IN THIS ISSUE:

• Simplifying Safety with Panduit® VeriSafe™
• Ideal Networks SecuriTEST IP
• Modern Industrial Computing with Stratus
• Human Machine Interface with Rockwell Automation
• PLC Wiring 2018 Training Available
• VFD Wiring 2018 Training Available
• Eaton’s Power of Authenticity Program
• Chat, Chat, Chat... with Kendall Electric
• Understanding Fuseology and Overcurrent Protection
• Appleton Mercmaster LED Low Profile Luminaires
• Cognex Training Available at Kendall Electric
• Arrow Hart’s X-Switch
• Kendall Electric Wire Capabilities
• Hubbell Premise Wiring 4K AV Extenders
• Kendall Electric Technology Summit 2018 Birmingham
• Hubbell Lighting Connected Lighting Solutions
• Get Control of Your Inventory and Costs with Mersen
• Eaton’s Crouse-Hinds Series Industrial LED

IF YOU WOULD LIKE TO RECEIVE THE CONNECTION VIA E-MAIL, PLEASE SUBSCRIBE AT: KENDALLELECTRIC.COM/TC
TINLEY PARK, IL (June 16, 2017) Panduit Corp., an industry leader in control panel, wire harness and heavy-duty cable management solutions for over 60 years, announced the North American release of its groundbreaking VeriSafe™ - Absence of Voltage Tester. VeriSafe™ is designed to minimize risk to electrical hazards by verifying the absence of voltage before equipment is accessed, making it easier for qualified electrical workers to determine an electrically safe environment in a fraction of the time compared to hand-held portable test instruments.

Prior to performing de-energized work on electrical equipment, NFPA 70E requires that workers verify equipment is in an electrically safe state. One of the steps in the process of verifying that equipment is an electrically safe state involves a test for absence of voltage. VeriSafe™ ensures the entire process of verifying absence of voltage is performed in the proper sequence – every time, every test.

The fail-safe and reliable process performed by VeriSafe™ tests the tester itself, verifies installation, checks for voltage, verifies installation, and retests the tester; all automatically performed in sequence with no risk of exposure to electrical hazards at the push of a button.

“We understand that our customers are committed to protecting their workers while meeting safety regulations,” said Bob Krisel, VP, OEM, Panduit, “This new tool allows them to effectively meet their objectives. This highly anticipated new product offering has the capability to transform the way our customers in the manufacturing industries conduct verification testing for industrial enclosures.”

To learn more about the Panduit VeriSafe™ - Absence of Voltage Tester, please visit kendallelectric.com/dl/VS.

About Panduit

For over 60 years Panduit has delivered solutions that help organize, connect, and protect wire and cable. A broad selection of Wire Harness, Heavy Duty Cable Management, and Control Panel solutions help customers meet design, quality, and regulatory requirements in a timely and cost-effective way. With automated tooling, technical support, and worldwide availability of quality products, Panduit is a single-source partner you can trust to help you Organize, Connect, and Protect electrical and mechanical systems.
SecuriTEST IP
CCTV Camera Tester for IP Digital / HD Coax / Analog Systems

An all-in-one CCTV tester that can connect, power, configure, and document, SecuriTEST IP increases productivity from start to finish.

FEATURES:
• Connect to various cameras using RJ45, Wi-Fi, or BNC ports
• Power the camera with 12V from the Li-Ion battery or PoE/PoE+ (up to 24 watts)
• Faster camera login using the unique QuickIP function
• Comprehensive camera setup with aim, focus, PTZ, presets, and network settings
• Provide proof of installation with PDF reports that show camera parameters and multiple video screen-shots
• Eliminate guesswork with data cable and network troubleshooting tools

For additional information, visit: kendallelectric.com/dl/CCTV and contact your Kendall Electric Account Manager or Datacom Specialist today.
In the last few years, more and more organizations have reached an inflection point for the computing environment that supports the plant floor. For some, they’re seeking to take advantage of advances in technology like virtualization or thin clients. For others, ad hoc growth of the plant network has led to a cumbersome patchwork of computers, switches, and wires. Whatever the impetus for this move, there are three key requirements that make for an ideal Industrial Computing infrastructure. Those requirements include simplicity of administration, uptime, and lifespan.

With many organizations streamlining and downsizing their IT staffing, OT teams have seen increasing responsibility for the computing environment that supports their application needs. Even if IT staffing is plentiful, it’s much better use of their time and attention to support enterprise initiatives like cybersecurity than to babysit computers running HMIs, Historians, and MES. In either scenario, an infrastructure with low administrative overhead is a big advantage.

Certain vertical markets like the process industries and those subject to high regulatory reporting know full well that they need uptime, but more and more the need for continuous availability of plant floor applications is growing to virtually every industrial market. Trends like the implementation of data analytics, IIOT, and tighter supply chains mean that any downtime can have ripple effects.

Nobody purchases PLCs, motors, and other OT products expecting a 3–4 year lifespan, but enterprise IT is often refreshed under that very timeframe. If built thoughtfully, the Industrial Computing Infrastructure should last at least twice that long to avoid all the hassles of the constant upgrade cycle.

The good news is that Stratus ftServer solves all of these issues to provide an ideal platform for creating an Industrial Computing Infrastructure that addresses the unique requirements of the OT team while at the same time satisfying the needs of the IT team as well.

Stratus has been known as the leader in Fault Tolerant Computing since its founding in 1980. Originally focused on Financial Services, 911, and Telecommunications Networks, Industrial Automation has now become the # 1 market for Stratus due to advances in complementary technology like virtualization and thin clients as well as focus on key partnerships with ISVs like Rockwell Automation.

The Stratus ftServer® is the only integrated, fully Fault Tolerant computer that utilizes the patented lockstepping technology. It’s a fully redundant system so there are at least two of every component (CPU, memory, power supplies, etc…) with no single point of failure. The CPUs run in lockstep so the processing is happening simultaneously. This means that even if one CPU dies, the other one is already running. Absolutely no blip in the software, no concept of fail and recover, just continuous availability of whatever software is running on the server.

Zero downtime is certainly a big benefit for all of Stratus’ customers, but Controls Engineers and the OT teams that deploy Stratus often find the ease of maintenance and administration as their top reason for choosing Stratus. Once the system is set up by the Stratus Field Services team, there’s no need for highly skilled IT technicians to fix anything. This is because of the Stratus ActiveService Architecture.

