



# PRODUCT BROCHURE

*Power resistors and electronic controllers*



INDUSTRY



E-MOBILITY



AUTOMOTIVE

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# FREUDE AM WIDERSTAND

The KRAH Group with its headquarters in Drolshagen, Germany, was founded in 1970. The product range includes passive and electronic components, particularly wire wound resistors, electromechanical resistor components and electronic controllers. As a globally operating group of companies, KRAH serves its customers with high quality products from engineering and production facilities across Europe, Asia and the Americas. In 2023 KRAH products are produced by approximately 2,000 employees.

The solutions of the KRAH Group have proven themselves millions of times in the following markets and fields of application:

## INDUSTRY

automation technology · power engineering · equipment and plant construction · power electronics · mechanical engineering · transport and logistics,

## E-MOBILITY

battery-management · e-drives recuperation · on board charger (OBC) · high voltage coolant heater,

## AUTOMOTIVE

heating / conditioning · engine cooling · ignition systems, control units and auxiliary units.

# INDUSTRY: ENCAPSULATED HIGH POWER RESISTORS

Due to their special design, all our power resistors in aluminium or metal housings with the exception of the WD series are particularly impulse-resistant and offer high dielectric strength. To increase the nominal capacity, optional forced cooling can be carried out or the unit can be directly mounted on cooling plates or cooling elements. The compact design and the geometry of each casing ensure that the resistors are easily fixed and mounted on your application. Complete encapsulation in conjunction with a connection strand guarantees protection against accidental contact with live parts.

**Special features:** high pulse load resistant, high dielectric strength, protection class up to IP65

**Options:** UL approval, intrinsically safe, LabS-free, assembly – also with UL approval, temperature switch, completely assembled modules



