DOWNLOAD PDF ELECTRIC CONTACTS

Chapter 1 : Home Page - Lanco Contacts

An electrical contact is an electrical circuit component found in electrical switches, relays, connectors and circuit breakers. Each contact is a piece of electrically conductive material, usually metal.

Brainin has electrical contact manufacturing solutions for every application, producing composite rivets, solid rivets, laminated welding buttons, powder metal contacts, and other designs to meet all electrical contact requirements. Electrical contact materials include silver cadmium oxide, silver tin oxide, fine silver, silver nickel, silver copper nickel and other precious metals. Our contacts are used in a broad range of power applications, from millivolts to kilovolts. In addition, Brainin operates a full-spectrum silver mill, a gold mill and a clad metal facility that are capable of supplying most of our specialty material needs. We appreciate the opportunity to work with you regarding the electrical contact requirements for your specific application. Size, material, attachment, and even the mechanics of the finished electrical switch or device are all important factors in the design. Brainin also regularly works with customers to analyze contact composition and assembly to identify the root cause of contact failures. Our Research and Development Test Center can help predict conductivity and reliability outcomes across a range of circumstances. Helpful information is also available through our Electrical Contacts Fundamentals video series and the Troubleshooting Common Electrical Contacts Problems page. This provides an exceptionally competitive cost production platform, with strong technology support and advanced manufacturing techniques that insure a consistent product with an excellent micro-structure and high density. Brainin silver-tungsten, silver-tungsten carbide, copper-tungsten and other powder metal electrical contacts are produced with strict quality controls at every step in the process. We do material blending in-house: Carefully prepared powder blends are pressed, sintered and infiltrated or repressed to attain a specific microstructure and mechanical and chemical properties. Applications include circuit breakers, transfer switches, power distribution and other high-energy devices. Machined contact assemblies Brainin produces milled, bored and reamed hinges, both silver plated and unplated, for reliable transfer switch operation. Other machining operations are available to manufacture metal parts in moderate volume for many applications. All machined contact assemblies are carefully inspected and cleaned to eliminate the need for additional processing at your facility. Composite rivet contacts When it comes to composite rivets, Brainin stands apart. Brainin can incorporate features others find challenging â€” such as large heads relative to shank size, and undercuts of the rivet head. Plus, our expert ability to control the distribution of silver contributes to making Brainin very cost competitive. Composite rivet electrical contacts are backed with either or copper. High volume bimetal rivet contacts: Silver alloy or metal oxide on copper composite contact rivets made on high-speed six-station machines in one operation. Semi-tubular and chamfered shanks are available. High volume, quality parts at low cost. Heavy duty bimetal rivet contacts: Composite rivets made by cold bonding a silver alloy or metal oxide contact face to a copper base in two fully-controlled, high force blows in a single operation. Designed to satisfy mid-high volume requirements for heavy duty electrical contact applications. The strongest bond available, at an attractive price. Solid rivet contacts Cold headed contacts made of fine silver, silver alloys and other precious and non-precious metals. Ideal for low volume applications, double-headed contacts and small diameter contacts that cannot be economically made as composites. Bimetal and trimetal contact buttons designed to be welded to a blade or terminal. Silver and other materials hot bonded providing a superior bond between layers. Large contacts can have a fine silver and solder back. Explore our Precision Engineered Products Group operations.

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Chapter 2 : Electrical Contacts | PEP - Precision Engineered Products

