Hartland Controls

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Contactors 101

Understanding and choosing the right contactor



HartlandControls

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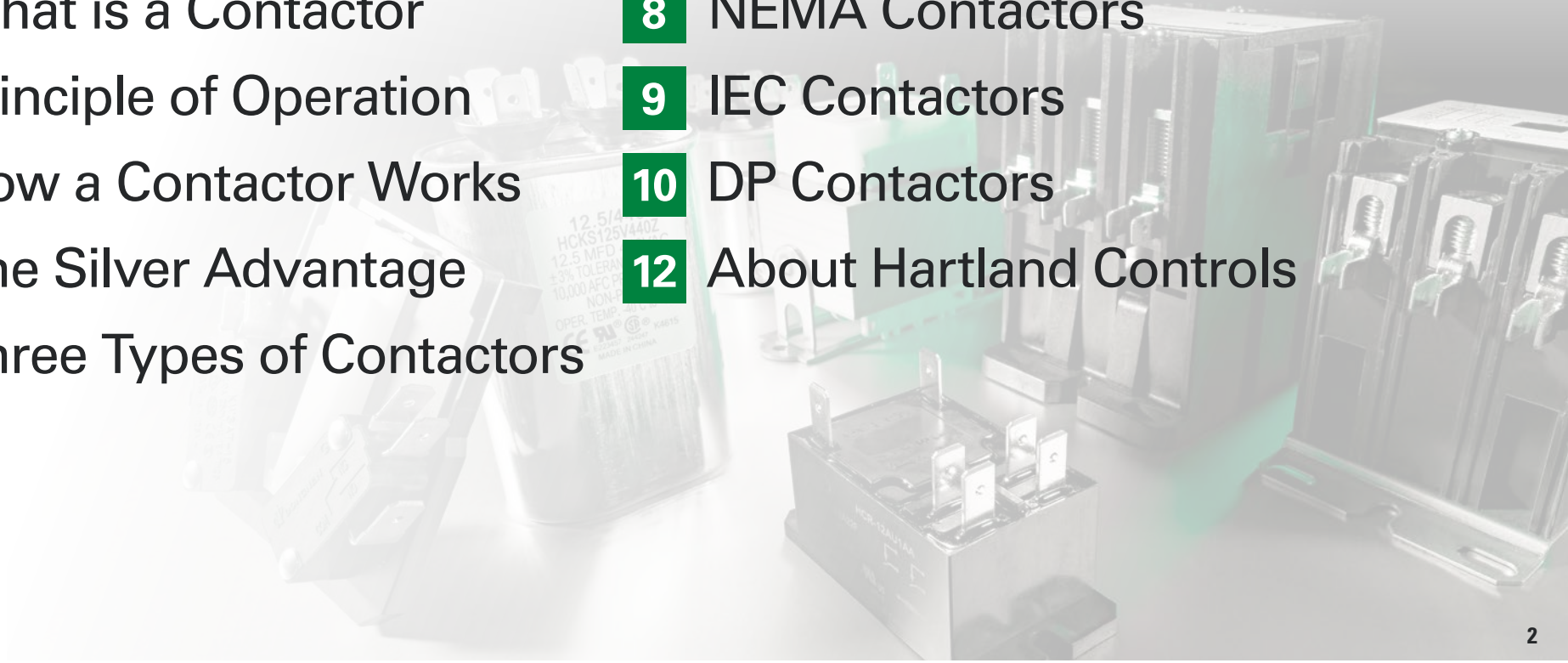
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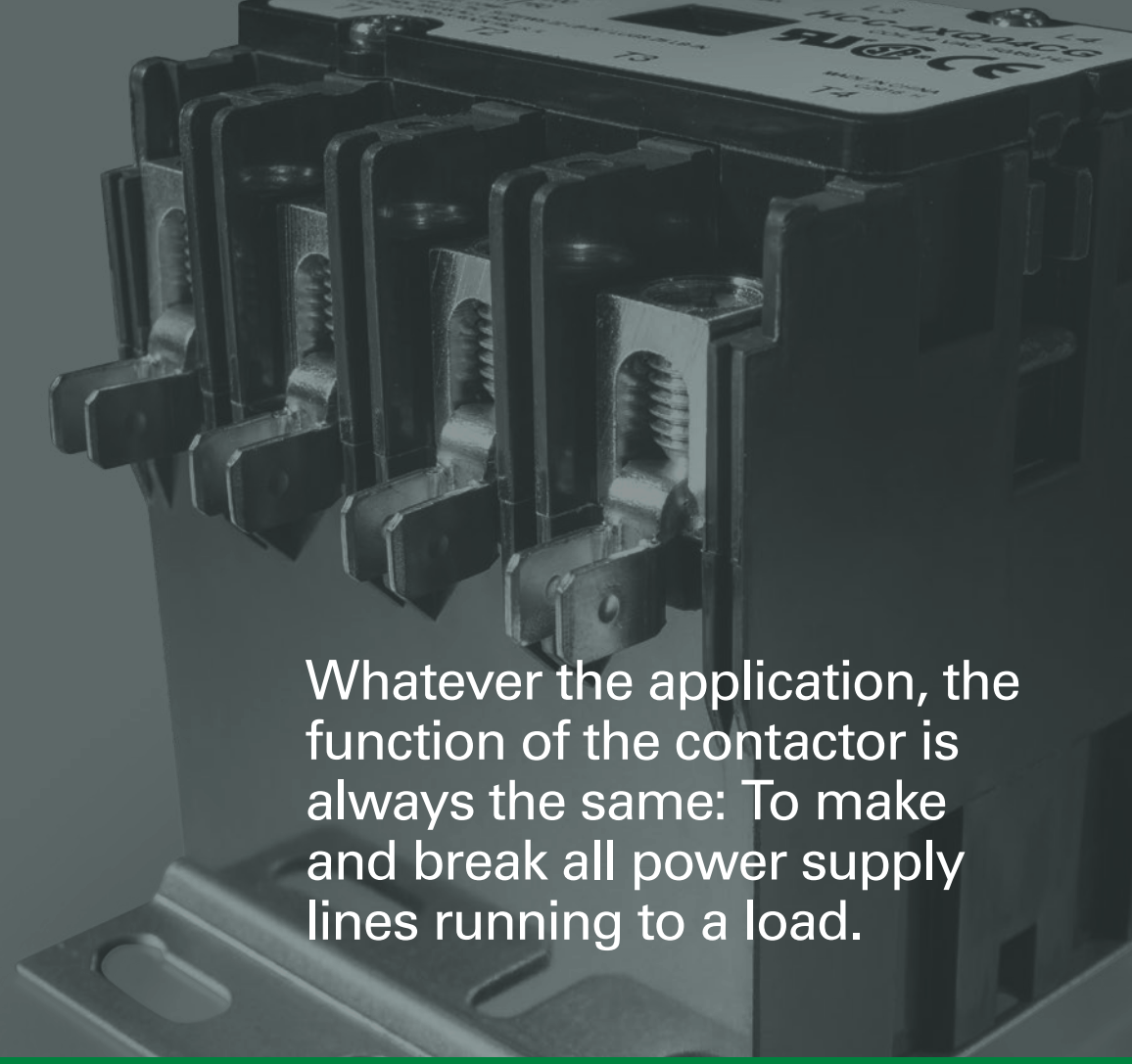
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What is a Contactor?

