

# Electrical

## Products & Solutions™

December 2020

*The Purchasing Guide for Electrical Contractors*

[www.epsmag.net](http://www.epsmag.net)



# SP PRODUCTS, INC.

*Productivity and value thru ideas*

**Proud to be the Electricians' Friend for Over 50 Years!**

## IP26 Flat "Big O"

### Box Support Plate



SAVES OVER 1 HOUR PER INSTALLATION

### Prefabricated Assemblies

SAVE More Than \$15.00 per Wall Outlet

PFA3



## IP11

### Trapeze Brackets

Original EZUTB - Size 1/2" thru 1 1/4" Conduit or equal size MC Cable.

SAVE OVER 20 MINUTES PER FOOT

TRAPEZE Eliminates ALL Conduit Clamps!



PATENTED

NECA SHOW STOPPER 1997

## IP28a

### 2 Box Flat Fixed Position



Strong 16 Gauge Galvanized Steel



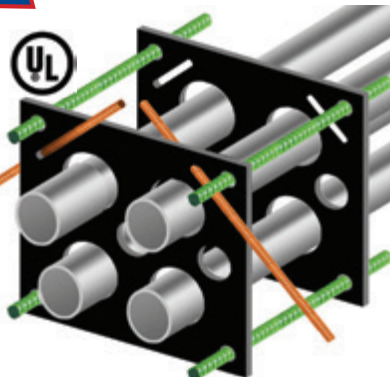
Mount Boxes on Both Sides or Between Studs

## IP1

### QwikDuct HDPE CUSTOM TEMPLATES

LOWER CONDUIT FROM ABOVE  
NO WORKERS BELOW PREVENTS INJURIES OR DEATHS  
4,000 PSI TENSILE STRENGTH AT BREAK  
OVER 12X FASTER THAN SPACERS & CHAIRS

PATENT PENDING  
NECA SHOW STOPPER 2000



## Conduit & Box Support Plates

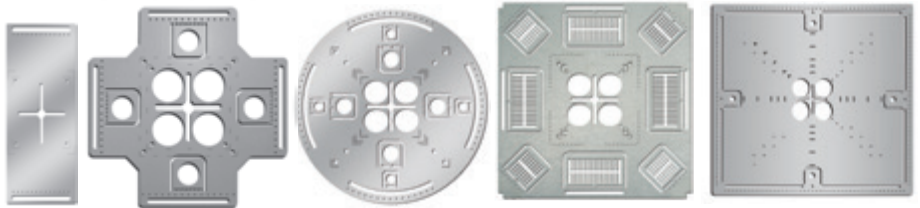
IP5  
PATENTED

\* IP6  
PATENTED

\* IP6c  
PATENT PENDING

\* IP7  
PATENTED

IP8  
PATENT PENDING



Support From Only ONE Rod Plus Eliminates Conduit Clamps  
Save More Than One Hour per Installation! \*

## IP13a-13h

### Transition Couplings



Sizes 1/2" thru 6" Schedule 40/80 Conduit

## IP15

### 1 Piece Reaming Bit

PATENT PENDING

1/2" thru 6"

High Speed Steel for Long Life.

## IP19 4-Conduit Block

PATENTED

Support up thru 4 conduits From ONLY 1 ROD!

SAVE OVER 30 MINUTES PER INSTALLATION



IP21a  
PATENT PENDING

### QwikBlock Box Support

NEW



Accepts Both 1/4" & 3/8" Threaded Rod

Installation in Less Than 5 Minutes

- Use For Entire Job -  
Not Just for Repair!

NEW

### Snap-ON Adjustable Back Box Support

IP18a

PATENT PENDING



## IP3a

### End Bell Adapter



Smooth Edges Allow Trouble Free Wire Pulls.  
PVC Schedule 40 & 80  
Sizes 1/2" thru 6"

## IP3b

### PVC Offset

1/2" thru 6" Conduit  
1/2" thru 2" Offset

PATENT PENDING



Plus More That Do Jobs **SAFER BETTER FASTER** Constantly Being Invented!

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LIGHTING SOLUTIONS. **SIMPLIFIED**

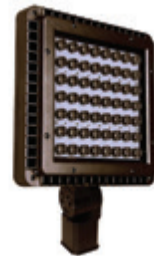
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# Generator InterLock Technologies, LLC

**Generator InterLock Technologies, LLC**, is a small-based company that manufactures and sells its products across the country. The company was founded after Hurricane Isabel hit the east coast in 2003. The product was developed to meet the need for a safe way to use portable generators to power homes in the event of power loss.

The initial inspiration for the product came from a persistent friend of an electrician working for Master Electrical Services. As electrical contractors, they had seen various unsafe and illegal methods that people had used to try to power their houses with their portable generators. The electrician set out to develop a product that would meet National Electrical Code requirements and at the same time be cost effective and convenient for the homeowner. From that original inspiration came a new company: Generator Interlock Technologies or GIT.

The Interlock Kit is a simple safety product that locks out the Main breaker in the existing home panel and allows for the portable generator to power the home through a back feed generator breaker. While many electrical inspectors liked the product; they all agreed that the product would have to be listed to UL standards. After thousands of dollars in fees, rigorous tests, a year of changes and modifications, the Interlock Kit was finally approved for production to be used with panels listed under UL Standard 67.

The company started filling orders in early 2005, using Master Electrical Services as its basis for customer awareness.

Starting with a few kits that fit the most recent Square-D and Cutler Hammer panels, the offerings grew to over 30 different models in less than one year. Generator Interlock Technologies now has kits for panels from 30 years ago to the most current and they continue to add new kits to meet their customer's needs. While contractors in Florida and the North East are the biggest customers, Interlock Kits have been sent throughout the United States and parts of Canada. Whether the power loss is due to coastal hurricanes or from crippling ice storms in the northern , GIT has a kit that will allow customers to keep the power on in their homes.

The Interlock Kits are designed to be installed by licensed electricians and are cost effective for both the customer and the installer. Other products on the market such as generator sub-panels and transfer switches require extensive rewiring of the home panel, often taking the electrical contractor 6 to 8 hours to install. With the Interlock Kit, a qualified electrician can install a complete system in 2 hours or less by simply mounting the correct kit to the face of the panel and wiring a gen-



erator convenience outlet to a breaker installed in the panel.

