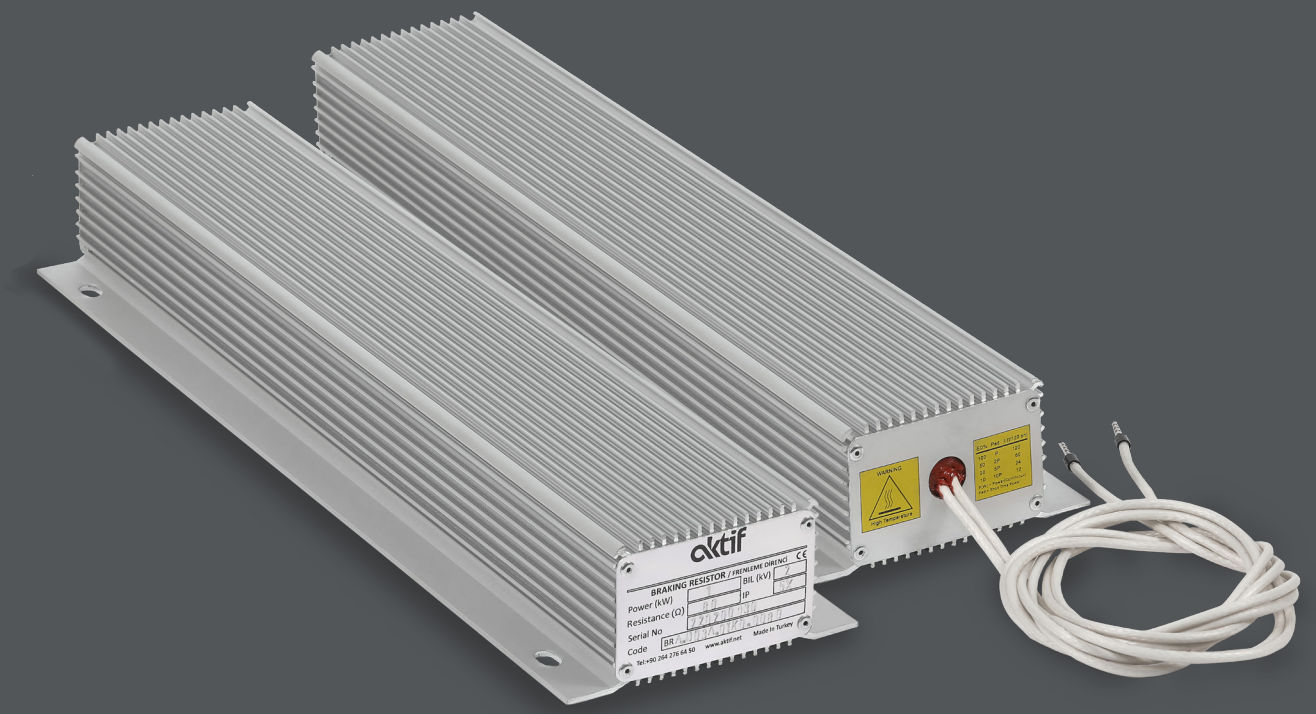
Dynamic Braking Resistors



BR Series

BRA | BRS | BRE | BRG

Switching Life to Infinity

aktif ELEKTROTEKNİK

Dynamic Braking Resistors
BR Series

"Dynamic Braking Resistors" are used in order to ensure fast stopping or decrease the speed of AC and DC electric motors controlled by speed drives (speed control devices).

Due to kinetic energy, an electric motor continues to rotate for a short time even after it has been switched off. As the rotor keeps rotating, the motor starts acting as a generator and feeding the drive. This may not only increase the stopping time of the motor, but also cause a voltage increase on DC drive's terminal leading to an overvoltage fault and consequently a shut down.

In order to avoid such problems, a breaking resistor of a proper resistance value and rated power should be connected to the DC drive's terminal.

Applications

Dynamic Braking Resistors are used in many motor applications that is controlled with driver.

