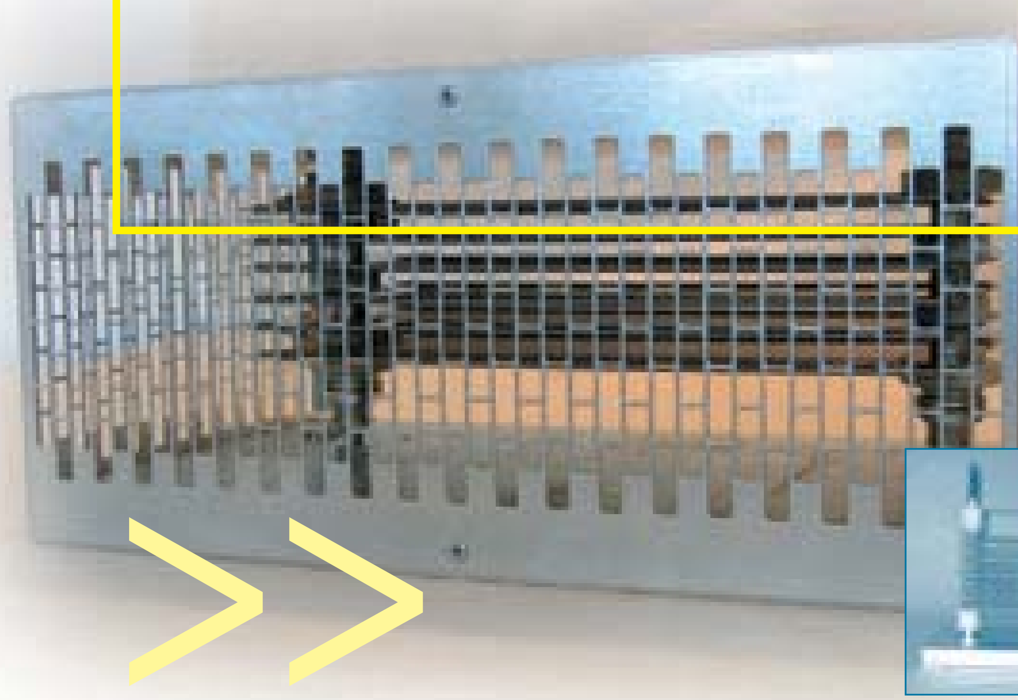
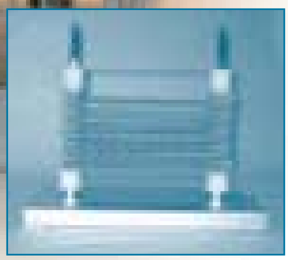
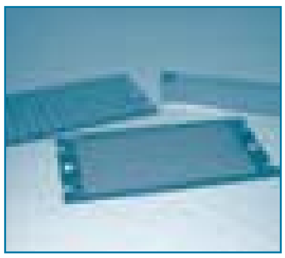
BARTH
GMBH E-MOTOREN & TRAFOS

Braking Resistors with a system

– customized solutions
– consistent casing design
– the complete product range
· wire-wound
· steel grid
· cast iron





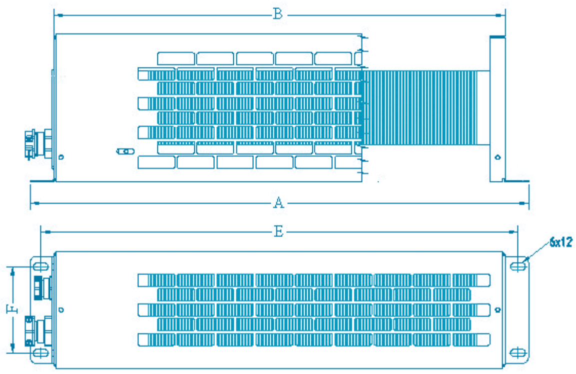


GINO ESE

Classic, wire-wound braking resistor with concrete-coated winding

GINO Series DEZ ...

These tube resistors consist of a ceramic support tube with wire windings made from NiCr 3020 or CuNi44. In the next manufacturing step, the winding is coated with a layer of special concrete to fix the resistor wire. The braking resistors are mounted in a touch guard casing made from galvanized steel sheet and wired to terminals arranged on the inside of the casing. The cable entry point is a metric thread.



