



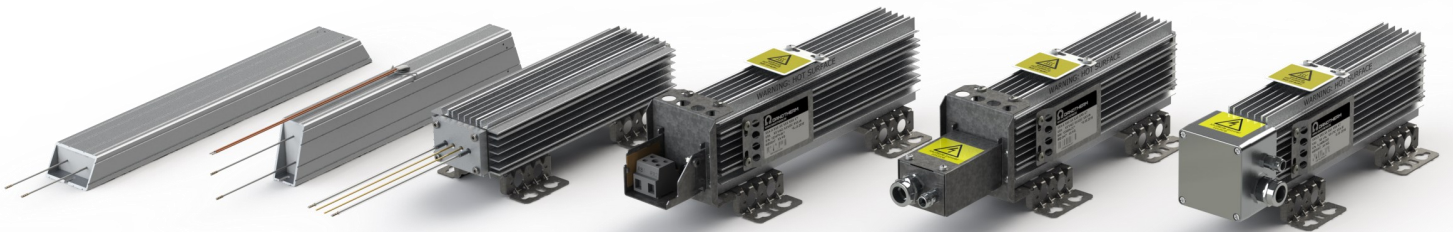
## CBH / CBV / CBR

Compact Alpha Power Resistor

110 - 1.700 W

1.8kW - 30kW @ 5/120s

(9kJ - 150kJ) 5/120s pulse load



The **CBH / CBV** and **CBR-H / CBR-V** 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 **110W** to **1700W** per profile. The pulse load capability is up to 60 times the nominal power for one second every 120 seconds, and 16 times the nominal power for five second every 120 seconds depending on the ohm value and resistor .

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 for any situation.

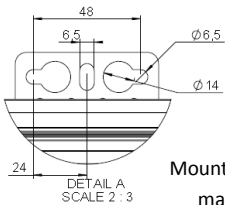
**CBR-H** and **CBR-V** resistors are optionally available with connection box in different design for different cable sizes and from IP20 to IP65, please, require special data sheets.

## 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 resistors and a maximum stability to high load impulses. The aluminium profile with the fixed resistor element is filled with Al<sub>2</sub>O<sub>3</sub> or SiO<sub>2</sub>. 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 10. We can supply cables in specified length and mounted with cable shoes or connectors as required.

## Mounting feet

All resistors have thermal relieve expansion mounting feet. When a resistor is heated up to its maximum temperature the length can increase by some 2 mm. 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 thermal stress relieve

## Accessories

We can customize the resistor concerning; connection style, IP class, horizontal or vertical mounting or connection box. Optional the resistors can be fitted with a thermal switch (TS). If a TS is needed the maximum temperature on the surface at the connection side is 200°C.

## CBH/CBV/CBR cable connections

Table A

Pn [W] @ 40°C According UL508							
CBH/CBV CBR-V/CBR-H	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 [kW]	duty 5 second [kW]	duty 10 second [kW]	duty 40 second [kW]
CBH / CBV 165 C	110	265	0.5 - 1000	5	1.4	0.9	0.3
CBH / CBV 215 C	155	270	0.8 - 1500	9.8	2.5	1.6	0.5
CBH / CBV 265 C	200	270	1.5 - 2000	16.6	4.0	2.4	0.6
CBH / CBV 335 C	270	280	1.8 - 2000	26.6	6.2	3.4	0.9
CBH / CBV 405 C	330	285	2.0 - 2000	34.1	8.5	4.3	1
CBR-V / H 175 C	311	265	0.8 - 1500	10.5	2.7	1.8	0.9
CBR-V / H 225 C	400	270	1.5 - 2000	18.3	4.5	2.8	1.2
CBR-V / H 295 C	525	275	1.8 - 2000	29.7	7.1	4.2	1.8
CBR-V / H 365 C	650	280	2.0 - 2000	38.4	11.3	6.7	2.4
CBR-V / H 426 C	980	285	2.4 - 2000	39.1	12.9	7.9	2.9
CBR-V / H 526 C	1220	295	3.0 - 2000	49.1	16.1	9.9	3.6
CBR-V / H 626 C	1460	305	3.5 - 2000	60.6	19.7	12	4.4
CBR-V / H 726 C	1700	310	4.0 - 2000	73.1	23.4	14.3	5.2

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.

