



# THE H⚡J FAMILY OF COMPANIES

■ SINCE 1969 ■



## Solutions Guide



**USA / HEADQUARTERS**



The H-J Family of Companies is a global leader in the manufacturing and supply of products and solutions to the heavy electrical industry. These components support the transformer, switchgear, regulator, recloser and breaker industries, along with specialties in the utility market.

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## CHINA



Founded in 1969, H-J is headquartered outside of St. Louis, Missouri, USA. The company maintains a global presence with offices operating in Brazil, Canada, China, Colombia, India, Mexico, the Philippines, Spain, Germany, the Netherlands, and throughout the United States, all which allow H-J to serve domestic and international customers. The H-J Family of Companies conducts business in more than 70 countries across all continents. The international operation as well as the multicultural company environment leads H-J to a comprehensive understanding of the challenges of its global customers.

In addition to the two facilities just outside the St. Louis, Missouri area, H-J has manufacturing facilities in Tianjin, China and Leon, Mexico.

H-J employs state-of-the-art manufacturing technology to produce a wide range of insulating components and non-ferrous castings; such as brass, bronze, copper, and aluminum. As an engineered solutions company, H-J has a vast expertise in designing and manufacturing custom products to meet customer needs.

The H-J Family of Companies was founded on the very principles that set it apart today – the desire to supply customers with the highest quality products, delivered on time at a competitive price. H-J is a vertically integrated manufacturer with in-house resources allowing product development from concept to design, through testing and final production. These

## MEXICO



resources include electrical, mechanical & material flow simulation software, full tool & die design and manufacture, and a fully equipped test lab for all electrical, mechanical, chemical & environmental test requirements. Continuous investment in operations and personnel has given H-J a worldwide reputation as a leader in the transformer and switchgear OEM markets.

In addition to component design and manufacturing, the company offers a broad portfolio of products and strategic partner brands serving the transformer and switchgear OEM markets. H-J supplies are not just limited to bushings, connectors, and insulators, but also include fuses, breakers, switches, tap changers, valves, instrumentation and capital equipment for core and winding manufacturing. This is a tremendous advantage for customers that aim to simplify their supply chain process by purchasing all that they need from a single, reliable, established and well-known company.

With thousands of available products in our portfolio, and a willingness to customize solutions for the specific requirements of our customers, The H-J Family of Companies truly is a one-stop source for the transformer and switchgear OEM markets.

***How can we make your life easier?***



# THE H⚡J FAMILY OF COMPANIES



2023 GLOBAL SALES TEAM

## H-J SOLUTIONS PORTFOLIO COVERS A VAST LIST OF PRODUCTS



- Bushings.
- Insulators.
- Connections equipment.
- Mechanical protections.
- Electrical protections.
- Switching.
- Valves.
- Hardware.
- Forging and castings.
- Machinery for transformer OEMs.
- Transformers and switchgears.
- Insulation components.
- Consulting services.
- Testing services.
- And many more!



## SERVICES

We take great pride in our team of highly skilled professionals, who are proficient in a wide array of fields, enabling us to offer an extensive range of services to our esteemed customers.

## MAINTENANCE

The H-J Family of Companies has a certified technical team to provide solutions for retrofits, spare parts, remote technical assistance, preventive and corrective maintenance to ensure our customers can concentrate on their core business.

## CONSULTING

- Protection coordination for distribution transformers (CSP and Pad-Mounted).
- Transformer components selection.
- Transformers production line implementation.
- Recommendation on machines to produce transformers.
- Introduction to Pad-Mounted transformers design, production, and testing.
- Transformers' IEEE standards application.
- Amorphous cores' introduction implementation, including design, testing, and production support.
- Design of distribution and small power transformers up to 50 MVA, 69 kV.
- High-temperature components recommendation for 155°C class transformers in ester oil.
- Failure analysis in transformers.
- Load analysis of transformers in operation, temperatures and loss of life.
- Offer a wide range of standard insulation products for many switchgear applications. We specialize in consultation with OEMs and repair/maintenance suppliers to provide custom insulation product designs to meet the needs of their specific applications.

## TESTING SERVICES

Our laboratory allows H-J to stay in the vanguard of our industry and further advance its product offerings through high quality research and development.

## TESTING CAPABILITIES

- Wet AC withstand.
- Dry AC withstand.
- Radio interference voltage.
- Partial discharge.
- Power factor.
- Impulse.
- Temperature rise.
- Current rating.
- Thermo cycling.
- Tension.
- Compression.
- Quv accelerated weathering.
- Differential scanning calorimetry.
- Thermal imaging.
- Contact resistance.
- Cantilever.
- X-Ray imaging.
- Insulations resistance.
- Glass transition temperature (Tg).
- Torsion.
- Bending.
- Moisture content.
- Density.
- Viscosity.
- Gel time.



# H-J SOLUTIONS



## BUSHING & CONNECTION SOLUTIONS

As the leading bushing manufacturer and worldwide supplier, The H-J Family of Companies offers a complete range of bushing and connection solutions for transformers and switchgear. Here you can find bushings made of porcelain, epoxy, or thermoplastic materials for primary & secondary distribution and power transformers for different final applications, circuit breakers, and switchgear. Our proprietary epoxy insulator materials can operate from -40°C to 155°C, depending on the material selected. This product line includes bushings, terminals & connectors and separable connectors.



## INSULATOR SOLUTIONS

Our switch and bus insulators are available in many sizes and hole configurations. They are also offered in either the NEMA A20 class or the NEMA A30 class strengths. We have the capability to customize products or make proprietary developments according to customer needs.



## PROTECTION SOLUTIONS

The H-J Family of Companies helps you properly size and select the electrical and mechanical protective devices for your transformer designs. From fuse-breaker coordination to buchholz relay and pressure relief valve sizing.

The electrical protection solutions include expulsion & current limiting fuses, breakers, and arresters. In contrast, the mechanical protection solutions include components with or without contacts, such as thermometers, oil level indicators, pressure-vacuum indicators, buchholz relays and much more.



## SWITCHING SOLUTIONS

The H-J Family of Companies offers various accessories for switching & regulating transformers and other electrical equipment.

Load-operated switches & tap changers for de-energized operation are selected according to the voltage level and current magnitude required for the equipment.



## VALVES, HARDWARE & LABEL SOLUTIONS

Our solutions for transformer tank components and switchgear enable our customers to deliver end products that meet technical specifications and improve their productivity. We can also develop custom solutions.



## PRODUCTIVITY SOLUTIONS FOR TRANSFORMERS OEMS

The H-J Family of Companies can provide different lines of machines and tooling for transformers OEMs. Solutions such as: core cutting machines, coil winding machines, cold welders, Oxygen – Hydrogen welding systems can be provided & commissioned by our technical team.



## SERVICE SOLUTIONS

The H-J Family of Companies is well known for always finding a way to provide solutions to the customer's needs; following that line, we offer the following services:

- Testing Services
- CNC Machining Services
- Design of Customized products



## RAW MATERIAL SOLUTIONS

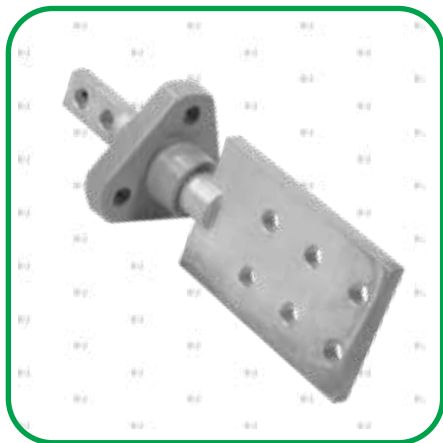
The H-J Family of Companies can source your raw material needs, helping you avoid shortages of critical components.