Continued on next page...
In the event that some hardware component does fail, the system generates its own support ticket, either depositing directly to the Stratus Customer Assistance Center or via the customer network depending on customer requirements. In either event, Stratus sends out a replacement via overnight delivery and the replacements are all hot-pluggable via the front of the server. That means that anyone with physical access to the system simply pulls out the bad part, slides in the new one, and puts the cover back on. Nobody needs to set up a script, load any software, or type a single keystroke. The system gets itself back into fully duplexed mode on its own and the software running on the system never blips during the whole process!

The other aspect of the Stratus solution that’s truly unique is how long the systems are supported in the field. Currently selling Generation 9 of the ftServer®, Stratus still offers support to customers going back all the way to the first Generation which hit the market in 2002. Averaging well over eight years in the field, the Stratus customer base in Industrial Automation knows they have a partner that supports them for the long haul.

If you’re looking at implementing new software applications for the plant floor or you simply are looking at establishing a solid computing infrastructure designed to support the OT team, ask your Kendall Electric Account Manager to arrange a discussion with the Stratus team.

Time is at the core of safe and efficient manufacturing. How quickly can we bring a machine or process to a safe state in the case of an emergency? How can we make more goods in less time? How can we empower employees to be more efficient in their jobs? There are many ways we can try to address some of these concerns, but for now, let’s think of this in terms of industrial visualization.

The essence of best in class visualization is to give people in various positions the ability to do their jobs more effectively. Whether that’s giving an operator a modern graphic interface to control the machine more effectively, or giving a plant manager the ability to access performance information from the machines around them on their tablet as they walk through the facility—effective visualization is important. That’s why Rockwell Automation has been investing in ways to provide our partners with the diverse, scalable, and mobile visualization platforms they require to be successful. Thin client technology, virtual network computing, and graphic HMI’s that can be programmed in Studio 5000 are examples of technologies in our modern visualization portfolio that businesses are using to make the most of their time today.

Technology is changing faster than ever. We’re here to help. Reach out to your Kendall Electric or Rockwell Automation Account Manager today to learn how we can help in your visualization endeavors.
PLC Wiring & Troubleshooting

Each student will have an individual set of hardware to wire up and configure.

Instructor: Bob Draime

Students will then get to develop a logic program in the controller to gain experience controlling and troubleshooting their system!

At the completion of this training, the participant will be able to “talk through” and troubleshoot the PLC’s ladder logic using the Logix5000 software in order to locate a “real” faulty input or output device, replace it, and get the process back up and running. It’s all about troubleshooting!

Next, each participant will wire the actual input and output (I/O) field devices to the PLC. This includes photo-electric and inductive proximity sensors, switches, pushbuttons, limit switches, along with the DC Power Supply. The participants actually wire their own PLC Trainer!

Using the RSLogix5000 software, the Communication Path will be configured along with the creation of Tags that will be used in the PLC’s ladder logic. The concept of “Real” and “Simulated” inputs and outputs will be covered, along with the troubleshooting tools of Toggling and Forcing. Next, Timer (TON, TOF, RTO, RTF) and Counter (CTU, CTD) circuits will be configured, along with One-Shot (ONS) and First-Scan (S:FS) instructions. Comparison Instructions (EQU, NEQ, LES, GRE, GEQ, LIQ, S:N) and Math Instructions (ADD, SUB, MUL, DIV, CPT) along with Set Bit if Zero/Negative (S:Z, S:N) will be thoroughly covered. The understanding of how a Jump (JMP), Master Control Reset (MCR), and Jump to Subroutine (JSR) functions, will be covered in detail.

To effectively troubleshoot a PLC-based system, one must know how the PLC’s Memory is structured using One, Two, and Three Dimension Arrays. This will be accomplished by troubleshooting ladder logic that includes instructions such as Fill File (FLL), Copy File (COP), Average File (AVE), Bit-Shift Right/Left (BSR, BSL), First-In-First-Out (FIFO) Load/Unload (FFL, FFU), Last-In-First-Out (LIFO) Load/Unload (LFL, LFU), Masked Move (MVM), Sequencer Output (SQO) using the Array, Mask, and Output Tables, along with Indirect Addressing and Add-On Instructions (AOI).

Fundamentals of VFD Wiring & Commissioning

After completing this class, students will have the ability to install, test, start-up, and troubleshoot basic VFD installations.

Topics Covered

- VFD Power and Control Fundamentals
- Testing VFD Power Components
- AC Motor Fundamentals and Measurements
- Installation Considerations
- Power & Control Wiring Configurations
- VFD Application Techniques and Parameter Adjustments
- Voltage and Current Measurements using Fluke® VOM and Clamp Ammeter

This three-day class covers a combination of instructor led discussions, demonstrations, and hands-on labs covering wiring, programming, and running VFDs.

Class topics cover VFD theory, motor theory, input protection, output protection, dynamic braking, encoder feedback, safe torque-off, parameter programming, wiring (students will wire their own individual workstations), VFD applications, and hands-on testing and troubleshooting using various Fluke test and measurement equipment.

During the hands-on labs, students will learn about various control configurations and applications using their own individual VFD workstations, HIM module, and hand-held VFD test module.

2018 Schedule

<table>
<thead>
<tr>
<th>Date</th>
<th>City and State</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apr 17-19</td>
<td>Lansing, MI</td>
</tr>
<tr>
<td>Apr 24-26</td>
<td>Fort Wayne, IN</td>
</tr>
<tr>
<td>May 22-24</td>
<td>Grand Rapids, MI</td>
</tr>
<tr>
<td>June 12-14</td>
<td>Knoxville, TN</td>
</tr>
<tr>
<td>June 26-28</td>
<td>Holland, MI</td>
</tr>
<tr>
<td>Jul 17-19</td>
<td>Cleveland, TN</td>
</tr>
<tr>
<td>Jul 24-26</td>
<td>Tuscaloosa, AL</td>
</tr>
<tr>
<td>Aug 7-9</td>
<td>Portage, MI</td>
</tr>
<tr>
<td>Sept 18-20</td>
<td>Jackson, TN</td>
</tr>
<tr>
<td>Sept 25-27</td>
<td>Fort Wayne, IN</td>
</tr>
<tr>
<td>Oct 16-18</td>
<td>Grand Rapids, MI</td>
</tr>
<tr>
<td>Nov 6-8</td>
<td>Dalton, GA</td>
</tr>
<tr>
<td>Nov 13-15</td>
<td>Montgomery, AL</td>
</tr>
<tr>
<td>Dec 4-6</td>
<td>Kingsport, TN</td>
</tr>
</tbody>
</table>

For ordering information and to register, Visit: training.kendallelectric.com/vfd
Today’s business environment is driving many contractors to seek lower cost alternatives to genuine breakers sold by authorized distributors. When purchasing replacement circuit breakers, what appear to be cheaper alternatives may actually be more costly to your business. When your company’s reputation is on the line, should you trust the unknown quality, condition, or origin of a breaker purchased from a breaker broker?

