

NEWSBYTES

INNOVATIVE PRODUCTS PROCESSES AND APPLICATIONS FOR INDUSTRY



2003 marks the 100th anniversary of the Allen-Bradley brand and Rockwell Automation is celebrating this century of quality, as well as honoring this special anniversary, by holding the annual Automation Fair in Milwaukee, Wisconsin. Milwaukee is the birthplace of the Allen-Bradley brand, and world headquarters for Rockwell Automation.

This annual event is popular because it brings together the latest in automation technology, products and services, as well as opportunities for conferring with experts via exhibits and classroom training labs. This year's special venue allows for guided tours of Rockwell Automation/Allen-Bradley corporate headquarters.

Plan on joining us November 18-20th. For more information on Automation Fair 2003 or package availability, contact your local McNaughton-McKay branchoffice.



New Products from Sola/Hevi-Duty Provide Power Quality Solutions

by Mike Goloback
Mike McAuliffe Sales, Inc.,
Hazel Park, Michigan

Edition 3 of the Sola/Hevi-Duty full-line catalog features the complete line of Sola/Hevi-Duty Power Quality and Power Conversion products, including several new items: the updated SDN-P Single-Phase DIN Rail Power Supply series, new series of UPS, the SLR Series of Line Reactors, and Industrial Control Transformers.

The single-phase SDN-P (Performance) 24 VDC DIN rail power supplies are more compact, meet SEMI F47 Sag Immunity standards, and have built-in Power Factor Correction. They feature auto select 115/230 VAC nominal input voltage, 50/60 Hz input, a DC OK signal, and adjustable output voltage. Available from 2.5 amps to 20 amps, and housed in a rugged, compact casing, the SDN-P provides reliable DC power for industrial process controls, machine control, and material handling and conveying equipment, including DeviceNet applications. The improved single-phase SDN-P series is part of a family of 64 DIN Rail power supplies in the Sola/Hevi-Duty range.

Sola/Hevi-Duty has also introduced the new S5K Modular UPS series and the S4K Industrial Online UPS. The S5K Modular series can vary from 4 to 20 KVA, offers multiple chassis options for adding modules, and is designed to be shipped in the configuration you need. The S5K Modular series can also be easily upgraded in the field. This will allow



you to upgrade cost-effectively, keeping your UPS current without investing in a new system. The modular components, including the power, battery, and system control modules, are hot-swapped. This allows you to provide power protection to the load, even while increasing power, extending backup run-time, or adding redundancy. The S5K is a fault-tolerant system that uses intelligent power and battery modules; automatically taking themselves off-line if there is a problem, and they do it without interrupting power. Maintenance and troubleshooting is simplified by the self-diagnostic capabilities. Each unit has an internal automatic bypass.

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The S4K Industrial Online UPS models handle power disruptions effectively and are compatible with most standby generators. The S4K models have built-in communications to provide maximum configurability and control. You can connect to almost any type of network easily with optional communication cards. The S4K series offers true online (double conversion) protection, eliminating a wider range of potential power problems. You will be protected from spikes, surges, noise, sags, extended overvoltage and brownouts, and even difficult-to-track harmonics and frequency variations that are common with standby generator operation. The design incorporates sinewave output in a slim 2U (3.5") package. Units have LED displays and can be hardwired easily.



The SLR Series DIN Rail Mounted Line Reactors are the only line reactors that are UL listed and CE marked. Available from 2 to 20 Hp, they provide safe, compact protection for high frequency drives and electronic equipment. The Sola SLR inductive filter prevents damage to any three-phase electronic system plagued by capacitor or large load switching, reducing stress on drive components to keep them running longer.

Additional SLR Series features include:

- IP 20 finger-safe packaging
- elimination of drive cross-talk and interference
- reduction of nuisance tripping to provide stable system performance

- removal of harmonics, helping to keep line voltage smooth through notching
- 10-Year Sola/Hevi-Duty Warranty

For demanding industrial applications, Sola/Hevi-Duty has a broad range of industrial control solutions, including four series of industrial control transformers. Sola/Hevi-Duty's products exceed NEMA standards. Transformers that don't meet those standards may cause unnecessary shutdowns of downstream systems. The series of industrial control transformers includes the SBE, SMT, International, and HSZ series.

- The SBE series offers 55° rise, and copper windings and encapsulation for longer life and protection from the environment. It provides low-temperature performance, which can lead to smaller cabinet size or longer life for any nearby electronic components.
- The SMT series have a 115° rise, are aluminum wound, and are well-suited for applications that require good voltage regulation and higher power capacities (1000 to 5000 VA).
- The International series, for European use, meets all IEC requirements, including Touch Safe covers (IP-20 ordered separately).
- The HSZ series is a line of enclosed control transformers from 1 KVA to 10 KVA that features either UL-3R or NEMA 12 enclosure. The unique design of HSZ transformers can help system designers meet harsher environmental standards or design for safer installations. This series provides a solution when cost or heat issues make it necessary to mount the transformer outside the control panel.

Contact McNaughton-McKay for more information about these and other Sola/Hevi-Duty power protection and conditioning solutions.



Customer Appreciation Open House

by Tina Reiriz
McNaughton-McKay Electric,
Charlotte, North Carolina



It was Race Week in Charlotte, but the rain was falling in buckets as the Rockwell race car rumbled across the parking lot to its final location under the recently erected tent in the parking lot. The Houston Wire and Cable crew were busily fanning the flames of what would soon be the busiest barbeque pit they ever managed. The Hoffman Race simulators were being tested, and over 30 proud vendors hastily put the finishing touches on their displays, preparing for what they hoped would be another successful event. As for McNaughton-McKay's North Carolina Team, well, they confidently readied themselves for the inevitable.

Finally, at 10 a.m., Thursday, May 22nd, the rain subsided somewhat; the doors were opened; and the first of many customers signed into what would be one of the most successful Customer Appreciation Days



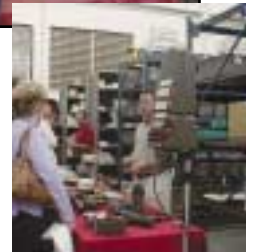
ever for McNaughton-McKay Electric Company!

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Despite the rain, McNaughton-McKay entertained and educated over 600 customers on the latest and greatest in electrical and automation products and services. "From the homemade deserts, prepared and served by McNaughton-McKay employees and their families in appreciation for the loyalty and partnership of our customers, to the grand opening of the new Automation Center in Charlotte, this event was great," commented Andy Pond, Assistant Sales Manager. "It demonstrates the commitment we have for bringing our customers and suppliers closer together so that we can all work with each other to solve problems and grow our businesses together."

inside the well-stocked and professionally equipped Charlotte facility just before Memorial Day Weekend, featured an extensive array of products and services. According to Chuck Baisley, McNaughton-McKay's North Carolina Purchasing Manager and one of the principal organizers of the event, "Our entire team pitched in to help out in the planning and executing of this event, but it was our customers who made it a success. Everyone was happy to be a part of this event, especially the ones who learned something new about us, or those who won some prizes!"



By 2 p.m., Houston Wire and Cable had served over 800 lunches, and many customers realized just how extensive McNaughton-McKay's products and services can be. "It's great to see how many folks are engaged in what really works, and for them to understand how we can help them improve their bottom line," described Dave Tillman, Sales Manager for North Carolina. "All we did was get the word out, and new and existing customers responded, knowing that we add serious value to all that we have to offer them."



This unique event, highlighted in these photos, gave a brief but welcome break to many hard-working customers who have battled world and local events in order to stay on top of their game. The Customer Appreciation Day, held



GE Industrial Power Solutions from McNaughton-McKay.

by Devon Woodruff
GE Industrial Systems,
Southfield, Michigan

GE Industrial Systems supplies lighting panels, disconnect switches, busway and bus plugs, circuit breakers, dry-type transformers, and residential load centers for commercial and industrial facilities.



A-Series Lighting Panels

The A-Series design is an extremely flexible design with over 12,000 combinations of factory-assembled interiors, boxes, fronts, main and/or sub-feed breakers, main lug or feed-thru applications, and bolt-on branch breakers. A-Series Pro-Stock Panelboards are shipped from distributor stock, unassembled for field assembly and installation.

A-Series panels are available with copper bus for 240 VAC single-phase and 208/120 VAC three-phase in 100-225, 400, and 600 amp ratings and 480/277 VAC three-phase in 100-225, and 400 amp ratings. Aluminum bus panels are available for 240 VAC single-phase, 208/120 three-phase and 480/277 three-phase in 100-225 amp rating. A wide variety of main and sub-feed breakers, main lugs, and bolt-on branch breakers may be used in the A-Series. Comprehensive selection guides are available to assist in configuring the right panelboard for the job.



Spec-Setter TH Heavy Duty Disconnects

Single throw disconnects for applications where safety, high performance, and continuity of service are essential. They meet major automotive manufacturers' and JIC electrical specifications. They are suitable for use as service entrance equipment when installed in accordance with the National Electrical Code.

Spec-Setter TH Heavy Duty Disconnects feature:

- 30 to 1200 amp, 600 VAC, 250 VDC range
- direct-drive, quick-make, quick-break mechanism (30-200 amp) for long life and positive ON/OFF indication
- bright red handles that are easy-to-see, easy-to-grip, and donut-shaped for hookstick operation
- NEMA 1, 3R, 5/12, and 317 stainless steel 4/4X water- and dust-tight enclosures available
- fusible and no-fuse types.



Spectra Series Low Amp Busway and Plugs

At the installed cost of conduit, the Spectra Series provides for repositioning machinery on the plant floor, or movement of machinery from one facility to another complete with the supporting

electrical system. Along with a lower installation cost and initial investment, advantages over wire and conduit include:

- adaptability and versatility
- predictable electrical characteristics
- longevity and durability
- smaller size
- lighter ceiling weight load
- higher short-circuit ratings
- virtually no maintenance
- fully UL/ANSI/CSA/ASTA tested and certified
- safety

The Spectra Series busway has tap-off provisions at 24" intervals on both sides – ten locations per 10' section of busway. Safe and quick connection of a switch (up to 600 amp) or circuit breaker (up to 800 amp) provides for short, direct connections to equipment. Meeting IEC finger-safe standards, the plug outlet provides for positive, safe, plug installation and helps eliminate accidental contact with live conductors.