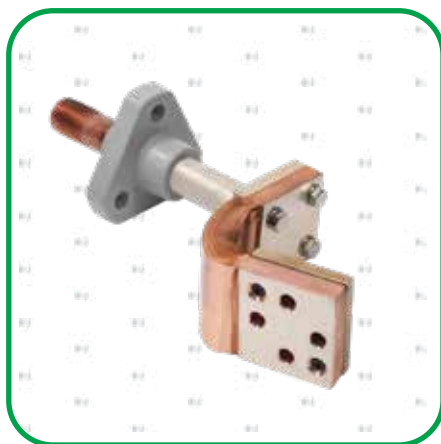


# BUSHINGS & CONNECTION SOLUTIONS









# **BUSHINGS**

## **SOLID/BULK BUSHINGS**

*A bulk or solid type bushing consists of a central conducting rod available in copper or aluminum, which is encased by an insulator. The surrounding insulator can be manufactured from porcelain, epoxy or thermoplastic materials. The general voltage and current ranges are:*



### **LOW VOLTAGE BUSHINGS UP TO 5kV CLASS**

*This product line features a wide variety of bushings designed for use on the low-voltage side up to 5kV class in liquid-filled transformer applications.*

#### **PORCELAIN & THERMOPLASTIC LV BUSHINGS**

The H-J Family of Companies offers voltage classes from 1.2 kV to 5 kV, with basic insulation levels from 30 kV BIL to 75 kV BIL and current ratings from 110 A to 7,500 A. Based on the application, insulator materials are available in epoxy, porcelain, and thermoplastics. Operating temperatures range from -50°C to 150 °C. Internally (threaded shank) or externally clamped designs are available, depending on the application. A wide variety of internal and external terminal connectors like studs with nuts & washers, eyebolts, double eyebolts, spades from 1 to 24 holes and more. Plating is available in tin, silver and nickel, among others. The terminal connectors can be adapted to suit customer requirements for easy installation in existing equipment. Conductor materials are available in copper and aluminum. Just as with our standard Low-voltage Bushings, our metric versions come in similar options.



#### **EPOXY LV BUSHINGS**

This product line is designed for use as secondary bushings in liquid-filled transformer applications. Conductor materials are available in copper and aluminum. For the ones constructed in copper, the bushings are constructed of C110 electrolytic grade copper with silver brazed connections for maximum conductivity.

#### **THERMOPLASTIC LV BUSHINGS**

Bushings used in pad mounted transformers with typical application being a one-hole spade with 5/8" or 1" threaded stud.



# BUSHINGS

## SOLID/BULK BUSHINGS

### HIGH VOLTAGE BUSHINGS UP TO 34.5 KV CLASS

High Voltage bushing assemblies are offered from 8.7 kV to 30/34 kV and from 75 kV BIL to 200 kV BIL.

These bushings are provided with a clamp or a spring grip nut for internal mounting. Different types of terminals can be requested such as eyebolts or spades.

### POWER CLASS BUSHINGS / PORCELAIN

Power class bushings are offered from 8.7 kV to 46kV and from 95kV BIL to 250 kV BIL. These bushings have an integral flange that is used for mounting to the transformer.

### APPARATUS BUSHINGS / EPOXY

This series is made for use in both liquid-filled transformer and switch-gear applications in ambient temperatures ranging from -40°C to 105°C and voltage classes from 5 kV to 46 kV. Constructed of C110 electrolytic grade copper for maximum conductivity. Insulation is cycloaliphatic cast epoxy, rated for enclosed or outdoor applications. The capabilities for customizations in this product line are vast, so please contact our sales representatives.

### AIR TO AIR BUSHINGS

Our Air to Air bushings are offered from 15 kV to 38 kV and from 110/125 kV BIL to 250 kV BIL. These are provided with a clamp for external mounting and a gasket. These bushings have top self-cleaning sheds or skirts, which are designed for outdoor applications. The internal shanks of the bushings are designed with a shed profile in order to maximize creep distances. They will have a semi-conductive glazing where higher voltage ratings apply. A solid copper conductor is mounted through the center of the bushing and sized depending on the current rating required. The conductor is held in place by aluminum end caps at the top and bottom. Each conductor is provided with standard threads at the top and with a 2-hole flattened spade at the bottom. Other conductor options are also available.



# **BUSHINGS**

## **PLUG-IN BUSHINGS / FOR SEPARABLE CONNECTORS**

*Plug-in devices made for easy connection during replacement, testing, or maintenance. A variety of devices can be provided in different materials.*

### **BUSHING WELLS**

200 AMP bushing wells are designed to improve the reliability of padmount transformers. The "Tuf Ex-Well" is the first bolted-design bushing well capable of being mounted directly onto the transformer without the use of a metal clamp ring. The gasketing system features positive gasket stops to ensure controlled gasket compression for maximum seal life.

### **DEADBREAK - INTEGRATED BUSHINGS**

Integrated Bushings meet all requirements of ANSI/IEEE Standards 386 Separable Insulated Connector Systems and combine the advantages of reliable one-piece designs with the operating features required for underground distribution switching. The bushings are designed for Pad-Mounted transformers, switchgear and other apparatus filled with transformer oil. We can provide integrated bushings for 200, 600 and 900 A, all in different materials depending on the applications.

### **SHEDMOUNT BUSHINGS**

Flexibility of design is reflected in the line of "Shed mount" bushings rated 200 AMP and 600 AMP. With the shed mount bushing line, the design variations are unlimited. Electrical Ratings: 200/600 AMP, 8.3 kV through 21.1 kV, 95 kV BIL through 150 kV BIL.

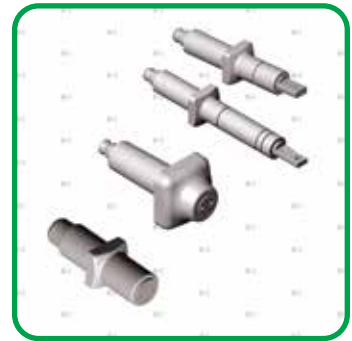
### **TEST BUSHINGS**

Elastomeric test bushings are designed for indoor production line testing, not outdoor or permanent installation. These are not suitable for partial discharge testing and must be kept clean to prevent interface and surface flashover. Use silicone dielectric grease on interface. Installation torque is 180 in.-lbs. max.



## ***CIRCUIT BREAKER BUSHINGS***

Circuit Breaker Bushings are designed for use in new, replacement and retrofit circuit breaker applications. The H-J Family of Companies manufactures a comprehensive library of bushing designs for replacement and conversion applications for virtually all original equipment manufacturers. We specialize in the development of designs for any custom requirement.



## ***PRIMARY BREAKER BUSHINGS***

Primary Disconnect Bushings are designed for use in switchgear applications ranging from 15 kV through 46 kV. All designs are manufactured using Cycloaliphatic Epoxy materials and are capacitive graded. That is, the disconnect bottle houses an integrally cast ground shield and a high voltage shield to control the electrostatic field. The internal shielding provides excellent partial discharge and stable power factor characteristics in comparison to external coatings required on older porcelain designs. Access to internal ground shields is provided through flange mounting inserts or sleeves, eliminating the need for cumbersome external leads. The one-piece design provides rugged performance typically required in primary disconnect applications. H-J specializes in custom development of replacement primary disconnect bottles for obsolete designs from all OEM's.



