL: 600VAC, IEC: 690VAC / 1100VDC
	on request	UL: 1000VAC, IEC: 1000VAC / 1400VDC
Time constant for heating up resistor		1000s
Thermal switch (optional)		130 / 160 / 180 / 200 °C, 2A, 250 VAC NC
Minimum measuring voltage		2V
Minimum measuring current		10mA
Insulation resistance		> 20MΩ
Rated current / voltage		2,5A @ 250 VAC cos φ=1
Dielectric voltage		2500VAC
Temperature requirements on cables	IP 21	80°C
	IP 65	90°C
Environmental:		- 40°C - 70°C



CAH/CAV cable connection

Type	L ± 2 ±2mm	L1 ± 2 ±2mm	Weight g
CAH / CAV 120 C	120	102	160
CAH / CAV 150 C	150	132	185
CAH / CAV 165 C	165	147	220
CAH / CAV 210 C	210	192	315
CAH / CAV 240 C	240	222	370
CAH / CAV 300 C	300	282	460
CAH / CAV 360 C	360	342	550
with thermal switch (T)			
CAH / CAV 145 CT	145	127	130
CAH / CAV 175 CT	175	157	160
CAH / CAV 190 CT	190	172	190
CAH / CAV 235 CT	235	217	280
CAH / CAV 265 CT	265	247	335
CAH / CAV 325 CT	325	307	425
CAH / CAV 385 CT	385	367	515

CAR cable connection

Type	L ±2mm	L1 ±2mm	Weight g
CAR 85 C	85	115	200
CAR 115 C	115	145	280
CAR 130 C	130	160	300
CAR 175 C	175	205	380
CAR 205 C	205	235	530
CAR 265 C	265	295	600
CAR 325 C	325	355	740
with thermal switch (T)			
CAR 110 CT	110	140	155
CAR 140 CT	140	170	230
CAR 155 CT	155	185	250
CAR 200 CT	200	230	335
CAR 230 CT	230	260	470
CAR 290 CT	290	320	550
CAR 350 CT	350	380	685

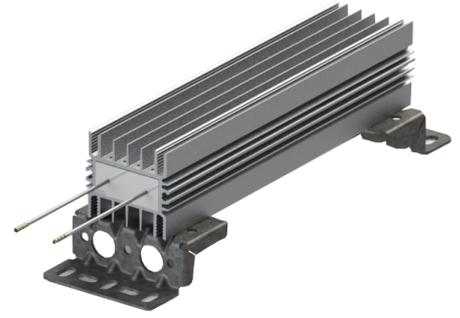
CAR Box type connection

Type	L ± 2 ±2mm	L1 ± 2 ±2mm	Weight g
with connection box			
CAR 115 K/-D	115	85	450/650
CAR 130 K/-D	130	100	470/700
CAR 175 K/-D	175	145	550/750
CAR 205 K/-D	205	175	700/900
CAR 265 K/-D	265	235	800/950
CAR 325 K/-D	325	195	900/1100
with connection box and thermal switch			
CAR 140 K / -DT	140	110	510/720
CAR 155 K / -DT	155	125	540/760
CAR 200 K / -DT	200	170	610/810
CAR 230 K / -DT	230	200	760/960
CAR 290 K / -DT	290	260	860/1010
CAR 350 K / -DT	350	320	970/1160

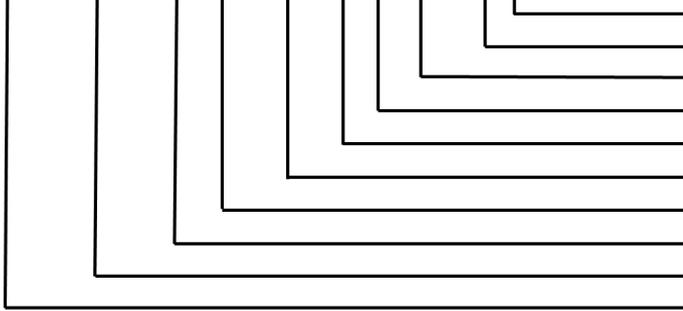
Main features for Alpha resistors:

- Compact
- Cool surface
- High pulse load capability
- High vibration capability
- No live parts outside
- High IP class
- Fail safe (on request)
- Low noise level

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CAR 400 C(H)(T) 2 8 1 22R



Last digits XXX > 400: Customer specified version, otherwise:

Ohm value (Examples: 2R2 = 2.2 Ω, 22R = 22 Ω, 220R = 220 Ω, 2k2 = 2.2 kΩ)

Number of profiles, only 1 is possible

Thermal switch: 3=80°C; 4=100°C; 5=130°C; 6=160°C; 7=180°C; 8=200°C; 9=PT100

0=cable connection; 2=connection box

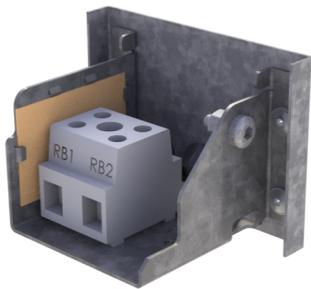
T = Thermal switch (NC)

Wire element (t.b.d. by Danotherm) none or H

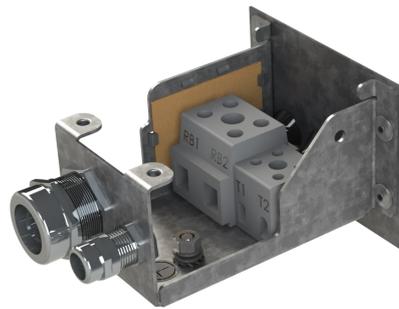
Connector; Box: K = IP00; D = IP20; C = cable version

Length of resistor body housing in mm.

Type; CAH / CAV / CAR



Connection K-box terminal block (0.5 to 10mm²).



Connection D-box with TS Cable gland M25 Clamping range 9-16.6mm terminal block (0.5 to 10mm²). Cable gland TS M12 Clamping range 3-7mm terminal block (0.5-4mm²)

