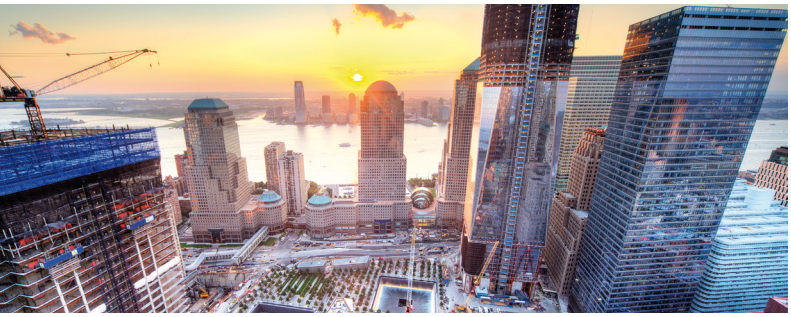
Spohn+Burkhardt
Elektrotechnische Fabrik Blaubeuren

Power resistors for motor control

Reliability for the most demanding applications

Tradition and expertise

Welcome to Spohn + Burkhardt



The company.

Spohn + Burkhardt was founded in 1920 by Karl Spohn and David Burkhardt in Blaubeuren, Germany and continues to be family owned to this day.

The product line has grown from a small offering of transfer switches to a full line of products including joysticks, control stations and resistors, known worldwide for unmatched design and quality.

Our complete line of industry leading control products are manufactured at two facilities in Southern Germany.
Sheet metal fabrication, finishing, resistor assembly and control system wiring is done at the facility in Schelklingen while corporate headquarters, controllers, controller accessories and control system final assembly resides in Blaubeuren.

The plant in Schelklingen boasts state of the art fabrication equipment that allows quick turnaround and the highest of quality for all customer requirements, including custom designs per customer specifications.

Our team of product developers and engineers work to create the most innovative new products in response to today's quick changing and demanding requirements.
We offer purpose built mechanical systems that integrate innovative electronics into all products. With industry leading engineering expertise and decades of experience, we work alongside our customers from start to finish in order to provide solutions to all of their control requirements.

We are prideful of this ability and see it as one of our many strengths and the foundation of our success.

Due to our size our strength lies in the unbeatable advantage of having the ability to be flexible and able to respond quickly and efficiently to new technological advances for any market throughout the world.

Made in Germany
for more than 90 years.

Spohn+Burkhardt
Elektrotechnische Fabrik Blaubeuren

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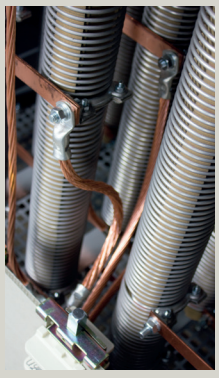


Innovative solutions for

- All port crane control applications
- Vessel throttle and winch control
- Conveyors and drive control
- Regeneration
- Power distribution
- Plant engineering
- Testing/laboratory technology

Reliable and efficient

Energy management solutions for every application.

Spohn+Burkhardt
Elektrotechnische Fabrik Blaubeuren

BENEFITS

- Decades of experience in resistor design and manufacturing
- Unmatched quality and service life
- Modular design allows for quick delivery
- Industry standard sizes and values
- Optional anti-corrosion stainless steel
- Large variety of cabinet finish colors
- Custom designed solutions per customer requirements
- Large dealer network providing service and support worldwide

Wire wound resistors

Proven versatile technology.

Spohn+Burkhardt
Elektrotechnische Fabrik Blaubeuren

Optimized for small to medium power requirements

Wire connecting posts

- Extra insulation included
- Individually replaceable
- Mounted in a sturdy frame for protection against vibration

Roof vents

- Suitable for outdoor use

Cabinet

- Made of high-quality stainless steel
- Additional ventilation slots if required
- Removable cover for easy access
- Simple cable entry and routing

Customer connections

- Easy access design
- Retrofits easily to other manufacturer's units
- Allows for flexible relocation

Options:

- Thermal switch
- Overload contact
- Internal/external cooling fans

Mounting

- Floor or wall mounting per customer requirements

BENEFITS

- Individually replaceable resistor connecting posts
- Maximum resistance value flexibility
- Any number of taps
- High resistance values are available for low current applications
- Surge-proof – high overload capacity

Steel grid resistors

Compact and rugged design.