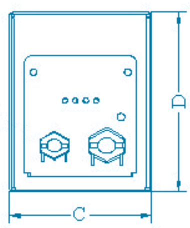
Tube resistor

Technical data

Resistance tolerance: +/- 10 % of the nominal value

Operating voltage: ≤ 1000 V AC or 1200 V DC

Insulating test voltage: 3.5 kV, 50 Hz, 60 s

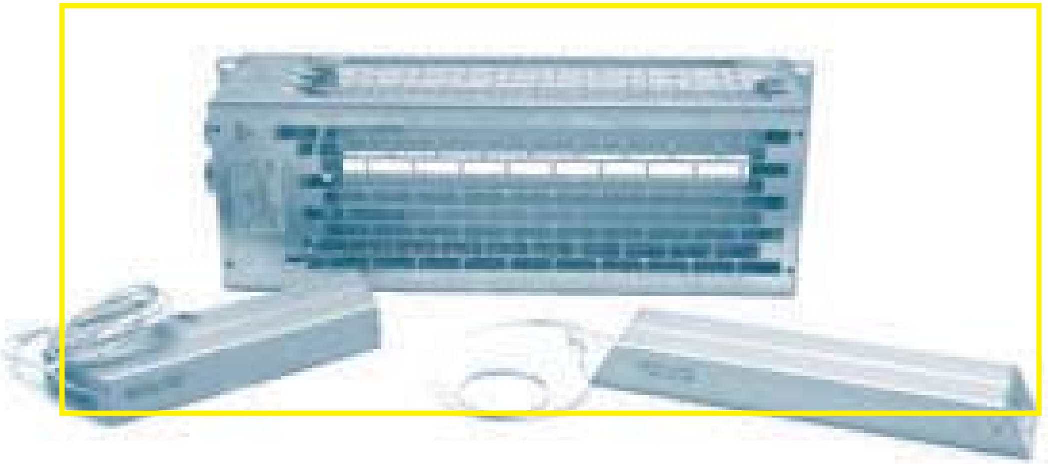


System characteristics

- Nominal power range ≤ 3 kW
- High pulse resistance and overload capacity
- Optional temperature control
- Compact design
- Low inductivity
- Protection IP00 and IP20

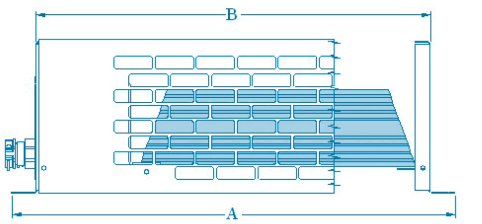
Tube ø (mm)			30	30	30	40	40	60	60	60	60	60
Tube lengths (mm)			120	160	200	300	400	200	300	400	500	600
Dimensions + no. of tubes in a casing	A	not dependent on number	225	265	305	405	505	305	405	505	605	705
	B	not dependent on number	188	228	268	368	468	268	368	468	568	668
	C_1	1	70			70		95				
	C_2	2	140			140		190				
	C_3	3	210			210		285				
	D	not dependent on number	95			95		120				
Fastening dimensions casing + no. of tubes in a casing	E	not dependent on number	208	248	288	388	488	288	388	488	588	688
	F_1	1	50			50		70				
	F_2	2	120			120		165				
	F_3	3	190			190		260				
Metric thread			M16 + M16			M16 + M16		M16 + M20				

Wire-wound, encapsulated braking resistor – The alternative



GINO Series DEG ...

This is a series of encapsulated, wire-wound resistors mounted in aluminum sections and coated with concrete. The degree of protection of these resistor elements is IP65. With this high protection, the braking resistors are also suited for operation in demanding climates with up to 100 % air humidity. In addition, the aluminum sections are mounted in touch guard casings made from galvanized steel sheet and wired to terminals arranged on the inside of the casing. The cable entry point is a metric thread. Due to the terminals, the resulting degree of protection of the braking resistor is IP20. The system is suited for installing up to four encapsulated resistors in one casing.