A wide variety of tap-off devices are available: fusible switches (QMT type) and molded case circuit breakers are the most common. Spectra RMS Busway plugs, available in E, F, G, and K frame, also provide the following benefits:

- simplified factory-floor changeover with adjustable trip-amp rating plug
- more accurate and reliable trip interruption with true digital RMS sensing
- higher interruption capacity
- optimum service life, performance, and safety

A plug-assist mechanism is standard on plugs rated above 100 amp and is optional on lower-rated plugs. Interlocks prevent opening the cover when the switching device is in the "ON" position, prevent insertion or removal of a plug when in the "ON" position, and prevent opening the cover when in the "ON" position. Provision for up to three padlocks with 5/16" shank is made for lock-out when the plug is in the "OFF" position.

Each busway joint is adjustable $\pm 5/8"$, which reduces the need for precise measurements. A field-adjustable straight length provides for on-site flexibility. It is nominally 54" long, with

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a minimum of 48" and a maximum of 60" to take up lengths that may not have been fixed until equipment installation was final. All joints are completed with a single-insulated, polarized bolt with a Belleville spring washer that retains 90% of original contact pressure, all but eliminating annual joint tightening. One standard clevis hanger is shipped with each straight length. Because of the lighter weight of Spectra Busway, this single hanger is usually sufficient. Vertical runs are supported at each floor with spring hangers.

Plug-in lengths are available in 4', 6', and 10' lengths; feeder lengths in 2', 3', 5', and 10' lengths. An assortment of elbows, tees, and offsets provides for designing a busway installation of almost any configuration. The Run-A-Bus software program is used to provide quick field drawings for engineering approval and release. Run-A-Bus also creates a three-dimensional busway layout with a complete catalog numbered bill of material.

Spectra Series busway is available in both silver-plated aluminum and tin-plated copper for 225 amp through 5000 amp AC and 600 amp through 8000 amp DC low voltage service. Indoor (IP409), drip-proof (IP439), and outdoor feeder (IP549) styles are available. Bus bars are coated with Blue Coat 130° Class B epoxy thermal-set insulation rated self-extinguishing by UL laboratories.



Q-Line General Purpose Main & Feeder Plug-In Circuit Breakers

Q-Line's high-performance design features copper-to-copper connections and heat-resistant thermal-set cases and covers for stability and structural rigidity. All Q-Line circuit breakers are tested to UL requirements. Each breaker is

calibrated to ensure optimum trip performance and the dedicated calibration screw is cemented to prevent shifting and ensure stable, reliable calibration. Q-Line breaker handles trip to the center position, for easier identification by the end-user.

Compact 1/2" THQP breakers provide the same performance as the 1" THQL in a space-saving module that provides for reduced load center space and installed cost. The THQP is available from 15 to 50 amp rated single- and two-pole configurations. THQL breakers are available from 15 to 125 amp and TQDL 1" breakers are available from 125 to 200 amp.

The THQP and THQL circuit breaker line-up extends to surge arresters, Ground Fault Circuit Interrupters (GFCI), and Arc-Fault Circuit Interrupters (AFCI). The THQLSURGE surge arresters provide "whole house" protection of sensitive electronic equipment from destructive surges and eliminate the need for surge arrester strips at each point of use.

A THQL GFCI provides protection against overloads, short circuits, and ground faults for receptacles located outdoors, and in bathrooms, garages, and spa areas, as required by the National Electrical Code. It detects very low levels of current leaks (ground faults) and acts quickly to shut off power, preventing serious shock. It is UL listed and available in 120- and 240-volt ratings, 15 to 30 amp single pole, and 15 to 50 amp double pole.

THQB and THQL AFCIs protect against short circuits and overloads, electronically identify the unique current and voltage characteristics of arcing faults, and de-energize the entire circuit when a fault occurs. They fulfill the 2002 NEC requirements for dwelling unit bedrooms. A trip notification flag provides for fast identification of a trip; a dual-function test button provides for both arc faults and low level arc-to-ground testing. The plug-in type is suitable for all GE PowerMark load centers and A-Series Type A panelboards; the bolt-on design is suitable for Pro-Stock Type AQ and factory-assembled A-Series Type AQ panelboards. All AFCI types are UL listed

and available in 10kAIC and 22kAIC ratings.

QHV Dry Type Distribution Transformers

The QHV distribution transformers are similar to the GE Type QL single- and three-phase transformers, which are available from 15 to 1500 kVa, are rated at 600-volt and below for supplying appliance, lighting, and power loads from electrical distribution systems. Standard distribution voltages are 600-, 480-, and 240-volt; standard load voltages are 480-, 240-, and 120-volt.

Type QL transformers are fully encased and ventilated for floor or platform mounting, with rubber isolation pads at the base to minimize transmission of vibration from the core and coil structure. Standard are indoor NEMA Type 2 enclosures, which may be converted to outdoor NEMA Type 3R enclosures with a factory-supplied conversion kit. Vent guards to deter rodents or debris from entering vent openings are also available. Being fully encased, the Type QL transformer may be installed at the load, eliminating the requirement for a vault.

Transformer temperature classification combines ambient temperature, winding temperature rise, and hot spot to determine the insulation system. Type QL transformers are designed using a 220° insulation system with standard temperature rise of 150°. Transformers with lower temperature classifications, generally 115° and 80° are available.



PowerMark Gold Residential Load Centers

The PowerMark Gold Single Phase Load Center series offers:

- copper bus with tin plating to resist corrosion
- main breaker and panel rated 22kAIC standard
- galvanized indoor enclosure and breaker mounting rails for durability

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- solid, full length neutrals with 100% terminations to speed wiring
- smaller, lighter enclosure that maintains optimum wire-bending space
- compatible with 1/2" THQP branch breakers to save space



Plug-in types provide for 2 to 42 feeder circuits and 40 to 225 amp main breakers. Feed-thru lug designs have 150 and 200 amp main breakers, straight in and out wiring, and factory-installed feed-thru lugs. The PowerMark Gold series includes a Generator Panel for switchable control of auxiliary power in the event of an outage.

All GE Residential products reflect GE's corporate Six Sigma quality improvement program.

Get power to be productive through McNaughton-McKay, a GE Industrial Systems Partner.



Key RSView Updates

Version 3.0 of Rockwell Automation's popular HMI software family, the RSView Enterprise Series, answers many productivity challenges. This robust product family includes RSView Supervisory Edition, RSView Machine Edition, and the RSView Studio PC-based development tool. The series offers improved productivity through redundancy and information collaboration, enabled by FactoryTalk.



Key features of the release include:

- **Enhanced Support:** including support for Allen-Bradley PanelView Plus operator interfaces, Allen-Bradley VersaView CE industrial computers, and options for users who would like the full-featured RSView Supervisory Edition environment with standalone functionality for single lines or processes.
- **FactoryTalk-Enabled:** control information may be shared across the factory, allowing the boardroom to have real-time manufacturing information.
- **Maximum System Availability:** built-in redundancy features ensure critical data is available to clients, even during server disruptions.
- **System-Wide Audit Capabilities:** in support of regulatory demands such as 21 CFR Part 11, FactoryTalk Diagnostics collect, store, and examine system activities in a centralized location...linking the actions recorded by software to what actually happened with the system.

Series 3.0 is available as a standalone product or pre-installed on VersaView industrial computer and monitors.

Use Series 3.0, distributed by McNaughton-McKay Electric, to deliver the power of seamless interconnectivity across the factory floor.



Hoffman's Networking PC Cabinet

Hoffman's Type 1 networking PC cabinet provides computer refuge at an affordable price. The Hoffman Type 1 cabinet offers off-the-shelf availability without sacrificing the protection needed when housing a remote PC for data entry or LAN or WAN access in a light industrial environment.

Features include:

- welded steel construction with rounded corners
- flush-mounted safety glass window
- flush doors
- pre-punched levelers and holes for optional casters

The cabinet is divided into three lockable sections allowing for controlled access to the equipment. The upper section offers ample space to house a large monitor and features an extensive viewing window. The middle section is for the keyboard and mouse. A sliding tray provides easy access when needed. The lower section accommodates the CPU, plus shelves and a printer, or 19" rack-mount equipment.



The open base and louvers located on the bottom quarter of the rear door allow the unit to draw cold air from the floor. An optional 6" fan installed in the top helps create a "chimney effect" to keep a generous supply of cool air to the internally housed equipment. A cable entry port in the top and an adjustable gland plate with stain relief at the bottom rear of the cabinet provide for secure and convenient cable entry.

Protect valuable remote PC equipment with the affordable Hoffman Type 1 networking PC cabinet. Contact McNaughton-McKay for ordering information.



Hoffman Offers Lean Manufacturing Enclosures

Responding to the industry need for lean manufacturing, Hoffman offers a standard line of enclosures meeting lean manufacturing principles. The A26 Low Profile Disconnect Enclosure series is the only off-the-shelf line of enclosures that abides by the 60" maximum height requirement of the lean manufacturing doctrine. The A26 series enclosures are designed to house today's control components in a package favoring small footprint and clear line of sight across factory floors.



A26 enclosures are offered in 38 standard free-standing, wall-mounted, or machine-mounted sizes. Sizes and configurations range from 30" x 28" x 8" single-door models to 60" x 196" x 16" five-door models. These unimposing, but heavy-duty steel cabinets are engineered to withstand UL/NEMA/CSA Type 12 environments and are finished in durable, recoatable, polyester powder finish. Other features include:

- flange trough collar for liquid evacuation from door openings
- removable center post for easy access and installation
- disconnect cut-out
- floor-stand options

The space-saving, visual control principles of lean manufacturing are obvious in the A26 series of enclosures from Hoffman, a worldwide leader in the industry. Learn more about these industry-leading enclosures by contacting McNaughton-McKay.



PlantMetrics from Rockwell Software

by William Fricks
McNaughton-McKay Electric,
Greenville, South Carolina

During the 1990s, your company probably spent significant sums of money to upgrade your production facilities. Now, you need to ensure that you receive maximum return on that investment. In short, it's time to make the machines work harder.

Rockwell Software's RSBizWare PlantMetrics can help you get the data you need to continually improve processes. Using the widely accepted Overall Equipment Effectiveness (OEE) metric, you can analyze the details behind the performance of your production assets so that you can pinpoint the real causes of inefficiencies and machine downtime. PlantMetrics helps you focus your plant efficiency improvement efforts and increase output.

Analyzing your operation can reveal significant opportunities. What would a 1% improvement in capacity mean for your bottom line? That potential capacity improvement is what Rockwell Software terms "Hidden Factory." You already own it. And PlantMetrics can help you uncover it by showing you how to increase production and drive down unit costs.