Spohn+Burkhardt
Elektrotechnische Fabrik Blaubeuren

Optimized for medium to high power requirements

Steel grid resistor unit

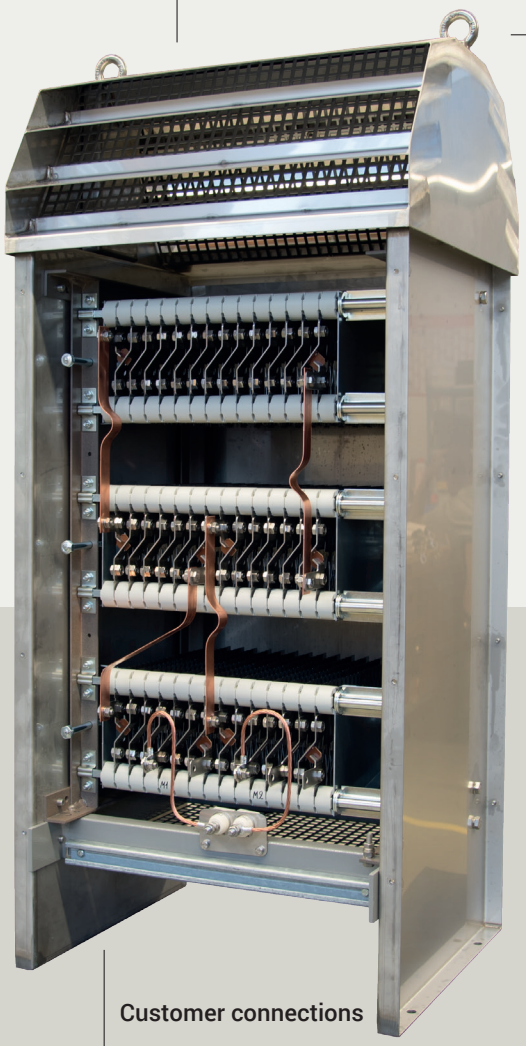
- Steel grids made from high quality stainless steel alloy 1.4841 | 1.4541
- Individually mounted resistor sections and grids for ease of replacement

Lifting eyelets

- Sturdy eyelet rings for easy transport and quick installation

Roof vents

- Large roof ventilation slots which promotes excellent air flow and optimal cooling
- Suitable for outdoor use



Mounting

- Floor or wall mounting per customer requirements

Resistor frames

- Resistor sections are mounted in individual frames for easy removal
- Patented Spohn + Burkhardt anti-vibration clamping fixture

Options

- Thermal switch
- Internal/external cooling fans

Customer connections

- Easy access design
- Retrofits easily to other manufacturers units
- Allows for flexible relocation
- Customizable

BENEFITS

- Individually mounted resistor sections and grids for ease of replacement
- Low inductance
- High quality stainless steel alloy resistor grids
- Capable of withstanding extreme temperatures, with a melting point well over 1000 °C
- Surge-proof - high overload capacity

Cast iron resistors

For your low maintenance, high load application.

Optimized for very high loads

Cast iron resistor unit

- High-quality cast iron elements
- Individually replaceable

Roof vents

- Large roof ventilation slots which promotes excellent air flow
- Suitable for outdoor use

Lifting eyelets

- Sturdy eyelet rings for easy transport and quick installation

Mounting

- Floor or wall mounting per customer requirements

Mounting Rails

- For easy conductor mounting and removal

Options:

- Thermal switch
- Internal/external cooling fans

Connections

- Easy access design
- Retrofits easily to other manufacturer's units
- Allows for flexible relocation

BENEFITS

- Individually mounted resistor sections for ease of replacement
- Surge-proof – high overload capacity
- Large mass provides high overload capacity

Special resistors

Solutions for all requirements.