Eaton’s “I Didn’t Know” anticounterfeiting campaign has been raising awareness on this electrical industry issue. The key points of the campaign include building a better understanding of the problem and learning how to protect your customers’ safety and your reputation.

Why Eaton for MCCBs? For nearly a century, Eaton has been manufacturing and continually improving circuit breaker technology. Our breakers meet the requirements of UL®, CSA™, and IEC standards, and provide safe and reliable circuit protection in power distribution equipment, motor control centers, MOEMs, and other applications. To support this extensive installed base, Eaton has a network of local authorized resellers, including Kendall Electric, that offer cost effective, innovative drop-in replacements to reduce maintenance time while enhancing protection.

Advantages of Eaton authentic replacement breakers

• Enhanced safety
• Protection for what you value most: your employees and customers
• Reduced business risk
• Increased reliability, productivity, and uptime
• Decreased likelihood of nuisance tripping, resulting in lower operational costs
• Use of the latest circuit breaker technology
• Leverage of the breadth of Eaton: warranty and product support through our authorized partners

Why you should purchase from your local Eaton authorized distributor, Kendall Electric:

• Large stock of MCCBs
• Next-day delivery or expedited ordering
• Guaranteed authenticity
• Local support and service
• One-stop shop for all of your breaker replacements

For additional information, contact your Kendall Electric Account Manager or visit our Eaton POA In-Stock Guide at: https://shop.kendallelectric.com/eaton-poa

Did you know?

Counterfeit trademarks can appear on labels, stickers, packaging, tags, signs, and more.

If a company violates the Act, it could be fined up to $15 million.

Individuals who are convicted under the Act can face up to a $2 million fine and 10 years in prison.

More than one trademark infringement may result in a fine up to $5 million or imprisonment for up to 20 years.

Source: http://codes.lp.findlaw.com/uscode/15/22/III/1116

How can you be sure it’s really Eaton?

Eaton’s Power of Authenticity Program ensures that users receive authentic Eaton products, eliminating the downtime, safety, liability and performance issues that may occur when using counterfeit products.

To learn more, visit: eaton.com/aftermarket
Chat, Chat, Chat...

In February, we added the ability to chat with someone at Kendall Electric via the shop.kendallelectric.com site. You may have seen the banner image and icons added to the screen.

This chat system is simple to use and will get you in touch with a real person, not an automated chat-bot, or someone that doesn’t work for Kendall. We’ve set this up so when you login to the site, if you decide to chat with an agent, you’ll be directed to someone from the branch in your local area. This allows you to talk to someone that knows you and your account and can help you quickly get your question answered most efficiently.

Simply click the chat icon on the right-hand side of the screen, and you’ll be directed to an available agent. And because you’ve logged in, your name and email address will be filled in automatically, so when we receive the chat request, we’ll know who we are talking to.

This is a great tool when you want to ask a question but don’t want to pick up the phone or send an email. Check the status of an order, ask about item ship time, check on product availability, or ask any of a hundred other questions.

We have seen positive usage so far and look forward to chatting with you in the near future.

This is just another upgrade to the shopping site to give you the best experience we can. More tools are in the works, so be sure to check out the “What’s New” link on the shop home page. This is where you’ll find information on the latest tools and recent updates.

Again, we are always looking for feedback, so please let us know your thoughts and comments at ecommerce@kendallgroup.com.

shop.kendallelectric.com
Fuseology is defined as the study of a fuse’s operating principles and its unique role in circuit protection. These principles include ratings, operating characteristics, and constructions that enable the fuse to act as a highly effective overcurrent protective device (OCPD).

Reliable OCPDs, like Eaton’s Bussmann™ series Low-Peak™ fuses, help prevent and minimize costly equipment damage while enhancing electrical safety and avoiding downtime. Many industry professionals rarely encounter the basics of reliable overcurrent protection during their courses of study, but it’s important to be aware of the three key principles in applying OCPDs.

These principles, referred to as Friemel’s Laws of Overcurrent Protection, provide a solid foundation for industry professionals to leverage regardless of National Electrical Code (NEC®) adopted. While these laws are not all inclusive of the considerations in applying OCPDs, an understanding of these three key concepts will lead to a safer, more reliable, and code compliant electrical system.

Friemel’s First Law: Interrupting Rating
OCPDs shall be applied with an interrupting rating equal to or greater than the maximum available fault current.

Friemel’s Second Law: Component Protection
OCPDs shall be selected and installed to clear a fault without extensive damage to electrical equipment and components.

Friemel’s Third Law: Selective Coordination
A properly engineered and installed electrical system will restrict outages to ONLY the nearest upstream OCPD for the full range of overcurrents and associated opening times, leaving the remainder of the system undisturbed and preserving service continuity.

These laws encompass the unique operating principles of modern day current-limiting fuses, especially the Bussmann series Low-Peak family:

- High interrupting rating to safely open very high fault currents
- Current limitation to “limit” fault currents to low values for optimum component and equipment protection, helping equipment achieve high short-circuit current ratings (SCCR)
- Simple selective coordination for the full range of overcurrents to prevent “blackouts” caused by upstream OCPDs cascading open when applied with the correct amp rating ratios

To learn more about Fuseology and how Friemel’s Laws of Overcurrent Protection directly relate to the NEC, download the new Bussmann series Fuseology handbook (publication number 10757). The 52-page technical guide demystifies topics like fuse operation, ratings, performance characteristics, and fuse types and classes. Download the PDF at: kendallelectric.com/dl/fuseology.