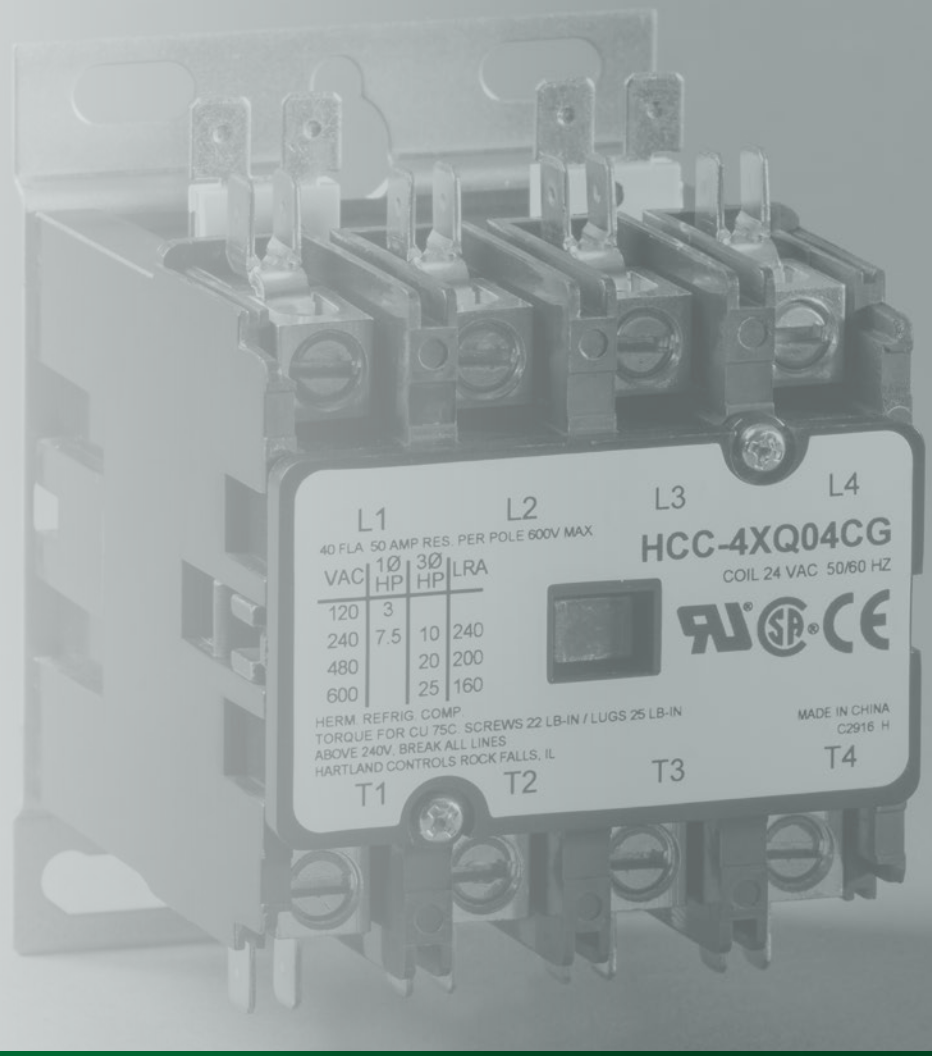


Whatever the application, the function of the contactor is always the same: To make and break all power supply lines running to a load.

At its core,

a contactor is primarily a remotely controlled and electrically operated switch consisting of one or more pairs of contacts that serve to open and close external circuits.