To use their portable generator, a homeowner plugs an extension cord from their generator to the new generator convenience outlet. He then starts the generator, turns off the main breaker, slides the Interlock Kit, turns on the generator breaker and selects the circuits for use up to the capacity of the generator.

Generator Interlock Technologies' Kit is a defining safety product that has been recognized as a Innovation Award Winner by *Electrical Contracting Products* magazine and one of the Top Products by *Electrical Products and Solutions* magazine.

Generator Interlock Technologies, LLC, has taken a problem of safety and convenience and developed a system to keep danger and expenses to a minimum. Starting with an idea of helping a friend in need, to helping thousands across the country, GIT continues to grow due to its commitment to deliver a quality product. Visit [www.interlockkit.com](http://www.interlockkit.com) for a complete list of products and details. □

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***With the Interlock Kit, a qualified electrician can install a complete system in 2 hours or less by simply mounting the correct kit to the face of the panel and wiring a generator convenience outlet to a breaker installed in the panel.***

---

# INTERLOCKKIT

A Generator InterLock Technologies Product



## Generator InterLock Technologies

**Quickly & Safely Connect  
Portable and Standby Generators to  
Home Panels with the INTERLOCKKIT**

**Advantages over existing options include:**

- Quick installation that provides the contractor and consumer with less cost.
- Our kits allow you to safely and legally use generators to feed the existing panel, permitting quick and convenient use of all original circuits.
- InterLock Kits retrofit to any existing panel and require no additional wall space.
- Tested for use with UL 67 Listed Panelboards  
Ref. Wyle Laboratories Test Report T52431-01
- Same day shipping available on all models.

**Quick installations make you more money.  
Do yourself and your company a favor and  
learn more about the InterLock Kit today!**



**To order or learn more about the INTERLOCKKIT  
visit us at [www.interlockkit.com](http://www.interlockkit.com) or call 804-726-2448**

# Protect Yourself

## Miller Safety Consultants — *A Leader in Arc Flash Protection*

**Vince Miller started Miller Safety Consultants**, a veteran owned business in 1999. The goal of the business was to provide cost effective safety consulting, employee training such as: confined space entry, fall protection, electrical safety and provide sales of electrical shock and flash protective equipment and fall protection equipment to businesses in the Washington DC area.

Reliance Industries provided fall protection products and much of the sales and training was on behalf of the supplier. In 2000, the owner decided to retire from his business, and Vince decided to discontinue the fall protection line of his business and concentrate more in the electrical training and products.

Vince had been a distributor for Certified Insulated Products (CIP), a manufacturer of electrical insulated tools and electrical arc flash clothing manufactured by Otex in Rochester, New York. As a distributor, Vince provided sales through his internet website and much through relationships with electrical contractors. His training was a classroom environment and was provided directly to customers but he also taught as a sub-contractor for other safety consulting companies and the

Chesapeake Safety Council in Baltimore, Maryland. In 2005, Vince partnered with Vivid Learning Systems in Cascades, Washington to provide on-line training in safe work practices.

Training in electrical safe work practices is still provided locally in the Washington DC area and as a partner with an electrical engineering firm and online. The training is based on the Occupational Health and Safety Administration (OSHA) standards and the National Fire Protection Association (NFPA) 70E standard.

Miller Safety Consultants is now a distributor for Cementex USA, Burlington, New Jersey, for insulated tools and equipment and clothing from OTEX Protective, Rochester, New York.

The majority of his sales of products are from the web-based store. Cementex is

nationally known for their quality equipment. Otex Protective is becoming more known for their quality clothing. For years, they have manufactured their products under other provider labels. Vince chose to not create his clothing line, but to sell the manufacturer product.

Vince has worked with many electrical company employees to fine-tune the clothing to be more comfortable for the user. Working closely with the manufacturer, they have made slight changes in how the cloth pattern was modified to meet final production. An example is the lightweight 40 Calorie vented hood offered by Otex.

The material is of the latest technology. The vented assembly is constructed for balance on the back of the hardhat and the airflow is 27 CFM to prevent fogging of the face shield and provide cooling to the worker. It took over a year to develop the product with the user prior to having the hood "flash tested". This product is now standard issue with many electrical contractors.

Being a small business and having quality providers has resulted in satisfied customers for Miller Safety Consultants. Being a direct supplier for OTEX Protective, another small business means customized customer needs can be met. □

*For more information, visit  
Miller Safety Consultants at:  
[www.electricalsafety supply.com](http://www.electricalsafety supply.com), email  
Vince at: [sales@millersafetyltd.com](mailto:sales@millersafetyltd.com)  
or give him a call at (703)367-0404.*



### **The V5™ 40 Cal Ultralight Lift Front Hood System**

1. V5™ High-Volume Ventilator with ArcSense Interrupter™
  - Patent-Pending ArcSense Interrupter™ shuts off airflow after an arc flash, preventing further inhalation of manganese fumes
  - 27 CFM blower fans
  - Snap-in design, removable in seconds
2. Milwaukee M12 rechargeable battery and receiver
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4. Paulson face shields and brackets
5. Hood Handle for easy removal or transport
6. LED Head Lamp included

**ULTRALIGHT Premium**

# Protect yourself from "Arc Flash"

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Our V<sup>12</sup> High-Volume Ventilator boasts an unexpectedly quiet, high output (35+ CFM) turbine fan to cool and circulate the ambient air within the hood. Fully protected beneath it's durable ABS shell and added fabric layering, the V<sup>12</sup> High-Volume Ventilator isn't just compliant, it's superior.



## 40 CAL/CM2 ULTRALIGHT CLOTHING BY OTEX

Our new dual-layer Ultralight clothing takes advantage of DuPont's® dedication to scientific advancement and Westex's® industry leading dependability. Weighing in 37% lighter than traditional HRC4 PPE, our Ultralight Clothing is the most innovative contender in the lightweight arena.