**WD**

for mounting on heat sink, IP00 to IP65

Power rating:  
5 ... 300W or 4 ... 75 W without heat sink

Resistance range:  
R01 ... 100K

Tolerance:  
±0,25% ... ±5%

Dimensions: L x W x H  
16,5 x 17 x 9 ... 127 x 73 x 45 mm



**RXLG-S4-F**

space heater

Power rating:  
250W

Resistance range:  
640Ω

Tolerance:  
±5%

Dimensions: L x W x H  
335 x 75 x 58mm



**KRX27-8**

with flat pin plugs

Power rating:  
20 ... 75W

Resistance range:  
R15 ... 51K

Tolerance:  
±1% ... ±10%

Dimensions: L x W x H  
47.6 x 19 x 19 ... 163.5 x 22 x 19 mm



**HPRS**

various types available, also for mounting on heat sink, IP54

Power rating:  
40 ... 210W

Resistance range:  
0R3 ... 30K

Tolerance:  
±5% ... ±10%

Dimensions: L x W x H  
100 x 33 x 13 ... 147 x 55 x 14 mm



**RXLG-Z/UL**

flat casing, IP65

Power rating:  
30 ... 100W

Resistance range:  
20R ... 550R

Tolerance:  
±5% ... ±10%

Dimensions: L x W x H  
80 x 40 x 7 ... 165 x 40 x 7 mm



**RXLG-PTC**

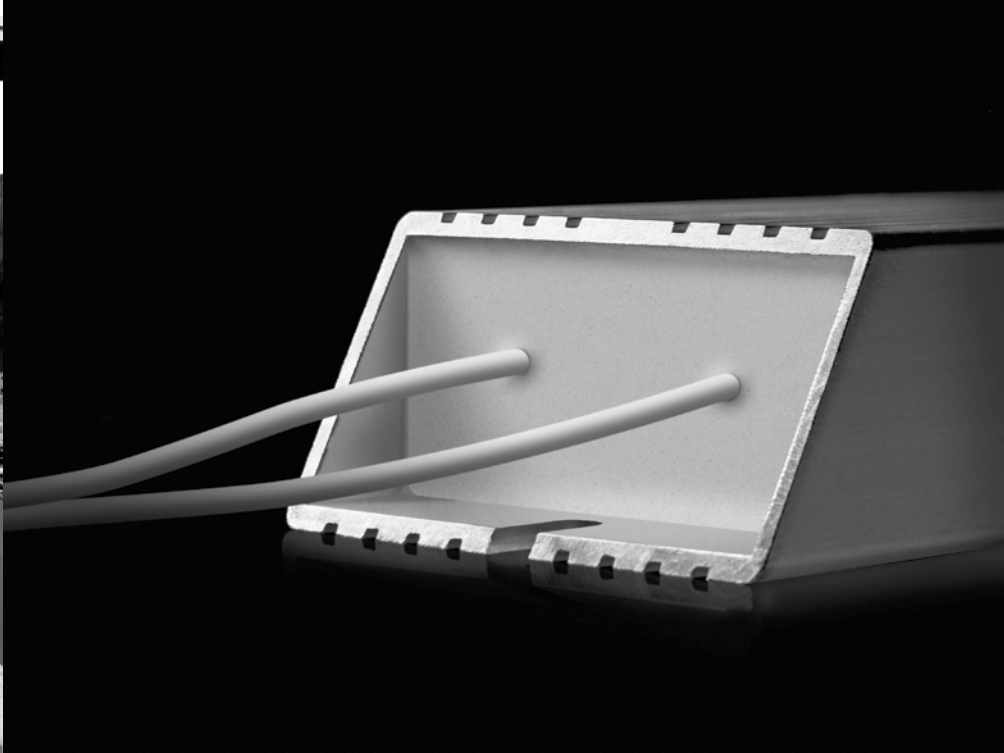
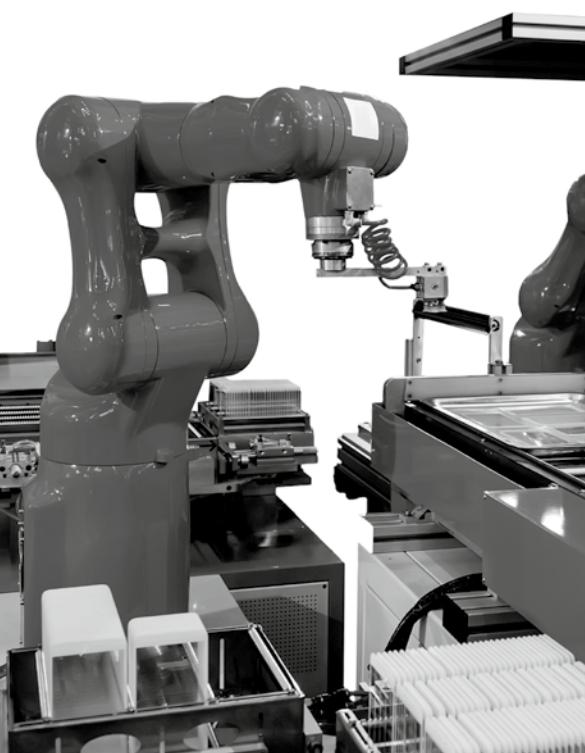
self-protecting, ceramic PTC thermistor with a transition temperature of approximately 140 °C

Power rating:  
35W ... 70W

Resistance range:  
175R ... 1750R

Tolerance:  
±35%

Dimensions: L x W x H  
89 x 34 x 11 ... 124 x 34 x 11 mm



**Field of application:** Braking resistor in multi-axis robots



**HPRF / HPRF...C**

flat casing, pulse resistant, IP65  
optional with stranded wire or shielded  
connection cable

Power rating:  
**100...260 W**

Resistance range:  
**1R0...680R**

Tolerance:  
**±1%...±10%**

Dimensions: L x W x H  
**110 x 80 x 15...321 x 80 x 15 mm**



**HPRF G**

pulse resistant, IP65  
especially for rotation and On- / Off-Shore  
applications

Power rating:  
**100W... 200 W**

Resistance range:  
**1R9...200R**

Tolerance:  
**±1%...±10%**

Dimensions: L x W x H  
**110 x 80 x 30 ... 216 x 80 x 30 mm**



**FHPR**

greater surface for increased nominal capacity,  
particularly at forced cooling, IP65

