

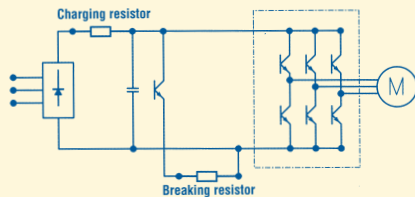
ISA-PLAN[®] -SMD

precision and power resistors

Braking resistors

Basics

When braking a three-phase motor driven with an inverter or servo controller, the flyweight of motor and moved external mass acts as a generator via the motor winding whereas the resulting electric energy in large drives is fed back into the mains. This is not possible for small drives from a few hundred watts to the 10 kW range for economical reasons, which means that the generated energy has to be converted into heat. In this case the „generator“ loads the intermediate circuit up to a maximum voltage (usually 750 V). When the preset limit value is exceeded, the braking resistor is connected directly between the intermediate circuit voltage and ground (see figure). If the transistor is opened only for a set time, this process is repeated more or less rapidly to the end of the braking process – this is called a braking chopper.



During the braking process which is limited to approximately 1–3 seconds, a relatively high braking power of up to 3 kW is generated, which needs to be converted into heat within the resistor and dissipated by its own heat sink.

Because of the limitation of successive braking cycles the average power is usually much lower than the peak braking power.

Product advantages

- Compact size
- High pulse load capacity
- Easy assembly
- Very good thermal conductivity
- Ideal for use in inverters
- UL-listed materials
- Protection class IP 54

Load capacity up to 3 kW

This requirement is met by the design principle of the ISA-PLAN[®] braking resistors. The resistor components are constructed in the proven ISA-PLAN foil technology, i.e. etched from relatively thick rolled MANGANIN[®] foil and electrically insulated with a high thermal conductivity adhesive on a solid 2 mm thick copper base. The high mass of the resistance structure ensures the very high energy load (up to 100 Joule) in the short term range. The sound thermal conductivity of the ceramic-filled adhesive reduces the internal thermal resistance to 0.1 K/Watt and, together with the large Cu mass of the substrate, allows a braking power of up to 3 kW for several seconds, which is extremely high considering the size of the component. Continuous power is mainly determined by the heat transfer to the external heat sink. The values specified in the data sheet are reference values and far higher loads can be accommodated with careful assembly and an effective external heat sink.

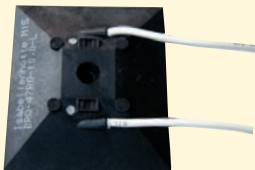


Technical data

Value ranges	1 to 150 Ohm
Pulse load capacity	up to 3 kW for 1 sec
Load capacity	100/200/300 Watt
Insulation voltage	2,500 VAC
Operating voltage	1,000 VAC
Tolerance	10 %
TC	< 50 ppm/K
Continuous current	up to 160 A
Stability	< 1 % after 2000 h

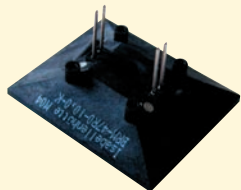
Braking resistors

Installation



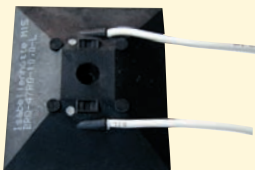
The cable connection **version with core sleeves** is particularly well suited for internal installation even in inaccessible areas. Easy mechanical mounting on the housing or heat sink is possible by the central one-hole connection.

This version can also be used as external resistor when retrofitting an inverter. In this case the Teflon stranded wire with UL approval is recommended allowing an operating voltage of 1,000 VAC.



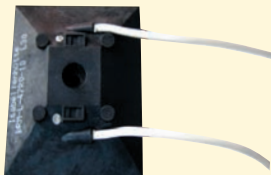
The **version with pin connectors** is compatible with the power module packing „Econopack“. It offers the user a great assembly advantage if – as frequently done today – the power semi-conductors are processed as hybrid in the same modular package. Here the power hybrid and the braking resistor are assembled in parallel with the control unit in one operation. Connection to the heat sink is again by means of central single-hole mounting.

versions



Type	R (Ω)	TC (ppm/K)	P (W)
BRQ Pulse load capacity 3 kW/1sec	1, 2.5, 10, 22, 47, 100, 150	< 50	300

Dimensions 61.5 x 69.5 mm



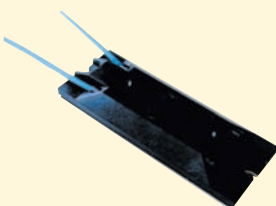
Type	R (Ω)	TC (ppm/K)	P (W)
BRM Pulse load capacity 2 kW/1sec	10, 47, 100	< 50	200

Dimensions 51.5 x 61.5 mm



Type	R (Ω)	TC (ppm/K)	P (W)
BRK Pulse load capacity 1 kW/1sec	10, 33, 68, 100	< 50	100

Dimensions 40 x 51.5 mm



Type	R (Ω)	TC (ppm/K)	P (W)
BEK Pulse load capacity 1 kW/1sec	27	< 50	100

Dimensions 89 x 34 mm

The resistor versions BRQ, BRM and BRK are available with cable or pin connectors. All resistors are approved for protection class IP 54.



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