For additional information, contact your Kendall Electric Account Manager today.
To address the global demands of industry, Emerson has added additional features and functionality to its Award-winning Appleton™ Mercmaster™ LED Low Profile luminaries. They feature ATEX/IECEx Zone 2 and 21-22 certification, additional color temperatures and safety features, a 20% higher ambient range of 65° C, longer luminaire life and higher efficacy, the ability to accept 170-300VDC Voltage inputs, and new competitive retrofit adapters. These new and improved luminaires enable plant and facility managers to standardize on a single low-mount, light-weight, and easy-to-install lighting solution. This leads to reduced complexity and costs in plant design, operations and maintenance. Facility Engineers will appreciate the broad, evenly distributed lighting pattern that can be tailored in the field using one of the four field changeable globes, creating a positive difference in the productivity and safety of employees. With a calculated fixture life of 200,000 hours at 25 C, this luminaire provides exceptional versatility and value.

TRUE 1:1 RETROFITS
Appleton™ Mercmaster™ LED Low Profile luminaries provide a true 1:1 retrofit solution for traditional High Intensity Discharge (HID) 70W-175W light fixtures such as mercury vapor and High Pressure Sodium (HPS), bringing up to 70 percent energy savings to the plant. With an installed profile of approximately seven inches and weighing under twelve pounds, these luminaries are suitable for catwalks, pipe racks, tunnels and other areas with mounting heights of twenty feet or less and where fixture weight must be minimized.

Appleton™ Mercmaster™ LED Low Profile luminaries are extremely simple to install, utilizing the same housing and mounting hoods as the legacy Appleton Mercmaster HID. This saves time and reduces labor costs during retrofits. New mounting options and accessories are also now available, including NEC/CEC Certified retrofit adapters for Appleton Mercmaster II and Crouse Hinds® mounting hoods with additional adapters to follow.

HIGH EFFICIENCY, LOW MAINTENANCE
The updated Mercmaster LED Low Profile luminaire is a safe, reliable lighting solution that performs in even the worst operating conditions, while significantly lowering the plant’s energy, maintenance and labor costs. Long-life, high-quality LEDs from only the best LED suppliers are ideal for difficult to re-lamp areas or where future re-lamping will cause production lines to be stopped during lamp maintenance. Additionally, LEDs are mercury-free, significantly reducing disposal costs and addressing ecological concerns.

For complete information, contact your Kendall Electric Account Manager or visit: www.appletonelec.com.
In-Sight® EasyBuilder® and Spreadsheets Standard class teaches the basics of how to configure a vision application using the EasyBuilder and spreadsheet configuration environment and user interface. This class features two days of standard EasyBuilder topics and two days of standard spreadsheets topics.

The In-Sight EasyBuilder and Spreadsheet Standard product class gives new In-Sight users an overview of the hardware and software used by In-Sight Vision Systems. With the focus on getting the most from the In-Sight Explorer EasyBuilder and spreadsheet interfaces, users learn how to walk through the process of setting up a vision application, step by step in EasyBuilder and spreadsheet programming best practices. This interface requires no programming and uses intuitive menus enabling them to focus on solving their application quickly and effectively.

**LEARNING OBJECTIVES**

- Demonstrate how to connect the In-Sight camera to the network
- Capture an image with the camera
- Calibrate the image using ‘real world’ measurements
- Utilize a variety of Locator Tools to find their part
- Inspect their part using various Identification and Defect Tools
- Configure a Discrete Input and a Discrete Output line
- Describe the use of communications within EasyBuilder
- Utilize the various tools available to deploy the system
- Explain the fundamentals of Lighting and Optics
- Troubleshoot when the camera/network/tools are not working as expected
- Navigate through a Spreadsheet
- Create basic mathematical formulas involving If & And functions
- Implement fixturing in an In-Sight job using a sample part or an image bit map
- Import and Export Snippets
- Describe the purpose of calibration
- List the four conditions that can affect whether In-Sight is Online or Offline
- Describe different forms of communication – PLC Protocols, FTP and TCP/IP
- Create a custom view in a job, including status indicators, results or vision analysis, and a button to control the region of the Histogram tool

**SCHEDULING INFORMATION**

All classes are Tuesday-Friday, 8:30 a.m. - 5:00 p.m.

Kendall Part # 2942549 COGNEX IN-SIGHT TRAINING

Tuition: $1,495.00 per person

Register Online

SEATING IS LIMITED. REGISTER TODAY AT: TRAINING.KENDALLELECTRIC.COM/COGNEX
Arrow Hart’s X-Switch by Eaton is the ideal motor controls disconnect switch solution for complex environments.

The X-Switch is a heavy-duty switch and enclosure designed specifically around the needs of the food and beverage industry. Its robust design qualifies it for a NSF listing and NEMA 4X rating. It also passes IP69K testing that is ideal for the high pressure and high temperature wash-downs. The enclosure is constructed with 316 stainless steel material that allows the Arrow Hart X-Switch to be used in environments with high corrosive substances.

The X-Switch is available in 30A, 60A, and 100A solutions. The Arrow Hart X-Switch features a sloped top design, which aids in the water run off during the wash-down and cleaning process that minimizes the collection of harmful contaminates. These contaminates are known to cause corrosion that disrupts the effectiveness of the equipment and can also introduce pathogens into the workplace environment. Additional features include a rotary style switch fastened on a din rail mount and offers supplemental spacing for late-make/early-break auxiliary contacts for VFD control circuits. These afford the end user further control of multiple electrical circuits, which allow for additional safety precautions. An efficient OSHA compliant lockout/tag out mechanism restricts the ability to open the door only in “off” position, which creates the safest working conditions.

This well-crafted X-Switch is engineered with robust material to provide a high level of quality and reliability that will ensure a long-lasting product lifespan while including safety features to give you the ultimate confidence for your operations.