## ***PORCELAIN INSULATORS FOR BUSHINGS***

We offer a wide range of electrical porcelains from 1.2 kV transformer low voltage insulators to 750 kV flanged insulators used in instrument transformers. Larger pieces are also available upon request. We provide both grey and brown porcelain and both C110 and C120 strengths. High voltage bushings, low voltage bushings, high voltage flanged insulators, power bushings, live front bushings, cutout porcelain, arrester housing porcelain, capacitor porcelain, reclosure porcelain, regulator porcelain, bushings/insulators specifically designed and approved for Mexico, EU/DIN style porcelain insulators.



## ***CT JUNCTION BLOCKS***

CT Junction Blocks are offered in 75 lead configurations. Several body styles are available including internally and externally clamped. Variable lead lengths with end terminations are also available.



# **BUSHINGS**

## **BUSHING HARDWARE**

*Along with the complete assemblies, we offer several individual components as well. The nuts, gaskets, clamps, washers and everything else are all available in most sizes and options needed.*

### **SPRING-GRIP NUTS**

Special spring grip nuts used for internal fixation and internal installation of the transformers bushings for high and low voltage.

### **CLAMPS**

Different types of clamps for the correct installation of bushings can be provided. According to the isolation material or the product lines, we can offer one- or two-piece clamps, round or square, as well as different materials according to customer needs.

### **GASKETS**

For all the bushings provided by us, you can look for the right gasket for a proper seal with our products.

### **NUTS/WASHERS**

As part of the installation hardware, we offer the right nuts & washers for your bushings in case you need more nuts for your installations.

### **ANTI-TRACKING DEVICES**

For use on high voltage transformer bushings in contaminated areas, the Anti-Tracking kit uses springs made of 302 stainless steel with a nickel-plated brass grommet.



# BUSHINGS

## TERMINALS AND CONNECTORS

*The H-J Family of Companies offers a wide variety of terminals & connectors for bushings and tanks, with the capability of customized products in this product line to match or customer's needs. Ground connectors, eyebolts and lead blocks made of bronze, are available in an extensive range of cable sizes, from 10 AWG to 4/0 MCM, with external or internal threads and 2- or 4-way connections. All the terminals and connectors may be tin plated if required.*

### AERIAL LUGS

Also made of bronze, these are available in configurations of cable to flat and stud to cable. The cable range is from 6 AWG to 2,000 MCM, and the stud range is from 5/8" to 4". The flat terminals can be 2 or 4 holes. All the terminals and connectors may be tin plated if required.

### GROUNDING LUGS

Grounding Lugs are offered in many design options such as 2-way or 4-way orientation, internal or external threads, eyebolt or vise style and metric or imperial dimensions.

### SPADES

Our spade terminals are offered in a variety of lengths, widths and thicknesses. Standards run from 2 holes up to 20 holes, but larger sizes are available. We also offer in-line or "G" spade styles, with or without tangs (an anti-rotation device), and imperial or metric dimensions. We can also produce blank terminals without any holes.

### EYEBOLTS / TAP LUGS

It is a type of fastener that has a threaded shank with a circular loop or "eye" at one end. This eye allows for a secure attachment point for various applications.

The eye of the eyebolt can vary in size and shape. Some eyebolts have a plain circular eye, while others might have a more elongated or rectangular shape. This design difference can affect how the eyebolt is used and what kind of connections it can accommodate.



## **FLEXIBLE CONNECTORS**

Different flexible connectors are offered for different applications: flexible links, flexible tinned copper braids, annealed copper stranded wire, laminated shunts and prefabricated braids.



## **LEAD BLOCKS**

Lead blocks are available in aluminum or copper and can be threaded or non-threaded.



## **SET SCREW BARS**

The set screw bars are devices used to make connections to the transformer's bushings with cables of different sizes.



## **SEPARABLE CONNECTORS**

*A wide range of Separable Connectors are offered for different underground or surface applications and even for renewable markets. With voltage ratings depend on the application required and meet IEEE Std. 386 and EN-50180, EN50181 & IEC 60502 for separable connectors.*



## **SILICON GREASES**

Lubricants for test bushings and separable connectors that aid installation and avoiding flashovers.



## **INSERT BUSHINGS**

The H-J Family of Companies provides a wide range of bushing inserts that meet the standard IEEE Std 386, with voltage class ratings from 15 kV to 38 kV. Also, we can provide a feed thru version. This element provides the connection between the wells and the elbows in underground or pad-mounted applications. Voltage ratings depend on the application required and meet IEEE Std. 386 and EN-50180, EN50181 & IEC 60502 for separable connectors.

## **ELBOWS AND T-CONNECTORS**

Load break Elbows and T-connectors are provided to offer a reliable connection at the dead front of the pad-mounted equipment. Current ratings are from 200 to 900 A with voltage class ratings from 15 kV to 35 kV, depending on the interfaces in IEEE Std. and from 250 to 1,250 A with voltage class ratings of 24 kV to 42 kV, depending on the interfaces in IEC Std.

## **SEPARABLE CONNECTORS ACCESSORIES**

Different types of accessories are available to complement underground connections such as caps, standoff bushings, feed-thru inserts, test rods, ground bushings and junction points.



# INSULATOR SOLUTIONS





# **INSULATOR SOLUTIONS**

## **STANDOFF INSULATORS (SWITCH AND BUS INSULATORS)**

Switch and Bus Insulators are used primarily as bus supports in switchgear applications, dry type transformers and other custom applications. This series is available for outdoor and enclosed applications ranging from 5 kV through 46 kV voltage classes and in temperature ranges from -40°C to +105°C. Our insulators are of cast epoxy construction with integrally cast metallic mounting inserts. Mounting configurations are NEMA standard and are available in any insert configuration.

The deep shed design offers generous creep distances. Our conical design provides superior mechanical loading characteristics. The epoxy material is self-extinguishing when exposed to continuous arcing or a constant heat source.



## **THRU WALL WINDOW BUSHINGS**

Wall Bushings are designed for use as bus entrance and cell transition insulation in switchgear applications. Numerous window configurations are available to suit most bus sizes. Wall Bushings can be used in direct mounting to conductive surfaces or in conjunction with other insulating materials for higher voltages. Styles are available for both direct flange mounting by way of through holes in the epoxy insulation, or mounting to GPO panels by way of assembly to the grooved epoxy bushing body. Designs are available for single and dual windows as well as integral three phase designs.



# PROTECTION SOLUTIONS





# PROTECTION SOLUTIONS

## ELECTRICAL PROTECTION

### FUSES

*Fuses are safety devices used to protect electrical circuits from overloading or short-circuiting. They consist of a metal wire or strip that melts when exposed to excessive current, interrupting the circuit and preventing damage to connected devices or potential fires. Once a fuse is blown, it must be replaced to restore the circuit's functionality. Different types of fuses and applications are in the portfolio, including special applications.*

#### CURRENT LIMITING FUSES

The current limiting fuse provides partial-range fault protection. This type of fuse is defined in IEEE C.37.40-2003 as a backup Current Limiting Fuse capable of interrupting all currents from the rated maximum interrupting current down to the rated minimum interrupting current. Since it is a partial-range fuse, another over-current protective device must be used in series to provide protection through the complete range.

#### EXPULSION FUSES

A wide range of expulsion fuses can be provided to complete the range of protection of the transformer in coordination with the secondary circuit breaker or with a Current Limiting Fuse, depending on the application.