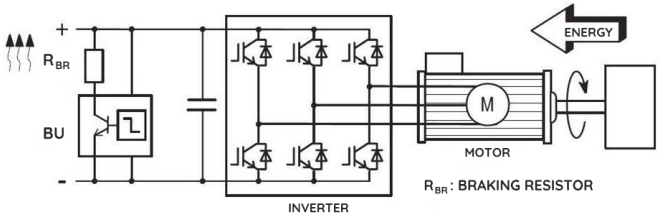
- Vertical and horizontal movements of fixed cranes, portal bridge cranes, overhead travelling cranes and tower cranes
- Travelling facade platforms, facade hoists and personnel elevators, cradle systems and facade cleaning systems
- Lifts and elevators controlled by a driver and operated by a synchronous (geared) and asynchronous (gearless) motors
- DC and AC servo motor drives used in robot control, digital control and position controller automation systems
- Vertical or angular movement systems such as conveyors or loaders
- Mixing, crushing and drum applications at mines
- Reel applications at cable, wire or textile manufacturing plants
- Machinery and presses where heavy loads are moved instantly
- Railway vehicles and hybrid or electrical road vehicles
- Wind turbines

Determination of Power and Resistance values of Dynamic Braking Resistor:

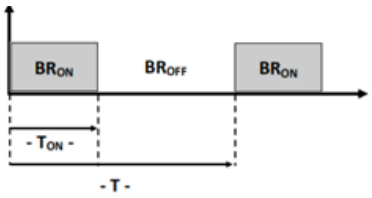
Resistance value of the dynamic braking resistor changes based on the drive. This can be detected by the driver's manufacturer. This value is specified in the drive's user guide.

If this value is given as R_{min} and R_{max}, the resistance should be close to R_{min} and but not lower than R_{min}. Braking time extends as it gets closer to R_{max}.

The resistance power is determined based on the application used by the motor to which the drive is connected. It can be determined with special engineering calculations or specified by the company based on our experience on frequently used applications. In some cases, the power of resistance can be equal to the motor power, or even up to ten times smaller than it.



Short-time loading principle of our Braking Resistors:

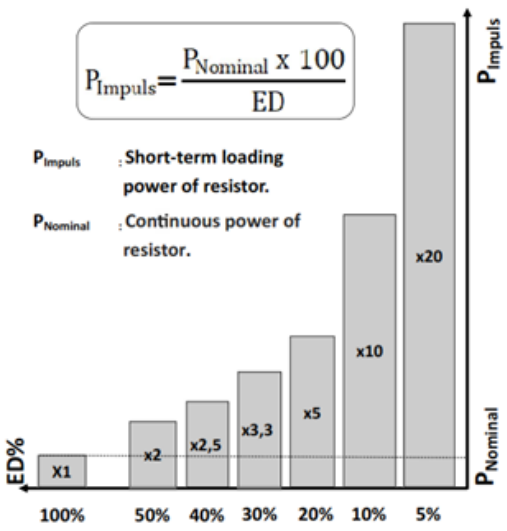


BR_{ON} : Regenerative phase, Braking Resistor is on.
BR_{OFF} : Normal operating phase, Braking Resistor is off.
T_{ON} : Regenerative phase time (If it is more than 60 seconds, it is accepted continuously)
T : Cycle time (If it is more than 120 seconds, it is accepted continuously)
ED% : Duty Cycle.

$$ED\% = \frac{T_{ON}}{T} \times 100$$

$$P_{Impuls} = \frac{P_{Nominal} \times 100}{ED}$$

P_{Impuls} : Short-term loading power of resistor.
$P_{Nominal}$: Continuous power of resistor.



Aluminium Braking Resistors
BRA Series

The resistor made of stainless steel wire is placed in an aluminum case with a larger surface which allows good heat dissipation. The space between the resistor and the case is filled with a material which have high thermal conductivity and electrical insulation. Resistors manufactured using this technology can be used as braking resistors or capacitor discharge resistors, constant load tester, wind power plants, hybrid vehicles and other industrial applications.