Customized solution for your specific application

Special resistors for conveyer belts

- Special design 3 m tall steel grid resistor unit for a power plant conveyer belt application in Hungary

Special resistors for a ship crane

- 4 custom engineered resistor units for a 100-ton ship crane in Baku (Azerbaijan)
- This special design allows the resistor grid to perform flawlessly in this extremely challenging environment

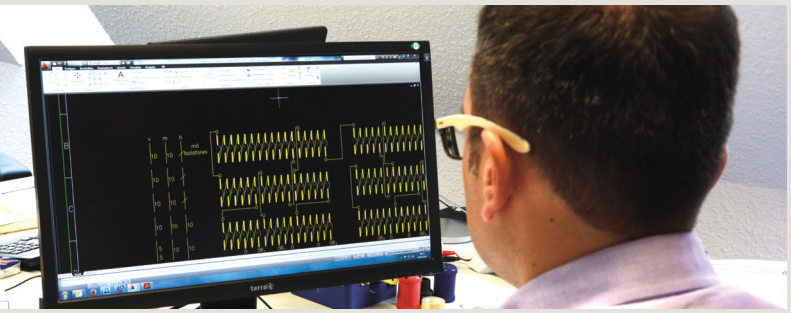
BENEFITS

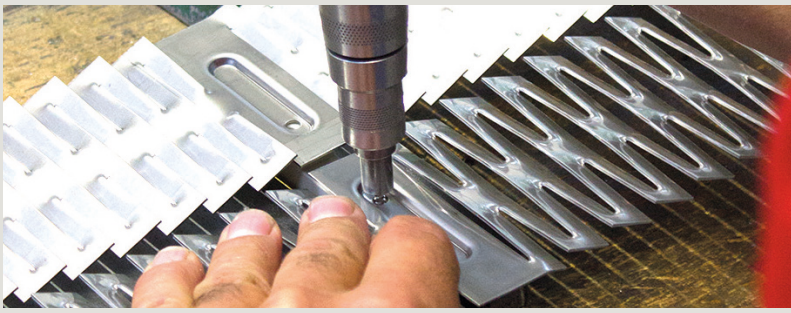
Customer specified:

- Electrical specifications
- Size
- Housing dimensions
- Special design/material requirements
- Combinations etc.

The resistor engineers: Spohn + Burkhardt

We build a solution for you.





Spohn+Burkhardt
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Every application is different and every solution is unique.

Since 1920 we have designed and manufactured high quality, custom resistors.

We listen to and take into consideration the needs of our customers and the markets we serve.

Our research and development department is constantly working on new designs to meet the ever changing market demands. We constantly review, update and improve existing products to optimize performance and increase value to our customers.

Our commitment to quality and innovative designs sets us apart from our competition.

We have an unmatched focus and commitment to offer the best solutions for all of our customers.

Spohn + Burkhardt:
Made in Germany
for more than 90 years.

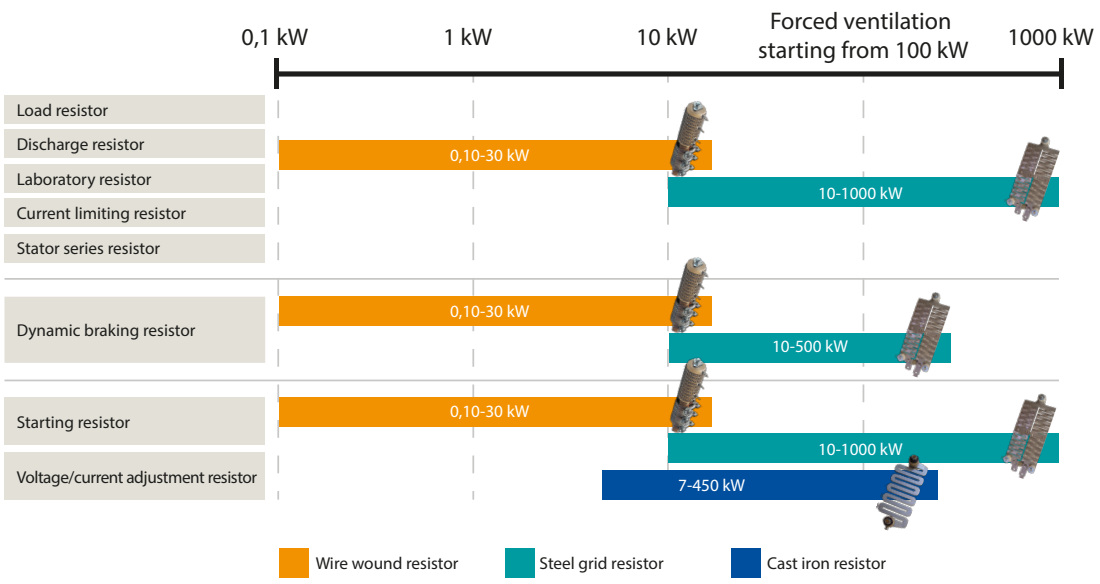
We build a solution for you:

Our design department works with you to develop custom solutions with the objective of meeting your requirement as effectively as possible.
All in accordance with our motto:

Spohn + Burkhardt:
We build it so you can control it.