The Arrow Hart X-Switch will be available in May of 2018.
Wire Capabilities

Wire Cutting
- Many types of wire and cord are in-stock and ready to cut-to-length
- Copper and aluminum building wire, multi-conductor, welding, armored cables, and more
- Ask us about specialty cables and services such as plexing and paralleling

Color Feeders
- A wide range of gauges are available. Please contact us for availability
- All sizes are cut to length
- Eliminates cross phasing, increasing worker and equipment safety
- Saves installation time by eliminating the need for phase taping
- Professional looking installation for the end customer

Compartment Reels
- Our compartment reels will accommodate 4–5 runs of wire
- Includes independent ground wire reel
- Both reels can be removed from the cart
- Free on-time delivery direct to your jobsite. We will pick up the compartment reel when done
- Reduces time and man-hours with fewer reels to setup and dispose of
- Eliminates the need to use heavy jack stands, reducing injury risk
- Cart dimensions: 56” x 45”
- Single reel dimensions: 45” diameter; 8.5” width
- 4-Compartment reel dimensions: 45” diameter; 32” width

<table>
<thead>
<tr>
<th>4 COMPARTMENT PARALLEL REEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAPACITY CHART</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Diameter</th>
<th>750 MCM</th>
<th>600 MCM</th>
<th>500 MCM</th>
<th>350 MCM</th>
<th>300 MCM</th>
<th>250 MCM</th>
<th>4/0 MCM</th>
<th>3/0 MCM</th>
<th>2/0 MCM</th>
<th>1/0 MCM</th>
<th>#1 MCM</th>
<th>#2 MCM</th>
</tr>
</thead>
<tbody>
<tr>
<td>34/1</td>
<td>400</td>
<td>525</td>
<td>700</td>
<td>845</td>
<td>1085</td>
<td>1320</td>
<td>1620</td>
<td>1910</td>
<td>2245</td>
<td>2575</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Drum diameter: 15 ½”
Ring diameter: 45”
Arbor hold diameter: 15/8”
Hubbell Premise Wiring has launched a new series of AV extension products that utilize the HDBaseT 2.0 protocol to provide in-wall, 4K UHD and HDR AV extension up to 100M (328 ft.). These units utilize standard punch-down termination to allow for easy termination to solid UTP network cable. The standard single gang decorator style units provide extension for five AV services while the double gang units add VGA/HDMI or three HDMI source switching.

**Hubbell’s 4K AV Extenders Feature:**
- HDMI, USB, RS232, analog audio, and IR extension
- Selectable USB host or device
- HDMI 2.0 and HDCP 2.2 support
- Front or rear power insertion
- 110 style punch-down terminals
- Integrated testing

AV requirements are rapidly becoming more demanding with the market acceptance of 4K displays and HDR color spaces. These modules provide the bandwidth customers need to support these emerging formats while also providing installers with many productivity enhancing features.

Hubbell’s 4K AV extenders can also be in-wall powered by Hubbell’s unique USB-charging receptacle with auxiliary low voltage power feed.

For more information about Hubbell Premise Wiring’s new line for 4K AV extender products, visit hubbell-premise.com and contact your Kendall Electric Account Manager or Datacom Specialist.
This all-encompassing event showcases the technologies below from our leading manufacturers.

- Process
- Automation and Safety
- Machine Vision and Barcode
- Motion Control and Mechanical
- Networks and Information Systems

Register Today at: KendallElectric.com/TS18B
Connected Lighting Solutions

It’s no secret that advancements in LED technology are happening at a rapid pace. Add to that all the new control features and it’s enough to make your head spin. Below is a primer on the topics of Power over Ethernet, lighting controls, and color temperature tuning for those that are curious how these new technologies can be effectively deployed and utilized in a commercial environment.

**Power over Ethernet**

PoE technology has evolved quickly over the last couple of years to offer a significant return on a customer’s investment and provide extensive capabilities. The advantage of a PoE solution is its ability to simplify lighting and control installations by reducing the time, specialized resources, and materials needed when compared to traditional line voltage installations. It is poised to grow in popularity, with some research organizations estimating growth from $35.8 million in 2016 to $419.9 million in 2025.

One of the main demand contributors are commercial building owners who are increasingly enlisting the support of actionable intelligence for energy management and better building performance. Analytics, the process of turning data into actionable information, can have a significant impact on sustainability and cost-saving strategies. PoE solutions that can be scaled from basic lighting control to advanced cloud-based analytics are in high demand because they are cost-effective solutions for smart building deployments that demand an immediate return on the investment.

The installation of PoE lighting solutions reduces material and labor costs by using a single Cat5e/6 connection for power and communication. Solutions that offer modularity, the degree by which a system can be separated and recombined, offer a competitive advantage. By using a low-voltage cabling approach, the installation process is simplified. Facility owners, like those in healthcare, see tremendous advantage in having the flexibility to make infrastructure changes to support the evolving needs of the real estate. Adding to the cost savings, when customers go the low-voltage route, the lighting can be installed by low voltage installers and it can be easily configured and reconfigured through software by IT personnel.

When evaluating PoE solutions don’t overlook the importance of standards. Today, industry standards are fluid and you will want to investigate and understand how the device input-output requirements are addressed by the solution.

**Lighting Controls**

According to BOMA, energy use in commercial and industrial buildings has seen significant reduction in recent years driven by new technology and code compliance. Through the implementation of intelligent controls, however, a significant opportunity remains to further reduce lighting energy usage, which makes up 17% of total energy use in a typical commercial building.

It’s easy to feel overwhelmed by the wide array of lighting control choices for commercial and industrial facilities. What’s important to note is you have options for wireless and wired luminaire-based controls, and contrary to popular belief, you don’t need to compromise.

At Hubbell Control Solutions we call this the hunt for “purpose-built flexibility.” Today, market requirements vary by end-user, and solutions that are available as wired and wireless, standalone luminaire-based control, small room network, or building-wide systems are the most advantageous. Distributed systems work by distributing the control intelligence out to the device itself, removing a single point of failures inherent in any centralized-control architecture and providing a much more scalable architecture.

Distributed systems also allow for direct communication between two devices, or from one device to many devices, or even from one device to all devices. This is accomplished without the need for a master device, eliminating the fault possibility of the master controller and removing a potential performance bottleneck. In addition to enhanced system performance, distributed systems are much more fault tolerant. A specific device failure affects only that one device, not potentially many devices, or even the whole system, as would be the case in centralized-control architectures.

Consider a distributed system to connect luminaires, room controllers, panels, occupancy sensors, photocells, wall switches, relays, and dimmers. Applications include occupancy and vacancy, scheduling, daylight harvesting, 0-10V dimming, color temperature control, task tuning, and occupant control.
...Continued from previous page.