Power rating:  
**on demand**

Resistance range:  
**15R...7K5**

Tolerance:  
**±5%...±10%**

Dimensions: L x W x H  
**90 x 60 x 90...375 x 60 x 90 mm**



**VHPR / VHPR...C**

particularly pulse resistant, IP65  
optional with stranded or shielded  
connecting cables

Power rating:  
**60...560 W**

Resistance range:  
**R10...7K5**

Tolerance:  
**±1%...±10%**

Dimensions: L x W x H  
**102 x 40 x 21...407 x 60 x 31 mm**



**VHPR G**

particularly pulse resistant, IP65  
especially for rotation and On- / Off-Shore  
applications

Power rating:  
**200...560 W**

Resistance range:  
**R15...7K5**

Tolerance:  
**±1%...±10%**

Dimensions: L x W x H  
**167 x 60 x 31...337 x 60 x 31 mm**



**HPR**

pulse resistant, IP50

Power rating:  
**750...2000 W**

Resistance range:  
**R90...330R**

Tolerance:  
**±5%...±10%**

Dimensions: L x W x H  
**340 x 50 x 100...800 x 50 x 100 mm**

# INDUSTRY: HOUSING UNITS

Housing units from the HWG mounting system series are an ideal choice when multiple high power resistors are interconnected and/or if protection against accidental contact with hot surfaces is required. VHPR high performance resistors are used for such applications, as are tube resistors and tubular heating systems. Various connection technologies can be selected for the electrical connections, such as terminal blocks, connection housings or connection cables.

The particularly powerful steel grid resistors of the KPG series can be cascaded almost infinitely and combined with different housing designs in order to fit into the customer's application as an optimal solution. Versions in galvanized steel or stainless steel for particularly harsh environmental conditions are available.

**Special features and options: nominal capacity per unit on request, protection against accidental contact with hot surfaces, protection class up to IP65 in the connection area, variable connection technologies via strands connecting cables or blocks**



## KPG

Steel grid resistors as single element or in cascaded design, various housing designs and material versions

Power rating:  
**500 W** per element

Resistance range:  
**R01 ... R68**

Tolerance:  
**±10%**

Dimensions: L x W x H  
**405 x 210 mm pro Element**





**Field of application:** elevator technology



### HWG / ZS

**cemented tube resistors in housing, touch-protected**

Power rating:  
**100 ... 12000W higher power ratings on demand**

Resistance range:  
**on demand**

Tolerance:  
**±5% ... ±10%**

Dimensions:  
**on demand**



### HWG / RXDG

**tubular heating systems, touch-protected, IP20, at the electrical connection area up to IP54**

Power rating:  
**2 ... 10kW**

Resistance range:  
**on demand**

Tolerance:  
**±5% ... ±10%**

Dimensions: L x W x H  
**688 x 330 x 295 mm**



### HWG S

**encapsulated power resistors in customized housings. Design is determined by customer demands.**



### HWG / VHPR 100 - 500

**encapsulated resistors in a housing, touch-protected**

Power rating:  
**100 ... 500W**

Resistance range:  
**R10 ... 7K5**

Tolerance:  
**±5% ... ±10%**

Dimensions: L x W x H  
**245 x 70 x 95 ... 445 x 95 x 95 mm**



### HWG / VHPR 400 - 2000

**encapsulated resistors in a housing, touch-protected**

Power rating:  
**400 ... 2000W**

Resistance range:  
**R08 ... 30K**

Tolerance:  
**±5% ... ±10%**

Dimensions: L x W x H  
**295 x 140 x 120 ... 445 x 300 x 120 mm**

# INDUSTRY: CEMENT COATED RESISTORS

Cemented power resistors are provided with a layer of cement which provides mechanical protection and increases the nominal capacity in comparison to unprotected resistors. The curing process achieves an inorganic state, so that the cement is resistant to most solvents, fungal attack and even termites. On request, the resistors can also be supplied with silicone cement, which offers advantages in case of climatic stress (e.g. humidity).