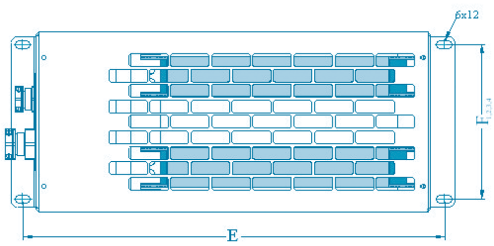
Encapsulated resistor

Technical data

Resistance tolerance: +/- 10 % of the nominal value

Operating voltage: ≤ 1000 V AC or 1200 V DC

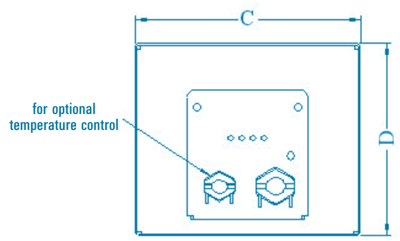
Insulation test voltage: 4 kV, 50 Hz, 60 s



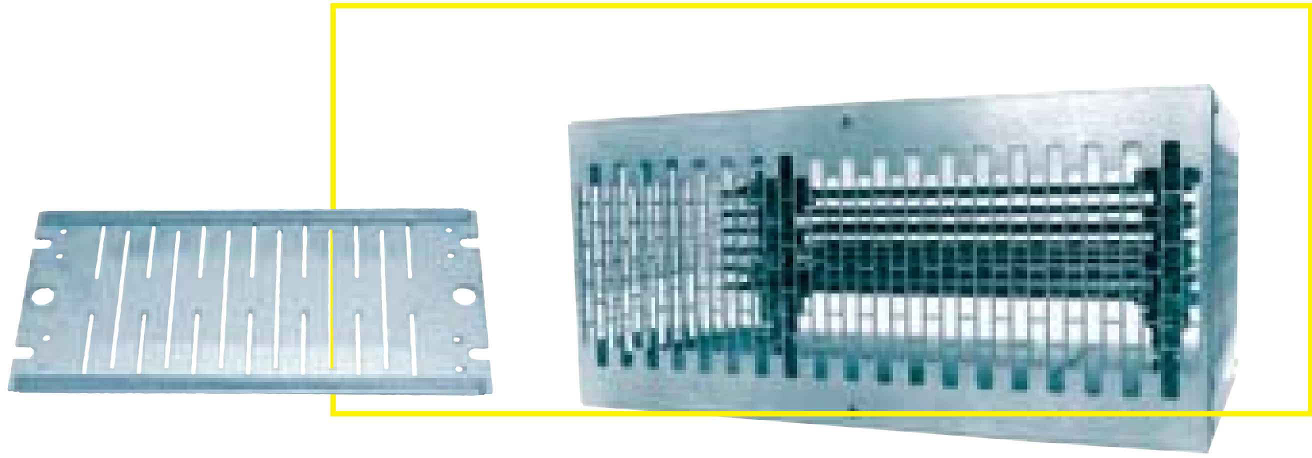
System characteristics

- Resistant to vibration and shock
- High pulse resistance and overload capacity
- Optional temperature control
- Compact, robust design
- Low inductivity
- Nominal power range ≤ 2 kW

VPR			100	200	200	300	300	400	400	500	500
Design			S	L	S	L	S	L	S	L	S
Dimensions + no.of VPRs in a casing	A	~~~	245	295		345		395		445	
	B	~~~	207	257		307		357		407	
	C_1	1	70	95	—	95	—	95	—	95	—
	C_2	2	—	—	140	—	140	—	140	—	140
	C_3	3	—	—	230	—	230	—	230	—	230
	C_4	4	—	—	300	—	300	—	300	—	300
	D	~~~	95	95	120	95	120	95	120	95	120
Fastening dimensions + no. of VPRs in a casing	E	~~~	228	278		328		378		428	
	F_1	1	50	70	—	70	—	70	—	70	—
	F_2	2	—	—	120	—	120	—	120	—	120
	F_3	3	—	—	210	—	210	—	210	—	210
	F_4	4	—	—	280	—	280	—	280	—	280
Metric thread			M16 + M16	M16 + M20	M16 + M20	M16 + M20	M16 + M20	M16 + M20	M16 + M20	M16 + M20	M16 + M20

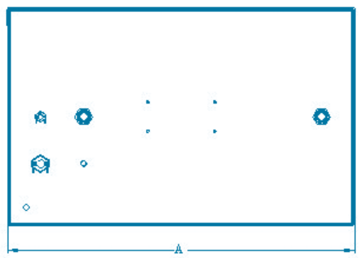


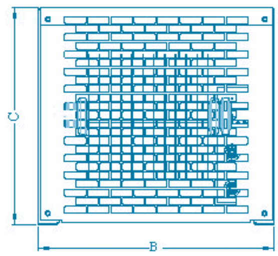
Braking resistor in steel grid design for medium and high load applications



GINO Series BEG ...