Technical data

Select your resistor.



Electrical resistance (Ohm value)	Milli-ohm to multiple kilo-ohms
Taps/connections	Number of taps specified by customer:
	Connection terminals located inside housing | Screened copper wire
	Screw terminal | Banana Jack | Threaded stud
Degrees of protection	IP 00 | IP 12 | IP 13 | IP 20 | IP 23
Monitoring	Optional temperature monitoring switch
	Optional thermal overload relay
Mounting	Available with or without cabinet | Floor leveling cabinet
	Wall mounted cabinet | Laboratory size cabinet
	Cabinet or frame on casters for mobility
Recognition	CE-recognized | UL-recognized | GL-recognized
Housing	Stainless steel | Sheet metal | Zinc plated

Glossary of terms

For power resistors.

A

Air flow
Air flow is a measurement of the amount of air per unit of time that flows through a particular device.

B

Brake resistor
AC variable frequency drives are commonly used with a general purpose AC induction motor to form a reliable variable speed drive system. For applications that require faster deceleration rates, or where motor speeds are exceeding the synchronous speed set by the output frequency of the drive, a braking resistor is required. Braking resistors increase the braking torque capability of a variable frequency drive, producing faster and more controlled braking. The resistor dissipates regenerated power to keep the bus voltage from exceeding the rated limit of the drive.

C

Chopper resistor
Chopper resistors, sometimes also referred to as braking unit, are used in the DC voltage intermediate circuits of frequency converters to control voltage when the load feeds energy back to the intermediate circuit. This arises, for example, when a magnetized motor is being rotated by an overhauling load and so functions as a generator feeding power to the DC voltage intermediate circuit.

Continuous output
The continuous output for a resistor is the permissible output that a resistor can convert into heat without sustaining damage.

D

Duty ratio
The duty ratio defines how long a resistor is switched on and the duration of the subsequent pause until it is switched on again. This value is important for calculating the size of the resistor. A duty ratio of 100 % means that the resistor may be continuously operated with the rated load – i.e. that it may be switched on continuously. For lifting equipment, 120 s = 100 % duty ratio, which means switching on for 30 s followed by a 90 s pause equals a 25 % duty ratio.
The formula for calculation of the duty ratio is as follows:
Duty ratio[%] = switch-on duration/120 s * 100 %.

E

Electrical current strength
The electrical current strength indicates how much electrical charge flows through a circuit over a specific time. It is measured in amperes. Resistors should be dimensioned such that they maintain the required output and the corresponding current. When a resistor designed for 1000 W is operated with 10 A at 100 V or 100 A at 10 V. Design consideration should be taken as the wire, grid density and/or connections must be scaled appropriately.

Electrical output
The electrical output indicates how much electrical work the electrical current performs each second and/or how much electrical energy is converted into heat in the resistor. It is calculated from voltage x current and is expressed in watts - usually in kilowatts.

External cooling
Unlike internal cooling, where natural convection is utilized to cool a resistor, external cooling is cold environmental air blown through the resistor by a fan. This is a benefit as it allows the use of smaller resistors as less resistor surface area is required in order to achieve the same output as a resistor with internal cooling. Air flow monitors are used for externally cooled resistors. If the fan fails, the resistor will overload quickly.

F

Frequency converter
A frequency converter is a power converter that generates an output signal voltage from the input voltage. The output signal voltage can be adjusted in frequency and amplitude in order to power a three-phase motor. The speed of the equipment can be infinitely adjusted from zero to maximum speed.

I

Insulator
An insulator is an electrical component with extremely low conductivity and high mechanical stability. Insulators are used where bare electrical conductors must be mounted or held. An insulator can be used in resistor construction in order to insulate resistor grids from each other. With wire wound resistors, the resistor wire is wound directly on a ceramic body, which is an insulator.