**Special features and options: good mechanical protection in particular with regard to the high ohm models, high thermal shock resistance, low temperature coefficient, optional low induction model available**



BR

with axial wire leads  
Also available with belts or angled connecting wires

Power rating:  
3 ... 18 W

Resistance range:  
R15 ... 110K

Tolerance:  
±1% ... ±10%

Dimensions: L x Ø  
12 x 4 ... 52 x 12 mm



ZDVW / ST

with flat plugs and mounting clips  
with adjustable lugs ZDVW/STRS

Power rating:  
25 ... 75 W

Resistance range:  
1R0 ... 80K

Tolerance:  
±2% ... ±10%

Dimensions: L x W x H  
63 x 13 x 13 ... 100 x 13 x 25 mm



ZK

with end caps

Power rating:  
16 ... 190 W

Resistance range:  
R47 ... 330K

Tolerance:  
±2% ... ±10%

Dimensions: L x Ø  
55 x 13 ... 265 x 24 mm



ZS

with radial tabs  
with adjustable lugs ZS ... V

Power rating:  
6 ... 300 W [5 ... 180 W]

Resistance range:  
R62 ... 820K [R62 ... 120K]

Tolerance:  
±5% ... ±10%

Dimensions: L x Ø  
45 x 9 ... 330 x 36 mm



ZSB

with corrugated band or wire and radial tabs  
with adjustable lugs ZSB ... V

Power rating:  
75 ... 300 W [55 ... 180 W]

Resistance range:  
R10 ... 270K [R10 ... 36K]

Tolerance:  
±5% ... ±10% [±10%]

Dimensions: L x Ø  
100 x 30 ... 333 x 30 mm



ZDSA

with spot-welded radial tabs (and lug)  
with adjustable lugs ZDRS

Power rating:  
6 ... 300 W

Resistance range:  
R62 ... 620K

Tolerance:  
±5% ... ±10%

Dimensions: L x Ø  
45 x 9 ... 330 x 36 mm





**Field of application:** Precharge resistor in traction applications



**ZDFA**

flat oval, with lugs or plug-type connections

Power rating:  
**30... 1300W**

Resistance range:  
**4R7... 82K**

Tolerance:  
**±5%... ±10%**

Dimensions: L x W x H  
**50 x 10.5 x 30... 500 x 22 x 72 mm**



**ZDFI**

flat oval, suitable for screw connection

Power rating:  
**40... 110W**

Resistance range:  
**R022... 100K**

Tolerance:  
**±5%... ±10%**

Dimensions: L x W x H  
**50 x 9 x 27... 250 x 12 x 45 mm**



**ZH/ZP**

flat oval

Power rating:  
**6... 17W**

Resistance range:  
**1R0... 30K**

Tolerance:  
**±5%... ±10%**

Dimensions: L x W x H  
**25 x 8 x 14... 75 x 9 x 17 mm**



**ZDST**

with two or more flat plug-type connections

Power rating:  
**6... 65W**

Resistance range:  
**R39... 160K**

Tolerance:  
**±5%... ±10%**

Dimensions: L x Ø  
**45 x 9... 120 x 21 mm**



**ZDFL**

with two or more lugs

Power rating:  
**6... 65W**

Resistance range:  
**R39... 160K**

Tolerance:  
**±5%... ±10%**

Dimensions: L x Ø  
**45 x 9... 120 x 21 mm**

Data sheets at  
[www.krah-gruppe.de](http://www.krah-gruppe.de)

# INDUSTRY: VITREOUS ENAMELLED RESISTORS

The carrier bodies of these series are made of specially developed fine-ceramic materials. Their particular characteristics are high mechanical resistance over the complete temperature range; good resistance to thermal shock; high dielectric strength; good leakage resistance, also at higher temperatures, and resistance to DC current. The vitreous enamelling process provides the resistor alloy with optimum protection against mechanical and climatic influences.