## HYBRID LAYERING

Combined Fabric Weight: 14 oz

Outer Layer: DuPont® Protera  
Color: Navy

Inner Layer: Westex Ultrasoft  
Color: Safety Orange



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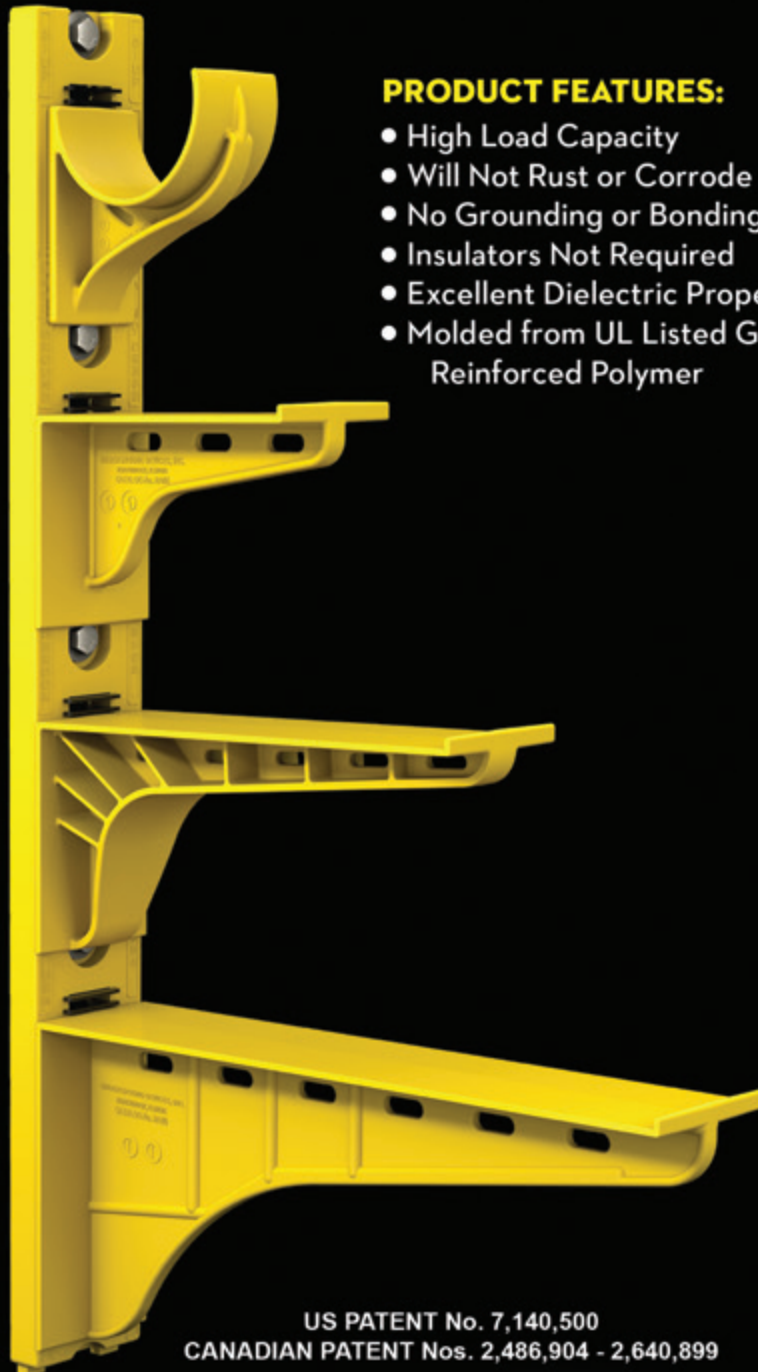
Each year we choose what we believe are **Top Products** in the Electrical Industry market. This year is no different. The products and services chosen are each unique, beneficial and reliable in their own right. Having the ability to choose the tools and services that best fits your job description and your work style is what it's all about. We hope you agree with our choices.



# The Heavy Duty Nonmetallic CABLE RACK



For Power and Communications Manholes And Vaults



## PRODUCT FEATURES:

- High Load Capacity
- Will Not Rust or Corrode
- No Grounding or Bonding
- Insulators Not Required
- Excellent Dielectric Properties
- Molded from UL Listed Glass Reinforced Polymer



HDL Arm Lock shown with  
RA04 Arm and CR36-B Stanchion



3HDS - 3" throat saddle shown with  
a cable secured by cable ties.



RA08 - 8" arm shown with three  
cables secured by cable ties.

US PATENT No. 7,140,500  
CANADIAN PATENT Nos. 2,486,904 - 2,640,899

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INCORPORATED



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## **AEMC® Instruments has a New Digital Ground Resistance Tester Model 6424**

The new Ground Resistance tester is both economical and feature rich. It performs 2-pole and 3-pole ground resistance and continuity measurement. It is ideal for testing commercial, residential, and light industrial grounding systems. The innovative design simplifies the process and provides reliable results eliminating confusion in setting it up correctly. The Model 6424 is easy to use - simply connect the leads, press to measure, and read. This direct reading tester is auto-ranging, so it automatically seeks out the optimum measurement range and test frequency.

The large LCD also indicates battery status, overrange. The Model 6424 can measure voltage up to 600V AC/DC and AC current up to 60A with the optional current probe Model MN72. The Model 6424 is powered by 6 x AA rechargeable NIMH batteries and includes a charger. The Ground Resistance Tester Model 6424 is also available in complete Kits (150ft and 300ft).

**For more information, visit  
[www.aemc.com](http://www.aemc.com)**

## **CL5 Base Cover from Brandon Industries**

The CL5 base cover is a simple and sleek design for 4" round or fluted poles. The base is a one-piece slip-over aluminum unit, covered in a polyester powder-coat for durability and long-lasting protection of the street light appearance.