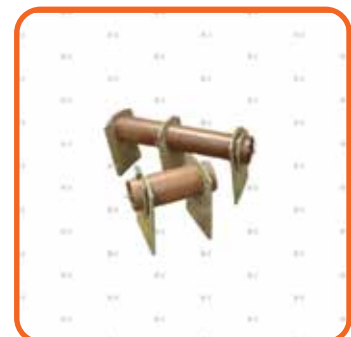
##### Bay-o-net Fuses

Fuse links protect distribution transformers from damaging currents and protect distribution systems from failed transformers.

They are used on single-phase conventional and self-protected distribution transformers rated through 500 kVA, and on Three-Phase transformers through 1500 kVA.

##### Oil Immersed Expulsion Fuses

Expulsion Fuses in oil-filled applications are available in our portfolio for installation with the high voltage bushing.



## ***FULL RANGE FUSES***

A Full Range Fuse is capable of interrupting any continuous current between the minimum current that can cause melting of its elements & its rated maximum interrupting current and this protection is in the same sealed body.

## ***FUSE HOLDERS***

Fuse Holders are devices to support or contain a fuse and to provide dielectric distance between the live parts of the fuse and ground. We provide different four types.

### ***Bay-o-net Fuse Holders***

Used to hold oil-immersed externally replaceable Bay-o-Net expulsion fuses in Pad-Mounted applications up to 23kV, 150kV BIL.

### ***Drip Shield***

These devices are provided to prevent or avoid the spill of oil during the operation of the bay-o-net fuse holder while replacing the Bay-o-Net fuse.

### ***Current Limiting Fuse Holders / Mounting Blocks***

Used to hold oil-immersed non-extractable Current Limiting Fuses in Pad-Mounted applications up to 34.5kV, 200kV BIL.



### **Dry Fuse Holders (Canister)**

A fuse-holder for dry-type or oil-immersed applications used to contain a full range current limiting fuse in pad-mount applications up to 21.1kV. It comes in the following versions:

- ▶ Standard applications up to 21.1kV class, 150kV BIL.
- ▶ Submersible applications up to 21.1kV class, 150kV BIL.
- ▶ Load-break up to 14.4kV 3ph, 95kV BIL and 15.2kV 1ph, 125kV BIL.



### **OTHER FUSES**

*Fuses for special applications can be found through our sales representatives around the world, please reach out for assistance.*

### **Isolation Link**

A Link is used in series with Bay-o-Net type expulsion fuses to provide extra protection during re-fusing operations. They are coordinated to operate at currents that exceed the one-shot rating of the expulsion fuse used in pad or vault type transformers. The isolation link will melt during transformer failure, so the opened primary circuit of a failed transformer cannot be re-energized by the line crew.



### **NH**

NH fuse-links 800VAC were engineered and designed specifically for photovoltaic systems. gR types are full range breaking capacity fuse-links and are used to protect cables and equipment. They can interrupt any fault current, from overloads up to their breaking capacity, and so can be used alone as protection. They are the perfect solution of protection when used with DC/800VAC Solar inverters. This fuse range is offered along with Mersen 800VAC Fuse-switch-disconnectors, for complete fuse-system protection.



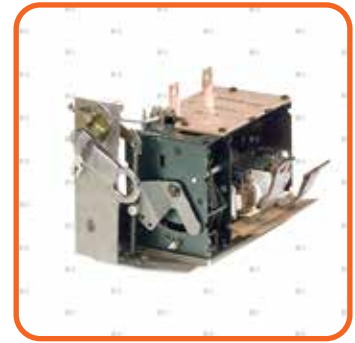
## **LV CIRCUIT BREAKERS AND ACCESSORIES**

*Oil-immersed secondary circuit breakers are designed for use as part of a protection package for either single- or three-phase distribution transformers. The breaker is electrically located between the transformer's low voltage coil and the low voltage bushings to provide protection against overloads and secondary faults.*



## **BREAKERS**

The H-J family portfolio includes single-phase and three-phase circuit breakers for installation on the low-voltage side of CSP type transformers to protect against external overloads and short circuits. These circuit breakers have an indicator light and a lever for external operation. These circuit breakers are coordinated with the expulsion fuses to ensure complete and selective protection. A coordination program is available on our website to select these accessories according to the characteristics of the transformer.



## **OVERLOAD SWITCHES**

Made for use in oil filled transformers, this switch turns on a light, signaling the transformer is overloaded. However, unlike a circuit breaker, it will not disconnect the transformer.



## **OVERLOAD SWITCH LIGHTS**

This element used for visual evidence that the transformer is thermally overloaded. They will remain on until you reset the circuit breaker.



## **ARRESTERS**

*A safety device designed to prevent or limit the potentially damaging effects of sudden voltage spikes or surges in electrical systems, such as those caused by lightning strikes or other power disturbances. It redirects excessive electrical energy away from sensitive equipment, protecting them from damage or malfunction.*



## **DISTRIBUTION ARRESTERS**

A protective device used in electrical distribution systems to safeguard equipment and circuits from voltage surges. It diverts excess electrical energy caused by lightning strikes or other power anomalies away from the distribution network, preventing damage to connected devices and ensuring stable operation of the system.



## ***SUBSTATION ARRESTERS***

They provide protection against voltage surges and transients that can result from lightning strikes, switching operations, or other disturbances in the power grid. These arresters are designed to divert excessive electrical energy away from sensitive substation equipment and transmission lines, preventing damage to transformers, circuit breakers, and other critical components.



## ***Surge Counters***

Surge counters install with the station arrester to monitor the leakage of current over the arrester housing.



## ***UNDERGROUND ARRESTERS***

Designed to provide shielded, dead-front arrester protection for underground systems, the arresters limit over-voltages to acceptable levels, protecting equipment and extending service life.



## ***LOW VOLTAGE ARRESTERS***

Low Voltage Arresters meet light duty distribution class requirements. Its primary application is for protection of the secondary side of a pole or pad type distribution transformers.



## ***OIL IMMERSED ARRESTERS***

Designed to be installed inside a distribution transformer, immersed in an insulating liquid. This arrester can be used when the maximum temperature does not exceed 125 °C, and when the weighted average temperature does not exceed 90 °C. The under-oil arrester is designed to limit surge voltage by discharging the surge current to ground.



# PROTECTION SOLUTIONS

## MECHANICAL PROTECTION

### OIL PRESERVATION SYSTEM

The H-J protect device was developed to be the highest quality with the following characteristics:

- ▶ Minimized fittings for enhanced leak prevention
- ▶ NEMA 3R enclosure with durable ANSI 70 gray powder coating
- ▶ Stainless steel floor for cylinder damage prevention
- ▶ Very flexible stainless steel armored high-pressure hose
- ▶ Check valve on high-pressure hose for easy cylinder replacement
- ▶ Designed to meet IEEE C57.12.10 and C57.148 standards
- ▶ Customizable cabinet design for versatility



### IMPACT RECORDERS

H-J offers an extensive range of products which we adapt to your situational risks, such as monitoring impacts on the equipment transported around the world.

- ▶ SE-MONIOLOG.SDC2
- ▶ SE-MONIOLOG.MSHOCK
- ▶ SE-MONIOLOG.SDC2PLUS
- ▶ SE-MONIOLOG.ENDALS
- ▶ SE-MONIOLOG.ENDAL
- ▶ SE-MONIOLOG.CALIBRATE



### WILDLIFE GUARDS

With the care of wildlife and the safety & reliability of medium voltage electrical systems in mind, The H-J Family of Companies offers a wide range of wildlife guards for use on medium voltage bushings of transformers and other electrical equipment as well as lightning arresters. H-J can help guide you in selecting the wildlife guard that best suits your needs.