## CBH/CBV/CBR with thermal switch, B / D box (only CBR)

Table B

Pn [W] @ 40°C According UL508							
CBH/CBV CBR-V/CBR-H 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 [kW]	duty 5 second [kW]	duty 10 second [kW]	duty 40 second [kW]
CBH / CBV 190 xT	85	210	0.5 - 1000	5	1.4	0.9	0.3
CBH / CBV 240 xT	120	215	0.8 - 1500	9.8	2.5	1.5	0.4
CBH / CBV 290 xT	150	220	1.5 - 2000	16.6	3.8	1.9	0.5
CBH / CBV 360 xT	200	225	1.8 - 2000	25.6	5.2	2.6	0.7
CBH / CBV 430 xT	250	230	2.0 - 2000	32.5	6.5	3.2	0.8
CBR-V / H 160 xT	280	210	0.5 - 1000	5.4	1.5	1	0.5
CBR-V / H 210 xT	360	210	0.8 - 1500	10.6	2.8	1.8	0.9
CBR-V / H 260 xT	450	225	1.5 - 2000	18.4	4.6	2.8	1.3
CBR-V / H 330 xT	570	230	1.8 - 2000	30	7.1	4.2	1.7
CBR-V / H 400 xT	680	230	2.0 - 2000	38.8	11.4	6.8	2.1
CBR-V / H 460 xT	790	240	2.4 - 2000	39.4	12.9	8	2.4
CBR-V / H 560 xT	960	250	3.0 - 2000	49.4	16.2	10	3.1
CBR-V / H 660 xT	1130	260	3.5 - 2000	60.6	19.7	12.1	3.8
CBR-V / H 760 xT	1290	260	4.0 - 2000	73.8	23.3	14.2	4.3

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.

## CBR K-box

Table C

Pn [W] @ 40°C							
CBH/CBV CBR-V/CBR-H	Pn [W] @ 40°C	max temp. [°C]	R [Ω] min - max	Pulse load [kW] T. amb. = 40°C each 120s			
				duty 1 second [kW]	duty 5 second [kW]	duty 10 second [kW]	duty 40 second [kW]
CBR-V 175 K	235	210	0.8 - 1500	10.5	2.7	1.8	0.8
CBR-V 225 K	305	215	1.5 - 2000	18.3	4.5	2.8	1.1
CBR-V 295 K	400	220	1.8 - 2000	29.7	7.1	4.2	1.5
CBR-V 365 K	495	225	2.0 - 2000	38.4	11.3	6.7	1.9
CBR-V 426 K	750	230	2.4 - 40	39.1	12.9	7.9	2.3
CBR-V 526 K	930	235	3.0 45	49.1	16.1	9.9	2.9
CBR-V 626 K	1100	240	3.5 - 50	60.6	19.7	12	3.6
CBR-V 726 K	1300	250	4.0 - 55	73.1	23.4	14.3	4.3

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.

General specifications		
De-rating cable version		Linear: $40^{\circ}\text{C} = P_n @ 250^{\circ}\text{C}$ to $70^{\circ}\text{C} = 0,85 * P_n @ 250^{\circ}\text{C}$
De-rating TS $200^{\circ}\text{C}$ version		Linear: $40^{\circ}\text{C} = P_n @ 200^{\circ}\text{C}$ to $70^{\circ}\text{C} = 0,80 * P_n @ 200^{\circ}\text{C}$
De-rating TS $180^{\circ}\text{C}$ version		Linear: $40^{\circ}\text{C} = 0,85 * P_n @ 200^{\circ}\text{C}$ to $70^{\circ}\text{C} = 0,75 * P_n @ 200^{\circ}\text{C}$
De-power rating vertical mounting		no de-rating
De-power rating horizontal mounting		$0,8 * P_n$
DE-rating at high altitudes	1000 m	no de-rating
	1500 m	$0,94 * P_n$
	3000 m	$0,82 * P_n$
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:		$< \pm 100 \text{ ppm}$
Dielectric strength		3500 VAC @ 1 minute
Isolation Resistance:		$> 20 \text{ M}\Omega / \text{profile}$
Overload:@ 1 sec pulse / 120 sec		$60 \times$ (depending on resistor)
Overload:@ 5 sec pulse / 120 sec		$16 \times$ (depending on resistor)
Vibration		Acc. To EN 60068-2-6
	1 - 13 Hz	$\pm 1 \text{ mm}$
	13 - 100 Hz	@ $\pm 0,7 \text{ G}$
Corrosive resistance		Acc. EN 60721-2-1: C2 medium
Connection recommendations		To minimize EMC interference screened cables are recommended, in particular with any PWM brake pattern.
Resistor tolerance		$\pm 10\%$
Working voltage	cable version	UL: 600VAC, IEC: 690VAC / 1100VDC
	conn. Box	UL: 600VAC, IEC: 690VAC / 1100VDC
	on request	UL: 1000VAC, IEC: 1000VAC / 1400VDC
Time constant for heating up resistor		1000s
Thermal switch (optional)	Thermal switch	130 / 160 / 180 / 200 $^{\circ}\text{C}$ , 2A, 250 VAC NC
Minimum measuring voltage		2V
Minimum measuring current		10mA
Insulation resistance		$> 20 \text{ M}\Omega$
Rated current / voltage		2,5A @ 250 VAC $\cos \varphi = 1$
Dielectric voltage		2500VAC
Temperature requirements on cables	IP 21	$80^{\circ}\text{C}$
	IP 65	$90^{\circ}\text{C}$
Environmental:		$- 40^{\circ}\text{C} - 70^{\circ}\text{C}$