How does PlantMetrics work? It collects performance metrics every hour of every day, saving the information to a database where it can be retrieved for analysis that enables you to identify actual problem areas. A powerful yet simple set of tools is provided to help you pinpoint ways to lower costs and increase production by increasing plant efficiency. You can focus on making

improvements that will bring payoffs while you measure the impact of your improvement programs.



Even if you are using PLCs and HMI systems, you may not be capturing and using all the valuable data these systems generate. PlantMetrics leverages your existing investments by using your shop floor control systems as sources of data.

Many people in your facility are going to need and want access to the PlantMetrics information. Reports generated by PlantMetrics, such as OEE, Downtime Analysis, Fault Analysis, and more can be delivered via standard web browser interfaces like Internet Explorer. Further, the information can be manipulated in this same interface, allowing you the ability to drill down into the data to get to the granularity you need to improve your process.

And all of this comes in an off-the-shelf system. PlantMetrics can be configured and customized to your unique requirements. You get fast implementation of a system that fits your factory and provides a level of scalability, security, database management, web publishing, and ease-of-data capture. Point your browser to <http://www.software.rockwell.com/rsbizwareplantmetrics/> for more information on this valuable production tool.



RSNetWorx: A Software Communication Tool for DeviceNet, ControlNet, and EtherNet/IP



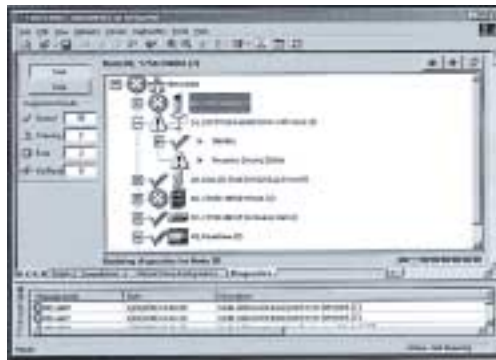
by Doug Detz
McNaughton-McKay Electric,
Norcross, Georgia

RSNetWorx software from Rockwell Automation is the tool of choice to configure and manage communications between devices on DeviceNet, ControlNet, and EtherNet/IP networks. Versions are available for each of these networks, allowing the user to take advantage of the synergy between the networks while also taking advantage of the unique characteristics of each network. Additionally, RSNetWorx can be coupled with RSNetWorx MD to provide advanced maintenance and diagnostic capabilities. This powerful package with its unified design, configuration, and maintenance ability allows for maximum productivity while greatly reducing the learning curve associated with deploying and maintaining an automation application.

RSNetWorx offers many common features for DeviceNet, ControlNet, and EtherNet/IP. These features allow you to:

- Automatically browse the network to determine what is present.
- Use the Electronic Data Sheet (EDS) services to configure device parameters and install support for new devices.
- Define the input/output information exchanges that take place on the network.
- Configure peer data exchanges.
- Maintain complete control over the mapping of information between controller and devices on the network. Capabilities include "auto-map" as well as manual adjustments.
- Define the components of the network in either online or offline mode.
- Recover hardware failures using single commands to upload or download individual devices or the entire network.

- Increase productivity by viewing error, warning, and informational messages immediately and taking appropriate corrective action.
- Use a common graphical user interface.
- Store an entire configuration in a single file, providing for easier management of network configurations.
- Produce HTML-formatted reports for scanner, device, and network configuration settings.
- Utilize RSNetWorx Answer Station – a handy resource to the most up-to-date information. Also available are online tutorials and manuals.

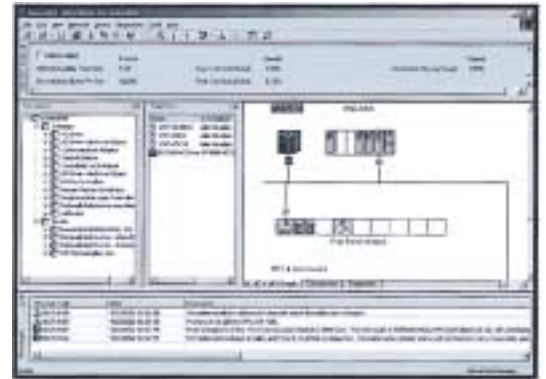


The addition of RSNetWorx MD to RSNetWorx provides a powerful maintenance and diagnostic tool to your system. RSNetWorx MD reads diagnostic data via network and device specific data files, eliminating the need to configure device specific diagnostic information. Since RSNetWorx MD is an add-on tied to RSNetWorx, the advanced maintenance and diagnostic features are coupled with the proven configuration management features already provided by RSNetWorx. This provides you with the most capable network management software package on the market.

RSNetWorx MD provides many additional features to those already available with RSNetWorx. These features enable you to:

- Query devices on the network automatically for diagnostic attributes and displaying the results.

- Troubleshoot faulted diagnostic attributes, providing device diagnostic information as well as corrective action procedures.



- View a historical diagnostic log of time-stamped events.
- Configure a device directly from the Troubleshooter dialog or through the RSNetWorx interface.
- View connection diagnostic information for devices on the network (ControlNet and EtherNet/IP only).
- Adjust the diagnostic timing rate (amount of time between queries), allowing you to control the amount of network bandwidth consumed by diagnostics.
- Launch associated applications directly from Troubleshooter dialog so that specific problems can be quickly resolved.

The hardware requirements for RSNetWorx are: an Intel Pentium microprocessor, a CD-ROM drive, a 3.5 inch disk drive, 16-color VGA graphics adapter with 640 x 480 or greater resolution, mouse or other Windows compatible pointing device, and 32 MB of RAM. Hard disk space requirements vary depending on network platform.

RSNetWorx and RSNetWorx MD – exceptional tools for your industrial network communication. For more information, please contact your McNaughton-McKay sales engineer.



Allen-Bradley's PowerFlex Medium Voltage AC Drives

Rockwell Automation's Allen-Bradley PowerFlex 7000, part of the PowerFlex family of AC drive products, represents the third generation of medium voltage drives from Rockwell Automation. PowerFlex drives incorporate leading-edge technology, embedded communications, and significant commonality across multiple platforms, networks, operator interface programming, and hardware. Designed for end-users, solution providers, and OEMs, PowerFlex 7000 air-cooled drives meet applications ranging from fractional to 5,500 horsepower.



The PowerFlex 7000 is a general purpose, stand-alone, medium-voltage drive that controls speed, torque, direction, starting, and stopping of standard asynchronous or synchronous AC motors. It adheres to the most common standards from NEC, IEC, NEMA, UL, and CSA, and is available with the world's most common supply voltages (from 2400-6600 volts). The PowerFlex 7000, like all members of the PowerFlex family, delivers high reliability, ease of use, and lower total cost of ownership.

See your McNaughton-McKay representative for information on Rockwell Automation's Allen Bradley line of PowerFlex drives.

Ultimate Loop Calibration Multimeter Fluke 789 ProcessMeter

by Dave Kohara
McNaughton-McKay Electric,
Spartanburg, South Carolina

Fluke has improved the already powerful 787 with a larger, brighter display, and a built-in, selectable 250 ohm HART resistor to create the ultimate loop calibrator, the Fluke 789 ProcessMeter. Process technicians can do a lot more while carrying a lot less - no separate resistor. The display, twice as large as the 787, has two levels of backlighting to provide the most suitable lighting for all conditions.

Other key features:

- 24 V loop power supply
- HART mode setting with loop power (adds 250 ohm resistor)
- 100% larger dual display
- enhanced backlight with two brightness settings
- 0-100% mA span check buttons to toggle between 4 and 20 mA



- infrared I/O serial port compatible with FlukeView Forms Software Version 2.1
- simultaneous mA and percent of scale readout
- 20 mA DC current source/loop calibrator/simulator
- manual step (100%, 25%, coarse, fine) plus auto step and auto ramp
- externally accessible battery for easy battery changes

Of particular interest are the device's output function specifications, noted in the chart.

| | |
|--|--|
| DC Current Output (internal battery operation) | Range and Resolution 0.000 to 20.000 mA or 4.000 to 20.000 mA (selectable at power-up) Over-range to 24.000 mA Drive Capability (% of span) 24 V compliance, or, 1,200 ohms @ 20 mA Accuracy: .05% |
| DC Current Simulate (external 24 volt loop supply) | Range and Resolution 0.000 to 20.000 mA or 4.000 to 20.000 mA (selectable at power-up) Overrange to 24.000 mA Drive Capability (% of span): 1,000 ohms @ 20 mA Accuracy: .05% |
| 24 V Loop Supply | Range and Resolution: Minimum 24 V Drive Capability (% of span): 250 ohms @ 20 mA Accuracy: > 24 V |

Double your power, with Fluke's 789 ProcessMeter, available from McNaughton-McKay.



Industry Trends: Lean Manufacturing

Amidst the blur of corporate buzzwords, ever-changing business models, and productivity paradigms, it's easy to see how a business manager could feel as though they're being setup for the next fashionable phrase or industrial idiom. But before you bring in the next motivational speaker who offers to train your people in the latest business fad, think lean. Lean is a manufacturing philosophy that seeks to shorten the lead-time between customer order and shipment of product by eliminating all forms of waste. It focuses on value-added expenditure of resources from the customer's viewpoint by giving them:

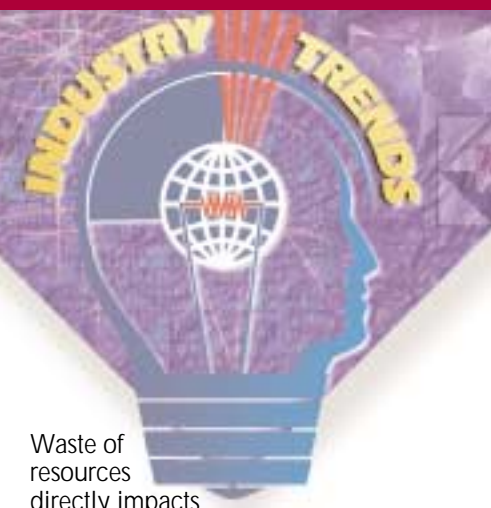
- what they want
- when they want it
- where they want it
- at a competitive price
- in the quantities and varieties they want
- always of expected quality

The National Institute of Standards and Technology Manufacturing Extension Partnership (NIST/MEP) says lean manufacturing is a systematic approach to identifying and eliminating waste (non value-added activities) through continuous improvement, by flowing the product only when the customer needs it (called "pull"). Lean helps firms reduce costs, cycle times, and unnecessary activities, resulting in a more competitive, agile, and responsive business.