- Extruded Aluminum Pole with Decorative Base
- Base Height: 23" Base Width: 17"
- 4" OD Smooth Round Pole
- Pole Heights: 9'8", 10'8", 11'8", 12'8", 13'8", 14'8"
- Polyester Powder-Coat Finish
- Fits all Post Top Fixtures

**For more information, visit  
[www.brandonindustries.com](http://www.brandonindustries.com)**



# REPAIR CONDUIT IN A SNAP!

No Tape • No Plastic Straps • No Metallic Straps

## NO KIDDING!

*Designed especially for power, communications  
and fiber optics.*



**STEP 1**  
Remove damaged  
conduit



**STEP 2**  
Cut split duct  
conduit to fit



**STEP 3**  
Snap in  
place

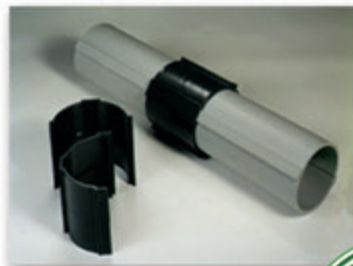
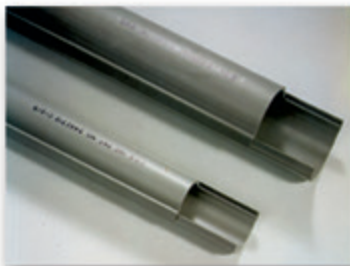
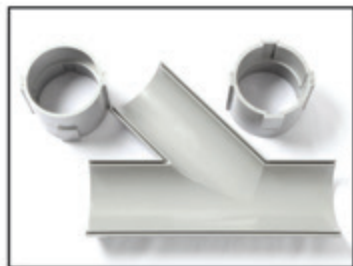
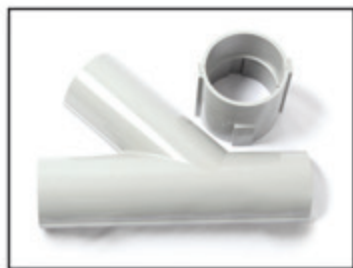


**STEP 4**  
Attach  
adapters



**STEP 5**  
Finish job in  
record time

***"The World Leader In Split Conduit Products"***



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### **Innovative Two-Piece Split Conduit and Split Coupler System**

As the world leader in split conduit repair products, Conduit Repair Systems' provides an array of products to offer you the perfect solution for your repair needs. Conduit Repair Systems innovative two-piece split conduit and split coupler system is available in ten-foot split conduit lengths, pre-bundled repair kits, split WYE kits, and our industry leading split sweeps.

Conduit Repair Systems' split sweeps are available in a 24" or 36" radius and come in both 45° and 90° sweeps. They are great for electrical conduit applications underground, being encased in concrete, as risers coming up and out of the ground, for solar projects and more. All of our split sweeps are available in the following sizes: 1", 1.25", 1.5", 2", 2.5", 3", 4", 5", and 6".

With our two-piece split conduit system, no tape, straps or clamps are needed. Everything is done in a snap!

**For more information, visit  
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# **NEW** Ground Resistance Testers

MODELS 6422 and 6424

## **The Highest Safety Rated Ground Resistance Testers**

- Two instruments in one – test Ground and Bonds
- Low cost, great performance and feature rich
- Stores the three 62% measurements along with average and % deviation – **easily determine proper test results (Model 6424)**
- One button connect - press - read operation **eliminates testing errors**
- CAT IV 600V rated **ensures operator safety**
- Automatic frequency adjustments **improves accuracy**
- Automatic continuity and resistance check of the H electrode
- Voltage and current measurement capability (Model 6424)
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**Complete Kits Available**  
(provides the ability to test most systems)



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**For more information, visit**  
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## Connect Generators with the InterLock Kit

Connect portable and standby generators to home panels with the InterLock Kit. Safe and easy-to-use, the InterLock Kit is designed to provide contractors and homeowners a low cost alternative to a transfer switch. The InterLock Kit is a safe and legal device that allows users to connect their generators to existing panels for quick and convenient use of all original circuits. The InterLock Kit retrofits to any existing panel and requires no additional wall space. The InterLock Kit meets NEC article 702.6 and NFPA 70 requirements. The InterLock Kit is a much-needed product that will save your business time and increase over-all sales. Make more money today by offering your customers the InterLock Kit. Generator InterLock Technologies offers same day shipping on all 45 models.

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# BIG difference



## DLRO2

### With new Difference Meter

We all know that small problems such as joint contamination, can lead to bigger issues like overheating and machine failure. This 2-Amp Ducter™ Low Resistance Ohmmeter comes with a brand new Difference Meter, which allows repetitive measurements to be easily compared with an initial reference measurement, helping you spot even the smallest of differences.

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For your FREE copy of our new and updated Guide to Low Resistance Testing, visit [us.megger.com/getbook](http://us.megger.com/getbook)

Reference code: DLRO2\_EPS\_DEC

**Megger**



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Our products are the safest, strongest, simplest and most versatile system of its kind on the market today, offering thousands of precision-made parts to fit almost every conceivable application.

The key component, the Griplock Cable Gripper, is a unique, self-locking, completely adjustable device, designed to securely lock onto a large range of aircraft cables. It requires no tools to adjust; up or down - as often as you like. The Griplock Gripper is precision built to our own engineering specifications and we closely monitor quality and test every shipment received. We continually refine the gripping mechanism to produce better results and our quality control system is modeled after ISO 9001.

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- ✓ Back panels available for all sizes
- ✓ Hand-close fastener tabs
- ✓ 100% nonmetallic

**KRALOY®  
JBox®**  
The Next Generation Junction Box

**New** Larger Sizes 14" & 16"



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- ✓ 100% Nonmetallic
- ✓ Hand-close fastener tabs
- ✓ Back panels available for sizes 6" and up

\*Applies only to 4" to 12" non-hinged covers



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UL 50 / CSA C22.2 NO. 94.1, UL 50E / CSA C22.2 NO.  
94.2, CSA C22.2 NO. 40 CSA C22.2 NO. 85

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The **Truck Console -X** is the latest innovative mobile office solution to join the Mobile Desk brand family of products. This complete control, communication and convenience Utility Truck Console is becoming the new standard for fleets of all sizes. The design of the **Truck Console -X** has originated from our years of experience working directly with the lineman, supervisors, communications, and fleets of some of the most notable utility companies in America. Loaded with standard and optional features that maximize ergonomics, productivity, and fleet/telecom standards into one Mobile Office Solution.