The steel grid resistor elements of this series consist of wave-patterned, punched or laser-cut elements made from aluminum-chromium steel X100CrAl13. The elements made from this stainless steel alloy are reinforced on their longitudinal sides and will be combined on insulated support brackets to form resistor banks. These banks are mounted in casings, e.g. made from galvanized steel sheet. The resistors are wired to terminals, the cable entry point is a metrical thread. Given the large surface of the resistor elements and the resulting good heat dissipation, this series is particularly suited for higher loads.





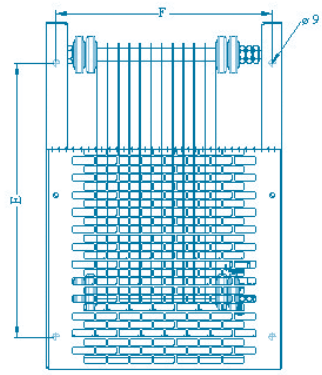
Braking resistor

Technical data

Resistance tolerance: +/- 10 % of the nominal value

Operating voltage: $\leq$ 1000 V AC or 1200 V DC

Insulation test voltage: 4 kV, 50 Hz, 60 s

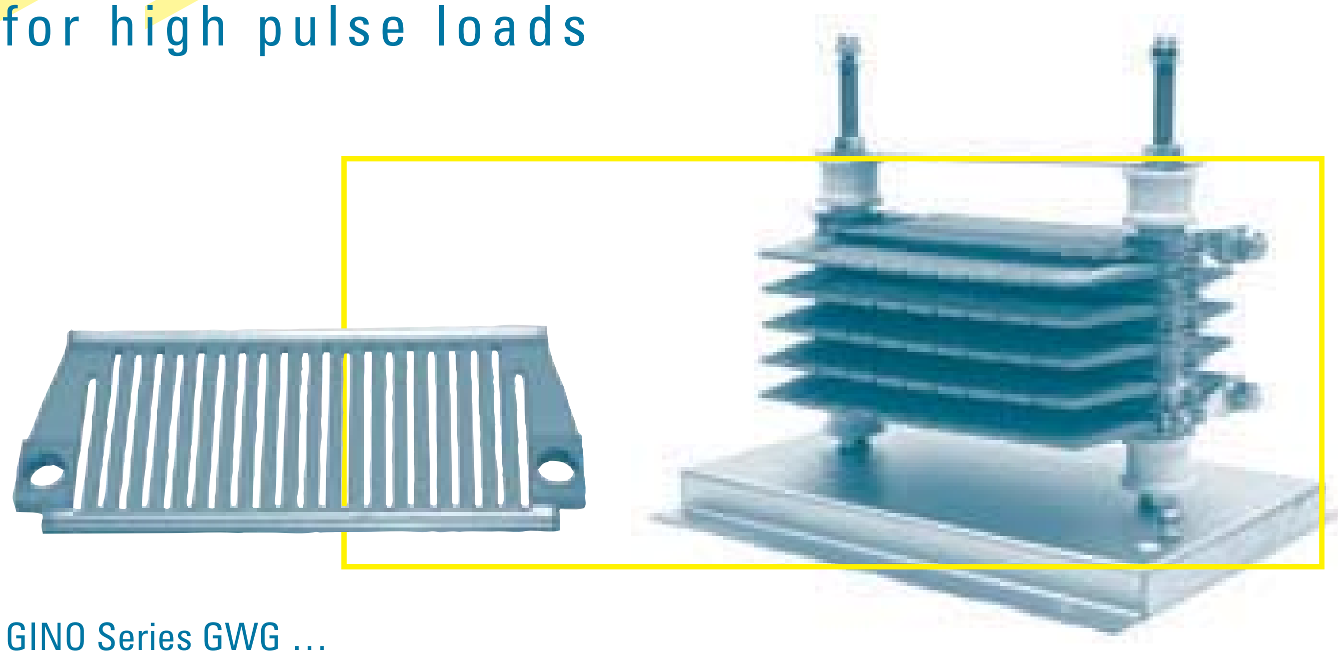


System characteristics

- Resistant to vibration and shocks
- High pulse resistance and overload resistance
- Optional temperature control
- Protection from IP00 to IP23
- Low inductivity
- Nominal power range ≥ 2 kW