The lean manufacturing concept has been around for decades, but has received increased attention over the last ten years. A few reasons for the renewed interest in lean manufacturing are:

- The need to remain competitive in the global economy.
- Pressure from the marketplace for price reductions.
- Increased rate of technological changes.
- Continued customer focus on quality, cost, and timely delivery.
- The need to standardize processes to consistently get expected results.

As stated earlier, lean manufacturing seeks to meet these goals through the continuous reduction and elimination of waste in all its forms within the company.



Waste of resources directly impacts a company's quality, delivery, overall costs, and ultimately, profitability. Overstock, unnecessary activity, unplanned downtime, lengthy changeover times, and untapped human potential are all symptoms of waste. Identifying and eliminating these forms of waste results in increased efficiency, throughput, profitability, and customer satisfaction.

Lean manufacturing identifies eight distinct forms of waste:

- 1. Overproduction:** making more, earlier or faster than required.
- 2. Inventory waste:** any supply in excess of one-piece flow through the manufacturing process; this includes raw materials, work-in-progress, and finished goods.
- 3. Defective Product:** consumes additional resources through inspection, sorting, scrapping, replacement, or repair.
- 4. Overprocessing:** extra effort that adds no value from the customer's point of view.
- 5. Waiting:** idle time spent waiting for such things as manpower, machinery, materials, or information.
- 6. People:** not taking full advantage of the workforce's experience and mental and creative skills.
- 7. Motion:** any movement that does not add value to the final product.
- 8. Transportation Waste:** transporting parts or materials around the plant.

Cutting out these eight types of waste is the main objective of lean implementation. Focusing on their continuous reduction and elimination results in large reductions in costs and cycle times.

To assist with the integration of the lean concepts into the manufacturing environment, several tools and techniques (often referred to as lean building blocks) are used to introduce, sustain, and improve a lean manufacturing system. The building blocks are:

- **5S.** The five steps for workplace organization: sort, set in order, shine, standardize, and sustain.
- **Visual Controls.** All tooling, parts, production activities and indicators are in view so everyone involved can understand the status of the system at a glance.
- **Streamlined layout.** Plant layout is designed according to optimum operational sequence.
- **Standardized work.** Perform tasks consistently according to prescribed methods with minimal wasted movement.
- **Batch size reduction.** Reduce batch size to the smallest size possible, with one-piece flow being the ideal.
- **Teams.**
- **Quality at the source.** Inspection is performed by operators to ensure that product passed on to the next process is of acceptable quality.
- **Point of use storage.** Work materials are stored where they're needed.
- **Quick changeover.** Allows for multiple products in smaller batches to be run on the same equipment.

Besides the building blocks, other important lean concepts or techniques include just-in-time (JIT) methods, error proofing, automation, and continuous improvement.

In order for lean implementation to be successful, management must take an active role in supervising the changes to a lean environment. Starting the lean process is relatively easy, but sustaining it as a part of the corporate culture takes robust planning, discipline, commitment, patience, an environment that tolerates some risks and mistakes, a good reward and recognition program, and openness to change and growth. Many managers have found the three essential ingredients for successful lean implementation are:

- Sustained, long-term commitment from senior management.
- Training for all employees on the lean building blocks.
- Good cultural change management during the transformation from the traditional to the lean mentality.

McNaughton-McKay can assist you with integrating lean manufacturing. Contact us to find out how.

Think lean! Think McNaughton-McKay!



Panduit: Partnering with McNaughton-McKay to Keep You Connected

McNaughton-McKay is proud of our many supplier relationships. We work hard to bring you the best there is to offer in order to make your facility safe, efficient and productive. Panduit supplies a wide variety of products to help you meet these demands. Use of their many quality products enables you to have access to information about your operation from the plant floor to the top floor.



Panduit is a global manufacturer of high-quality network connectivity and electrical/electronic solutions. The Panduit Network Connectivity Group offers the most complete network infrastructure support in the world, helping you to connect, route, manage, and identify your network.

Complementing this group is the Panduit Electrical Group, offering a broad range of innovative wire management solutions. This group manufactures a wide range of high-quality products including: cable ties, wiring accessories, terminals, identification products (such as labels and labeling systems), wiring duct, power connectors, surface raceways, heat-shrink tubing, and wire abrasion protection products. These products are designed to deliver maximum reliability at the lowest total-installed cost.

Panduit is a leader in their field, utilizing CIM, JIT, and CAD/CAM philosophies and technologies. CIM – Computer Integrated Manufacturing – is a key to providing the highest quality products and services to the customer. JIT – Just-In-Time – manufacturing techniques reduce customer lead time and inventory,



getting the product to the customer when it is needed. Finally, CAD/CAM – Computer Aided Design/Computer Aided Manufacturing – reduces the time it takes to get a new idea from the drawing board to the user, allowing innovation to hit the plant floor quickly.

Here is just a sampling of the many products and services offered by Panduit to meet your needs:

- The MINI-COM 48-port High Density Modular Patch Panel accepts up to 48 MINI-COM Modules in a single-rack space to maximize valuable rack space in applications where space is limited. Included are six snap-in faceplates that are rear-mounted giving the connectors a flush appearance. These high-density patch panels mount to standard TIA/EIA 19" racks and 23" racks with optional extender brackets, and will accept MINI-COM Modules for copper, fiber, or coax facilitating future moves, adds, and changes.
- Type NNC Halogen Free Wiring Duct is a two-piece slotted wall base with cover available in 8 metric sizes ranging from 25x50 mm to 100x50 mm. The base features a wide-slot design, allowing the product to be used with a wide range of cable diameters, and a dual score line, allowing individual fingers or whole sections of sidewall to be easily removed. The material properties of Type NNC duct make it ideal for use in control panel and wire management applications near sensitive electronic equipment, in elevated temperature environments, in halogen-free applications, and in enclosed areas where public safety is a concern.
- PAN-SERVE is a web-based online business system to help Panduit's global distribution partners, find product, and price information. This system allows users to view and print records of current Panduit invoices and offers search capability by purchase order number, invoice number, Panduit order number, or by selection of a specific date range. The system also provides the ability to make requests from Panduit for credit requests, order expediting, and return material authorization.
- A U.S. online catalog lists Panduit's comprehensive line of Network Connectivity Products. The catalog is formatted for quick and easy product location, succinct product information, and streamlined ordering. The catalog complements a complete selection of multi-language catalogs available on the Panduit website.
- Training – Panduit and Cisco Systems, Inc. sponsor a Fundamentals of Voice and Data Cabling course, designed to give students hands-on experience in the lab using Panduit's complete copper and optical fiber cabling system solutions, in preparation for careers in IT. The Fundamentals of Voice and Data Cabling course is taught by Networking Academies in the U.S. and selected sites around the world.

Panduit is an ISO 14001, 9000, and QS 9000 certified supplier with products and services available to you through McNaughton-McKay. Contact McNaughton-McKay to learn more about the products and services available through this trusted partner.



Edwards Omni-Directional Outdoor Warning Systems

Good communication is always crucial when trying to get your message across. In times of crisis it is critical that the audience understand the urgency of the emergency. Whether plant, community, or citywide, Edwards Signaling offers the means to broadcast a warning that your audience can't ignore. Edwards EWS series of outdoor sirens offers a wide variety of early warning signaling solutions to fit virtually any application.

All products in the EWS family are equipped with:

- All-weather continuous-duty electric motors
- Non-corrosive aluminum fan and housing
- Zinc-plated powder-coated steel construction for all exposed siren components
- Distinctive almond color (also available in red, blue, white, or yellow on request)
- Omni-directional design

The key to the effectiveness of the EWS series is the omni-directional design. A standard rotating siren spends 75% of its on-time facing away from a given point, presenting its maximum output to the listener's ear only 25% of the time. This results in a loss of decibels and a potentially dangerous "peaking" and "ebbing" of the sound. Consider the confusion this could cause in an emergency situation if a single tone is used to signify a hazardous condition and a warbling tone is used as the "all clear."

Edwards' 360° omni-directional design projects the same decibel level in all directions simultaneously, broadcasting your emergency warning more effectively for greater safety by avoiding the "peaking-and-ebbing" effect associated with a rotating system.

Edwards' EWS series offers a wide range of outdoor sirens to meet your mid-size or large-scale signaling needs (all decibel ratings are calculated at 100 feet).

EWS-V1 Series

This model features a skirted horn design, and is ideal for large industries, small communities, or filling "dead



spots" in your signal area. Powered by a 5 Hp motor (available in single- or three-phase power), the EWS-V1 is rated at 107 dB, produces a port tone frequency of 460 cycles per second, and has an estimated sound circle of 3200 feet.

EWS-V2 Series

This model is equipped with eight equal length horns in a single row configuration, and is ideal for small towns or volunteer fire departments. Combining large siren functions with a cost-effective design, the EWS-V2 is rated at 109 dB, produces a port tone frequency of 460 cycles per second, and has an estimated sound circle of 4000 feet. Its 5 Hp motor is available in single- or three-phase power.

EWS-V3 Series

Similar in design to the EWS-V2, this model is also equipped with eight equal length horns in a single row configuration, only the EWS-V3 is powered by a 7.5 Hp single- or three-phase motor. The EWS-V3 is rated at 112 dB, produces a port tone frequency of 460 cycles per second, and has an estimated sound circle of 5000 feet.

EWS-V4 Series

The EWS-V4, Edwards' most popular mid-sized siren, is equipped with eight staggered length horns in a single row configuration. The EWS-V4 is powered

by a 10 Hp motor (available in single- or three-phase), and produces a port tone frequency of 460 cycles per second. The EWS-V4 is rated at 115 dB and has an estimated sound circle of 6000 feet.

EWS-V5 Series

The EWS-V5 is a dual tone siren designed to provide a cost-effective solution for almost any signaling application. The EWS-V5 features eight staggered length horns in a dual row configuration and is rated at 120 dB. Its two 7.5 Hp motors (available in single- or three-phase) produce a port tone frequency of 460 and 920 cycles per second. The EWS-V5 has an estimated sound circle of 8000 feet.