Table D



CBR-V 160 BT 281  
Pnom. = 360W, IP 65  
Connection terminal box

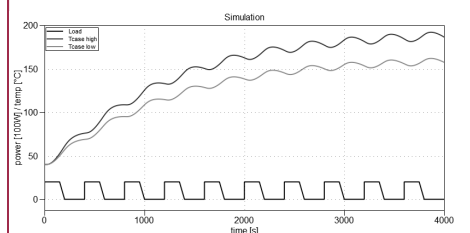
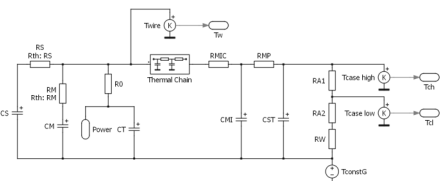
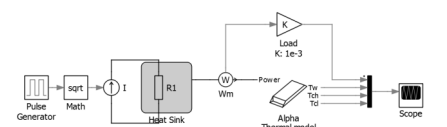
## Applications

CBH/CBV/CBR 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.

In the pulse load tables A through C you find an example of a 40R resistor with various duty times and a cycle time of 120 seconds. The ambient temperature is taken as  $40^{\circ}\text{C}$ . Maximum temperature at the cable side is  $250^{\circ}\text{C}$ , connection box versions and thermal switch versions have a maximum temperature at the connection side of  $200^{\circ}\text{C}$ .

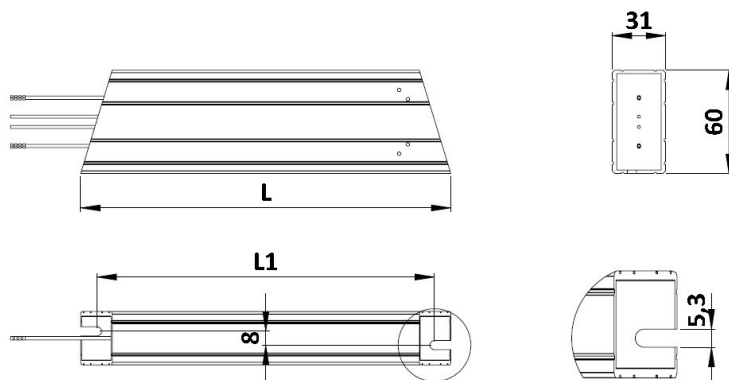
## Thermal simulations

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.