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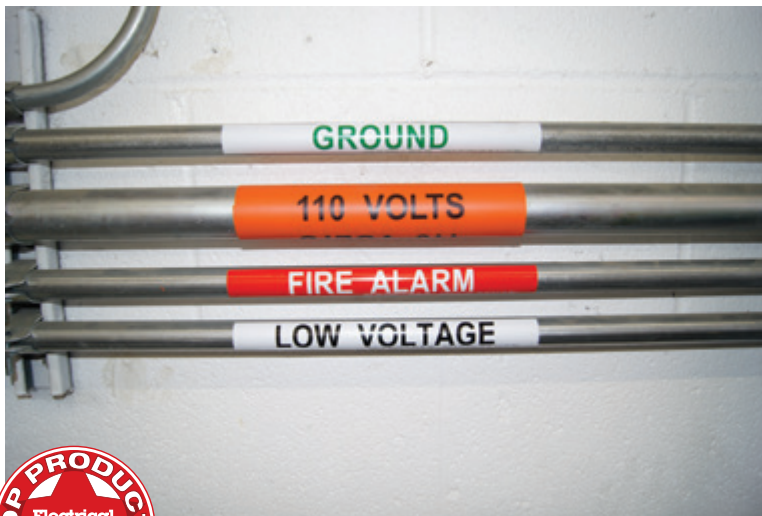
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## Identification Products from Kolbi

The Kolbi Pipe Marker Company has been manufacturing identification products for the electrical industry for 48 years. We offer a complete line of labels, engraved nameplates and coiled markers for the electrical industry.

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**For more information, visit  
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## 2-Amp Ducter™ Low Resistance Ohmmeter

The Megger DLRO2, a 2-Amp Ducter™ Low Resistance Ohmmeter, is ideal for use in production line testing and industrial applications.

Applications that require long test leads are not a problem for the DLRO2 as it has a dedicated long test lead mode that optimizes the instrument to work with very long test leads. The unit's long test lead function is able to provide up to 1A of test current into 4 Ohms resistance, making it, with its optional cable test reel leads, ideal for testing wind turbine and avionic lightning protection applications.

This robust and intuitive handheld instrument offers a 'difference meter' that allows for quick data comparisons which permits repetitive measurements to be easily compared with an initial reference measurement. The difference meter translates percentage difference to a needle/pointer movement on the unit's display to make it easier to see the change.

**For more information, visit  
[www.megger.com](http://www.megger.com)**

## First there was 4 square... and now the **REVOLUTIONARY 5 Square®** Box!!

You've struggled with 4 Square boxes for years - you know how small, cramped and time consuming they are. Finally, there is a solution that allows you the space you have always needed.

The **5 Square®** Boxes (5" x 5" x 2-7/8") provide up to 88 in<sup>3</sup> of interior volume which more than doubles that of most existing boxes on the market.

Create a robust and unrivaled infrastructure for the life of your facility with the **5 Square®** Products!

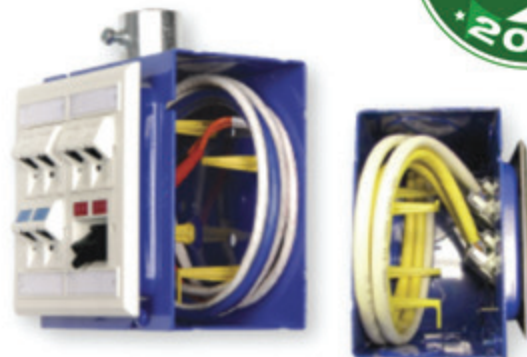


### Fire Signal



- TWICE THE VOLUME AS MOST BOXES
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- ELIMINATES TROUBLESHOOTING TIME AND COST
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## New UltraLite 40 Cal Lift-front Vented Hood

We've listened to our users who perform "non-contact" testing within the arc-flash protection boundary and have release the OTEX lift shield hood. This new style hood will incorporate the Paulson lift shield assembly. The new hood assembly will also have the additional safety features of our standard M12 vented 40 Cal hood such as the patented arc flash sensor, head lamp and the Milwaukee M12 battery powered fan system.

**For more information, visit  
[www.electricalsafety.com](http://www.electricalsafety.com)**



## Milwaukee's new M18™ FORCE LOGIC™ 750 MCM Dieless Crimper

Milwaukee Tool is proud to unveil the simplest way to crimp without dies. The M18™ FORCE LOGIC™\* 750 MCM Dieless Crimper utilizes an industry-first, groundbreaking technology called Auto Distance Control. Auto Distance Control enables the tool to sense the instant it contacts the connector, applying a precise pressure for each size based on crimp distance. This revolutionary technology delivers optimal compression for each individual size allowing for one crimp UL Classified connections and uniform crimp appearance across the entire capacity range.



Historically, there's been single-point dieless crimpers and four-point dieless crimpers, both of which have limitations:

- Single-point tools have larger capacity ranges but have extra wide nests and oversized indenters that mash and distort smaller and medium sizes.
- Four-point tools create better-looking crimps but require a varying number of crimps per connector and the teeth are prone to breaking if the connector is not perfectly aligned.



The lightest in its class, the M18™ FORCE LOGIC™ 750 MCM Dieless Crimper features an in-line design and 180-degree rotating head for easiest alignment. A fully enclosed high-speed hydraulic pump provides for the fastest dieless connections. When equipped with an M18™ REDLITHIUM™ CP2.0 Battery Pack, the tool delivers up to 90 crimps per charge.