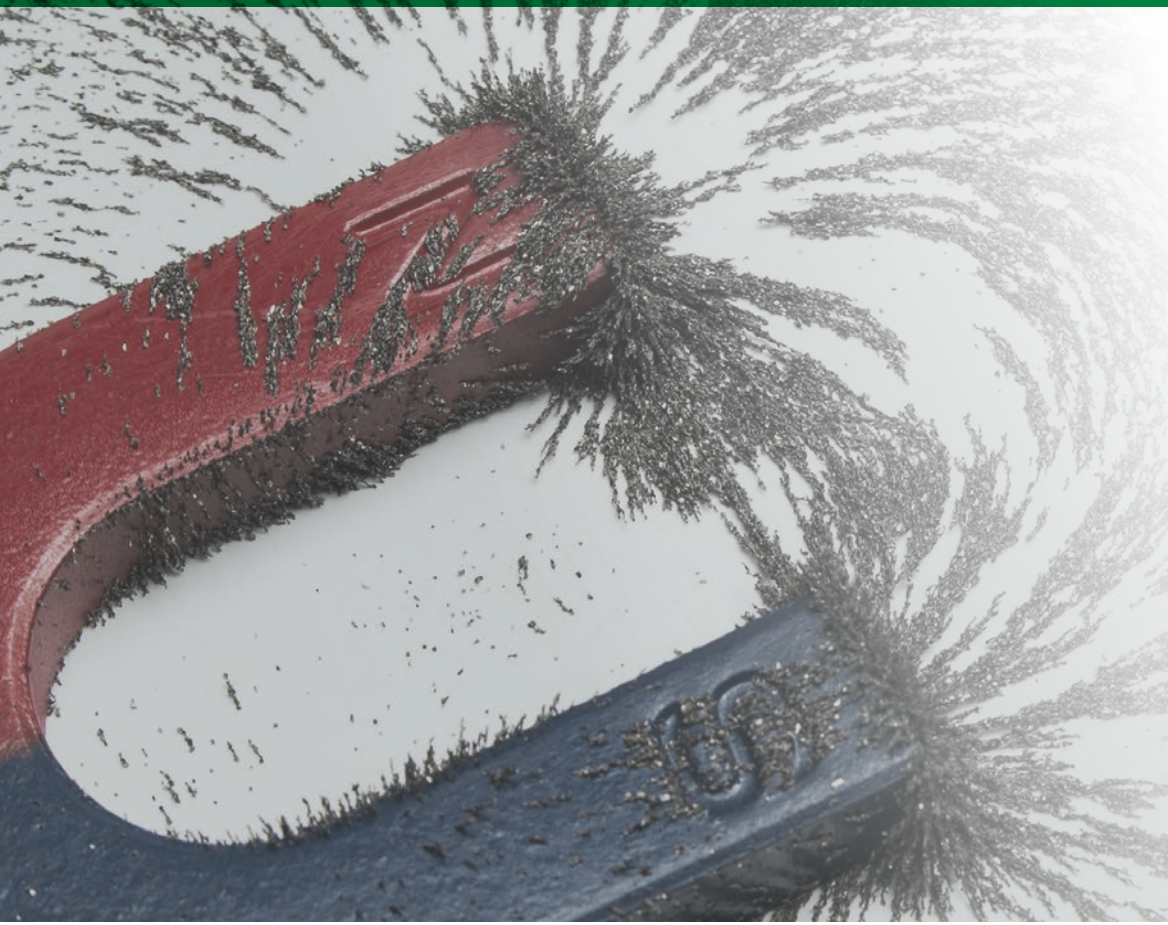
Principle of Operation



A contactor usually has both moveable and fixed, low resistance contacts which do the actual circuit opening and closing.

Fixed contact assemblies are mounted on a secure structure, or base. The movable contact assemblies are mounted on a structure known as the actuator, and an armature is attached to the actuator.

How a Contactor Works



The contactor is operated by an electromagnetic circuit. A wire coil is wound around the contactor's iron core. When voltage is applied to the coil, a current is induced in the windings. This current flow creates a magnetic field in the iron core. The magnetic field attracts the armature and overcomes the strength of the spring holding the armature away from the iron core. The attraction of the armature to the core closes the set of contacts.

The Silver Advantage

Contacts made of fine silver work well at currents in the light to medium current range (1 to 20 amps) where light to moderate contact pressure is available and low contact resistance is a requirement.

Hartland Controls, now part of Littelfuse, uses silver-based contacts. Silver has the highest electrical and thermal conductivity of any known metal and shows good resistance to oxidation and tarnishing, leading to a longer contactor life.

Silver's tendency to erode and weld at medium current levels and its somewhat low hardness can be overcome by combining silver with other metals or metal oxides, such as nickel, cadmium oxide, or silver tin oxide.



The Three Contactor Types



Definite Purpose (DP)



NEMA



IEC

NEMA Contactors

National Electrical Manufacturers Association

Robust designs for broader applications

NEMA (National Electrical Manufacturers Association) contactors are designed to meet the size ratings specified in the NEMA Standard. The NEMA Standard philosophy is to provide electrical interchangeability among manufacturers. Other conventions include that contacts are replaceable when needed and that molded (encapsulated) coils are common.