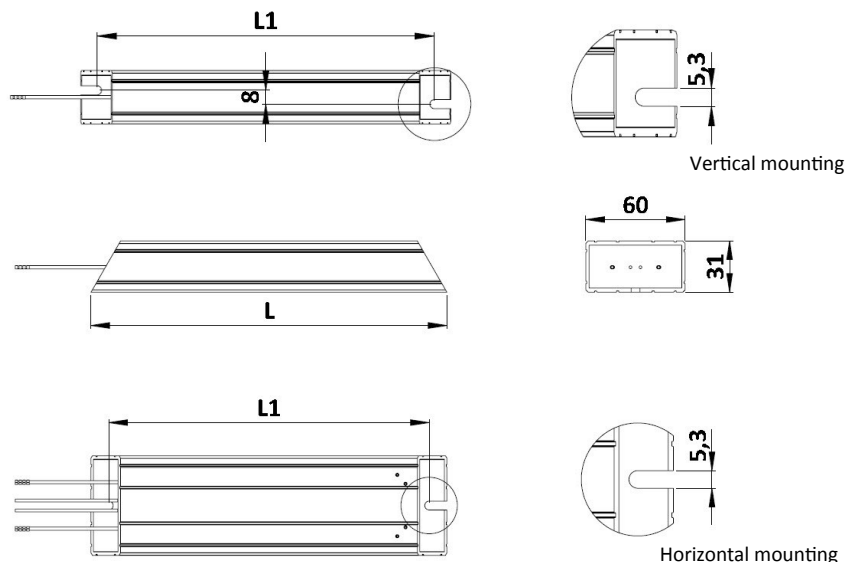
### CBH/CBV cable connections

Type	L ± 2	L1 ± 2	Weight
	±2mm	±2mm	kg
CBH / CBV 165 C 800	165	146	0.39
CBH / CBV 215 C 800	215	196	0.63
CBH / CBV 265 C 800	265	246	0.88
CBH / CBV 335 C 800	335	316	1.2
CBH / CBV 405 C 800	405	386	1.5



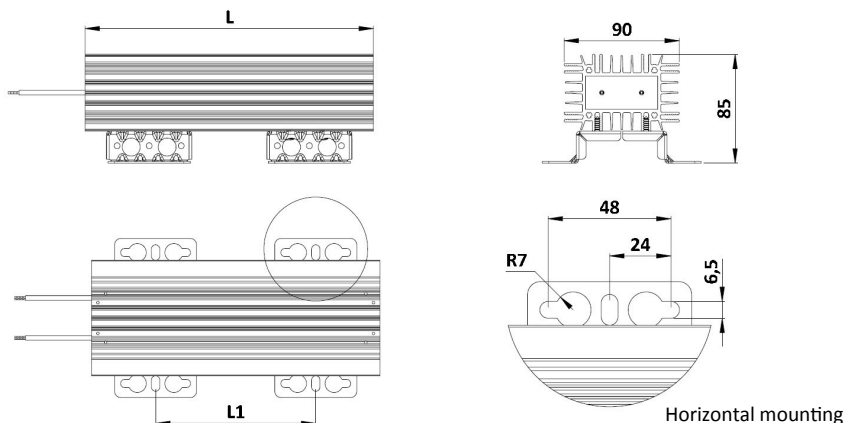
### CBH/CBV cable connections with internal thermal switch

Type	L	L1	Weight
	±2mm	±2mm	kg
CBH/CBV 190 CT 800	190	171	0.5
CBH/CBV 240 CT 800	240	221	0.71
CBH/CBV 290 CT 800	290	271	0.97
CBH/CBV 360 CT 800	360	341	1.3
CBH/CBV 430 CT 800	430	411	1.6