As standard aluminum resistors are manufactured with 1 meter length fiber glass braided silicone cable, suitable to rated current and connections resistant to high temperature. They can be manufactured with connectors or terminals on request.

Technical Specifications

- Maximum operating voltage : 1000 V
- Resistance tolerance @ 20°C: ± 5%
- Protection class : IP5X (Indoor only)
- Insulation : 2 kV, 50/60Hz, 1 min

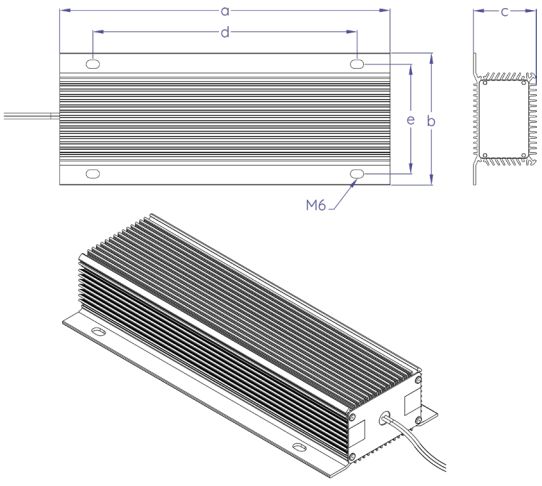
Aluminium Resistors

Advantages

- Compact sizing, option to use without a cabinet, elegant design
- High protection degree against to humidity, dust, solvents and water splash
- Excellent mechanical impact and vibration withstand
- Efficient design to ensure long life time with an internal structure for high heat transmission and external structure facilitating heat transmission

A series for Indoor use

Type	Power Limit		Dimensions				
	kW	kJ	a [mm]	b [mm]	c [mm]	d [mm]	e [mm]
BRA-D01a	0,25	30	150	100	47,5	100	83
BRA-D02a	0,60	72	250	100	47,5	200	83
BRA-D03a	1,00	120	350	100	47,5	300	83
BRA-D04a	1,50	180	250	120	80	200	103
BRA-D06a	2,00	240	350	120	80	300	103
BRA-D08a	3,00	360	250	200	100	200	182,8
BRA-D12a	5,00	600	350	200	100	300	182,8
BRA-D16a	7,00	840	450	200	100	400	182,8
BRA-D16b	7,00	840	450	200	100	400	182,8
BRA-D20a	10,00	1200	550	200	100	500	182,8
BRA-D20b	10,00	1200	550	200	100	500	182,8
BRA-D24a	12,00	1440	650	200	100	600	182,8
BRA-D24b	12,00	1400	650	200	100	600	182,8



Options
Thermal switch (with 1m cable)
Thermal switch (with 2m cable)
Thermal switch (with 3m cable)

Frame Braking Resistors
BRS, BRE, BRG Series

As the name states, Frame Resistors are resistors mounted inside an enclosure where resistor elements are positioned in open space environment. It is possible to connect resistors in serial or parallel according to the requirements. Besides the connection type wire cross-section or grid size are calculated by an engineering software to perfectly fit the application.

Frame resistors types are defined according to the type of resistor design used in the enclosure. Different series are defined as:

Resistor Type	Our Indication
Spring Wound Resistor	BRS Series
Edge Wound Resistor	BRE Series
Grid Resistor	BRG Series

By the design of the enclosure here it means the Frame Resistors can be manufactured to be used in Outdoor applications as well as Indoor applications when the frame is manufactured accordingly.

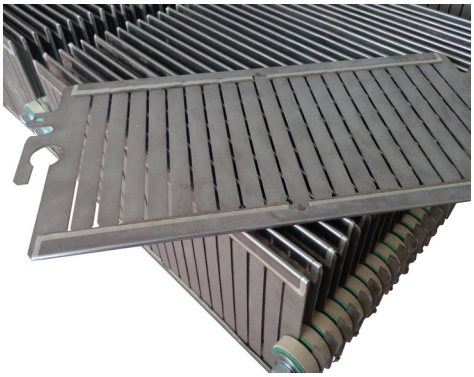
When galvanized steel is used at Indoor use frame resistors, stainless steel is used at Outdoor use for higher durability and life-time instead of painted frames which causes corrosion thus low quality and short-life time.