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The contacts are the current carrying part of the contactor. This includes power contacts, auxiliary contacts, and contact springs. The electromagnet or "coil" provides the driving force to close the contacts. The enclosure is a frame housing the contacts and the electromagnet. Enclosures are made of insulating materials such as Bakelite , Nylon 6 , and thermosetting plastics to protect and insulate the contacts and to provide some measure of protection against personnel touching the contacts. Open-frame contactors may have a further enclosure to protect against dust, oil, explosion hazards and weather. Magnetic blowouts use blowout coils to lengthen and move the electric arc. These are especially useful in DC power circuits. AC arcs have periods of low current, during which the arc can be extinguished with relative ease, but DC arcs have continuous high current, so blowing them out requires the arc to be stretched further than an AC arc of the same current. Sometimes an economizer circuit is also installed to reduce the power required to keep a contactor closed; an auxiliary contact reduces coil current after the contactor closes. A somewhat greater amount of power is required to initially close a contactor than is required to keep it closed. Such a circuit can save a substantial amount of power and allow the energized coil to stay cooler. Economizer circuits are nearly always applied on direct-current contactor coils and on large alternating current contactor coils. A basic contactor will have a coil input which may be driven by either an AC or DC supply depending on the contactor design. The coil may be energized at the same voltage as a motor the contactor is controlling, or may be separately controlled with a lower coil voltage better suited to control by programmable controllers and lower-voltage pilot devices. Certain contactors have series coils connected in the motor circuit; these are used, for example, for automatic acceleration control, where the next stage of resistance is not cut out until the motor current has dropped. The electromagnet coil draws more current initially, until its inductance increases when the metal core enters the coil. The moving contact is propelled by the moving core; the force developed by the electromagnet holds the moving and fixed contacts together. When the contactor coil is de-energized, gravity or a spring returns the electromagnet core to its initial position and opens the contacts. For contactors energized with alternating current , a small part of the core is surrounded with a shading coil, which slightly delays the magnetic flux in the core. The effect is to average out the alternating pull of the magnetic field and so prevent the core from buzzing at twice line frequency. Because arcing and consequent damage occurs just as the contacts are opening or closing, contactors are designed to open and close very rapidly; there is often an internal tipping point mechanism to ensure rapid action. Rapid closing can, however, lead to increase contact bounce which causes additional unwanted open-close cycles. One solution is to have bifurcated contacts to minimize contact bounce; two contacts designed to close simultaneously, but bounce at different times so the circuit will not be briefly disconnected and cause an arc. A slight variant has multiple contacts designed to engage in rapid succession. The first to make contact and last to break will experience the greatest contact wear and will form a high-resistance connection that would cause excessive heating inside the contactor. However, in doing so, it will protect the primary contact from arcing, so a low contact resistance will be established a millisecond later. Another technique for improving the life of contactors is contact wipe ; the contacts move past each other after initial contact in order to wipe off any contamination. Arc suppression Without adequate contact protection , the occurrence of electric current arcing causes significant degradation of the contacts, which suffer significant damage. An electrical arc occurs between the two contact points electrodes when they transition from a closed to an open break arc or from an open to a closed make arc. The break arc is typically more energetic and thus more destructive. The extremely high temperature of the arc tens of thousands of degrees Celsius cracks the surrounding gas molecules creating ozone , carbon monoxide , and other compounds. The arc energy slowly destroys the contact metal, causing some material to escape into the air as fine particulate matter. This activity causes the material in the contacts to degrade over time, ultimately resulting in device failure. For example, a properly applied contactor will have a life span of 10, to , operations when run under power; which is significantly less than the mechanical non-powered life of the same device which can be in excess of 20