EWS-V6 Series

The EWS-V6 features eight equal length horns in a dual row configuration and is Edwards' most popular dual tone siren. Ideal for medium or small, growing communities, the EWS V6 is powered by two 7.5 Hp motors (available in single- or three-phase) producing a port tone frequency of 460 and 920 cycles per second. The EWS-V6 is rated at 122 dB, and has an estimated sound circle of 9400 feet.

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EWS-V7 Series

The EWS-V7 is a dual tone siren large enough to tackle almost any signaling application. Equipped with eight staggered length horns in a dual row configuration and powered by two single- or three-phase 10 Hp motors, the EWS-V7 is rated at 124 dB, produces a port tone frequency of 460 and 920 cycles per second, and has an estimated sound circle of 10500 feet.

EWS-V8 Series

The largest omni-directional siren in existence, the EWS-V8 has 5 equal length horns in a dual row configuration. It is powered by a 40 Hp three-phase motor and is rated at 127 dB. The EWS-V8 is a dual tone siren capable of producing a port tone frequency of 600 and 850 cycles per second, and has an estimated sound circle of 12800 feet.

EWS-V9 Series

The EWS-V9 features eight equal length horns in a dual row configuration and is the largest battery powered siren on the market. This dual tone siren produces a port tone frequency of 460 and 920 cycles per second, is rated at 125 dB, and has an estimated sound circle of 11000 feet. A motor starter, charging system, and battery box are included with the package.

EWS-V10 Series

Based on the EWS-V3, the EWS-V10 is a single tone siren equipped with eight equal length horns in a single row configuration. Like the EWS-V9, the EWS-V10 is a battery-powered siren and comes standard with a motor starter, charging system, and battery box. The EWS-V10 is rated at 118 dB, produces a port tone frequency of 460 cycles per second, and has an estimated sound circle of 7000 feet.

In addition to outdoor warning sirens, Edwards also offers a full line of audible and visual signaling devices. From simple horns and bells to demanding factory automation signaling utilizing your PLC or Devicenet network, Edwards' signals come with innovative features that meet all your signaling application needs. Contact McNaughton-McKay to find the signaling solution that makes the most sense for your business.



McNaughton-McKay and Reliance Electric – A Powerful Partnership

Reliance Electric has been delivering top-quality motors, drives, transmissions, and motor controllers for almost a century. Established in 1904 in Cleveland, Ohio, Reliance was the first manufacturer of adjustable-speed DC motors. The Reliance business philosophy of customer service, flexibility, timely delivery, and innovative solutions has made it the largest manufacturer of industrial motors in the United States. In 1994, Reliance Electric and Allen-Bradley joined Rockwell Automation, becoming the number one provider of high-performance automation products in the world.

Reliance offers a broad selection of AC and DC motors, AC general purpose and micro-drives, DC single- and three-phase drives, and both rack-mounted and PC-based distributed control systems. Its most recent innovations include:

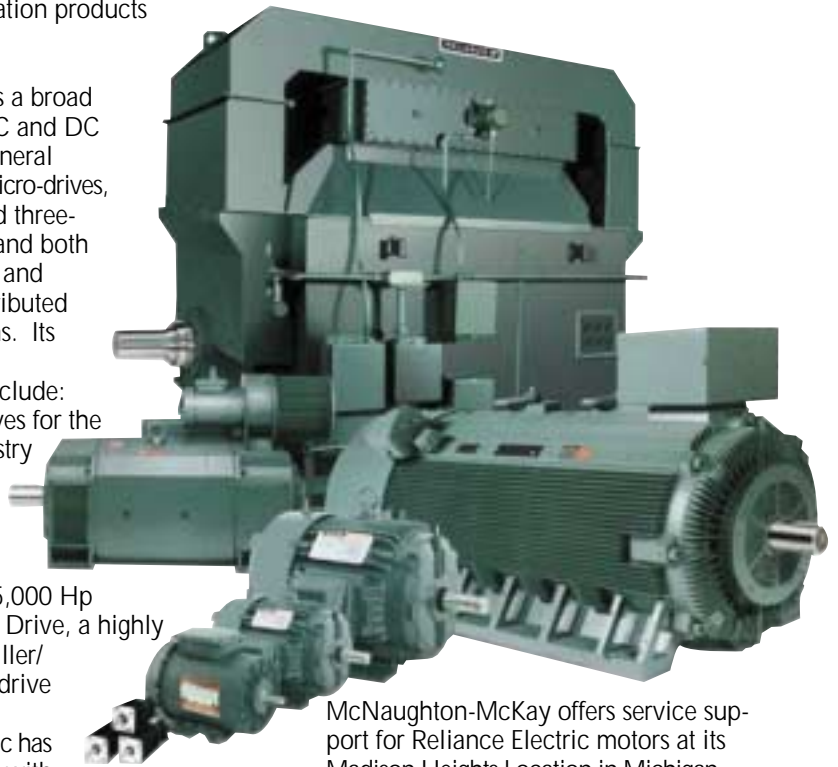
- VTAC 7 drives for the HVAC industry
- RPM XL DC motor line
- engineered motors with ratings to 25,000 Hp
- LiquiFlo AC Drive, a highly compact chiller/compressor drive

Reliance Electric has also partnered with the U.S. Department of Energy to support the Superconductivity Partnership

Initiative and the "Motor Challenge," a long-standing commitment to continued improvements in motor efficiency.

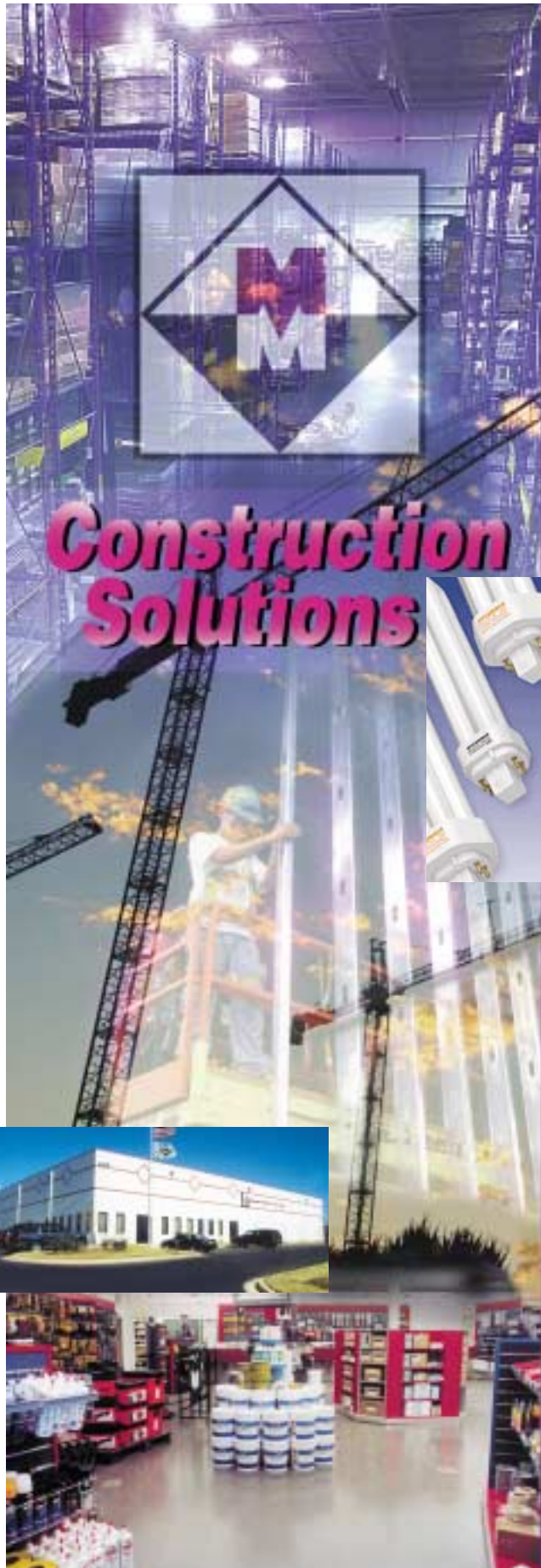
Reliance also offers support through their Motor Technical Reference, an online resource for technical and related information on Reliance Electric motors, and their interactive, online Maintenance and Troubleshooting of Electric Motors manual.

McNaughton-McKay is deeply committed to servicing customers, and has invested heavily in a world-class staff with the technical expertise necessary to identify the Reliance Electric products best suited to meet your needs.



McNaughton-McKay offers service support for Reliance Electric motors at its Madison Heights Location in Michigan, and service and repair support at its Motor Shop, located in Columbus, Ohio.





SYLVANIA QUICKTRONIC CF Ballasts

SYLVANIA has expanded the QUICKTRONIC CF family of electronic ballasts to accommodate a wider variety of compact fluorescent lamps. The expansion includes the following lamp types, in addition to the 13W-70W DULUX D/E and DULUX T/E standard:

- 13W DULUX S/E
- 18W- 40W DULUX L
- 22W and 40W PENTRON CIRCLINE
- 18W and 24W DULUX F
- 21-38W 2D

QUICKTRONIC CF ballasts are designed for reliability and supported by features such as universal input voltage, programmed rapid start, and end-of-lamp life sensing features. Flexibility is built-in through a variety of mounting options, metal or plastic enclosures, and multi-lamp type, and multi-watt capability. When QUICKTRONIC CF ballasts are used with SYLVANIA lamps, the system is warranted by SYLVANIA's comprehensive QUICK 60+ warranty.

Contact McNaughton-McKay and choose a QUICKTRONIC CF ballast for your application out of the comprehensive line of durable and versatile ballasts from SYLVANIA.



SYLVANIA Sign Ballasts Now in T12/HO

SYLVANIA's line of magnetic fluorescent sign ballasts includes models for T12/HO lamp types. These ballasts will accept two-, three-, four-, six-, and eight-foot length high-output T12 fluorescent lamps, and can also be used with four- and eight-foot SUPERSAVER T12 fluorescent lamps. These ballasts may operate from one to six lamps in either new or retrofitted sign cabinets with lamp lengths up to 40 feet. They boast a -20°F cold temperature start-up (excluding SUPERSAVER lamps) and a two-year warranty.

Additional features include:

- UL listed
- Class P, Type 2, outdoor thermal protection
- CSA certified

McNaughton-McKay carries the complete line of SYLVANIA magnetic sign ballasts.