**Special features and options:** optimum protection against climatic stresses, high thermal shock resistance, DC current-proof (no electrolytical reactions), high dielectric strength, low induction model optionally available



## GLD

with axial wire leads

Power rating:  
9.5 ... 24.5 W

Resistance range:  
R24 ... 82K

Tolerance:  
±2% ... ±10%

Dimensions: L x Ø  
18 x 6.5 ... 50 x 11 mm



## GKD

with axial wire leads

Power rating:  
5 ... 20 W

Resistance range:  
1R5 ... 56K

Tolerance:  
±5% ... ±10%

Dimensions: L x Ø  
14 x 5 ... 48 x 8 mm



## GK

with end caps

Power rating:  
20 ... 250 W

Resistance range:  
2R2 ... 330K

Tolerance:  
±2% ... ±10%

Dimensions: L x Ø  
55 x 13 ... 265 x 24 mm



## GF

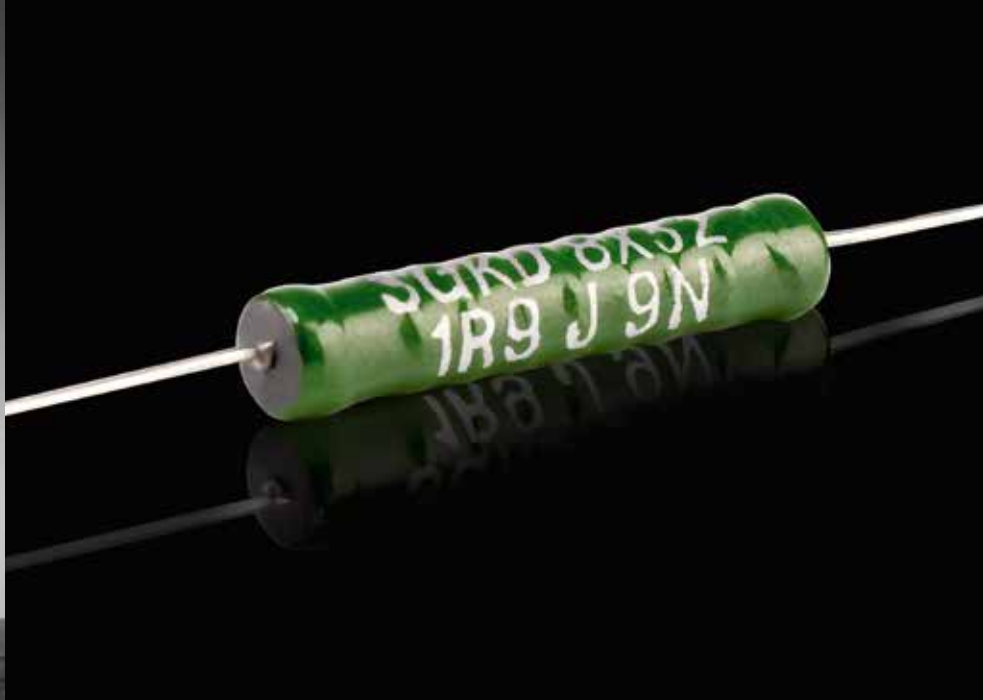
with radial lugs  
with adjustable lugs GF ... V

Power rating:  
25 ... 80 W [20 ... 64 W]

Resistance range:  
1R0 ... 130K [5R1 ... 5K1]

Tolerance:  
±2% ... ±10% [±10%]

Dimensions: L x Ø  
55 x 13 ... 100 x 24 mm



**Field of application:** Discharge resistor in windmills



**GS**

with radial tabs  
with adjustable lugs GS...V

Power rating:	15 ... 500W	[12 ... 400W]
Resistance range:	1R0 ... 300K	[4.3 ... 36K]
Tolerance:	±5% ... ±10%	[±5% ... ±10%]
Dimensions: L x Ø	45 x 9 ... 330 x 36 mm	



**GSB**

with corrugated band or wire  
with adjustable lugs GSB...V

Power rating:	150 ... 500W	[120 ... 400W]
Resistance range:	R15 ... 270K	[R15 ... 36K]
Tolerance:	±5% ... ±10%	[±10%]
Dimensions: L x Ø	100 x 30 ... 330 x 30 mm	