**Color Temperature Tuning**

In a recent AIA study, architects and building owners noted they are beginning to place greater emphasis on the impact of design decisions on human health. Nearly 75 percent of architects and 67 percent of owners say health considerations now play a role in how their buildings are designed, indicating that healthy environments have become an important tool in marketing to faculty, students and staff. Advances in lighting technology are having an impact on this trend.

Lighting manufacturers now offer the option of changing the color temperature within a luminaire to create various environments within a space. In the past, changing “scenes” within the same space would require multiple luminaire types with different color temperatures. This can now be accomplished within a single luminaire and can be achieved without sacrificing lumen output.

We are speaking with our customers about the practical applications for this new technology. Currently the most frequent applications are education, healthcare and commercial spaces.

In the educational space, teachers and administrators now have the option to customize the learning area to produce a more cohesive learning environment. Providing educators with the ability to “warm” the color temperature of the lighting in the space has the potential to aid calming or settling actions for students just as tuning the light to a “cooler” color temperature containing more blue light could potentially help with focus.

In the healthcare environment, particularly in hospitals, one luminaire can be used for a physician to perform an examination of a patient, yet give the patient the ability to change from the examination light to a more soothing, comfortable ambient light. Studies are currently being conducted that measure the use of artificial lighting to maintain the natural circadian rhythm of patients who are staying in interior sections of the hospital, or who are there for extended stays, to experience similar effects of natural light. The healthcare industry is researching human centric lighting and color tuning to define its effects and benefits more clearly.

Commercial offices can be some of the most challenging areas for artificial light. Critical considerations include the visual tasks that will be performed in the space and the reason for lighting can vary. Although the technology is available, it may not be practical in all office situations. Individual offices will benefit from this technology, whereas a large space with many occupants would pose a challenge to keep every luminaire in the same space from having a different temperature and light output. There is still relevance, however, to creating a cohesive environment between the natural light and artificial light in the space.

Lighting Control Technology, such as Daylight Harvesting, can aid with lowering light levels and creating an interior environment that is more in tune with the exterior environment.

It’s easy to get caught up in the latest technology and there’s enough information out there to make your head spin. At Hubbell, we certainly recognize there’s a need for continued education on these topics and we’ve developed a number of courses to help the industry. Take a look at the courses we have on the horizon at kendallelectric.com/dl/LSC and consider visiting our facility. Contact your Kendall Electric Account Manager for more information on Hubbell connected lighting solutions.
Mersen’s Fuse Control program is a powerful combination of circuit protection products and services designed to help you get control of your plant inventory, operating costs, code compliance, and workplace safety.

Developed by Mersen and refined through extensive field research, Fuse Control is a simple program that packs a lot of muscle. It will give you the edge you need to mitigate arc flash hazards, achieve code compliance, reduce inventory by 25% or more, and offer the highest grade overcurrent protection available.

How can one program deliver such benefits? It’s easy! Let the fuses do the work. The key lies in consolidating your current inventory and installed overcurrent protective devices to one fuse line - Mersen’s innovative Amp-Trap 2000® fuse family. Amp-Trap 2000 fuses out-perform the traditional fuse, opening in less than one-quarter cycle at fault currents up to 300kA, and minimize the let-through currents and energies that flow downstream during faults.

The Five Major Benefits of Fuse Control

1. Improve workplace safety

The explosive energies reached during an arc flash – intense heat, thermoacoustic shock wave, molten metal – can cause severe, often fatal, injuries to workers even several feet away. The fuses we recommend for reducing arc flash energies are UL Listed branch circuit fuses with the highest degree of current limitation — Mersen Amp-Trap 2000® fuses. Amp-Trap 2000 fuses can isolate a faulted circuit before the fault current reaches it maximum value, enabling the fuses to (a) limit the total energy delivered to an electrical fault, (b) limit thermal and mechanical stresses created by the fault current, (c) reduce both magnitude and duration of the fault current, and (d) be easily coordinated in both the overload and short circuit regions. Because this energy reduction lowers the amount of heat generated, the use of these fuses typically minimizes the level of personal protective equipment (PPE) required, allowing personnel to work more efficiently, and more importantly, safer.

2. Decrease operating costs

The Fuse Control program saves you money in two ways: by streamlining inventory and alleviating product replacement costs with current-limiting Amp-Trap 2000 fuses. If sized properly, Type 2 “No Damage” protection can be achieved when installing current-limiting Amp-Trap 2000 fuses, which prevent short circuits from destroying your critical equipment. What does this mean? Basically it means that your motor starter, contactor, or variable frequency drive will remain in functional condition if an electrical fault were to occur, saving you product replacement costs and installation time. To make sure your equipment is Type 2 coordinated, visit kendallelectric.com/dl/MerLit and locate our Type 2 No Damage Coordination Guides.

3. Reduce downtime associated with electrical failures

Mersen’s innovative SmartSpot® open-fuse indicator is available on the Amp-Trap 2000 Class J and Class RK1. SmartSpot uses a combination of advanced materials and a unique, solid-body design, which turns an eye-catching red to help you locate an open fuse quickly and safely. SmartSpot eliminates the guessing and allows you to locate the open fuse faster, helping you avoid even more costly downtime. When installed properly, Amp-Trap 2000 fuses have a convenient 2:1 coordination ratio. A selectively coordinated system will localize a fault condition, restricting outages only to the equipment affected. By having a coordinated system, you will mitigate unnecessary outages, saving you time and money.

4. Streamline inventory as much as 25% or more!

Amp-Trap 2000 fuses have the ability to replace multiple SKU’s, reducing your overall inventory by 25% or more. The most common fuses found in today’s medical facilities are the UL Class H, K, and RK5. The UL Class H, K, and RK5 fuses are dimensionally interchangeable with the Amp-Trap 2000 Class RK1, making them easy to replace with a single class. The Amp-Trap 2000 Class RK1 provides a higher level of safety and performance than the other classes. A Class RK fuse holder should also be installed to prevent users from mistakenly installing Class H or K fuse in the future.

Continued on next page...
5 Achieve electrical code compliance

Being responsible for your workers’ safety means being up-to-date on the arc flash hazard regulations and standards, and integrating them into a comprehensive electrical safety program. The major industry regulations and standards that you should be aware of are OSHA, NFPA 70E®, CSA-Z462, IEEE Standard 1584, and NFPA 70®: National Electrical Code®. AmpTrap 2000 fuses can reduce hazard risk categories allowing for a safer work environment. Mersen can assist you with electrical hazard assessments, including Arc Flash Hazard Analysis and Short Circuit Study.