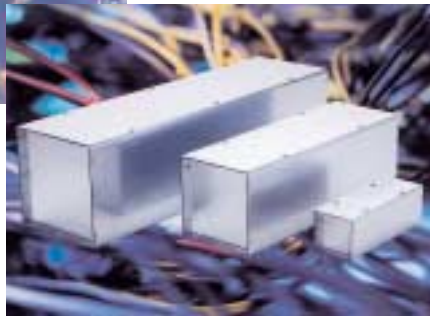


Construction Solutions

Bussmann Fuse Finder Pocket Guide

If you like information at your fingertips, the Bussmann Fuse Finder has it all. Pocket-sized, but packed with 120 pages of more than 11,000 cross-reference listings, including most manufacturer's fuses, the Bussmann Fuse Finder will enable you to find the fuse you need. This guide provides the perfect on the spot aid in finding the exact fuse replacement quickly and easily, wherever you are.

Also included in the Fuse Finder is a Motor Protection Guide, an Out-of-Stock Substitution and Upgrades Listing, as well as Fuse Selection and Sizing information. The Bussmann Fuse Finder is everything you need in a handy pocket size. Contact a McNaughton-McKay sales engineer today to get your copy.



Type 1 Screw Cover Wiring Trough by Hoffman

When installing power and lighting control cables, a clear path can make the job less time-consuming. The Type 1 Screw Cover Wiring Trough by Hoffman provides that much-needed clear path and allows easy installation of cabling to locations throughout a building.

Hoffman designed this indoor trough to provide quick and easy mounting by incorporating a better joining method. The unique joining method allows end sections to be attached without fasteners or heat, providing a joint that is as strong as riveting or spot welding, but without the burns or disruptions they can cause.

The Type 1 Trough is constructed of unpainted 16- or 14-gauge galvanized steel with a corrosion-resistant finish. Rear mounting holes and a flat cover allow the wireway to be easily mounted flush with walls or ceilings. The flat cover is outfitted with keyhole screw slots to provide easy access to the internal components and the cover can be removed without removing the screws.

Availability in five cross-section sizes and in lengths ranging from 1 to 10 feet makes the Hoffman Type 1 Screw Cover Wiring Trough an excellent choice for power and lighting control cables in any indoor environment. Contact McNaughton-McKay for all the details.



Rockwell Automation Adds VersaView CE to the VersaView Line

Rockwell Automation's Allen-Bradley VersaView industrial computer line now includes the VersaView CE industrial computer. Combining the Windows CE operating system with durable computer hardware, and designed to meet the demands of industrial applications, the VersaView CE is a dependable, open platform ideal for human machine interface (HMI), customized applications, information management, and remote terminal applications requiring customized or third-party software applications.

Similar to a Windows 2000 or XP industrial computer, VersaView CE is an open platform that provides great flexibility. VersaView CE supports multiple applications and includes the following tools which enable connection to supervisory, production, or enterprise information systems with minimal integration effort:

- RSVIEW Machine Edition run-time
- Internet Explorer
- Terminal Services for thin-client applications
- Software Development Kit (SDK) for creating customized Visual Basic and C++ applications



The VersaView CE comes equipped with an Intel Celeron 650 MHz processor and 256 MB of both flash and RAM memory. Engineered with no moving parts, VersaView CE is ideal for rugged industrial environments where reliability can be an issue. It is available with 6.5", 10.4", 12.1", and 15" TFT active matrix color displays with keypad, touch, and keypad/touch screen options.

Your McNaughton-McKay sales engineer can help you select the VersaView CE best suited for your needs.





www.SYLVANIA.com

Would a consolidated source for lighting information help you accomplish more? Are you looking for products that will save money and increase efficiency? Are you puzzled by the large array of lighting products available? If so, surf to www.SYLVANIA.com, where Osram Sylvania, the second largest lighting and materials company in the world, allows you to easily access a wealth of information about their robust product line.



An informative front page provides links to thorough overviews of Osram Sylvania's stable of automotive lighting, business lighting and ballast, home lighting, precision materials and components, and consumer electronics products. It is also a good place to find out about exciting new products from Osram Sylvania and to read up on the latest news about the company's offerings.

Real value to the busy user can be found in the online product catalog which contains a complete and detailed listing of all ballasts and ballast components, compact fluorescent products, fluorescent products, high-intensity discharge (HID) products, incandescent products, lamp and ballast systems, LED lamp modules, miniature and automotive products, photo-optic specialty products, starters, and tungsten halogen products available from Osram Sylvania. In addition to browsing the full product catalog, users can search the catalog using order abbreviations, or part numbers. Users can also run a cross-reference search for a competitor's part number, returning the Osram Sylvania equivalent part number.

This online catalog doesn't just list available products. Downloadable specifications, and links to product documents, graphs, and information, are available for all products. In the Photo-Optic Specialty Lamps Catalog, literature and resources are provided to educate you about discharge, halogen, and specialty fluorescent products. These products provide solutions for diverse applications such as effect lighting, cinema film projection, stage and studio lighting, and TV lighting, and also have applications in the semiconductor (microlithography), lightguide, technical/industrial, medical/scientific, and aircraft/airfield industries.

The online catalog is a fantastic tool to have in the office, but Osram Sylvania recognizes that many people with professional lighting needs spend a great deal of time in the field where they may not always have the Internet at hand. For those situations two downloadable catalogs are provided. Both can be downloaded in sections, eliminating the need to waste time downloading information that doesn't pertain to a particular project.



The Lamp & Ballast Catalog (nearly 300 pages) provides all the details on Osram Sylvania's complete lamp and ballast offerings. It includes general lamp and ballast information, a product selection guide, and a glossary of terms.

The Sylvania Electronic Ballast Technology & Specification Guide (nearly 100 pages) provides all the details about Osram Sylvania's complete electronic ballast offerings, including the former Motorola product offering that was acquired by Osram Sylvania. The guide's product information pages include system performance, wiring diagrams, and case sizes. The Guide

also includes several "QUICK" comparison sections including QUICKSYSTEMS, QUICKSAVINGS, QUICKLENGTH, QUICKSPEC, QUICKCROSS, and QUICKINDEX. Most importantly, information on the QUICK 60+ registered warranty, the first and most comprehensive system warranty in the industry is included in this guide.

Osram Sylvania shows a commitment to customer education with the frequently asked questions (FAQ) section link on the bottom of the front page, which contains an informative section providing answers to FAQs relating to lamps and other issues with which the lighting industry is concerned. Extensive information is provided on the following topics:

- Light & Color
- Health Issues
- Light Sources
- Lighting Equipment
- Specialty Applications
- Industry Contacts

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www.mySYLVANIA.com

Osram Sylvania's commitment to customer service and education was recognized when their extranet site, www.mySYLVANIA.com, was awarded the prestigious Best of Category award from the National Association of Electrical Distributors (NAED) and TED (The Electrical Distributor) Magazine.

Osram Sylvania developed www.mySYLVANIA.com for their business partners, end-users, and specifiers. The site currently serves more than 12,000 users, including more than 95% of Osram Sylvania's distributors. This information-packed site is made up of a primary distributor site as well as 12 additional sales and lighting community web portals.

With this award-winning site, Osram Sylvania utilizes web technology and creates a useful tool for their customers, an initiative they are sure to continue.

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Topics covered in the FAQ are not specific to Osram Sylvania products, but cover generic issues of interest to customers with professional lighting needs.

Information about the latest Osram Sylvania developments can be found in the Press Xpress section also linked to the front page. Press Xpress provides links to an archive of Osram Sylvania press releases containing company news about recent trade shows, significant purchases and sales, and recent appointments. Press Xpress also contains informative case studies detailing how innovative products from Osram Sylvania have benefited your local school, library, hotel, or retail store. Press Xpress isn't just a news section - it's an ideas section.

Osram Sylvania's website provides a plethora of information about their products and the industries they serve. The extent of the information provided shows a commitment to customer service and education as well as a solid understanding of the requirements of those with professional lighting needs. It reinforces the value that McNaughton-McKay brings to you as an Osram Sylvania distributor.



Rockwell Automation's Ethernet Interface Module

The 1761-NET-ENI module and 1761-NET-ENIW (web-enabled) Series B Ethernet Networking Interface (ENI) modules are the latest offerings in ENI technology designed for Allen-Bradley MicroLogix and CompactLogix controllers. They provide a cost-effective method to network these controllers via Ethernet, allowing you to leverage existing networks for Ethernet-based computer and control-system communications.



A main Series B module advantage is the data-handling/communications opportunities it offers. Users can expect to decrease upload and download times by 33% through the enhanced buffering capacity and message queuing.

1761-NET-ENI supports a maximum of six connections, allowing simultaneous data communications with up to six other devices. Users of e-mail capable devices (including cell phones) can send data through any computer on the Ethernet and communicate with MicroLogix and CompactLogix controllers. This eliminates the need for additional network drops and adds value to existing facility cables, hubs, switches, and routers. IT personnel will favor this improved module because it is built for the network and control systems they are familiar with, saving training and labor costs. The 1761-NET-ENIW module offers R/W capability via the Internet, further enhancing remote access options.

For these modules and other leading technology offerings, contact McNaughton-McKay.



Rockwell Automation Module Serves as an EtherNet/IP Bridge for Greater Communication Flexibility



Rockwell Automation has extended connectivity options for Allen-Bradley FlexLogix and PowerFlex controller families through the 1788-ENBT EtherNet/IP communications daughter-card. This module greatly improves the ability to exchange plant-floor information using an open, interoperable network.

Inserted in FlexLogix, the 1788-ENBT works in conjunction with ControlNet, DeviceNet and EtherNet/IP cards; core elements of the Rockwell Automation NetLinx organization sharing a common application layer protocol. Depending on the required application, the user may swap out and choose any of the aforementioned network cards to work side by side with the 1788-ENBT. The result is a flexible, application-driven solution greatly improving peer-to-peer communications, data exchange, and I/O remote control across entire facilities.

Investigate the flexibility and communications benefits of the Allen-Bradley 1788-ENBT EtherNet/IP daughtercard. The expertise and technology is available from McNaughton-McKay.



Revolutionizing Power Protection

by Dennis Ferguson
McNaughton-McKay Electric,
Madison Heights, Michigan

SoftSwitching Technologies is an emerging leader in power technology, offering proven power quality solutions as well as the innovative I-Grid web-based power monitoring system.