All S, E and G series frame resistors can be manufactured either as Indoor or Outdoor type. As stated in the type designation at page 8, the indicator for Outdoor/Indoor selection is the third letter of the product code. “D” states Indoor type and “H” states Outdoor type.

Application	Our Indication
Indoor	D
Outdoor	H

Spring Wound Resistor Element

Edge Wound Resistor Element



Grid Resistor Element

Frame Braking Resistors
BRS Series

Spring Wound Resistors

Spring wound (wire wound) resistor elements are used inside S series frame resistors. This type is perfectly suitable for short-time overloads due to its spiral form. Heated wire absorbs any expansion thanks to spiral form and gets back to its colder form. With this feature, the spring resistor ensures safety and a long operating life for especially the braking resistors.

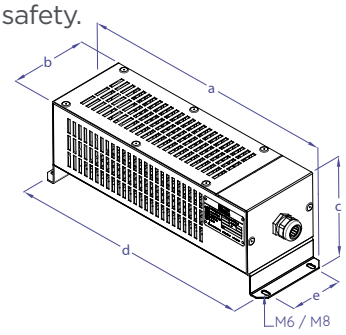
Spring Wound Resistor Element

Technical Specifications

- Maximum operating voltage : 1000 V
- Resistance tolerance @ 20°C: ± 5%
- Protection class (Indoor) : IP20
  (Outdoor) : IP23
- Insulation : 3 kV, 50/60Hz, 1 min
- Frame Material (Indoor) : Galvanized steel
  (Outdoor) : Stainless steel

Advantages

- To ensure protection degree from all direction, the bottom part of the frame is also closed and ventilated.
- For İndoor model (BRS-D), all connections are made with electric terminal. All terminals are inside a junction box with an easy-to-remove cover.
- For outdoor model (BRS-H), all connections made with electric terminal. All terminals are inside an aluminum (IP65) junction box with an easy-to-remove cover.
- Cable entries are with a waterproof brass gland.
- Resistors are connected to the connector with a thick copper wire covered by a silicon tube or silicon glass fiber cables resistant to heat.
- All connection elements are manufactured of non-corrosive material.
- Our frames are designed with special connector-junction box system. Our frames have a unique quality both visually elegant design and with friendly usage and safety.



Spring Wound Resistors

S series for Indoor use

Type	Power Limit		Dimensions				
	kW	kJ	a [mm]	b [mm]	c [mm]	d [mm]	e [mm]
BRS-D01a	1,50	180	362	110	120	345	75
BRS-D01b	2,00	240	452	110	120	435	75
BRS-D02a	3,00	360	362	190	120	345	155
BRS-D02b	4,00	480	452	190	120	435	155
BRS-D04a	6,00	720	362	190	210	345	155
BRS-D04b	8,00	960	452	190	210	435	155
BRS-D06b	12,00	1440	452	290	210	435	255
BRS-D09b	16,00	1920	550	550	500	485	390
BRS-D12b	25,00	3000	550	550	500	485	390
BRS-D16b	30,00	3600	550	550	600	485	390
BRS-D20b	35,00	4200	550	550	700	485	390
BRS-D24b	40,00	4800	550	550	800	485	390

S series for Outdoor use

Type	Power Limit		Dimensions				
	kW	kJ	a [mm]	b [mm]	c [mm]	d [mm]	e [mm]
BRS-H01a	1,50	180	362	110	140	292	75
BRS-H01b	2,00	240	452	110	140	382	75
BRS-H02a	3,00	360	392	200	140	292	165
BRS-H02b	4,00	480	452	200	140	382	165
BRS-H04a	6,00	720	362	200	230	292	165
BRS-H04b	8,00	960	452	200	230	382	165
BRS-H06b	12,00	1440	452	290	230	382	255
BRS-H09b	16,00	1920	550	550	500	485	390
BRS-H12b	25,00	3000	550	550	500	485	390
BRS-H16b	30,00	3600	550	550	600	485	390
BRS-H20b	35,00	4200	550	550	700	485	390
BRS-H24b	40,00	4800	550	550	800	485	390