Steel grid resistors		B12	B13	B14	B15	B17	B25	B27	B37	B47
Dimensions	A	483	483	483	483	483	483	483	483	483
	B	240	330	430	530	740	530	740	740	740
	C	301	301	301	301	301	601	601	1022	1322
Fastening dimensions	$D_ø$	9	9	9	9	9	9	9	9	9
	E	380	380	380	380	380	380	380	380	380
	F	200	300	400	500	700	500	700	700	700
Ground stud		M8	M6	M6	M6	M8	M8	M8	M8	M12
Metric thread		M12xM20	M16xM20	M20xM25	M16xM25	M20xM25	M20xM40	M20xM40	M20xM40	M20xM40
Mounting		The minimum distance to other bodies shall be 200 mm on all sides that have ventilation slots								

Braking resistor in cast iron design for high pulse loads



GINO Series GWG ...

The typical field of application for cast iron resistors of the GEW series are short, high-energy impulse loads. With their highly active resistance material the cast iron resistor elements are arranged in series on insulated support brackets and mounted in a painted steel sheet casing with cable box. Cast iron resistors are resistant to climatic impact pursuant to DIN 50 010 T1 and suited for indoor and outdoor climates at varying conditions of condensation, without weathering protection and with low pollutant impact. Cast iron resistors in alternative designs such as in the systems by AEG, BBC, Siemens and Wiemann, are suited for a wide range of applications as braking, starting, damping, industrial-type and grounding resistors.

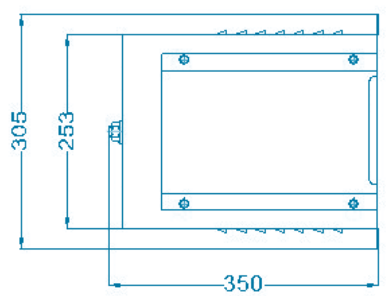
Cast iron resistor element

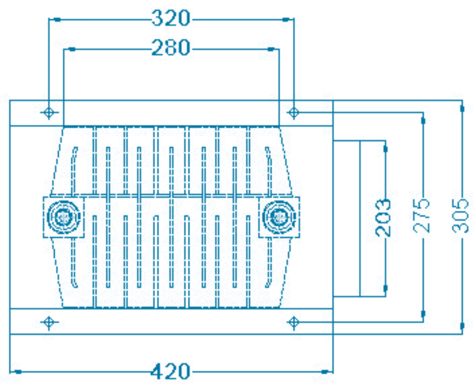
Technical data

Resistance tolerance:	+/- 10 % of the nominal value
Operating voltage:	≤ 1000 V AC or 1200 V DC
Insulation test voltage:	3.5 kV, 50 Hz, 60 s

System characteristics

- Impulse capacity, e.g. 500 kW for t = 2 sec.
- Highest impulse resistance and overload capacity
- Optional temperature control
- Robust and shock-proof design
- Wall mounting possible
- Protection IP00, IP20 and IP23





Braking resistors for frequency converters

General

Braking resistors are used in the d.c. link of the frequency converter. A braking chopper activates the resistor. If the output frequency of the frequency converter drops – be it by a control process, a drop in speed or a braking operation – below the current operating frequency of the motor, the motor takes on the function of a generator. The consequence is a rise in the link voltage. If this voltage exceeds the specific value of the unit in question, the chopper will activate the braking resistor. If the voltage drops to a value just above the grid voltage of the link, the chopper will interrupt the circuit. This process will be repeated until the motor speed once again matches the applied operating frequency.

The braking resistor takes on the energy and converts it into heat.

Braking resistor operating modes

Braking resistors are usually only activated for a short time, save the braking energy and give off the stored heat to the environment during the breaks when they are inactive. This is an intermittent operation with a cyclic duration factor (c.d.f.) indicated in % of the duty cycle time.

The duty cycle time t_{sp} is calculated from the total of the braking time t_a plus resting time t_r. The overload capacity of the resistors is dependent on the thermal time constant and thus on the design, among others.

The resistance value of the braking resistors

In general, the resistance value of a braking resistor is not critical. It may range between the lowest value of the admissible value for the braking chopper and a maximum value where the required braking performance is still achieved. Assuming a standard reserve of 25 % which takes into account the manufacturing tolerances and the resistance change due to heating up as well as the lower mean value of the link voltage as compared with the chopper activating voltage, the maximum value for the braking resistor is calculated as:

$$R_{BR} = \frac{U_Z^2}{P_{BR}} \cdot 0{,}75$$

U_Z indicates the chopper activating voltage and PBR the braking capacity in Watt.

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