The Three Phases of Fuse Control™

Now that you understand the benefits of the Fuse Control program, we can review the proper steps needed to implement a successful consolidation:

• Storeroom Audit and Database Analysis
• Consolidation Report & Plan
• Implementation

The Fuse Control program will be performed by Kendall Electric, your authorized Mersen electrical distributor, in collaboration with a Mersen regional sales representative, making it effortless for you. Each phase contains its own list of action items and deliverables which allow for a smooth and efficient conversion. There is no time pressure; the phases are performed at a pace that works around your schedule.

Order Fuse Control and receive a FREE Fuse Inventory Audit & Analysis.

Take action today to get control of your inventory, and contact your Kendall Electric Account Manager to initiate your Fuse Control program today. The initial storeroom audit and database analysis is very simple and will take up little of your time or resources. Also, did we mention, it is free!
Eaton’s Crouse-Hinds Series Industrial LED
The No-Doubt Choice for LED Lighting

The Reliability You Require

Reliable lighting in your factory, warehouse, or industrial workplace is essential for jobsite efficiency and employee safety. To ensure reliability in your installation, opt for LED lighting from Eaton's Crouse-Hinds Series. Our extensive portfolio offers consistent, maintenance-free performance: 50,000 hours of rated life at 65°C operating ambient. In some cases, Crouse-Hinds lighting can offer up to 20 years of maintenance-free performance. These products are built to withstand difficult conditions, from extreme temperatures and vibration to excess water and dust.

Across-the-Board Savings

The unmatched maintenance-free performance of Crouse-Hinds LED Lighting leads directly to a reduction in labor costs. Forget the costly budget item of regular repairs for your lighting; a Crouse-Hinds LED light can be installed and trusted for more than a decade.

In addition to labor savings, these LED products offer operational savings and improvements in energy efficiency. LED luminaires consume an average of 50% less energy than HID and 85% less than incandescent. In one recent example, a packaging and newsprint company saved over $50,000 in maintenance and operational costs after switching their staging yard to Eaton’s Crouse-Hinds LED series.

For more information, contact your Kendall Electric Account Manager today.

Crouse-Hinds series

Crouse-Hinds series LED features at a glance

- 7 years of maintenance-free performance: 50,000 hours of rated life at 65°C operating ambient
- Fixtures constructed to withstand extremes in temperature, vibration, water, and dust
- Custom optics on luminaires ensure that you achieve the best light distribution and intensity for your installation
- Industrial LED fixtures are backwards compatible with Crouse-Hinds’ HID, fluorescent, and incandescent installed bases
- Crouse-Hinds’ series of LED luminaires are compliant with a wide range of global certifications
**Connected LED Lighting**  
*Coming Soon in 2018!*

- Remote monitoring and control for use in **hazardous and hard-to-access areas**.  
- Combining our advanced LED lighting fixtures with communications and sensing technology, we put full lighting control at our customers’ fingertips.  
- Optimize industrial lighting applications based on space and specific usage requirements.  
- Advanced scheduling.  
- Daylight harvesting.  
- Fixture grouping.  
- Occupancy sensing.  
- Advanced dimming controls.  

**Champ VMY LED** with integral control and sensing unit can send commands to multiple fixtures.  

- Low traffic area.  
- High traffic area.  

Maximize energy savings and minimize maintenance costs with custom control settings.

---

**KENDALL ELECTRIC**  
**EATON**  
Crouse-Hinds series

Let Kendall Electric & Eaton’s Crouse-Hinds help you stay sharp this year!

Receive one Buck knife for every $500 worth of Eaton’s Crouse-Hinds products purchased from Kendall Electric, April 1st through May 31st, 2018. Promotion available while supplies last.