Options
1,5 m 2,5 mm^2 LIYCY cable
2 m 2,5 mm^2 LIYCY cable
1,5 m 4 mm^2 LIYCY cable
2 m 4 mm^2 LIYCY cable
1,5 m 6 mm^2 LIYCY cable
2 m 6 mm^2 LIYCY cable
Thermal switch (with terminal connection)

Frame Braking Resistors
BRE Series

Edge Wound Resistors

Edge wound resistors are used for E-series frame resistors. Edge wound resistor type, the resistor element is in the form of stainless steel stripe plate. This stripe plate is wound on an electro-ceramic frame vertically. Large cross-section and the capability of fast cooling offers an optimal solution for high power - low resistance braking resistors.

Edge Wound Resistor Block

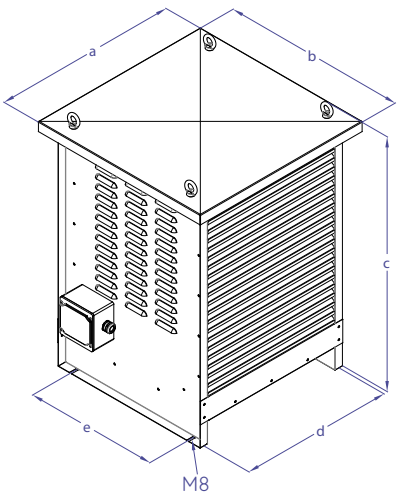
Edge Wound Resistor

Technical Specifications

- Maximum operating voltage : 1000 V
- Resistance tolerance @ 20°C: ± 5%
- Protection class (Indoor) : IP20
  (Outdoor) : IP23
- Insulation : 3 kV, 50/60Hz, 1 min
- Frame material (Indoor) : Galvanized steel
  (Outdoor) : Stainless steel

Advantages

- Compact and elegant frames with a high cooling performance are specially designed for high power loads
- Available for transport with forklifts and lifting lugs at the roof
- All connector elements are manufactured of non-corrosive materials
- All terminals are inside an aluminum (IP65) junction box with an easy-to-remove cover. Cable entries are with a waterproof brass gland
- High-quality resistance materials resistant to corrosion and extreme environmental conditions
- Special structure resistant to fast cooling, overloads and electrical forces



E series for Indoor use

Type	Power Limit		Dimensions				
	kW	kJ	a [mm]	b [mm]	c [mm]	d [mm]	e [mm]
BRE-D12n	25,00	3000	550	550	500	485	390
BRE-D16n	30,00	3600	550	550	600	485	390
BRE-D20n	35,00	4200	550	550	700	485	390
BRE-D24n	40,00	4800	550	550	800	485	390
BRE-D25n	50,00	6000	650	650	850	545	470
BRE-D26n	65,00	7800	650	750	850	545	570
BRE-D27n	80,00	9600	650	850	850	545	670
BRE-D28n	100,00	12000	890	650	850	780	470
BRE-D29n	120,00	14400	890	750	850	780	570
BRE-D30n	130,00	15600	890	850	850	780	670

E series for Outdoor use

Type	Power Limit		Dimensions				
	kW	kJ	a [mm]	b [mm]	c [mm]	d [mm]	e [mm]
BRE-H12n	25,00	3000	550	550	500	485	390
BRE-H16n	30,00	3600	550	550	600	485	390
BRE-H20n	35,00	4200	550	550	700	485	390
BRE-H24n	40,00	4800	550	550	800	485	390
BRE-H25n	50,00	6000	650	650	850	545	470
BRE-H26n	65,00	7800	650	750	850	545	570
BRE-H27n	80,00	9600	650	850	850	545	670
BRE-H28n	100,00	12000	890	650	850	780	470
BRE-H29n	120,00	14400	890	750	850	780	570
BRE-H30n	130,00	15600	890	850	850	780	670