**RW**

with radial lugs (acc. to MIL-R-26)

Power rating:	11 ... 480W (11 ... 240W)
Resistance range:	R39 ... 300K (5R6 ... 91K)
Tolerance:	±5% ... ±10%
Dimensions: L x Ø	25.4 x 15.1 ... 304.8 x 33.3 mm



**RX**

with radial lugs and adjustable lug  
(acc. to MIL-R-19365)

Power rating:	11 ... 240W (11 ... 210W)
Resistance range:	1R0 ... 47K (1R0 ... 15K)
Tolerance:	±5% ... ±10%
Dimensions: L x Ø	44 x 12.7 ... 266.7 x 33.3 mm

# INDUSTRY: LOW POWER RESISTORS

The smallest resistor models are, in almost all cases, also wire-wound; however, these resistors are not wound onto a ceramic but instead onto a fibreglass carrier body. The resistance element is mounted in a casing, the casing serves to provide mechanical protection as well as increasing performance thanks to the large surface for heat dissipation.

**Special features and options:** flame resistant, particularly pulse resistant models optionally available



**SFD**

with axial wire leads

Power rating:

**1 ... 3W**

Resistance range:

**R051 ... 33K**

Tolerance:

**±5% ... ±10%**

Dimensions: L x Ø

**16 x 4 ... 35 x 4 mm**



**SFR**

with radial leads

Power rating:

**2 ... 8W**

Resistance range:

**R10 ... 27K**

Tolerance:

**±5% ... ±10%**

Dimensions: L x Ø

**18 x 5 ... 53 x 5 mm**



**FX**

in ceramic casing with outer groove  
with soldering fuse FTX

Power rating:

**4 ... 17W**

**[1.5 ... 11W]**

Resistance range:

**R39 ... 300K (5R6 ... 91K)**

**[R11 ... 82K]**

Tolerance:

**±5% ... ±10%**

Dimensions: L x W x H

**30 x 7 x 8.3 ... 75 x 9 x 10 mm**



**FH**

in ceramic casing for standing mounting  
with soldering fuse FTH

Power rating:

**4 ... 17W**

**[1.5 ... 10W]**

Resistance range:

**R15 ... 270K**

**[R15 ... 36K]**

Tolerance:

**±5% ... ±10%**

**[±10%]**

Dimensions: L x W x H

**30 x 7 x 8.3 ... 75 x 9 x 10 mm**

Data sheets at  
[www.krah-gruppe.de](http://www.krah-gruppe.de)



**Field of application:** Braking resistor for door locking systems on CNC machine



**KFD**

in ceramic casing

Power rating:  
4... 17W

Resistance range:  
2R2... 330K

Tolerance:  
±5%... ±10%

Dimensions: L x W x H  
20 x 6.5 x 6.5... 75 x 9 x 9 mm



**KBD**

in ceramic casing, low resistance value,  
low-inductive

Power rating:  
4... 17W

Resistance range:  
1R0... 300K [4.3... 36K]