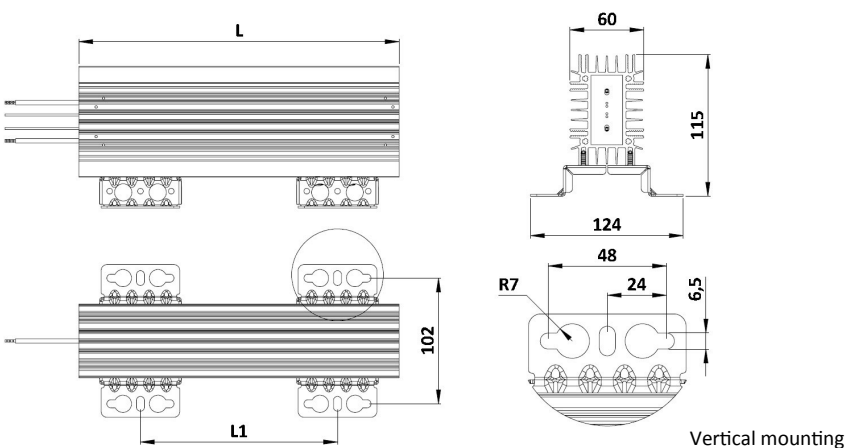
### CBR cable connections

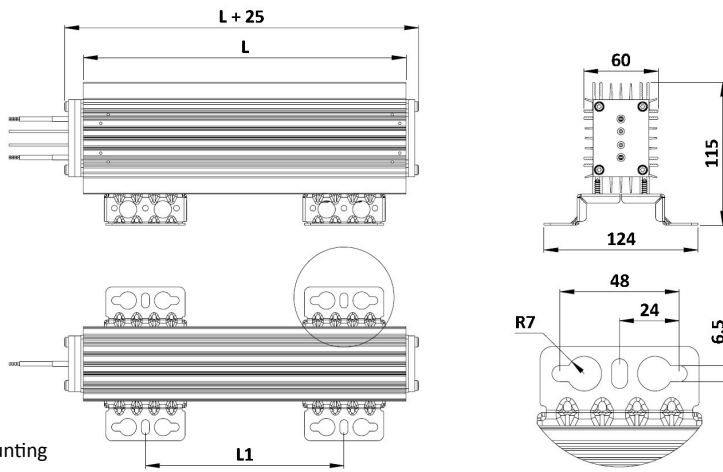
Type	L ± 2	L1 ± 2	Weight
	±2mm	±2mm	kg
CBR-V/CBR-H 175 C 001	175	75	1.5
CBR-V/CBR-H 225 C 001	225	125	1.8
CBR-V/CBR-H 295 C 001	295	195	2.3
CBR-V/CBR-H 365 C 001	365	265	2.8
CBR-V/CBR-H 426 C 001	426	326	3.2
CBR-V/CBR-H 526 C 001	526	426	3.8
CBR-V/CBR-H 626 C 001	626	526	4.5
CBR-V/CBR-H 726 C 001	726	626	5.2



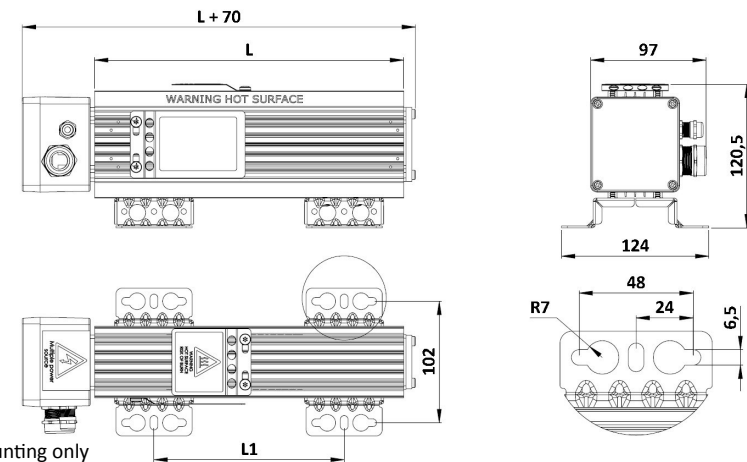
### CBR cable connections with internal thermal switch

Type	L	L1	Weight
	±2mm	±2mm	kg
CBR-H/CBR-V 160 CT 081	160	70	1.5
CBR-H/CBR-V 210 CT 081	210	110	1.8
CBR-H/CBR-V 260 CT 081	260	160	2.1
CBR-H/CBR-V 330 CT 081	330	230	2.6
CBR-H/CBR-V 400 CT 081	400	300	3.1
CBR-H/CBR-V 460 CT 081	460	360	3.5
CBR-H/CBR-V 560 CT 081	560	460	4.1
CBR-H/CBR-V 660 CT 081	660	560	4.8
CBR-H/CBR-V 760 CT 081	760	660	5.5