Since the installer often orders a controller by the motor horsepower and voltage rating, and may not know the application or duty cycle planned for the motor and its controller, the NEMA contactor is designed with sufficient reserve capacity to assure performance over a broad band of applications without the need for an assessment of life requirements.

IEC Contactors

Specific designs require precise application knowledge

IEC (International Electrotechnical Commission) contactors do not define standard sizes. An IEC rating, therefore, indicates that a contactor has been evaluated by the manufacturer to meet the requirements of a number of defined applications (utilization categories).

The contactors are matched to a load, expressed in terms of both rating and electrical life. A higher level of skill is required to select contactors for an application, taking into consideration motor load, duty cycle, full load amps, etc. Typically, the contacts for larger horsepower-rated IEC contactors are replaceable while the smaller contactors are not. IEC contactors are allowed to have a smaller creepage path and higher temperature rise than NEMA contactors which results in a smaller physical size.

DP Contactors

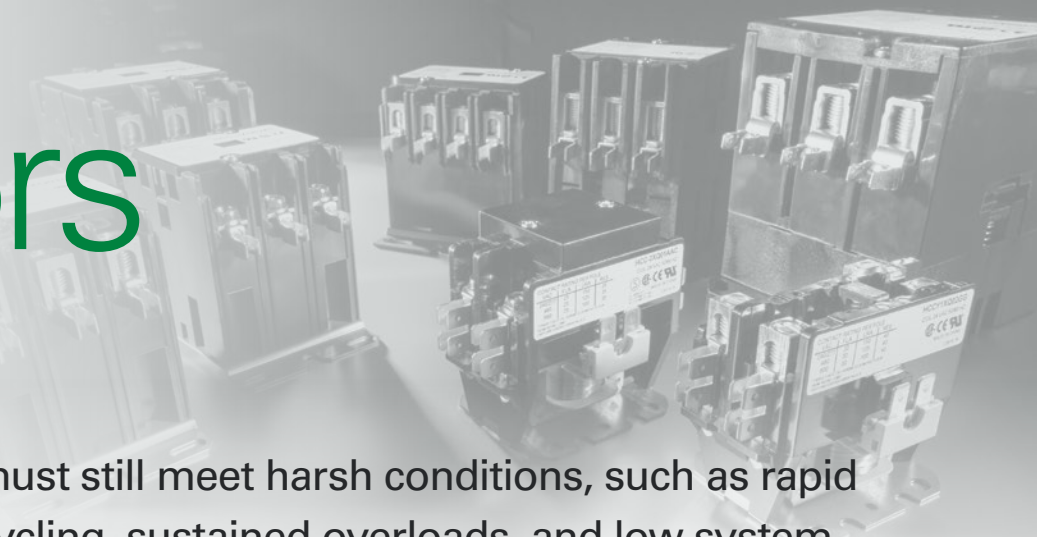
A cost-effective solution

Definite purpose (DP) contactors are similar in function to NEMA and IEC contactors. The concept for DP contactors originated in the 1950s at the request of several large HVACR OEMs. Until that time, the OEMs had used NEMA rated contactors in their equipment. These NEMA rated devices were robust, expensive and typically outlasted the equipment in which they were installed.



DP Contactors

An industry work horse



DP contactors have been designed specifically for loads where the life can be statistically predetermined by their application. DP contactors are sized either by their resistive load rating or by their inductive rating (LRA/FLA). DP contactors have a lower initial cost compared to NEMA and IEC devices and are often considered throw away devices. Although their cost is less, these contactors must still meet harsh conditions, such as rapid cycling, sustained overloads, and low system voltages. Even though DP contactors were originally developed for the HVACR industry, there are a variety of other industries that are utilizing these contactors based on properly sizing the contactors to application.

About Hartland Controls



Hartland Controls, part of Littelfuse, Inc., is a premier provider of custom electrical control solutions and engineered assemblies. Our state-of-the-art facilities are geared for high-volume, ongoing product programs. Located in the heart of the Midwest, our facility is ideally situated to serve customers nationwide through a broad distribution network and associates who are dedicated to outstanding customer service.

Hartland Controls NOW PART OF Littelfuse
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