The I-Grid web-based distributed power quality and reliability (PQ&R) monitoring and notification system spans the U.S. electric grid. It uses low-cost I-Sense monitors to capture and transmit PQ&R data through the Internet for display on the I-Grid website. Corporations use the I-Grid to analyze the short duration voltage sags and momentary interruptions. Utilities use the I-Grid to enhance service and improve operational productivity. Power quality and reliability events shut down production processes and plants, with a cost to industry of \$150 billion annually.

Nationwide power quality event data may be viewed free of charge by registering at the I-Grid website. Individual monitor locations and identities are protected. Power quality event data for a specific facility may be viewed after installation of an I-Sense monitor. In one example, investigation of the cause of 13 hours of process downtime linked specific plant I-Grid data, regional I-Grid data, and a utility incident report that a crow had flown into medium voltage switchgear at a substation. The first clue was an I-Grid e-mail notification to the plant of the power quality event.

Causes

Analysis of data published in the 1995 Electric Power Research Institute (EPRI) Distribution Power Quality study determined that more than 92% of all power "events" are of very short duration, lasting less than 1/4 second. An "event" is defined as voltage out of normal range. The effects of an event are dependent on the susceptibility of the connected equipment. Events are

typically caused by everyday occurrences, like wind, construction, auto accidents, rodents and birds, utility equipment failures, lightning, and voltage sags generated from other facility electrical loads.

Power users nearest a lightning strike may experience a voltage surge or spike. All users on the affected feeder line suffer a short interruption when a protective breaker or fuse opens and the fault clears automatically. However, the lightning discharge causes a short-circuit to ground and the entire grid tries to "feed the fault" causing depressed voltage, or sag, for more than 100 miles from the incident. The short voltage dip is no problem for most residential and commercial users, the lighting just "blinks." However, the voltage sag event can be quite costly for industry.



If you have a continuous or automated process and the voltage sags for even a quarter-second, your process could be disrupted for 2 or 3 hours while equipment is reset and restarted.



Ice-cube relays are often the most sensitive equipment in a facility, and they can drop out at very shallow voltage sags. Another common component that can experience problems are simple input devices such as photoelectric and proximity sensors. A voltage sag can cause any of these devices to misoperate, potentially bringing the entire process to its knees. With a normal utility, customers experience an average of 25 power disturbances a year lasting from 1/4 second to less than 30 minutes. That gives the utility a 99.99 percent reliability level. However, from a manufacturing perspective, the 25 events could lead to 25 hours of downtime a year or 99 percent reliability, assuming only 1 hour of downtime per event. A premium grid service can certainly reduce the average number of disturbances, typically to 10 events per

year of 1/4 second or less duration, giving the utility a reliability rating of 99.99999 percent. However, the manufacturing disruptions that still occur with quarter-second voltage sags could still result in 10 hours of downtime for the plant - yielding 99% reliability at much greater cost...to productivity, and even safety.

Solution

The SoftSwitching Dynamic Sag Corrector (DySC) provides voltage sag correction across a range of 250 VA to more than 3,000 kVa to protect a single controller, piece of equipment, or an entire facility. The DySC uses no batteries, which have life cycle limits, environmental concerns, and high maintenance cost. The standard DySC system corrects deep sags down to 50% of specified voltage for 2 seconds cumulative every 60 seconds, or three cycles of power restoration down to zero volts. With additional capacitor modules the power ride-through time may be extended to 12 cycles. Other features include:

- <2 ms dynamic response to voltage sags
- high efficiency (99%) under normal conditions
- standard static bypass switch
- true sine wave output

Two models are available, the MINIDySC single-phase, 120-, 208-, or 240-volt, 50/60 Hz, 1 to 50 amp, 250VA to 12 kVa and the PRODySC - three-phase, 208-, 240-, or 480-volt, 50/60 Hz, 25 to 400 amp, 9 kVa to 3,000 kVa.

A DySC installation has a fast payback, often paying for itself on the first "save," depending on the complexity of recovery from downtime and the value of product scrapped or reworked due to the power disruption event. The technical analyses supporting the investment decision are most easily and quickly derived from I-Grid data.

SoftSwitching Technologies is an authorized Rockwell Automation Encompass Partner. Their complete product line is offered by McNaughton-McKay. The reference source for this Soft Switching article on power quality and reliability may be found on the Internet at <http://www.ab.com/abjournal/feb2003/features/fixsagssurge/index.html>.



MGE Offers Ultimate AC Power Protection

by Dennis Ferguson
McNaughton-McKay Electric,
Madison Heights, Michigan

Surge strips, voltage regulators, tap-changing transformers and gas-powered generators offer varying amounts of single-phase power insurance. MGE offers the Pulsar EX series online UPS, designed to provide the ultimate in single-phase AC power reliability for critical loads from 700 VA to 3 kVA.

The Pulsar EX is a true double-conversion, online UPS with constant voltage regulation and input power factor correction. A common misconception of online UPS systems is that they constantly run off their batteries, but Pulsar EX can handle extreme brownout conditions WITHOUT switching to batteries (down to 70 volts with 1/3 load.) Single phase line-interactive UPS systems will typically begin draining their batteries at 90 volts. Pulsar EX online technology provides superior voltage regulation (120V +/- 3%) over a wide input voltage range (70/138V) and input power factor correction (>0.95), which may reduce load harmonics and increases UPS output power.



Other features and benefits of the Pulsar EX series include:

- Available in five tower models and four rack-mounted 700 VA to 3 kVA models
- Cold start during power outage
- Extended Battery Runtime with additional battery modules
- Compatible with most emergency generators
- Network-based Power Management Software
- Optional SNMP/Web card provides direct network connection; no additional cards or splitters for multiple network computers

MGE warrants all their high quality UPS products and is ISO 9001 certified. To learn more about the single-phase Pulsar EX and three-phase, 30kVA to 800 kVA MGE UPS products, contact your McNaughton-McKay sales engineer.



Complete Automation on the Move

by Tom Voulos
McNaughton-McKay Electric,
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Everyone walked away a winner after the Complete Automation on the Move exposition, seminar, and workshop sponsored by Rockwell Automation March 26 and 27, 2003 in Detroit Michigan. Around 600 customers attended the two-day event held at the beautiful Atheneum Suite Hotel and Conference Center located in the shadows of the Greektown Casino.

The theme of the show was "Don't Gamble on your Automation Investment." Customers took advantage of the opportunity to discuss applications with McNaughton-McKay systems engineers and Rockwell product managers, applications engineers, and Encompass partners. Seminar topics included safety, design automation, process industry, water/wastewater, power quality/energy management, predictive maintenance strategies, and more.



Hands-on labs were well-attended, as customers experienced the PanelView Plus for the first time. Other labs with Ethernet tested the limits of the house. Attendees also saw first-hand how ControlLogix and ControlLogix with motion bridge the gap between CNC and PLC, minimizing integration costs and implementation risks.

Complete Automation on the Move provided a bigger payoff than the nearby casino. Whether people learned about emerging technologies and discussed current

topics at the seminars, or they got down and dirty at the hands-on labs, everyone was dealt a full hand of solutions to increase ROI and to improve manufacturing productivity, product quality, asset utilization, and integrated technology.



Allen-Bradley's ControlNet Network Interface Adapter Cost-efficient Connectivity for Distribution of POINT I/O



Rockwell Automation's Allen-Bradley POINT I/O product family has added a ControlNet network interface adapter. The POINT I/O Redundant ControlNet Adapter allows POINT I/O users to tap into the benefits of an open, digital network, with the ability to directly monitor I/O status and diagnostics with an electronic operator interface. It offers flash upgradeable firmware, redundant media ports, supports removal and insertion under power (RIUP) of POINT I/O modules, and can support up to 25 direct and 5 rack I/O connections per adapter.

The POINT I/O product line consists of terminal bases with removable terminal strips, 2- and 4-point I/O modules, and network interface options – all DIN rail-mounted and snapped together to meet the exact needs of an application.

The ControlNet Network Interface Adapter is available from McNaughton-McKay, the world's largest distributor of the quality offerings of Rockwell Automation.



Rockwell Automation Genuine Renewal Parts

Genuine Renewal Parts for Rockwell Automation Brand Products Can Help Lower your Company's MRO Asset Costs and Improve Productivity

Equipment downtime can cost anywhere from hundreds to thousands of dollars per hour. Rockwell Automation genuine factory replacement parts can help lower your company's MRO asset costs and improve productivity.

The genuine renewal parts are performance matched to your Allen-Bradley and Reliance Electric equipment. They provide the ultimate in service life and equipment functionality.

Rockwell Automation has a global network of parts centers and distributor partners that carry an in-depth inventory of parts. The Rockwell Automation parts network is open all day, everyday with an emergency after-hours parts support team.

For more information on genuine renewal parts, their availability, or to order any replacement part, contact your McNaughton-McKay sales engineer.



Rockwell Automation Support Agreements

McNaughton-McKay has partnered with Rockwell Automation to offer the Rockwell Automation Support Agreements (RASAs) – aimed to minimize downtime and reduce overall operating costs.

No two businesses are alike, so each support agreement provides a personal approach to covering each business as individual needs dictate. Field support engineers take the time to evaluate current equipment, production, personnel skill levels, and budget requirements. Strategies are developed to aid in achieving business goals; a customized plan is carefully laid out. RASA support can range from performing a small



segment to managing the entire maintenance program. Simply put, RASAs are customized to meet your needs.

With a RASA, equipment evaluations and recommendations are performed to provide for continuous improvement opportunities. Regularly scheduled inspections and equipment maintenance, including infrared thermography, vibration and current analyses, laser alignment, and harmonics analyses, are performed to keep existing equipment on track. Spare parts surveys and recommendations are made to ensure minimal downtime. RASAs also provide training for operators and maintenance personnel, 24-hour telephone assistance, and more, all catered to the individual business need.

Productivity is the key to reaching a business goal. Let McNaughton-McKay help calculate how much a Rockwell Automation Support Agreement can potentially save your business. Contact us today to get started on a customized plan to help reduce downtime and increase productivity.



First Annual Safety Seminar in Norcross, Georgia Addresses Arc Flash

by Bryan Hays
McNaughton-McKay Electric,
Norcross, Georgia



Arc flash was the main topic of a recent safety seminar hosted by Cooper Bussmann at the Marriot Perimeter Center in Atlanta, Georgia. Industry expectations and the general rise in concern over electrical hazards in the workplace brought over 100 electrical engineers, consultants, risk management and maintenance personnel, and other industry professionals to the seminar.