Options
Thermal switch (with terminal connection)

Frame Braking Resistors
BRG Series

Grid Resistors

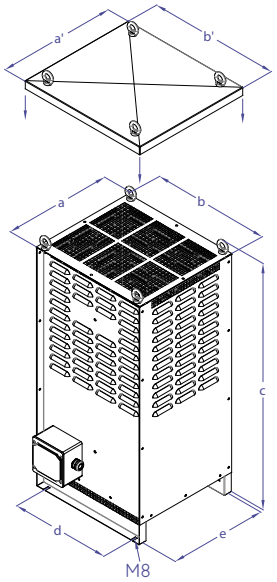
G series braking resistors are manufactured in blocks by connecting in series or in parallel with the desired power and resistance value by the stainless steel grid type resistors specially designed according to the desired current density. They are generally used for high power and low resistance applications.

Technical Specifications

- Maximum operating voltage : 1000 V
- Resistance tolerance @ 20°C: ± 5%
- Protection class (Indoor) : IP20
  (Outdoor) : IP23
- Insulation : 3 kV, 50/60 Hz, 1 min
- Frame material (Indoor) : Galvanized steel
  (Outdoor) : Stainless steel

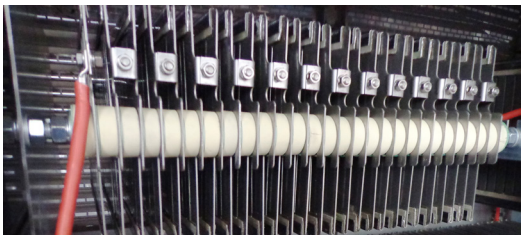
Advantages

- Compact and elegant frames with a high cooling performance are specially designed for high power loads
- Available for transport with forklifts and lifting at the roof
- All connector elements are manufactured of non- corrosive materials.
- All terminals are inside an aluminum (IP65) junction box with an easy-to-remove cover. Cable entries are with a waterproof brass gland.
- High-quality resistance materials resistant to corrosion and extreme environmental conditions.
- Special structure resistant to fast cooling, overloads and electrical forces.



Outdoor use

Indoor use



Grid Resistor Block

Grid Resistors

G series for Indoor use

Type	Power Limit		Dimensions				
	kW	kJ	a [mm]	b [mm]	c [mm]	d [mm]	e [mm]
BRG-D01a	16,00	1920	400	450	900	380	380
BRG-D01b	16,00	1920	400	450	900	380	380
BRG-D02a	25,00	3000	500	450	900	380	480
BRG-D02b	25,00	3000	500	450	900	380	480
BRG-D03a	35,00	4200	650	450	900	380	630
BRG-D03b	35,00	4200	650	450	900	380	630
BRG-D04a	55,00	6600	800	450	900	380	780
BRG-D04b	55,00	6600	800	450	900	380	780
BRG-D05a	75,00	9000	1000	650	1150	625	700
BRG-D05b	75,00	9000	1000	650	1150	625	700
BRG-D06a	85,00	10200	1000	800	1150	775	700
BRG-D06b	85,00	10200	1000	800	1150	775	700
BRG-D07a	110,00	13200	1000	1000	1150	975	700
BRG-D07b	110,00	13200	1000	1000	1150	975	700
BRG-D08a	150,00	18000	1600	650	1150	625	1300
BRG-D08b	150,00	18000	1600	650	1150	625	1300
BRG-D09a	170,00	20400	1600	800	1150	775	1300
BRG-D09b	170,00	20400	1600	800	1150	775	1300
BRG-D10a	220,00	26400	1600	1000	1150	975	1300
BRG-D10b	220,00	26400	1600	1000	1150	975	1300
BRG-D11a	300,00	36000	1400	800	1750	775	1100
BRG-D11b	300,00	36000	1400	800	1750	775	1100
BRG-D12a	330,00	39600	1400	1000	1750	975	1100
BRG-D12b	330,00	39600	1400	1000	1750	975	1100
BRG-D13a	440,00	52800	1800	1000	1750	975	1500
BRG-D13b	440,00	52800	1800	1000	1750	975	1500
BRG-D14a	550,00	66000	2200	1000	1750	975	1900
BRG-D14b	550,00	66000	2200	1000	1750	975	1900
BRG-D15a	660,00	79200	2600	1000	1750	975	2300
BRG-D15b	660,00	79200	2600	1000	1750	975	2300