Internal cooling
A resistor converts electrical power into heat. This heat must be released. Resistors with internal cooling achieve this through natural convection, which means cold air flows into the resistor housing from below and then exits through the top. This air flow is enhanced naturally by a chimney effect in the housing.

L

Load bank
A load bank can be used to test generators. The output range of a load resistor can vary from a few kilowatts to several megawatts in large generators. Mobile units are often used for smaller outputs.

Load resistor
A load resistor is used to load and test generators, transformers, and batteries with a desired current to determine if the device is functioning correctly.

O

Ohm
The unit of measure for electrical resistance is the ohm. It is calculated as a voltage/current ratio. The resistance value of resistors in drive control are usually small and normally lie in the range between 1 and 10 ohm.

Operating voltage
The voltage level by which an electrical system is designated and to which certain operating characteristics of the system are related.

Overload capacity
Experience, precise calculations and the highest-quality of materials designed into resistors provided by Spohn + Burkhardt have a high overload capacity. This means that the short-term overload, current, voltage, or power level beyond which permanent damage will occur to the resistor is very high.

P

Protection rating
The IP Code, or International Protection Rating, consists of the letters IP followed by two digits and an optional letter. As defined in international standard IEC 60529, it classifies the degrees of protection provided against the intrusion of solid objects (including body parts like hands and fingers), dust, accidental contact, and water in electrical enclosures. The standard aims to provide users more detailed information than vague marketing terms such as waterproof. These IP protection ratings are shown in tables starting with 0 for no protection and extending to 6 or 8 for total protection (such as immersion in water). Protection ratings for resistors for standard applications frequently have a protection rating of IP 00 for exposed resistors or IP 23 for resistors in housings with rain protection.

R

Resistor
A resistor is a passive two-terminal electrical component that implements electrical resistance as a circuit element. Resistors act to reduce current flow, to divide an electrical voltage, or to convert electrical energy into thermal energy.

Resistor posts
Resistor posts are comprised of at least one insulator wound with wire. Several of these insulators, or resistance cartridges, are overlapped on a carrier plate and arranged to form resistor posts.

S

Starter resistor
A starter resistor is used to limit the starting current of an electric motor. Starter resistors usually have a low resistance value and are capable of accommodating a relatively high output. Starter resistors are used for the starting of high-output slip ring motors or for the regulation of motor speed. Due to high energy losses, starter resistors are being replaced by electronic solutions, where applicable. However, with low motor outputs, starter resistors are still used to control the motor speed due to relative low cost and durability. Applications frequently include running gears with 2 or 3 gear trolley traveling gears.

Starting resistor
Starting resistors are necessary because the DC resistance of a motor armature is very low. Excessive current will flow when DC voltage is first applied unless current is limited in some way. Adding resistance in series with the armature windings reduces initial current. It may then be removed after counter emf has been built up.

Steel grid resistor
Steel grid resistors are manufactured by Spohn + Burkhardt from high-quality stainless steel alloys and can withstand the highest loads under extreme conditions. The housings are manufactured from powder-coated steel sheet or stainless steel sheet. Full stainless steel versions are also available for special requirements, such as marine applications. The resistance grids are produced in-house from high-alloy stainless steel and have melt temperatures in excess of 1100 °C, which guarantees extreme overload capacity. The internal structure is comprised of a sequence of stainless steel resistor grids isolated from each other by insulators and include front-side connections. Resistors can be ordered with optional stud terminals facing such that connections are very simple using standard cables.
The resistor units are held by a clamping fixture that allow the replacement of individual resistor grids from the front without having to disassemble the entire resistor. This design is extremely service friendly.

T

Taps
Electrical resistors are frequently supplied with taps in order to be able to tap partial values of the overall resistance. For example, partial values of the overall resistance can be used to operate a running gear at different speeds.

Thermal circuit breaker
A thermal circuit breaker is an electrical component used in a resistor to monitor the exhausted air temperature. When a predetermined temperature is reached, an electrical contact opens removing power to the control unit. This allows the overloaded resistor to cool down before further use so as to avoid damage.

Spohn+Burkhardt
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National and international

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