**For more information, visit  
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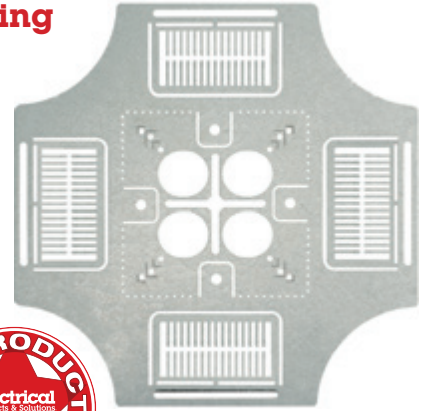


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[www.randl-inc.com](http://www.randl-inc.com)**

## 4-way Conduit & Box Support Plate Split Fingers Positioning Device for Horizontal or Vertical Installation

CATALOG # CSPV-4W-FC

1. It is used with 4", 4 11/16" or 5" square outlet box and 6"x6" and 8" x8" junction boxes.
2. Eliminates all conduit clamps.  
Bend large tabs with split fingers out and feed 1/2" thru 1 1/4" conduit or equal O.D. MC Cable into box at any KO location on all 4 side of box.
3. For vertical application bend 4 smaller tabs out and insert 1/4", 3/8" or 1/2" rod secure with nuts.
4. Four Large open KO-s in center allow entering back of box with up thru 3/4" raceway to save even more.
5. Slots size 1/4" for fastening conduit clamps to plate with nuts and bolts plus holes for TEK screws if required are part of plate. These slots allow conduit for other systems to be installed at any location.
6. Insert rod for horizontal application in fixed center hole of plate secure with nuts and washers or use with our QWIK BLOCK for easy horizontal application.
7. SAVE over 1 hour per install with less material.



Customer must satisfy all codes and owner's specifications. Parts are C UL US Listed and made in 18 Gauge Galvanized Steel or Stainless Steel. Made In USA.

**For more information, visit  
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## QwikBlock Box Support



CATALOG # QBBS-25/38 ( for 1/4" or 3/8" threaded rod application)  
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5. Eliminates 2 washers, 1 nut and knockout of center KO on back of box.
6. Install it with or without plate on box .
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## Now Available: Fire Rated Covers for LED Lights



Tenmat's FF109-200 and FF109-250 are the only fire rated enclosures on the market, specifically developed for low-profile LED lights. Tenmat fire rated light covers are made out of a flexible intumescent material and have been 1 hour fire tested to meet the building code requirement and provide a fire barrier around LED lights. These firestopping covers are ideal for retrofit and new construction alike, as the covers are flexible enough to get installed through 4" and 6" ceiling openings. Quick and easy to install, these innovative covers are compatible with most LED light fixtures and trims, saving the contractor time and money.



\*Light sold separately

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Topaz's Satellite Pro High Bay offers the latest in performance and functionality for food production areas, warehouses and gymnasiums. With a smooth aluminum die-cast housing this fixture is IP69K rated for maximum resistance of dust, steam and high water pressure and combined with the IK08 rated impact resistant lens, the Satellite Pro is NSF rated for food processing facilities that require a complete hose down to meet sanitation and safety standards. Optional accessories include a pre-programmed motion sensor for increased energy savings by dimming down to 10% during periods of vacancy and remote control to customize settings to meet application brightness, sensitivity, and stand-by needs.



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## Solar Voltaic Insulated Bonding Bushings

Adding to their extensive line of electrical fittings and supplies, Topaz has introduced Insulated Bonding Bushings ideal for solar photovoltaic applications. As the solar energy industry continues to grow exponentially, Topaz is meeting their demands for corrosion resistant fittings. Available in malleable iron and zinc in sizes ¾" through 2", these fittings offer a UV insuliner to stand up to direct exposure to the sun and prevent damage to wire insulation. Additional features include tin plated copper lay-in lug provided for bonding jumper to a neutral bus bar, durable stainless-steel hardware and can be used to provide a means of grounding Rigid or IMC conduit.



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## Duct Spacers and Nonmetallic Cable Supports

Underground Devices manufactures several different styles of duct spacers and nonmetallic cable supports. The Heavy Duty Nonmetallic Cable Rack has become a standard in manhole racking. The Heavy Duty Rack is nonconductive and will never rust or corrode. Grounding and insulators are no longer necessary. The Heavy Duty Rack has the same loading capacity as comparable steel cable racks. With seven standard stanchion lengths ranging from 8" to 48" long, and ten arms ranging from a 3" saddle to a 20" long arm, the Heavy Duty Rack is an extremely versatile cable racking system.

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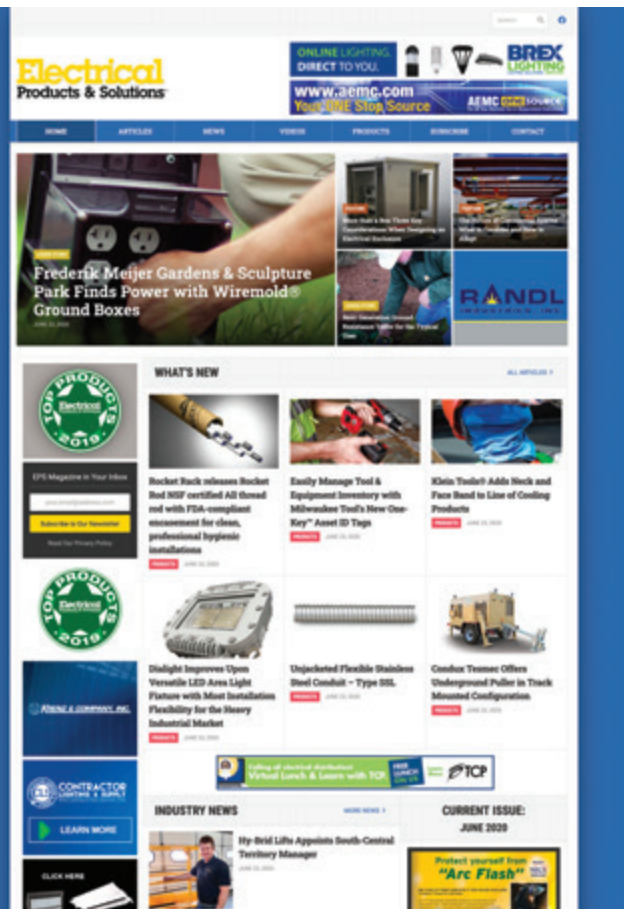
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# The Future of Outdoor Lighting

BY BRAD McELROY

**THE FUTURE OF OUTDOOR LIGHTING** can be summarized by one word and one acronym on everyone's mind: efficiency and LED. From the cost-saving homeowner to a facility's bottom line, efficient LED lighting motivates the entire outdoor lighting market — and for a good reason.