### INSTRUMENTS WITH CONTACTS

The H-J Family of Companies offers a wide variety of products for power and distribution transformers, these include protection and measuring devices, that increase the system's stability and confidence in the longevity of the transformer. They protect and limit the risk of damage in the transformer induced by abnormal variations in current, voltage, oil level, temperature, gas generations or entering of humidity.



### ***OIL TEMPERATURE INDICATORS WC***

H-J offers bimetal Thermometers complying with DIN 16160 for oil immersed distribution transformers having either one or two adjustable contacts (normally open or changeover) for alarm and/or trip signals. The thermometer can be mounted through a threaded connection available in 1/2", 3/4" or 1". This device includes a resettable indicator for maximum temperatures with an oil temperature scale from 10°C to 140°C. The thermometer's normal operation conditions have an ambient temperature between -40°C and 70°C. The bimetal thermometer body is made of diecast aluminum and coated with C4 corrosion-resistant powder coating (C5-M available per request) with protection degree IP65.



### ***OIL LEVEL INDICATORS WC***

H-J offers magnetic Oil Level Indicators that comply with DIN 42569 and are available in radial or axial float movements with various float lever lengths depending on the transformer design. Signaling switches are offered in one or two normally open contacts or one, two, or four changeover contacts. The oil level indicator body is made of diecast aluminum and coated with C4 corrosion-resistant powder coating (C5-M available per request) with protection degree IP65.



### ***BUCHHOLZ RELAYS WC***

The Buchholz Relay complies with EN 50216-2, and is available for different pipe sizes (25, 50 or 80 mm), connections (threads, round or square flange) and oil flow rates depending on the size & the design of the transformer. The signaling connection scheme is also eligible for two or four contacts, normally open or changeover type. It is made of diecast aluminum housing with UV-resistant C4 powder coating (C5-M available per request) with protection degree IP65 for the highest level of UV and corrosion resistance. An optional gas sampling device is available to be installed at ground level for easier gas sampling.



### ***TRANSFORMER PROTECTION RELAYS WC***

H-J transformer Protection Relay offers installation in the cover of hermetically sealed oil-filled distribution transformers and reactors, it complies with EN 50216-3 and offers four functions in one reliable device that becomes an excellent cost/benefit solution.

The transformer Protection Relay is capable of measuring oil temperature, indicating oil level and gas accumulation and detecting the internal pressure when exceeding a set limit. All variables have contacts for signaling.

The relay features a diecast aluminum housing with UV-resistant C4 powder coating (C5-M available per request) with protection degree IP65 for the highest level of UV and corrosion resistance.



## INSTRUMENTS WITHOUT CONTACTS

*The H-J Family of Companies is pleased to offer an extensive line of Instrumentation (Thermometers, Pressure Vacuum Gauges & Liquid Level Gauges). This line of instrumentation enhances H-J's ability to offer a complete package of components and accessories to our valued customers. Each instrument is made to H-J's exact specifications and is in full compliance with all existing industry standards including IEEE and ANSI. Extensive QA procedures ensure the accuracy and quality of*

### **OIL TEMPERATURE INDICATORS W/O**

H-J thermometers are made for indoor or outdoor applications. The system, case & bezel are all made of stainless steel. The thermometer mounting thread and standard well are constructed of brass. Clear, molded polycarbonate is used for the lens. Magnetic coupling is used to reset the maximum indicator, which maintains the unit's seal. Each thermometer comes with a thermowell that mounts onto the transformer tank, making an oil-tight connection. Both long and short stem thermometers and wells are available.

### **VACUUM/PRESSURE INDICATORS W/O**

H-J Vacuum Pressure Gauges offer extended years of service life in both indoor and outdoor environments. Corrosion resistant materials are used on all internal mechanisms for prolonged protection. A 3-1/2" dial with white characters on a black background makes reading easy. In addition, a breather hole on the bottom of the case allows the gauge to function accurately while being exposed to constant atmospheric pressure.

### **OIL LEVEL INDICATORS W/O**

The H-J "Dual Mount" Liquid Level Gauge is composed of a dial face with minimum and maximum markings. The internal float and external indicator are separated by a solid hermetic seal and are linked and operated by means of a magnetic field, eliminating any possibility of leaking. The dial face has a black background with white indicator and characters for clear visibility. The "Dual Mount" feature allows the Liquid Level Gauge to be externally or internally mounted. For external mounting it features a flange with 4 holes on a 2-1/2" bolt circle, suitable for use with 1/4" weld studs, providing interchangeability with other leading brands. The gauge can also be mounted internally by means of a threaded case design using a standard steel hex nut. Mounting requires a standard Tap Changer, DV Switch or LBOR Switch hole. This feature eliminates the need for welded studs and the use of backup flanges, thus reducing cost and installation time. A Buna-N gasket is provided for an adequate seal. Both bent float and straight float versions are available.



### **Features:**

- ▶ For use on new or retrofitted units
- ▶ External or internal mounting
- ▶ UV stabilized polycarbonate lens
- ▶ Aluminum & brass components
- ▶ Easy to read dial with white characters on black background
- ▶ Indoor and outdoor Applications

### **DEHYDRATING BREATHERS W/O**

The dehydrating breathers comply with DIN 42567 and 42562, and they are available from 0.5 to 4.8 kg for an approximate volume of 600 – 5,400 Gal with different mounting types. Housing parts are covered with UV-resistant C4 powder coating (C5-M available under request).

## **TRANSFORMER COOLING FANS**

*Cooling solutions are offered by request for medium and large distribution transformers. Different technologies can be reviewed according to the customer's needs.*

### **AC FANS**

Axial fans developed with asynchronous motors, they have upgraded efficiency and low noise that offer the customer a proper solution.

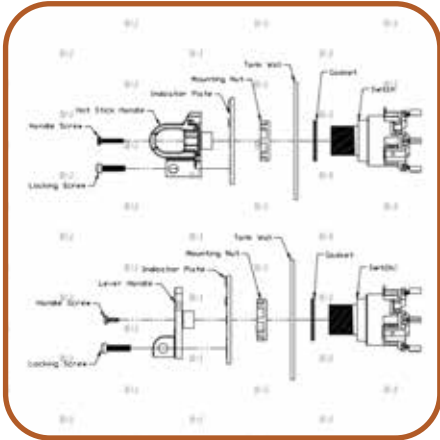
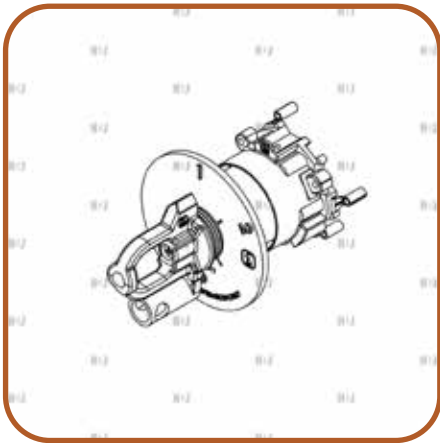
### **EC FANS**

EC Fans meet higher technological requirements to reduce noise, energy consumption and rates of usage.



# **SWITCHING SOLUTIONS**





# **SWITCHING SOLUTIONS**

## **SWITCHES**

### **DUAL VOLTAGE SWITCHES**

Our portfolio has these accessories that can be used for voltage change in transformers with dual voltage in the medium voltage winding. These two-position Dual Voltage tap changers, which can be operated without voltage, can be used in 1-, 2- or 3-phase systems, with series voltages up to 35 kV, BIL 150 kV and current capacities up to 300 amperes.