Tolerance:  
±5%... ±10%

Dimensions: L x W x H  
20 x 6.5 x 6.5... 75 x 9 x 9 mm



**KRGG**

in ceramic casing, vertical mounting,  
also available with integrated fuse

Power rating:  
2... 10W

Resistance range:  
R20... 8K0

Tolerance:  
±5%... ±10%

Dimensions: L x W x H  
20 x 11 x 7... 35 x 14 x 13 mm



**KST**

in ceramic casing, with flat plug, soldering  
connections or radial wire leads

Power rating:  
15... 30W

Resistance range:  
R18... 75K

Tolerance:  
±5%... ±10%

Dimensions: L x W x H  
50 x 13 x 13... 100 x 13 x 13 mm



**KRX**

in ceramic casing with radial leads

Power rating:  
3... 20W

Resistance range:  
R20... 36K

Tolerance:  
±5%... ±10%

Dimensions: L x W x H  
24 x 9 x 9... 63.5 x 12.5 x 12.5 mm



**KRX27-4H**

in ceramic casing with flat plugs and  
mounting clips

Power rating:  
20... 40W

Resistance range:  
1R0... 20K

Tolerance:  
±5%... ±10%

Dimensions: L x W x H  
63.5 x 12.5 x 12.5... 90 x 19 x 19 mm

# INDUSTRY: LIQUID COOLED POWER RESISTORS

Liquid cooling is a highly efficient way of dissipating thermal energy from a heat source. The KRAH Group offers established product series here, which can be cooled both with free convection in air (RXDG) and actively with a cooling medium. High-quality materials, such as stainless steel, are used in order to prevent corrosion. The RXDG series of units is offered in a wide range of diameters and geometries and is characterized by its high power density. The LCRXG series is flowed through by the cooling medium and offers the advantage of different connection technologies as well as several taps and thus several resistance values on request.

**Special features and options: RXDG: Different geometries possible according to customer requirements, also as cascaded design, adapter plates for finished installation in the customer's housing; LCRXG: Different connection technologies with multiple taps.**



**RXDG**

Stainless steel tubular heaters, diff. tube diameters, connection technologies and geometries available. Customized design possible.

Power rating:  
**400 ... 4500 W**

Resistance range:  
**6 ... 200**

Tolerance:  
**±5% ... ±10%**

Dimensions: L  
**Up to 5000 mm per element**

**Field of application:**

Filter resistance in industrial pressing, punching and forming equipment



**LCRXG**

cemented, liquid-cooled, pipe resistance, Versions with various winding fields or glaze coatings on request

Power rating:  
**1000 ... 2000 W**

Resistance range:  
**On request**

Tolerance:  
**±5% ... ±10%**

Dimensions: L x W x H  
**331 x 44 x 93 mm**





# INDUSTRY: CUSTOMER SOLUTIONS

Specific customer solutions are an integral part of the services offered by the KRAH Group. Specific resistor solutions, ranging from variations on our standard products through to completely new developments, can be realized in accordance with customer requirements. When doing so, our development engineers employ modern simulation programmes or make use of an excellently equipped testing laboratory to design the perfect high power resistor for your application in line with your expectations.

**Our range of services: competence and know-how thanks to over 40 years of experience, skilled development engineers for appropriate solution proposals, computer-aided thermo-simulation for optimum dimensioning, high performance test laboratory for test series and validation, cost-optimized sample creation via 3D printing**



## BGG

openly wire wound resistor solution on a mica plate

Power rating:  
**50... 150 W**

Resistance range:  
**1R0... 20R**

Tolerance:  
**±10%**

Dimensions: L x W x H  
**100 x 50 x 8 mm acc. to DIN 41475**



## VHPR S

extremely pulse-resistant power resistors, pulse energy consumption up to 250 KJ

Power rating:  
**500 W**

Resistance range:  
**R025**

Tolerance:  
**±5%**

Dimensions: L x W x H  
**337 x 60 x 31 mm acc. to DIN 41475**



## UK

pipe resistor on ceramic carrier, unprotected, with spray protection caps

Power rating:  
**450... 1000 W**

Resistance range:  
**2R0...1M0**

Tolerance:  
**±5%... ±10%**

Dimensions: L x Ø  
**300 x 126... 600 x 126 mm acc. to DIN 41475**



## HRR SH

pre- and discharge circuit for electric vehicles (intermediate circuit capacity)

Power rating:  
**30 W**

Resistance range:  
**10R... 2K0**

Tolerance:  
**±10%**

Dimensions: L x W x B  
**90 x 120 x 40 mm acc. to DIN 41475**



## HPR S

extremely pulse-resistant power resistors, pulse energy consumption up to 1 MJ, suitable for commercial e-vehicles