Switching to LEDs is not only way more efficient than traditional lighting sources, but it also improves sustainability and cost savings. But is that still the case in 2020? Here, we look at what's on the horizon for outdoor lighting and how LEDs are still changing the industry for the better.

## Even More Efficiency

By now, everyone knows that LEDs are far more efficient than incandescent — four to five times as much to be ex-

act. It's more versatile, color-changeable, consumes less energy, and lasts roughly 15 years, about 10 times as long as incandescent lighting.

That sounds great, but what's the next step? Even more efficiency certainly couldn't hurt, which is a huge selling point for upgrading your outdoor lighting.

However, the U.S. is still in the process of transitioning to outdoor LEDs.

Recently, a 2020 study found that lighting accounts for 19% of the world's energy consumption. With LEDs, that could



be reduced by 40%; with lighting controls, it could be reduced by 80%.

According to the U.S. Department of Energy (DOE), outdoor area lighting itself is responsible for a huge portion of nationwide energy use — about 120 terawatt-hours of energy.

The International Dark-Sky Association





(IDA) puts that number in perspective: 120 terawatt-hours is enough to power New York City for two full years. And that's just how much energy is consumed by outdoor lighting.

The IDA also estimates that 30% of all outdoor lighting in the U.S. alone is wasted, and most of that is because of lights that aren't shielded. Instead of casting the light where it needs to go — on the ground — it's uplighting the night sky. This waste alone accounts for roughly \$3.3 billion and 21 million tons of carbon dioxide each year.

### Nonpolluting Lighting

So, what does the future look like for outdoor lighting? First, we need to switch to LEDs.

There's going to be an even bigger focus on committing toward nonpolluting lighting in 2020 and beyond. It not only addresses the bottom line for commercial and industrial buildings, but it also focuses on sustainability and meeting more demanding building codes.

If you already have LEDs installed, how can you even measure your light pollution? Turns out that there are three things to consider: backlight, uplight, and

glare (BUG). By minimizing the light pollution given off by artificial lighting at night, you will not only consume less energy, but you'll also have a better-lit facility or home because the light is directed exactly where it needs to go.

### Seeing Outdoor Lighting in a Greener Light

Motion sensors and daylight harvesting is a rather new innovation that is still being promoted in the lighting industry to maximize savings and efficiency. But does this really make a difference in outdoor lighting? After all, isn't outdoor lighting only turned on at night when it's needed most?

The short answer is yes, it's absolutely worth it. Daylight harvesting, motion sensors, and even dimming capabilities are all responsive lighting technologies worth investing in.

City Electric Supply District Manager Jacob Pitts has seen these savings firsthand on countless retrofits.

"When you look at outdoor LED lighting upgrades in the commercial and industrial sectors, there's a lot of potential for energy savings as most of these fixtures are HID," he said. "Add control

efficiency to that and there's a lot of watts to be saved. After all, what company doesn't want to support environmental sustainability and take advantage of cost reduction that will strengthen their bottom line?"

The best part is, even if you already have LEDs installed outdoors, you should be able to retrofit your existing lighting to integrate these smart features. At the end of the day (or night), that's going to boost your cost savings while making your building, home, or facility greener and more sustainable.

### Landscape Lighting

We couldn't talk about outdoor lighting without talking about its residential applications. Outdoor lighting isn't just for building security or home alarm systems — it's also an important part of a home's landscaping.

Fortunately for electrical contractors, the shift to LED technology has benefited them greatly. Whereas before most residential and light commercial applications used low-voltage lighting, LEDs have now changed the game by making installations easier — smaller transformers, the flexibility to install larger gauge wire, and more.

What's next for landscape lighting? Outdoor spaces are seeing color-changing lighting and lighting controls installed rapidly. Now, it's not just enough to set a timing schedule. Homeowners and businesses alike are expecting complete control over their landscape lighting for aesthetic purposes and to reduce the effects of BUG.

For contractors, this represents opportunity. As outdoor lighting becomes integrated with the Internet of Things and other smart capabilities, contractors will be the ones responsible for providing both aesthetic and sustainable solutions.

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**ABOUT THE AUTHOR:** Brad McElroy is a Copywriter for City Electric Supply

# Total Power Quality and Its Impact on Machinery Availability

An often overlooked element of overall equipment effectiveness comes in the form of poor power quality

BY MARK DZIEDZIC

**A DECREASE IN MACHINE AVAILABILITY** due to power quality issues disturbs the natural flow of manufacturing, leading to lost productivity, increased maintenance requirements and eroded customer trust.

Machine downtime is the single largest source of lost production, typically accounting for almost 5 percent of factory losses—although many manufacturers lose more. For example, when the cost of equipment replacement and parts, labor, maintenance, delays, sales and production are added up, downtime can exceed \$10,000 per hour.

With such high costs at stake, keeping machinery operating smoothly is critical to the bottom line. OEMs who focus on improving their machine availability through monitoring overall equipment effectiveness (OEE), as well as deploying power quality strategies, will strengthen their competitive position and customer relationships.

## Elements of OEE

Power quality falls under the category of OEE, which is a best practices metric

that identifies the percentage of planned production time that is truly productive. An OEE score of 100 percent represents perfect production: manufacturing only good parts, as fast as possible, with no downtime. OEE is a simple yet powerful roadmap that helps production floor people and management to visualize and eliminate equipment losses and waste.

Calculating OEE begins with establishing Planned Production Time (PPT). PPT is total time minus the time when the manufacturer has no intention of running production, such as lunches, employee breaks, scheduled plant shutdowns or when there are no orders to produce. To establish the OEE of a machine or process, its PPT is scrutinized targeting the lean manufacturing goals of reducing productivity losses by factoring in availability, performance and quality using this formula:  $OEE (\%) = \text{availability ratio} \times$

$\text{performance ratio} \times \text{quality ratio}$ .

## Availability Ratio

Availability has to do with any event that halts scheduled PPT for several minutes or more, whether the events are “planned” i.e., die changeovers, or “unplanned” such as machinery failures or a shortage of materials.