### **LOADBREAK SWITCHES**

These two-position, load-operated switches can be used for wall mounting on pad mounted transformers or cover mounted on submersible transformers. Available for single-, two-, or three-phase systems, with voltage ratings up to 38 kV, BIL of 150 kV and current capacity of 300 amperes.

### **ARRESTER DISCONNECT SWITCHES**

The device is designed for use in transformers equipped with an internal under-oil arrester and is used to disconnect when testing.

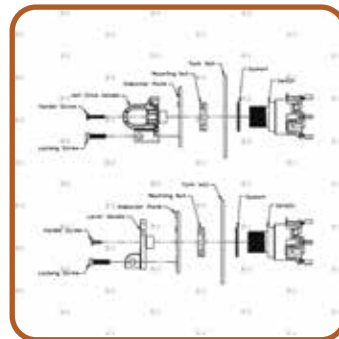
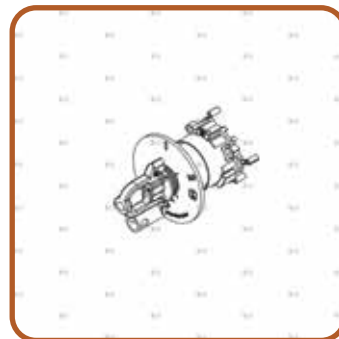
### **SPECIAL APPLICATION SWITCHES**

When your designs require a non-standard switch, let our sales team know, and we'll help you to find the solution you need.

### **SWITCHES ACCESSORIES**

All the accessories you need to replace such as nameplates, gaskets, and others.

1. Hot Stick Handle
2. Lever Handle
3. Handle Screw
4. Locking Screw
5. Indicator Plate
6. Mounting Nut
7. Gasket



## **DE-ENERGIZED TAP CHANGERS**

### **ROTATIVE TAP CHANGERS**

The H-J Family of Companies has a broad portfolio of de-energized tap changers with a variety of possibilities to be used according to customer needs. With voltage levels up to 38 kV, BIL 200 kV and maximum current ratings up to 300 amps (6 decks parallel applications). Available from 1 to 7 decks, these tap changers are used in distribution transformers with normal and special applications. We have all the knowledge and experience to advise you on the use of this product.

### **LINEAR TAP CHANGERS**

Our Linear Tap Changers are available in six different types that cover a range from 5 to 63 kV, 75 to 325 kV BIL, from 10 to 1,250 A, and from 2 to 11 positions, with connection diagrams Delta, Star, Series-Parallel coupling, Star-Delta Coupling and others.

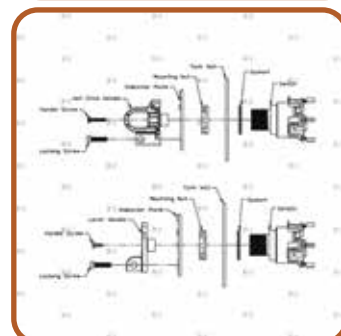
### **SPECIAL APPLICATION TAP CHANGERS**

When your designs require a non-standard tap changer, let our sales team know, and we'll be happy to help you to find the solution you need.

### **TAP CHANGERS ACCESSORIES**

All the accessories you need such as nameplates, gaskets, handles and others.

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# **VALVES, HARDWARE & LABEL SOLUTIONS**





# VALVES, HARDWARE & LABELS SOLUTIONS

## VALVES

### DRAIN VALVES

The H-J Family of Companies maintains a large inventory of Drain Valves & Accessories and can provide a variety of custom-manufactured valves for transformer & switchgear applications. Valves can be ordered with "custom" installed pipe plugs, nipples and flanges.

In addition, H-J can furnish various pre-applied thread sealers and thread lockers on the valves, plugs and nipples. Among these products are; Vibra-Seal 516 from Loctite Corporation, SAF-T-LOK S90 from SAF-T-LOK Chemical Corporation and others.

### GLOBE DRAIN VALVES

The brass body globe sampler valves are designed for sampling, filling, or draining coolant from an electrical apparatus. The Drain Valve with Sampler has an integral sampling device on the outlet side of the valve. All gaskets throughout the valve are "Viton" for compatibility with all insulating fluids. The large port opening ensures minimum flow resistance. Drain Valves with Samplers are available in 1" and 2" sizes and are rated at 200 lb. WOG. Drain Valves are also available in stainless steel.

### SAMPLING DEVICES

The Sampling Device has a protective cap. When the cap is removed, a fitting on the drain outlet controls flow for taking a coolant sample either directly from the sampler, or a hose extension may be attached to the 5/16" male thread on the end of the fitting. The inlet is 3/8" thread.

### OTHER DRAIN VALVES

Other types of drain valves according to applications can be reviewed by our sales team in your regions.



## **SCHRADER VALVES**

Its main application is in pad mounted transformers and hermetically sealed transformers with a gas cushion. Normally installed on the oil filling plug or the oil filling valve, it is used to pressurize the transformer with air or nitrogen after the oil filling process.

## **RADIATOR VALVES**

Radiators Valves are designed to allow the cooling liquid's flow while transporting oil-filled transformers or during repairs or replacements. When the valves are in the open position, they easily allow the transformer's refrigerating liquid to flow to and from the radiators with little resistance. These valves are also used with the Buchholz relay to allow for its disassembly in case of replacement or maintenance.

## **TANK & ENCLOSURE HARDWARE HINGES**

As a complement for some Pad-Mounted transformer manufacturers, we offer Hinges and Hinge Pins, with the possibility to customize them.

## **LATCHES & PENTABOLTS**

Latches and Pentabolts for pad mounted transformers can be provided according to the standard models we have or customized in those cases with unique dimensional requirements.

## **TANK PLUGS**

We offer a 3 in 1 interchangeable Tank Plug that is designed to fit three different tank hole sizes. It can be used in lieu of filling a gap or void after removing a low voltage bushing, tap switch, etc. This concept helps eliminate the necessity to stock three different tank plugs. They are constructed of aluminum and furnished with the mounting cup, bolt and gaskets. The common tank hole sizes for this plug are: 1.06", 1.295", 1.437".



## PIPE PLUGS

Used as additional accessories in the drain valves, pipe plugs can be offered in brass or stainless steel in sizes of 1" or 2", NPT.

## TRANSFORMERS WHEELS

Our transformer wheels in accordance with DIN42561/EN50216-4 are used for distribution transformers. Types and diameters available are:

- Flat and rail type wheels: 125, 160, 200 mm
- Solid type wheels: 50, 70, 80, 90 mm
- Load capacity available from 1,200 up to 6,000 kg.

## LABELS & DECALS

Labels and Decals are a very important feature of your transformers. As such, our industrial decal and label manufacturer is known as one of the world's leading harsh environment decal producers, offering the highest quality product in the industry. They have invested years in combining the best inks, adhesives, materials, and laminates to make the best decal for your specific needs. Long-lasting outdoor durable decals are made to meet the demands of a rugged world.