Power rating:  
**1000 W**

Resistance range:  
**R10**

Tolerance:  
**±5%**

Dimensions: L x W x B  
**460 x 50 x 100 mm acc. to DIN 41475**



## ZO

extremely impulse-resistant and robust, with edgewise wound resistance tape

Power rating:  
**130... 2200 W**

Resistance range:  
**R027...5R15**

Tolerance:  
**±10%**

Dimensions: L x Ø  
**117 x 57... 708 x 57 mm acc. to DIN 41475**

# E-MOBILITY: POWER RESISTORS

As a leading technology company, KRAH develops and manufactures customised wire wound high-performance resistors for hybrid (HEV), plug-in hybrid (PHEV) and electric vehicles. The main areas of application include high-voltage auxiliary heaters, the pre- or discharge of the DC-link capacity in the battery management system, current-limited charging of capacities and the discharge of inverters. For high voltage systems up to 1000V or higher, as well as for recuperation and safety-relevant functions in electric vehicles, you will find your solution within the KRAH group of companies.



BR

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as precharge and discharge resistors, for example, in on-board charging systems

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ZDFL / ZDST

---

for current-limited charging of capacities or discharge of inverters, e.g. as precharge or discharge resistor

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CHPR

---

for current-limited charging of capacities or discharge of inverters, e.g. as precharge or discharge resistor

---



HPRS TS

---

for current-limited charging of capacities or discharge of inverters, e.g. as precharge or discharge resistor

---



HPRS L

---

for current-limited charging of capacities or discharge of inverters, e.g. as precharge or discharge resistor

---



HPRS T

---

for current-limited charging of capacities or discharge of inverters, e.g. as precharge or discharge resistor

---

# E-MOBILITY: POWER RESISTORS



HPRD and HDPR stranded connection

---

for current-limited charging of capacities or discharge of inverters, e.g. as precharge or discharge resistor

---



HPR S

---

extremely impulse-resistant braking resistor in commercial e-vehicles when recuperation into the battery is not possible

---



RXDG

---

high-voltage auxiliary heater for integration into the cooling circuit and temperature control of the passenger compartment

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HVCH

---

high-voltage auxiliary heater for integration into the cooling circuit and temperature control of the passenger compartment

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# AUTOMOTIVE: POWER RESISTORS

As the world market leader in wire wound resistor solutions for the automotive division the KRAH Group delivers solutions for the speed control of fan motors (HVAC and engine cooling) and suppressing of electromagnetic interference in electronic ignition systems.



Resistor Relay box

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for the speed control of fan motors in heating/ventilation/air conditioning (HVAC) or engine cooling including the relay

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Cement coated wire wound resistors

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for the speed control of fan motors in engine cooling

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Cement coated wire wound resistors

---

for the speed control of fan motors in heating/ventilation/air conditioning (HVAC)

---



**Field of application:** Suppressor in ignition systems



Plate style resistors

---

for the speed control of fan motors in heating/ventilation/air conditioning (HVAC) or engine cooling

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Coil resistors

---

for the speed control of fan motors in heating/ventilation/air conditioning (HVAC) or engine cooling

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Suppressor

---

to suppress disruptive signals within electronic passenger vehicle ignition systems, also available as overmolded version

---

# AUTOMOTIVE: ELECTRONIC CONTROLLERS

As the world market leader for wire wound resistors in the automotive segment, the KRAH Group also supplies electronic assemblies, for example for continuously adjustable speed control in heating and air-conditioning applications or engine cooling fans.



PWM-EC

---

for the speed control of fan motors in engine cooling

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PWM-HVAC

---

for the speed control of fan motors in heating/ventilation/air conditioning (HVAC)

---



BLDC

---

for speed control of the interior blower with brushless DC motors

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MPM-HVAC

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for the speed control of fan motors in heating/ventilation/air conditioning (HVAC)

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LPM-HVAC

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for the speed control of fan motors in heating/ventilation/air conditioning (HVAC)

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PWM-HVAC

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for the speed control of fan motors in heating/ventilation/air conditioning (HVAC)

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# AUTOMOTIVE: ELECTRONIC CONTROLLERS



GZS

---

for controlling glow plugs made of steel or ceramic

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ZOP

---

integrated electronics for controlling an additional oil pump. control via CAN interface.

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HCU

---

for power control of auxiliary heating in diesel engines

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