Five highly accredited and nationally recognized experts in the electrical safety field gave presentations in the day long event, beginning with Tim Crnko, Training and Technical Services Manager for Cooper Bussmann. Mr. Crnko's presentation focused on electrical hazards and overcurrent protection. Joe Andrews, Principal Consultant with Electrical Safety Resources, Inc., addressed the topic of electrical safety standards and regulations. After an hour lunch, attendees settled into the subject of electrical accidents and investigations, presented by John Mathews, President of John Mathews & Associates, Inc., Consulting Electrical Engineers, Cookeville, TN. Mr. Mathews is a registered professional engineer in 12 states and is a part-time professor at the Georgia Institute of Technology. Dennis K. Neitzel, CPE, Director of the AVO Training Institute, presented "Protective Device Maintenance and Arc Flash Considerations." Among many other distinctions, Mr. Neitzel is a Principal

Committee Member of the NFPA 70E, and co-author of the Electrical Safety Handbook, Second Edition. The final presentation of the afternoon was given by Dr. Ben Bird, President of Certified Insulation Products, and focused on PPE. Following these presentations, the panel of experts addressed questions from seminar participants.

Attendees felt they were treated to a highly informative seminar that would help them address their own compliance and safety concerns in regard to electrical hazards and arc flash. Participants received PDH and CEH credit.

Future McNaughton-McKay seminar topics include Machine Safety and Lean Manufacturing. Contact your McNaughton-McKay sales engineer for more information.



Safety on the Internet

Ideally, it should be simple to maintain a safe workplace. Fortunately, there are numerous resources on the Internet that can help bring the ideal to reality. Rockwell Automation offers several of those safety websites.

Rockwell Automation has an award-winning safety program, and they are sharing their safety secrets. You can read about how they earned the award from the National Safety Council at www.ab.com/abjournal/nov1999/features/safetyfirst/index.html. If you go to www.ab.com/safety, you'll learn why safety is good business, and you'll have complete access to an online safety library, product selector, and links to hot new safety products. Rockwell Automation's Safety Product Library provides links to product catalogs, *Safety Now* magazine, CAD drawings, user manuals and installation instructions, CE declarations of conformity, additional safety websites such as the OSHA and ANSI sites, and other documents relevant to safety and safety product issues.

If you desire more personal assistance, Rockwell Automation also offers a safety training and consulting service. To learn more about Rockwell Automation Safety and Environmental Systems, point your web browser to www.sandesystems.com. There, you will find access to a team of environmental and safety professionals with experience in assisting manufacturing operations with developing, implementing, and maintaining effective plant safety and environmental management systems. The website also offers safety checklists, training event schedules, and information about Rockwell Automation's interactive training CDs and customized training/consulting services.

There are other Internet sites that may prove useful in your quest for safety.

- The American Society of Safety Engineers (www.asse.org) provides industry news, links to training and development for safety professionals, and information on ASSE certification in safety management.
- The Occupational Safety and Health Net (www.osh.net) is a gateway to abundant safety and health information. The site includes links to safety and safety organization websites. Topics covered include accident, fire, and explosion prevention; investigation and reporting; biological, chemical, construction, electrical, and food safety; hazardous materials and MSDS; risk management; and emergency management and preparedness.
- Safety Online (www.safetyonline.com) offers free newsletters, trade publications, and a consultant locator.
- SafetyInfo (www.safetyinfo.com) bills itself as America's largest online safety library. The site includes links to written programs, references, forms and documents, safety training, and off-the-job training. Some areas of this website require registration for a user name and password. Full access to 5,000 customizable print-and-edit pages for improving internal company safety programs will require a subscription fee.

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- Vermont Safety Information Resources, Inc. (<http://hazard.com/index.php/>) is a good resource for MSDS and chemical toxicity data. You can search for MSDS information directly from the manufacturer, or search the SIRI database by company, product name, CAS, or NSN. You can also search toxicology reports.
- The Center for Chemical Process Safety offers Security Vulnerability Analysis (www.aiche.org/sva) with their *Guidelines for Analyzing and Managing the Security Vulnerabilities at Fixed Chemical Sites*. This is a preferred methodology used to assess security risks. This was a response from the U.S. chemical industry to address another potential cause of catastrophic chemical accidents - those caused by terrorist attacks. This site offers access to resources for assistance with analyzing chemical product and facility security risks.
- The Center for Chemical Process Safety (www.aiche.org/ccps/) is also a good source of chemical process safety information and tools. This website provides links to a publications catalog, conference information, software information, process safety alerts, and more. The Center was founded in 1985, and is committed to protecting employees, communities, and the environment by developing ways to prevent or mitigate catastrophic releases of hazardous materials.
- For international safety concerns, take a look at the International Labour Organization's website about the InFocus Programme (www.ilo.org/public/english/protection/safework/index.htm). This website provides access to policy documents, areas of action, and resources with an international scope.



Allen-Bradley's Guardmaster SafeZone

by Barry Brigham
McNaughton-McKay Electric,
Greenville, South Carolina

Maintaining the safety of personnel and visitors in a hazard area is a top priority. With the Guardmaster SafeZone Safety Laser Scanner by Allen-Bradley, safety is ensured with ease and confidence.



The SafeZone is an optoelectronic device that uses the diffuse reflection of emitted infrared light to determine if a person or object has penetrated a defined area. The rotating deflection unit periodically emits Class 1 infrared laser light pulses over a 300° angular range to create a two-dimensional detection zone.

The SafeZone has two programmable zones, warning and safety. When a person is detected in the warning field, the scanner alerts that person by activating an audio or visual warning. The warning lets the person know they are entering a hazardous area. If that person continues into the protective (or safety) field, the SafeZone switches two

independent relay contacts that turn off dangerous machinery movement before an accident can happen.

The secret to optimizing the use of this safety device is calculating the machine's stopping time and the SafeZone laser scanner's response time to keep anyone entering the danger zone safe. Setup of the fields is accomplished using Allen-Bradley's SCD (Safety Configuration and Diagnostic) Windows-based software.

A simple click-and-drag of the entry points using the PC mouse allows for quick and easy zone configuration. The "warning zone" can be configured for up to a 10-meter radius and the "safety zone" for a 6-meter radius, making it a perfect personnel safety solution for stationary machinery, robot assembly cells, hazard zones with overhead motion, and mobile transport vehicles.

Contact a McNaughton-McKay sales engineer and inquire about the Allen-Bradley Guardmaster SafeZone Safety Laser Scanner.



Edwards Signal Solutions

Getting the word out is a key element in personnel and plant protection under normal operating conditions, but it becomes critical in situations involving threat of natural disaster, potentially hazardous process upsets, and the increasing awareness of homeland security considerations. Good emergency communications play a large part in keeping employees safe. Edwards Signaling provides an array of solutions to these concerns including audible and visual signals for indoor, outdoor, and hazardous locations; workstation message centers; Chameleon LED multi-status indicators; industrial, weatherproof, and marine-rated hazardous location beacons; outdoor-rated hazardous location bells and horns; and fire alarm and security products.

Edwards intercom systems provide for complete paging and communication between phones and intercom stations, with industrial intercom speaker zones, a clock program, dial-in activation, emergency tone distribution, and signaling output circuits. One-way public address systems are configured to inform, warn, and notify with voice communication and multiple tone signals generated electronically. Synchronized time systems provide accurate and reliable time at multiple locations through use of a master program clock, which displays time on digital and analog clocks, and can communicate with clocks from multiple manufacturers. An independent timer controller enables clocks to be used for timing and scoreboard functions. Any of the Edwards Evacuation and Communication Systems can be used alone or integrated with other components for a complete, signaling communication system.

Edwards Process Control Signals (PCS) offer the easiest and most cost-effective way to add visual and audible signals to PLC-based control systems. The PCS uses outputs directly from the PLC, no



relays, loading resistors, or snubbing circuits, and no PLC programming as signals operate using standard constant voltage from the PLC. The PCS family includes horns, bells and 19-tone electronic signals, long-life LEDs, strobes, and halogen lights in steady and flashing models.

Keep personnel informed of Homeland Security threat levels with the Edwards Homeland Security Light. The five lens colors correspond to the Department of Homeland Security levels of risk of terrorist attack: Severe, High, Elevated, Guarded, and Low. The light is UL listed for indoor and outdoor usage. It includes a multi-tone horn module, and light sources can be customized upon request.

attention, and provide instant multi-lingual recognition of your plant's operational status.

If your needs include an outdoor warning system, Edwards has a solution for you. Edwards Outdoor Warning Systems offers omni-directional, early-warning sirens that project the same decibel level in all directions simultaneously. This 360°, omni-directional advantage avoids the distortion often associated with a rotational siren system. The lack of distortion ensures that emergency warnings are communicated more effectively, resulting in greater safety. Edwards' outdoor sirens are available in a wide variety of models, ranging from a single-tone, 107 dB siren to a dual-tone, 125 dB siren.

Edwards Signaling Systems can be configured to meet all OSHA requirements for employee alarm systems,



For a complete package for plant-wide signaling, take a look at the Adaptatone Millennium series. The Edwards Adaptatone Millennium electronic signals offer the widest selection of tones in the industry. Whether short code blasts or sustained warning signals are required, the signals meet practically every need – from emergency evacuation to routine communication. Your choice of voice, telephone paging, or field-programmable voice units will command employees'

ADA requirements, and UL standards for emergency evacuation signaling. Improve communications and operating efficiency while ensuring safety and security. Contact McNaughton-McKay for a review of plant emergency warning communications. We will provide solutions from Edwards Signaling to help keep you and your employees safe.





Hoffman Specifier's Guide

Hoffman has published a Specifier's Guide for enclosure specifiers and control system design engineers. The guide details electrical and electronic enclosures and accessories for every application.

Included in the catalog are complete descriptions of Hoffman's Modification Services. A technical information chapter serves as a reference for key data, such as:

- material and finish selection
- thermal management
- standards and ratings
- seismic and electromagnetic compatibility
- wireway fill tables

New and updated product information includes supporting photographs and dimensional drawings for all of Hoffman's product families, categorized by application types such as:

- modular
- operator interface
- DataCom
- industrial
- disconnect
- corrosion-resistant
- commercial
- hazardous location
- EMC
- thermal management and accessories

For further information, or for a free catalog, contact McNaughton-McKay.



www.mc-mc.com

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Industry types and concentrations vary by geographic region. To best serve customers, each McNaughton-McKay location tailors their inventory and product lines. Thus, not all products discussed in *NewsBytes* are available at all locations.

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