**Be a Cut Above!**

- Promotion ends May 31, 2018 or when the knives are gone.  
- Knives will be sent to Kendall locations for customer distribution at the conclusion of the promotion.  
- Maximum of five knives per customer account.  
- Accounts must be current to qualify.  
- Kendall Marketing will track all sales.  
- Orders are cumulative over the promotion period and must invoice by May 31, 2018.  
- Offer void where company gift policy prohibits premium acceptance.  
- Prize winners are responsible for all federal and state tax liability.  
- Knife style and color may vary from the image represented.
<table>
<thead>
<tr>
<th>Location</th>
<th>Address</th>
<th>Phone</th>
<th>Fax</th>
<th>Contact Info</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpena, MI 49707</td>
<td>1240 US 23 North</td>
<td>989-355-3411</td>
<td>1-800-968-3411</td>
<td></td>
</tr>
<tr>
<td>Battle Creek, MI 49037</td>
<td>702 N. 20th Street</td>
<td>269-965-6897</td>
<td>1-800-255-5214</td>
<td></td>
</tr>
<tr>
<td>Benton Harbor, MI 49022</td>
<td>1405 South M-139</td>
<td>269-925-3244</td>
<td>1-800-442-1711</td>
<td></td>
</tr>
<tr>
<td>Cadillac, MI 49601</td>
<td>909 W. 13th Street</td>
<td>231-775-9734</td>
<td>1-800-695-5464</td>
<td></td>
</tr>
<tr>
<td>Coldwater, MI 49026</td>
<td>646 E. Chicago Rd.</td>
<td>517-278-4518</td>
<td>1-800-695-5464</td>
<td></td>
</tr>
<tr>
<td>Grand Haven, MI 49417</td>
<td>1436 Fulton Ave.</td>
<td>616-844-7017</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grand Rapids, MI 49504</td>
<td>832 Scribner Ave., N.W.</td>
<td>616-459-8327</td>
<td>1-800-442-2523</td>
<td></td>
</tr>
<tr>
<td>Holland, MI 49424</td>
<td>11581 Greenway Dr.</td>
<td>616-396-4625</td>
<td>1-800-968-9800</td>
<td></td>
</tr>
<tr>
<td>Jenison, MI 49428</td>
<td>6726 Roger Dr.</td>
<td>616-662-0185</td>
<td>1-800-292-0802</td>
<td></td>
</tr>
<tr>
<td>Lansing, MI 48917</td>
<td>7633 Lanac St.</td>
<td>517-322-2411</td>
<td>1-800-968-3600</td>
<td></td>
</tr>
<tr>
<td>Midland, MI 48642</td>
<td>4600 James Savage Rd.</td>
<td>989-496-3600</td>
<td>1-800-968-3600</td>
<td></td>
</tr>
<tr>
<td>Muskegon, MI 49442</td>
<td>1699 Wierenga Dr.</td>
<td>231-773-6621</td>
<td>1-800-968-6621</td>
<td></td>
</tr>
<tr>
<td>Petoskey, MI 49770</td>
<td>1915 Fochtman Ind. Park Dr.</td>
<td>231-347-2646</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Portage, MI 49002</td>
<td>5101 S. Sprinkle Rd.</td>
<td>269-965-3411</td>
<td>1-800-255-5214</td>
<td></td>
</tr>
<tr>
<td>Saginaw, MI 48604</td>
<td>5420 Davis Rd.</td>
<td>989-752-4181</td>
<td>1-800-968-4181</td>
<td></td>
</tr>
<tr>
<td>Sturgis, MI 49091</td>
<td>700 N. Centerville Rd.</td>
<td>269-651-9495</td>
<td>1-800-916-1958</td>
<td></td>
</tr>
<tr>
<td>Three Rivers, MI 49093</td>
<td>1201 W. Broadway</td>
<td>269-273-6644</td>
<td>1-800-632-2011</td>
<td></td>
</tr>
<tr>
<td>Traverse City, MI 49686</td>
<td>2458 N Aero Park Ct.</td>
<td>231-946-7262</td>
<td>1-800-968-7262</td>
<td></td>
</tr>
<tr>
<td>Wyoming, MI 49509</td>
<td>1100 S 8th St. SW</td>
<td>616-406-1555</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Angola, IN 46703</td>
<td>2795 Woodhull Drive</td>
<td>260-665-2098</td>
<td>1-800-525-2842</td>
<td></td>
</tr>
<tr>
<td>Auburn, IN 46706</td>
<td>1200 S. Grandstaff Ave.</td>
<td>260-927-1530</td>
<td>1-800-368-0187</td>
<td></td>
</tr>
<tr>
<td>Fort Wayne, IN 46825</td>
<td>415 Ley Road</td>
<td>260-484-0755</td>
<td>1-800-552-0999</td>
<td></td>
</tr>
<tr>
<td>Kendallville, IN 46755</td>
<td>109 S. Allen Chapel Rd.</td>
<td>260-347-3190</td>
<td>1-800-525-2841</td>
<td></td>
</tr>
<tr>
<td>La Porte, IN 46350</td>
<td>915 Boyd Blvd.</td>
<td>219-362-2019</td>
<td>1-800-728-4331</td>
<td>219-872-0628 Mich. City</td>
</tr>
<tr>
<td>Mishawaka, IN 46544</td>
<td>4905 Lincolnway E.</td>
<td>574-259-0026</td>
<td>1-800-682-4528</td>
<td></td>
</tr>
<tr>
<td>Warsaw, IN 46580</td>
<td>1095 Fisher Ave.</td>
<td>574-267-8168</td>
<td>1-800-421-5214</td>
<td></td>
</tr>
<tr>
<td>Birmingham, AL 35222</td>
<td>3317 5th Ave. S.</td>
<td>205-254-3192</td>
<td>1-800-605-3192</td>
<td></td>
</tr>
<tr>
<td>Montgomery, AL 36116</td>
<td>6064 Perimeter Pkwy.</td>
<td>334-356-1845</td>
<td>1-866-711-8021</td>
<td></td>
</tr>
<tr>
<td>Tuscaloosa, AL 35405</td>
<td>1323 Whigham Pl.</td>
<td>205-759-5716</td>
<td>800-263-8393</td>
<td></td>
</tr>
<tr>
<td>Chattanooga, TN 37408</td>
<td>2310 Rossville Blvd.</td>
<td>423-698-4471</td>
<td>1-886-263-6673</td>
<td></td>
</tr>
<tr>
<td>Cleveland, TN 37323</td>
<td>2395 Shady Lane</td>
<td>423-479-2639</td>
<td>1-800-472-4547</td>
<td></td>
</tr>
<tr>
<td>Jackson, TN 37801</td>
<td>25 American Dr.</td>
<td>731-423-0134</td>
<td>1-800-467-1155</td>
<td></td>
</tr>
<tr>
<td>Kingsport, TN 37660</td>
<td>1241 Jan Way</td>
<td>423-246-8151</td>
<td>1-800-775-3530</td>
<td></td>
</tr>
<tr>
<td>Knoxville, TN 37922</td>
<td>170 Mabry Hood Rd.</td>
<td>865-546-8755</td>
<td>1-800-532-8742</td>
<td></td>
</tr>
<tr>
<td>Newport, TN 37821</td>
<td>133 Highway 25E</td>
<td>423-623-0628</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oak Ridge, TN 37830</td>
<td>745 Emory Valley Rd.</td>
<td>865-482-4906</td>
<td>1-800-832-8742</td>
<td></td>
</tr>
<tr>
<td>Pigeon Forge, TN 37863</td>
<td>117 Golf Rd.</td>
<td>865-453-4638</td>
<td>1-800-532-8742</td>
<td></td>
</tr>
</tbody>
</table>

**KENDALL ELECTRIC LOCATIONS**

**MI**

- Alpena, MI 49707
- Battle Creek, MI 49037
- Benton Harbor, MI 49022
- Cadillac, MI 49601
- Coldwater, MI 49026
- Grand Haven, MI 49417

**IN**

- Grand Rapids, MI 49504
- Holland, MI 49424
- Saginaw, MI 48604
- Sturgis, MI 49091
- Three Rivers, MI 49093
- Angola, IN 46703
- Auburn, IN 46706
- Fort Wayne, IN 46825
- Kendallville, IN 46755
- Mishawaka, IN 46544

**TN**

- Chattanooga, TN 37408
- Cleveland, TN 37323
- Jackson, TN 37801
- Kingsport, TN 37660
- Knoxville, TN 37922
- Oak Ridge, TN 37830
- Pigeon Forge, TN 37863

**AL**

- Birmingham, AL 35222
- Montgomery, AL 36116
- Tuscaloosa, AL 35405

**GA**

- Dalton, GA 30720

**Contact the Kendall Electric location nearest you for all of your electrical and datacom needs.**