As an example:

- PPT is 10 hours (600 minutes)
- Downtime = Machine breakdown is 30 minutes, changeovers are 30 minutes, stoppage is 30 minutes. Total of 90 minutes
- Available time is  $600 - 90 = 510$  minutes
- Availability ratio: 510 minutes divided by 600 minutes or 85%

## Performance Ratio

Performance takes into account any-





thing that slows down the manufacturing process like jams, breakdowns, accidents or basic machine wear. This total is subtracted from standard output. Standard output is the best output rate known to be produced on the machine, regardless of whether that is above or below design speed.

For example:

- Standard output is 3 parts per minute x available time (510 minutes) = 1530 parts
- Actual output (defects and good parts) = 1250 parts
- Performance ratio is 1250 parts divided by 1530 or 81%

### Quality Ratio

Finally, there's quality. This ratio measures defective parts like scrap, rejects, or parts that need reworking, to good parts.

Example:

- Actual parts output is 1250
- Defective parts are 150
- Quality ratio is (1250 – 150) divided by 1250 or 88%

Therefore, OEE of the machine is 85% (availability) x 81% (performance) x 88% (quality) = 55.4%.

While many manufacturers have risen to the challenge of improving OEE by honing in on basic availability, quality and performance issues, one area that has remained largely elusive is the role power quality plays in all three. After all, how do you judge the quality of such an unseen commodity as electricity?

### Understanding Total Power Quality

Power quality ensures that the needs of a facility are met by the existing source of

electricity from the service entrance to the most critical production equipment. Power disturbances such as voltage transients, surges and spikes, harmonics and voltage imbalance will have an impact on the quality of electricity, and therefore, carry the potential to disrupt production, damage manufacturing equipment and corrupt data in automated environments. By conditioning incoming power, however, plant operators can be assured against outages and disturbances that can interrupt machinery availability and cause shutdowns mid-process.

The only way to mitigate the risk of poor power quality is to have the right technology, both for power protection and power conversion, since the power conversion choices made upstream can impact the type of power protection required downstream. Power protection plus power conversion results (CONTINUED ON PAGE 30)



in a solution known as Total Power Quality (TPQ).

A power protection strategy consists of surge protection and filtering devices that protect critical operations across facilities from the continuous threat of transient spikes, noise and harmonic distortion. Employing an entire facility protection strategy safeguards the electrical system against most transients. Multi-stage protection involves clamping the initial high energy surge, filtering any remaining noise or transients to the protected sensitive equipment, and finally, protecting the data/signal lines entering or leaving the control panel or the factory floor. This coordination of devices provides the lowest possible let-through voltage to the equipment ensuring maximum productivity.

**Surge Protection:** These devices focus on limiting high-voltage spikes to a level that is acceptable to most electronic equipment. Plus, they're a great first line of defense, using components that are placed in parallel with the line and serve as clamping mechanisms for high-energy impulses. Surge protective devices are typically installed at service entrances, on larger distribution panels and at the point of use as recommended by Institute of Electrical and Electronic Engineers (IEEE) in their Emerald Book (Standard 1100-2005): Recommended Practice for Powering and Grounding Electronic Equipment.

**Filters:** Low-energy transients and high-frequency noise (also referred to in the industry as electronic rust) are the primary causes for system disruption and long-term degradation of microproces-

sor-based equipment within a facility's processes, for instance, PLCs and motion control systems that require clean AC power. Protection calls for the use of active tracking filters that attenuate impulses that would normally go untouched by standard, parallel clamping devices to limit stress and the electronic rust that degrade electronics.

**Data/Signal Surge Protection:** Networked industrial operations require error-free transmission of information for maximum productivity and integrity of data, but these areas are often overlooked when it comes to power protection. The importance of protection at this level grows with the manufacturer's reliance on sensitive instrumentation, networked automation and uncorrupted data transmission increases with the adoption of Industrial Internet of Things (IIoT) systems. Data/signal line surge protection devices are used as the final part of the multi-stage protection strategy recommended by IEEE practices which involves clamping the initial high-energy impulse, filtering any remaining noise or transients to the PLC or sensitive equipment and finally, protecting the data/signal lines entering and leaving the control panel.

As for power conversion, in a processing or packaging environment there are critical power loads that warrant full protection. For example, a critical piece of machinery on the plant floor that would dramatically impact productivity if it were to shut down unexpectedly due to a power outage. This type of machinery requires an uninterruptible power supply

(UPS) system capable of handling the load on its own for a reasonable period of time to perform a controlled shut down; limit scrap and enable faster restart of production. Several UPS topologies or types exist depending on production environment run-times and needs.

Online double conversion UPS systems provide critical machinery with the highest level of protection by isolating that machinery from raw utility power. It converts the input AC electricity from AC to DC and then back to fresh AC. If the power supply fails it is supplied directly from the UPS batteries.

This topology differs from a standby UPS, also called an "offline UPS," which is the most common type of UPS found in a computer or office supply store. It draws current from the AC and switches to battery within a few milliseconds after detecting a power failure. The line interactive UPS "interacts" with the AC power line to smooth out the waveforms and correct the rise and fall of the voltage. By contrast, the online UPS inverter is always on so that all incoming power is converted to direct current, which both fills up the batteries and feeds the inverter and provides more protection. Depending on the complexity of the controls, run-time and the amount of a control shut-down required, OEMs can decide which topology will work best for their application needs.

### The Power of Protection

In the world of manufacturing, machine downtime is an ugly word. But it doesn't have to be something you deal with in the dark. OEE metrics can measure the impact of downtime on each piece of equipment that's integral to the manufacturing processes. Once the OEE score is established and tracked, the end users—perhaps with a little help from the OEM—should investigate how power quality may be degrading the three ratios that make-up OEE: availability, productivity and quality. Focusing on availability and employing power quality devices in a multi-stage design as recommended by the IEEE is critically important to reducing and eliminating future downtime and improving OEE and the bottom line. □

**ABOUT THE AUTHOR:** Mark Dziejdz is the Senior Product Marketing Manager for Sola HD at Emerson.



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