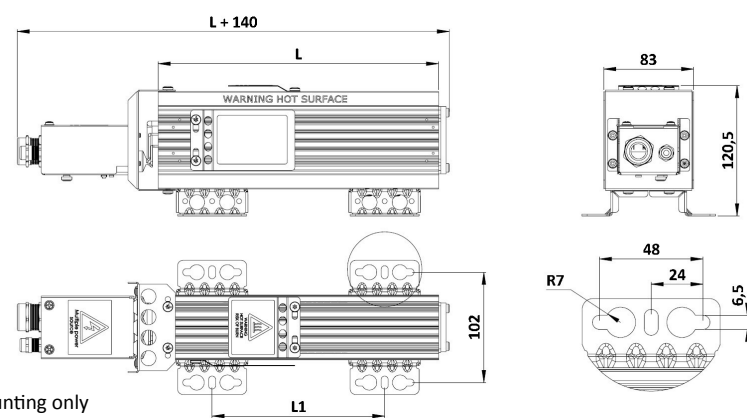




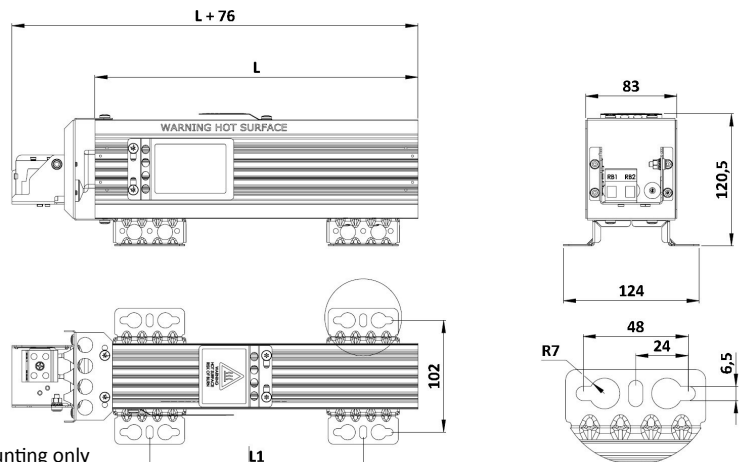
Vertical mounting



Vertical mounting only



Vertical mounting only



Vertical mounting only

**CBR cable connections  
with internal thermal switch (TS)  
With(out) TS (only -W type)**

Type -H / -V W(T)	L	L1	Weight
	±2mm	±2mm	kg
CBR-H/ CBR-V 160 XX 081	160	70	1.5
CBR-H/ CBR-V 210 XX 081	210	110	1.8
CBR-H/ CBR-V 260 XX 081	260	160	2.1
CBR-H/ CBR-V 330 XX 081	330	230	2.6
CBR-H/ CBR-V 400 XX 081	400	300	3.1
CBR-H/ CBR-V 460 XX 081	460	360	3.5
CBR-H/ CBR-V 560 XX 081	560	460	4.1
CBR-H/ CBR-V 660 XX 081	660	560	4.8
CBR-H/ CBR-V 760 XX 081	760	660	5.5

**CBR B-box connection  
with internal thermal switch**

Type	L	L1	Weight
	±2mm	±2mm	kg
CBR-V 160 B T 281	160	70	1.3
CBR-V 210 B T 281	210	110	1.8
CBR-V 260 B T 281	260	160	2.4
CBR-V 330 B T 281	330	230	3.0
CBR-V 400 B T 281	400	300	3.5
CBR-V 460 B T 281	460	360	3.9
CBR-V 560 B T 281	560	460	4.6
CBR-V 660 B T 281	660	560	5.4
CBR-V 760 B T 281	760	660	6.1

**CBR D-box connection  
with internal thermal switch**

Type	L	L1	Weight
	±2mm	±2mm	kg
CBR-V 160 D T 281	160	70	1.3
CBR-V 210 D T 281	210	110	1.8
CBR-V 260 D T 281	260	160	2.4
CBR-V 330 D T 281	330	230	3.0
CBR-V 400 D T 281	400	300	3.5
CBR-V 460 D T 281	460	360	3.9
CBR-V 560 D T 281	560	460	4.6
CBR-V 660 D T 281	660	560	5.4
CBR-V 760 D T 281	760	660	6.1