million operations. Modern medium-voltage AC motor controllers use vacuum contactors. High voltage AC contactors greater than 1, volts may use vacuum or an inert gas around the contacts. High voltage DC contactors greater than V still rely on air within specially designed arc-chutes to break the arc energy. High-voltage electric locomotives may be isolated from their overhead supply by roof-mounted circuit breakers actuated by compressed air; the same air supply may be used to "blow out" any arc that forms. A general purpose motor control contactor may be suitable for heavy starting duty on large motors; so-called "definite purpose" contactors are carefully adapted to such applications as air-conditioning compressor motor starting. North American and European ratings for contactors follow different philosophies, with North American general purpose machine tool contactors generally emphasizing simplicity of application while definite purpose and European rating philosophy emphasizes design for the intended life cycle of the application. IEC utilization categories[edit] The current rating of the contactor depends on utilization category. Example IEC categories in standard are described as: AC-1 - Non-inductive or slightly inductive loads, resistance furnaces AC-2 - Starting of slip-ring motors: NEMA standard contactor sizes are designated 00, 0, 1, 2, 3 to 9. The horsepower ratings are based on voltage and on typical induction motor characteristics and duty cycle as stated in NEMA standard ICS2. Exceptional duty cycles or specialized motor types may require a different NEMA starter size than the nominal rating. Contactors for medium-voltage motors greater than 1, volts are rated by voltage and current capacity. Auxiliary contacts of contactors are used in control circuits and are rated with NEMA contact ratings for the pilot circuit duty required. Normally these contacts are not used in motor circuits. The nomenclature is a letter followed by a three-digit number, the letter designates the current rating of the contacts and the current type i. To reduce power consumption in the contactor coils, latching contactors are used, which have two operating coils. One coil, momentarily energized, closes the power circuit contacts, which are then mechanically held closed; the second coil opens the contacts. Magnetic starter A magnetic starter is a device designed to provide power to electric motors. It includes a contactor as an essential component, while also providing power-cutoff, under-voltage, and overload protection. Vacuum contactor[edit] Vacuum contactors utilize vacuum bottle encapsulated contacts to suppress the arc. This arc suppression allows the contacts to be much smaller and use less space than air break contacts at higher currents. As the contacts are encapsulated, vacuum contactors are used fairly extensively in dirty applications, such as mining. Vacuum contactors are also widely used at medium voltages from volts, effectively displacing oil-filled circuit breakers in many applications. Vacuum contactors are only applicable for use in AC systems. The AC arc generated upon opening of the contacts will self-extinguish at the zero-crossing of the current waveform, with the vacuum preventing a re-strike of the arc across the open contacts. Vacuum contactors are therefore very efficient at disrupting the energy of an electric arc and are used when relatively fast switching is required, as the maximum break time is determined by the periodicity of the AC waveform. Mercury relay[edit] A mercury relay , sometimes called a mercury displacement relay, or, mercury contactor, is a relay that uses the liquid metal mercury in an insulated sealed container as the switching element. Mercury-wetted relay[edit] A mercury-wetted relay is a form of relay, usually a reed relay , in which the contacts are wetted with mercury. These are not considered contactors because they are not intended for currents above 15 amps. Camshaft operation[edit] When a series of contactors is to be operated in sequence, this may be done by a camshaft instead of by individual electromagnets. The camshaft may be driven by an electric motor or a pneumatic cylinder. Before the advent of solid-state electronics , the camshaft system was commonly used for speed control in electric locomotives. The contacts generally are spring loaded to prevent contact welding. Unlike lower-powered relays, contactors generally have special structures for arc-suppression to allow them to interrupt heavy currents, such as motor starting inrush current. Relays often have normally closed contacts; contactors usually do not when de-energized, there is no connection. Contactors usually have provision for installation of additional contact blocks, rated for pilot duty, used in motor control circuits. Wikimedia Commons has media related to Contactors.

Chapter 3 : Electrical contacts

A contactor is an electrically-controlled switch used for switching an electrical power circuit. A contactor is typically controlled by a circuit, which has a much.

Contact states[edit] Light switch with a normally open contact pair A normally closed NC contact pair is closed in a conductive state when it, or the device operating it, is in a deenergized state or relaxed state. Form A contacts[edit] Form A contacts "make contacts" are normally open contacts. The contacts are open when the energizing force magnet or relay solenoid is not present. When the energizing force is present, the contact will close. Its operation is logically inverted from Form A. Where Form C guarantees that, briefly, both connections are open, Form D guarantees that, briefly, all three terminals will be connected. This is a relatively uncommon configuration. SPDT toggle switches with a center off position are common, but relays with this configuration are relatively rare. When actuated, the moving contact swings left to bridge the gap between the two fixed contacts. Form X or double-make contacts are equivalent to two Form A contacts in series, mechanically linked and operated by a single actuator, and can also be described as SPST-NO contacts. These are commonly found in contactors and in toggle switches designed to handle high power inductive loads. As with forms X and Y, both current paths involve two contacts in series, mechanically linked and operated by a single actuator. Again, this is also described as an SPDT contact. In most cases, the rule is break-before-make or B-B-M; that is, the NO and NC contacts are never simultaneously closed during the transition between states. This is not always the case, Form C contacts follow this rule, while the otherwise equivalent Form D contacts follow the opposite rule, make before break. The less common configuration, when the NO and NC contacts are simultaneously closed during the transition, is make-before-break or M-B-B. Opening voltage rating may be an A. If the voltage is high enough, an arc may be struck even without an inductive load. Regardless of how the arc forms, it will persist until the current through the arc falls to the point too low to sustain it. Arcing damages the electrical contacts, and a sustained arc may prevent the open contacts from removing power from the system being controlled. The problem is more severe with DC where such zero crossings do not occur. This is why contacts rated for one voltage for switching AC frequently have a lower voltage rating for DC.

Chapter 4 : Home - Electrical Contacts Intl.

Repco is the industry-leading source for replacement electrical contacts and contact kits for AC and DC motor controls. For more than 30 years Repco has built a solid reputation for superior product knowledge and customer service.