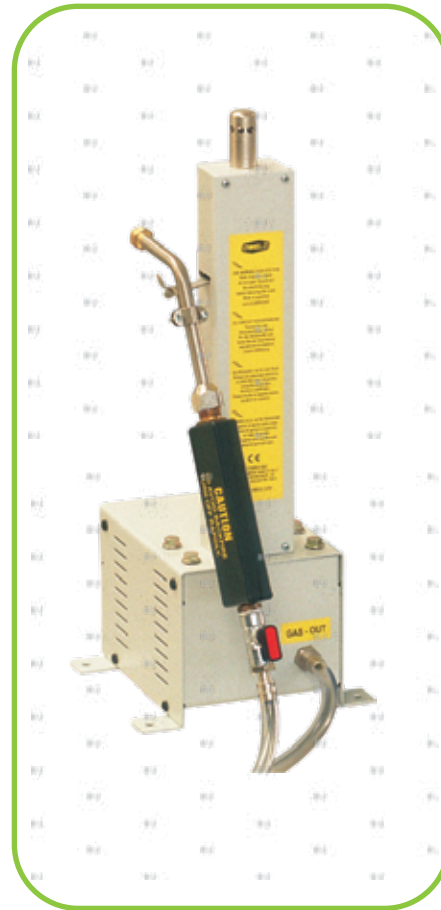
## TRANSFORMER OIL LEAK REPAIR

We offer effective solutions for leakages in the field to apply in small gaps, irregular surfaces and big surfaces; cured in 24 hrs.



# PRODUCTIVITY SOLUTIONS FOR TRANSFORMERS OEMs





# PRODUCTIVITY SOLUTIONS FOR TRANSFORMERS OEMs

## CORE PROCESSING EQUIPMENT

### UNICORE CORE MACHINES

To improve the efficiency of transformer core technology, we are offering the best solutions for producing wound cores, Unicore, widely used in distribution and renewable energy transformers.

### WOUNDED CORE CUTTING MACHINES

- Single and Three Phase
- Low Destruction Factor Cores
- DUO Cores
- Distributed Gap / DG Cores
- Cruciform
- Stepbutt
- Butt Cores
- Gapped Cores
- Uncut Core
- Straight Laminations
- Toroidal cores
- Includes Decoiler & Dust Collection System

### COIL-CORE ASSEMBLY TABLES

Core-coil assembly table (up to 10,000 lb). Mitre stacking table (3, 5 & 10 Ton).

### CORE PRESSES

Core Presses form wound DG Cores with internal spreaders to control inside dimensions.

### STACKED CORE MACHINES

Full sequential cutting and precision stacking up to 30 segments, 50 to 600 mm steel width and 0.2 to 0.35 mm thickness. E & I stacking core is optional. Computer-controlled system with 16-inch wide industrial touch screen HMI. Production rate P20 stacker 25-40 sheets/min. Max sheet length 3,500 mm from centerline.

MPS600. Cut to length 90 degrees machine, progressive length, punch and dual strip modes. Up to 130 pcs/min..



### **STEP-LAB 45 DEGREES CORE CUTTING MACHINES**

Full sequential cutting and precision stacking up to 30 segments, 50 to 600 mm steel width and 0.2 to 0.35 mm thickness. E & I stacking core is optional. Computer-controlled system with 16-inch wide industrial touch screen HMI. Production rate P20 stacker 25-40 sheets/min. Max sheet length 3,500 mm from centerline.



### **STACKED / 90 DEGREES CORE CUTTING MACHINES**

MPS600. Cut to length 90 degrees machine, progressive length, punch and dual strip modes. Up to 130 pcs/min.



### **STACKING CORE STATIONS**

Miter Core Stacking Tables available up to 10 tons including integrated hydraulics for upending the assembly.



### **SINGLE PHASE CORE TESTING STATIONS**

Core tester for single phase and Toroids. 50, 60 and up to 400 HZ, flux density up to 1.8 Tesla. C.R.G.O, NiFe and amorphous material steel. Core degaussing, testing database. Min ID 40 mm, Max OD 520 mm. Max core mass 600 kg.



### **COIL PROCESSING EQUIPMENT**

#### **LV AND/OR HV WINDING MACHINES**

Foil, round (30-7 AWG), square wires (up to 6 wires total), and up to 6 rolls of insulation. Coil scanner and close loop tensioning system. Computer-controlled system with 16-inch wide industrial touch screen HMI, fully automatic wire winding with gradient insulation. IoT/Industry 4.0 ready. Following arm for foil winding machine.

## MANDRELS

Winding mandrels (rounds, square and expandable).

### ROUND MANDRELS

For distribution and power transformer coil manufacturing, we count on heavy-duty expandable winding mandrels capable of handling diameters from 6" (150 mm) to 50" (1,270mm) and coil lengths up to 135" (3,430mm).

### RECTANGULAR MANDRELS

Two- and four-way expandable mandrels, for integration with winding machines, are designed to accept a variety of forms allowing rectangular, square, and obround coil constructions.

## TOOLING FOR WINDING MACHINES

Solutions are available as stand-alone or can be integrated to already existing machines.

- ▶ Pull thru wire flattener
- ▶ Loop wire bender
- ▶ Multi wire bender

### WIRE FLATTENER

This simple, compact 2-way wire flattener can easily be installed on any round wire winding machine. A typical reduction of 20 to 25% in cross-sectional area is attainable. Custom mounting arrangements are also available. The pull thru wire flattener is suitable for round wires ranging between 0 up to 5mm.

### WIRE BENDER

The Multi Wire Bender is designed to assist machine operators with the process of bending multiple rectangular wires at the same time as part of the coil winding process. The wire bender is suitable for bending wires 45 or 90 degrees (or at any other position) for terminations.



## CORE/COIL ASSEMBLY TABLES

Streamline your operations with our precision-engineered Core-Coil Assembly Table, purpose-built to manage weights of up to 10,000 pounds. This robust solution optimizes your workflow and ensures seamless assembly processes. Elevate your efficiency with our Mitre stacking Tables, expertly designed to accommodate weights of 3, 5, and 10 tons. These tables are meticulously crafted to meet the demands of heavy-duty stacking tasks, providing a reliable foundation for your industrial needs.

## BRAZING & WELDING SYSTEMS

### PORTABLE COLD WELDER SYSTEMS

Cold welding represents an easy, clean and repeatable process for joining materials in the manufacturing of transformer coils.

The technology allows for the joining of similar and dissimilar materials (Cu to Cu, Al to Al, and Al to Cu) in a foil – lead or lead – foil application.

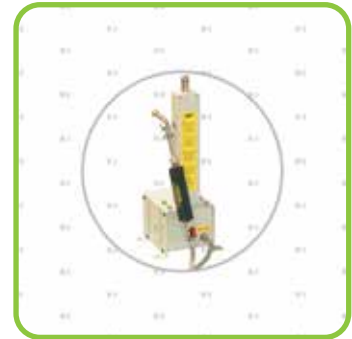
Typical materials joined range from 2 to 15 mm in combined thickness. MTM also offers integrated cold-welding solutions in our winding machine designs.

### OXYGEN-HYDROGEN SYSTEMS

- ▶ Distilled Water as Fuel
- ▶ No Storage of Gas
- ▶ Multi-Operator Setups
- ▶ No High Pressure Tanks
- ▶ Easy to Use / Fully Automatic
- ▶ Safe Operator System
- ▶ Gas generated develops very high temps (3650 C) and can braze all non-ferrous materials quickly compared to traditional systems.
- ▶ Gas produced is perfectly mixed and does not required operator adjustment.

### ROBOTICS WELDING

We offer custom robotic controlled welding solutions.



## ***RADIATORS PRODUCTION LINES***

Elevating productivity in radiator manufacturing for transformer and radiator manufacturers. Unlock transformative solutions designed to elevate productivity within the intricate realm of radiator manufacturing. We specialize in empowering transformer and radiator manufacturers with cutting-edge advancements redefining efficiency and precision. Our expertise lies in crafting tailor-made solutions calibrated to meet the specific demands of radiator lines. Whether you're engaged in transformer manufacturing or dedicated to radiator production, our offerings are engineered to seamlessly integrate into your processes, enhancing every facet of your operations.