Frame Braking Resistors
BRG Series

G series for Outdoor use

Type	Power Limit		Dimensions				
	kW	kJ	a [mm]	b [mm]	c [mm]	d [mm]	e [mm]
BRG-H01a	16,00	1920	450	500	900	380	380
BRG-H01b	16,00	1920	450	500	900	380	380
BRG-H02a	25,00	3000	550	500	900	380	480
BRG-H02b	25,00	3000	550	500	900	380	480
BRG-H03a	35,00	4200	700	500	900	380	630
BRG-H03b	35,00	4200	700	500	900	380	630
BRG-H04a	55,00	6600	850	500	900	380	780
BRG-H04b	55,00	6600	850	500	900	380	780
BRG-H05a	75,00	9000	1050	700	1150	625	700
BRG-H05b	75,00	9000	1050	700	1150	625	700
BRG-H06a	85,00	10200	1050	850	1150	775	700
BRG-H06b	85,00	10200	1050	850	1150	775	700
BRG-H07a	110,00	13200	1050	1050	1150	975	700
BRG-H07b	110,00	13200	1050	1050	1150	975	700
BRG-H08a	150,00	18000	1650	700	1150	625	1300
BRG-H08b	150,00	18000	1650	700	1150	625	1300

Type	Power Limit		Dimensions				
	kW	kJ	a [mm]	b [mm]	c [mm]	d [mm]	e [mm]
BRG-H09a	170,00	20400	1650	850	1150	775	1300
BRG-H09b	170,00	20400	1650	850	1150	775	1300
BRG-H10a	220,00	26400	1650	1050	1150	975	1300
BRG-H10b	220,00	26400	1650	1050	1150	975	1300
BRG-H11a	300,00	36000	1450	850	1750	775	1100
BRG-H11b	300,00	36000	1450	850	1750	775	1100
BRG-H12a	330,00	39600	1450	1050	1750	975	1100
BRG-H12b	330,00	39600	1450	1050	1750	975	1100
BRG-H13a	440,00	52800	1850	1050	1750	975	1500
BRG-H13b	440,00	52800	1850	1050	1750	975	1500
BRG-H14a	550,00	66000	2250	1050	1750	975	1900
BRG-H14b	550,00	66000	2250	1050	1750	975	1900
BRG-H15a	660,00	79200	2650	1050	1750	975	2300
BRG-H15b	660,00	79200	2650	1050	1750	975	2300

Options
Thermal switch (with terminal connection)

Dynamic Braking Resistors Coding

B	R	A	-	D	0	1	a	.	2	3	4	5	.	6	7	8	9	
B	R																	**Dynamic Braking Resistor**
		A																**Case Code** A : Aluminum Case - S : Frame Type, Spring wound E : Frame Type, Edge wound - G : Frame Type, Grid type
				D														**Application** D : Indoor - H : Outdoor
					0	1												**Case Code** Look tables for details
							a											**Detail** n : Null (for edge wound resistor only) a : Low current (for aluminum and grid resistors) Short cabin (for spring wound resistors) b : High current (for aluminum and grid resistors) Long cabin (for spring wound resistors)
									2	3	4	5						**Power (Watt / kWatt)**
														6	7	8	9	**Resistance (Ohm / kOhm)**

Some example for power and resistance indication :

- 11r8 : 11,8 W / Ω
- 0085 : 85 W / Ω
- 0185 : 185 W / Ω
- 1285 : 1285 W / Ω
- 1k85 : 1850 W / Ω
- 10k5 : 10,5 kW / kΩ

P.S.: Thermal switch option should be requested additionally as options are not indicated in DBR coding.

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