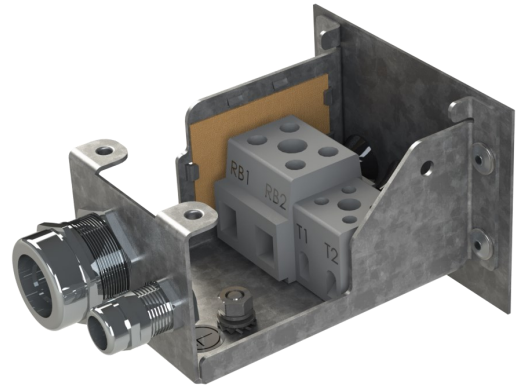
**CBR K-box connection**

Type	L	L1	Weight
	±2mm	±2mm	kg
CBR-V 175 K 201	160	70	1.3
CBR-V 225 K 201	210	110	1.8
CBR-V 295 K 201	260	160	2.4
CBR-V 365 K 201	330	230	3.0
CBR-V 426 K 201	400	300	3.5
CBR-V 526 K 201	460	360	3.9
CBR-V 626 K 201	560	460	4.6
CBR-V 726 K 201	660	560	5.4

**CBR DT** is a range of compact Aluminum Profile Brake Resistors with protection class IP20 (horizontal mounting) / IP21 (vertical mounting with connection at down side). The resistors are supplied with an internal thermal switch (Max. temperature 200°C) and equipped with a connection box, which contains cable glands and cable connection to the resistor and the thermal switch.

**Connection D-box**

The power cables are connected through a M25 cable gland with integrated braid connection. The gland clamping range: 9-16.6mm and the braid minimum diameter: 7.5mm. The power cables (0.5–10mm<sup>2</sup>) are connected to a terminal block with screw connections. The PE is connected directly to the connector box with an M5 screw. The thermal switch cable is connected to a terminal block (0.5-4mm<sup>2</sup>) via a M12 gland with clamping range 3–7mm.

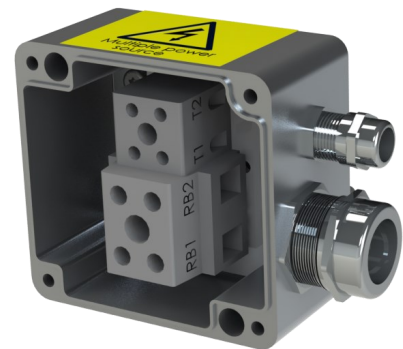


D-box

**CBR BT** is a range of compact Aluminum Profile Brake Resistors with protection class IP65. The resistors are supplied with an internal thermal switch (Max. temperature 200 °C) and equipped with a connection box, which contains cable glands and cable connection to the resistor and the thermal switch.

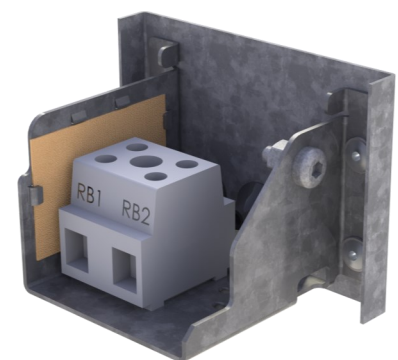
**Connection B-box**

Power cables are connected through a M25 cable gland with integrated screen connection. The range of outer diameter of the power cable is 9.0-16.6mm. The power cables (0.5–10mm<sup>2</sup>) are connected to a terminal block with screw connections. The PE is connected directly to the connector box with a screw. The cable for the thermal switch is connected to a terminal block (0.5-4mm<sup>2</sup>) via a M12 gland with clamping range 3–7mm.



B-box

**CBR K** is a range of compact Aluminum Profile Brake Resistors with protection class IP00. The resistors are fitted with a connection box, which contains a terminal block (0.5 to 10mm<sup>2</sup>). The PE is connected directly to the connector box with an M5 screw.



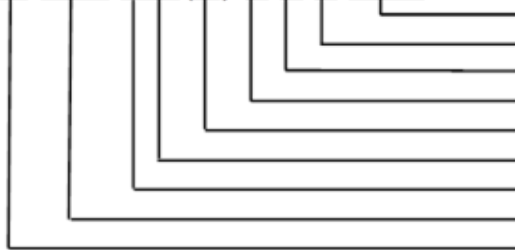
K-box

## Type designation

CBV style resistors are aluminium housed body resistors without cooling fins. CBV-type means mounting on the short side of the housing body (vertical). CBH resistors are mounted on the long side of the housing body (horizontal). CBV and CBH can be fitted with an internal thermal switch. This increases the standard length of the body by 25mm. CBV and CBH have cable connections.