Reliable contact technology always results from the right combination of different contact properties: To create durable connectors, these properties must be adjusted to each individual application and designed to perfectly fit the respective specifications. It covers extremely durable springwire contacts, high-performance lamella contacts, universal turned and slotted contacts, as well as economically stamped contact solutions for use in large serial production. Termination technology also plays an important role, determining to a major extent the quality of the connection and its durability. Just contact our experts: This technology provides over one million mating cycles. The multiple independent springwire contact elements ensure top contact security and stable, yet low contact resistance â€" even for highly demanding applications. Its minimal power loss enables top performance integration even in the smallest of construction spaces. It has proven reliable even in harsh environments and excels through its extraordinarily robust nature when misalignment occurs on mating â€" no matter how high the mating cycle rate. Even the smallest contact diameters from 0. Optimally designed for automated processing, the most complex geometries can be developed. Thanks to its flexible contact design, it can be tailored perfectly to customer needs â€" while also offering the reliability and durable contacting customers have come to expect from ODU. System solutions, from simple modules to complete assemblies, can be developed, using this contact design. An intelligent crimp termination system ensures maximum flexibility in the tiniest of installation spaces â€" as well as one million mating cycles. Even the smallest of dimensions allow for high contact density. The sophisticated contact technology combined with our surface engineering enable reliable contacting even in the most challenging operating conditions. The ODU product, which we manufacture right down to the cable assembly, guarantees easy installation. A special protection against unintentional mating creates perfect connections. Thanks to the integration of an overmolded sealing element, customers have the additional benefit of shortening the process chain while still achieving IP Optimal functioning, however, can only occur through perfect surfaces. The selective gold-plating we apply is resource-friendly and ensures reliable connecting. Otto Dunkel ODU founder solved classic connection problems 80 years ago, with a simple yet ingenious idea â€" the springwire contact. Countless electrical contacts are still based on this very idea today. Making a connection via multiple contact surfaces, is still the best solution for providing completely reliable and extraordinarily durable connections. The drive to achieve this, together with decades of experience, is what continuously pushes ODU to develop new and innovative connector solutions â€" constantly maintaining the highest attainable standards. Find your ODU contact person here:

Chapter 5 : Electrical contacts for connector systems

For contact theory and engineering information, our Electrical Contact Design Manual is a great resource. Our experience and technologies help designers select the most cost effective alloy and electric contact technology.

Our team of product engineers and designers provide technical support in the areas of part design and collaborative applications engineering. Although we have developed many innovative production techniques in the past, we are constantly developing new technologies to provide our customers with the best part at the best price. Connector Contacts Sub-miniature to large precision stamped parts for a wide array of connector and other complex electronic applications. Parts with tight critical dimensions and cosmetic requirements. Quantities up to millions per week. Our connector contacts and interconnect parts are provided as loose piece or reel-to-reel, high-speed precision stampings and rely on the latest technology in tool and die building â€" from CNC machining to EDM wire cutting. Our dies use the most up-to-date die sensing technology, material handling and automated optical vision systems in order to achieve the highest speeds and most accurate stamping configurations possible. Our stamping dies are guaranteed for the life of the part, including maintenance and component replacement. Rivet Contacts Solid silver or silver alloy cold headed rivets, silver alloy or metal oxide composite rivets made on our proprietary six-station high-speed machines for large volumes, or our two-blow headers for heavier duty contact applications. We can provide cold headed contacts made of fine silver, silver alloys and other precious and non-precious metals. These contacts are ideal for low-volume applications, double-headed contact configurations and small diameter electrical contacts that cannot be economically made as composite rivets. With straightforward tooling designs, these contacts are perfectly suited to quick delivery turnaround and fast prototype requirements. Our proprietary six-station composite rivet machines are the ideal equipment to produce high volume bimetal contact rivets at low cost. Semi-tubular and chamfered shanks are routine for this process. Our HD composite rivets are designed to satisfy mid to high volume requirements for heavier-duty applications. The strongest bond available at an attractive price. Stamped Contacts Precision stampings for electrical switches and relays available in a wide variety of solid materials and precious metal clads. Wire forms and other four-slide parts with simple to complex bends and optimized grain direction for superior performance. Our capabilities in precision stamping, matched with our insert and overmolding processes, offer significant value-in-use for those customers interested in a more integrated design approach. Working with a variety of precious and high-performance specialty metals, we can work with your engineers to construct the most cost effective solution available for your requirement. Using four-slide technology, we routinely craft wire forms and other small parts with complex bend requirements. Two-piece assemblies can be automatically welded in one operation. PEP can also produce stampings and coined tips from a wide variety of precious metal clad or solid materials. These can be produced as round, rectangular or square contact tips, with or without solder backing, for heavier duty electrical contact applications. Furnace and induction brazing to insure quality of the diffused bond. Precious metal solid and clad contact tape for direct welding to base metal strip and then stamping into finished contact assemblies. Solder brazing is accomplished by furnace brazing, induction brazing and other techniques to insure high quality diffused bonds. Tapped holes can also be provided. Full automation permits tight process control or high volume production. Specification plating is also available to provide corrosion resistance and performance enhancement. High energy powder metal contacts:

Chapter 6 : GEMCO MFG: Electrical Contacts, Connectors, Custom Manufacturing.

Electrical Contacts. Brainin is one of the world's leading suppliers of electrical contacts and contact assemblies. Brainin has electrical contact manufacturing solutions for every application, producing composite rivets, solid rivets, laminated welding buttons, powder metal contacts, and other designs to meet all electrical contact requirements.

Materials Contact Material Selection In selecting contact materials for a specific application, the design engineer will have to find the proper balance in material selection that allows the greatest likelihood of success. Generally, as the conductive metal silver or copper increases, contact resistance decreases and electrical and thermal conductivity increase, but contact erosion and contact "sticking" or welding become more of a concern. CTI encourages you to discuss your application requirements with a CTI representative as early in the design process as possible. In addition to aiding in the selection of the material, CTI can tailor the material to suit your application. Adjusting material particle sizes, choosing additives, and altering furnace temperatures all play a role in the final properties of the selected contact material. CTI can help you design the most cost-effective contact. A discussion of the most popular contact materials follows. Silver tungsten is by far the most popular of the contact material families used in circuit breakers and other power switching devices. The superior conductivity of the silver combined with the ability of tungsten to withstand mechanical and electrical wear make this the ideal material for use in oxidizing atmospheres and where severe arcing is anticipated. In addition to varying the composition, CTI engineers can modify the contact material by changing process parameters. This may include changing particle size, furnace temperatures, as well as the addition of additives. Because it is a harder material than silver tungsten, AgWC is more resistant to arc erosion and contact wear. As with AgW, changes in processing will produce varying application results. In some instances, it is advantageous to have a combination of tungsten and tungsten carbide mixed with silver. Copper tungsten and copper tungsten carbide offer low-cost alternatives to silver tungsten and silver tungsten carbide when used in non-oxidizing conditions. Vacuum as well as oil and gas filled devices often use copper tungsten contacts. In air, the material is frequently used for arcing contacts or where there is sufficient contact force to break through the oxides that are inevitably formed. Silver graphite has become a very common stationary contact material and is typically paired with AgW or AgWC. Silver graphite has superior anti-welding characteristics and therefore is a good choice when tack welding is an issue. In addition, silver graphite has excellent electrical conductivity due to the typically high silver content and because of the reducing gas formed by graphite. A much softer material than silver tungsten or silver tungsten carbide, silver graphite has a higher erosion rate. CTI is particularly adept in the manufacture of these materials because of its vast experience in high graphite sliding contacts. Silver tungsten carbide graphite based materials are used in many applications as a replacement for silver graphite. This material is less costly than comparable silver graphite materials and exhibits the positive characteristics of both silver graphite and silver tungsten carbide. When used as a stationary contact, AgWC has good thermal and electrical properties and has minimal contact erosion. This material satisfies applications requiring both the UL and IEC approval, eliminating the need for two versions of a stationary contact. You are invited to challenge CTI with virtually any powder metal material composition.

Chapter 7 : Electrical Contacts & Terminals - Custom Manufacturer | Fotofab

"This is the book you want to own if you design or test electrical connectors or develop devices using switching or arcing contacts. It provides the most comprehensive coverage of electrical contact theory, material selection, and switch design of any book on the market today, covering almost all electrical contacts below 1, V and some vacuum interrupter technology operating above 1, V.".

Chapter 8 : Electrical Contacts | Contact Materials & Assemblies Manufacturers

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Why do thousands of electrical suppliers choose Lanco contact kits and coils?

Chapter 9 : Contactor - Wikipedia

Electrical contacts are used in the temporary connection between electrical devices or components, which can be found pretty much everywhere from a cellphone to the International Space Station.