## ***CUSTOMER CARE FIELD SERVICES***

The H-J Family of Companies has a certified technical team to provide solutions for retrofits, spare parts, and technical assistance including preventative and corrective maintenance. H-J is proud to offer services of:

- Commissioning
- Maintenance
- Training
- Trouble shooting

## ***SPARE PARTS***

The H-J Family of Companies can provide assistance to identify needed parts and recommend spare parts packages we keep on hand many common machine components ready to ship as needed.

## ***RETROFITS***

The H-J Family of Companies offers recommendations to improve and retrofit many older machines to modernize and improve longevity and functionality.

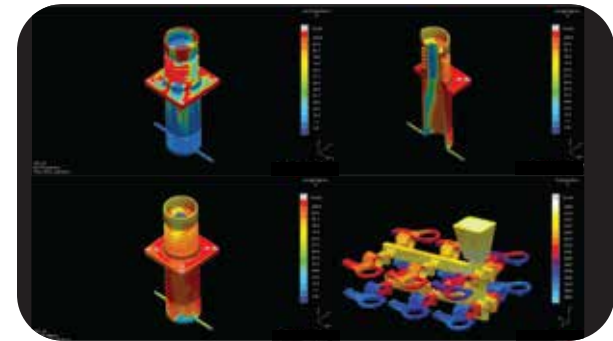
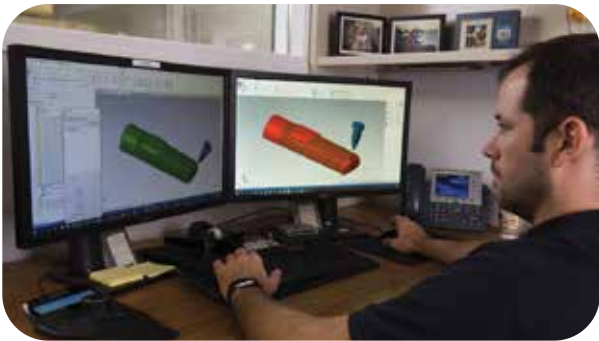
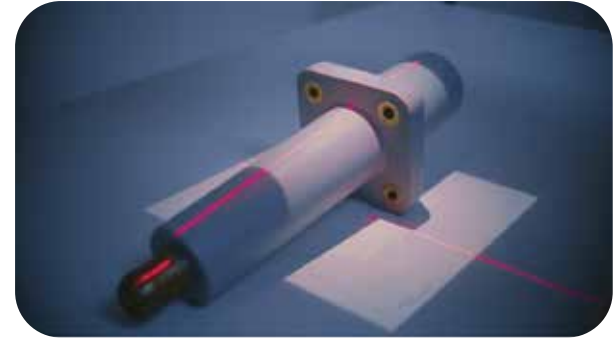
## ***REMOTE ASSISTANCE***

The H-J Family of Companies can provide remote assistance for troubleshooting machine problems and issues.

# **SERVICE SOLUTIONS**







# **SERVICE SOLUTIONS**

## **TEST LABORATORY**

### **ELECTRICAL TEST**

- ▶ *Contact Resistance: 10-200A DC*
- ▶ *Insulation Resistance: 5kV DC*
- ▶ *Partial Discharge: 0-125 kV*
- ▶ *Power Factor: 10 kV*
- ▶ *Impulse: 600 kV*
- ▶ *Current Rating: 0-20,000A Single Phase (4-10 kV Secondary)*
- ▶ *Wet AC Withstand: 0-350 kVAC*
- ▶ *Dry AC Withstand: 0-350kVAC*
- ▶ *Radio Interference Voltage: 0-125 kV*

### **THERMAL TESTS**

- ▶ *Thermo Cycling: -70°C - 170°C*
- ▶ *Thermal Imaging: -20°C - 650°C*
- ▶ *Glass Transition Temperature (Tg): -20°C - 650°C*
- ▶ *Differential Scanning Calorimetry (DSC): -70°C - 600°C*
- ▶ *Temperature Rise: 0 - 20,000A Single Phase (4 - 10V Secondary)*

### **MECHANICAL TESTS**

- ▶ *Compression: 300 - 30,000 lbs*
- ▶ *Cantilever: 300 - 30,000 lbs*
- ▶ *X-ray Imaging: Digital Panel*
- ▶ *Tension: 300 - 15,000 lbs*
- ▶ *Torsion: 300 - 30,000 lbs*
- ▶ *Bending: 300 - 30,000 lbs*

### **ENVIRONMENTAL TESTS**

- ▶ *QUV accelerated weathering: UVA - UVB irradiance control with condensation*

### **CHEMICAL LABS**

- ▶ *Moisture Content: For solid by weight differential*
- ▶ *Density: For liquids*
- ▶ *Viscosity: Viscosity profile vs temperature for liquids up to 100,000 cPS*
- ▶ *Gel Time: For polymers up to 500 F*



## ***DESIGN OF CUSTOMIZED PRODUCTS***

The H-J Family of Companies understands the dynamics of the industry and puts all the efforts and knowledge of its engineers into developing products and solutions tailored to your needs. Contact us, and we'll work together to build your projects.

## ***CNC MACHINING SERVICES***

The H-J Family of Companies utilizes state-of-the-art CNC machines and technology in the manufacture of our products to achieve the highest accuracy, precision and finish. We can put that same capability to work fulfilling your needs. Please reach out to us, and we'll contact you.

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# **RAW MATERIAL SOLUTIONS**



# RAW MATERIAL SOLUTIONS

## ALUMINUM & COPPER CONDUCTORS

### BUSBAR

- ▶ *Copper: Various sizes available*
- ▶ *Aluminum: Various sizes available*

### FOIL

- ▶ *Copper strips: Various sizes available*
- ▶ *Aluminum strips: Various sizes available*

### WIRE

- ▶ *Distribution & control core transformers machine.*

## AMORPHOUS CORE

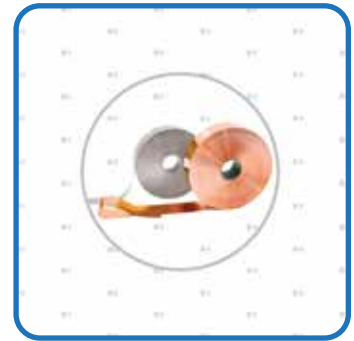
H-J is offering, for oil immersed and dry type transformers manufacturers, the option to optimize total owning cost with the use of Amorphous Core designs. Cores are manufactured from the proven Metglas Inc materials 2605A1 or 2605 HB1M, for the product quality consistency to meet the most stringent efficiency standards in today's transformer markets.

### 1. Oil Immersed

- ▶ Up 35kV; 5,000 kVA
- ▶ Single phase pole or pad mounted.
- ▶ Three phases, three leg or five leg core construction.

### 2. Dry type

- ▶ Up 35kV; 6,500 kVA (3 layers, 6.5 MT)
- ▶ Three phases, three leg or five leg core construction.





## OUR PROMISE

With our portfolio of solutions and services,  
The H-J Family of Companies will simplify the lives  
of our customers. We are committed to being creative,  
innovative, competitive, hardworking, ethical and responsive  
while providing outstanding customer service  
through our talented team.

**The H-J Family of Companies is proud of our  
"Quality Products of International Reputation."**

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