CBR style resistors are aluminium housed body resistors with cooling fins. CBR-V type are mounted on the short side (vertical) where CBR-H type are mounted on the long side. CBR-V and CBR-H can have cable connections. Optional CBR-V can be fitted with a cable box in three different styles; K-box, D-box or B-box.

CBR-H 400 CH(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 1, 2 or 3

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) E = parallel, H = series

Connector; Box: K = IP00; D = IP20; B = IP65, C = cable version

Length of resistor body housing in mm.

H = Horizontal mounting feet, V = Vertical mounting feet

## Pulse load

The ability to withstand pulse loads varies per resistor size and length and diameter of the internal resistor wire. As such, it is impossible to create standard graphs that would apply for most customers applications. In some cases the load is a combination of a square form + triangle like in emergency brake situation.

On request Danotherm performs simulations based on the actual application. For better understanding, Danotherm has already produced tables for some different load forms for resistors with standard wire. Please, note that these are only examples.

Tables A through C show overload power ratings based on a resistor with a 40 ohm value and normal wire thickness. Depending on the application we can change the construction of the resistor to fulfill the demands best without over dimensioning. In the table the absolute peak power of a rectangular shape pulse during 1 to 40 seconds with a repetition time of 120 seconds is shown.

## Ingress Protection

The Ingress Protection rate (IP value) depends on the resistor and on the connection style. Standard the resistors are IP 50. By use of gaskets it can be increased to IP 54 or IP 65. (option only available in B-box). For resistors with flying leads these IP values are possible.

Resistors with connection box D and K have IP 21 when the resistor is mounted vertically and IP 20 when they are mounted horizontally.

IP grades are well defined, also the tests which the grading should withstand. For instance IP 65 means that dust cannot penetrate the box or if there is any dust coming inside it would not influence the electrical properties. It should be able to withstand water jets from any direction with a certain pressure during 3 minutes. IP 65 does not mean it can withstand rain continuously! If the resistor is used outside than it should be protected against rain.

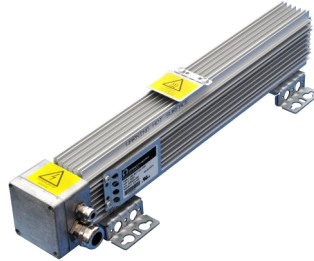
The resistors that are IP 65 rated can be cleaned with a high pressure hose, however, it must be noticed that this can only be done when the resistor has the same temperature as the ambient. If not, the water will cool down the housing body causing an under pressure inside the resistor and water can be sucked inside the resistor.

Danotherm can customize the resistor concerning; connection style, IP class, horizontal or vertical mounting, open terminals or connection box . Optional the resistor can be fitted with a thermal switch (TS). If a TS is needed the maximum temperature at the cable side surface is 200°C.

We have standard solutions for 1 up to 4 profiles combined in one compact configuration. For very high pulse power loads we recommend our CBT, CBS or CMQ type resistors. The IP class ranges from IP 20 to IP 65, depending on the connection type. Connection can be box, DIN-rail terminals (K-box) or box with cable glands (B-box or D-box).

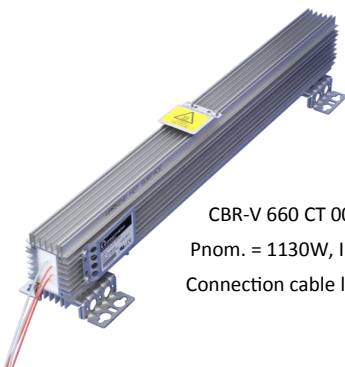
Main features for Alpha resistors:

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

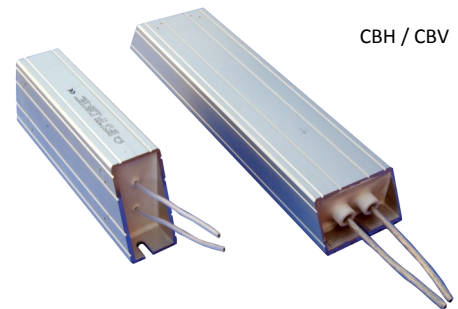


CBR-V 460 BHT 281  
Pnom. = 790W, IP 65  
Connection B-box

**Ω NIBE**



CBR-V 660 CT 001  
Pnom. = 1130W, IP 50  
Connection cable leads



CBH / CBV

