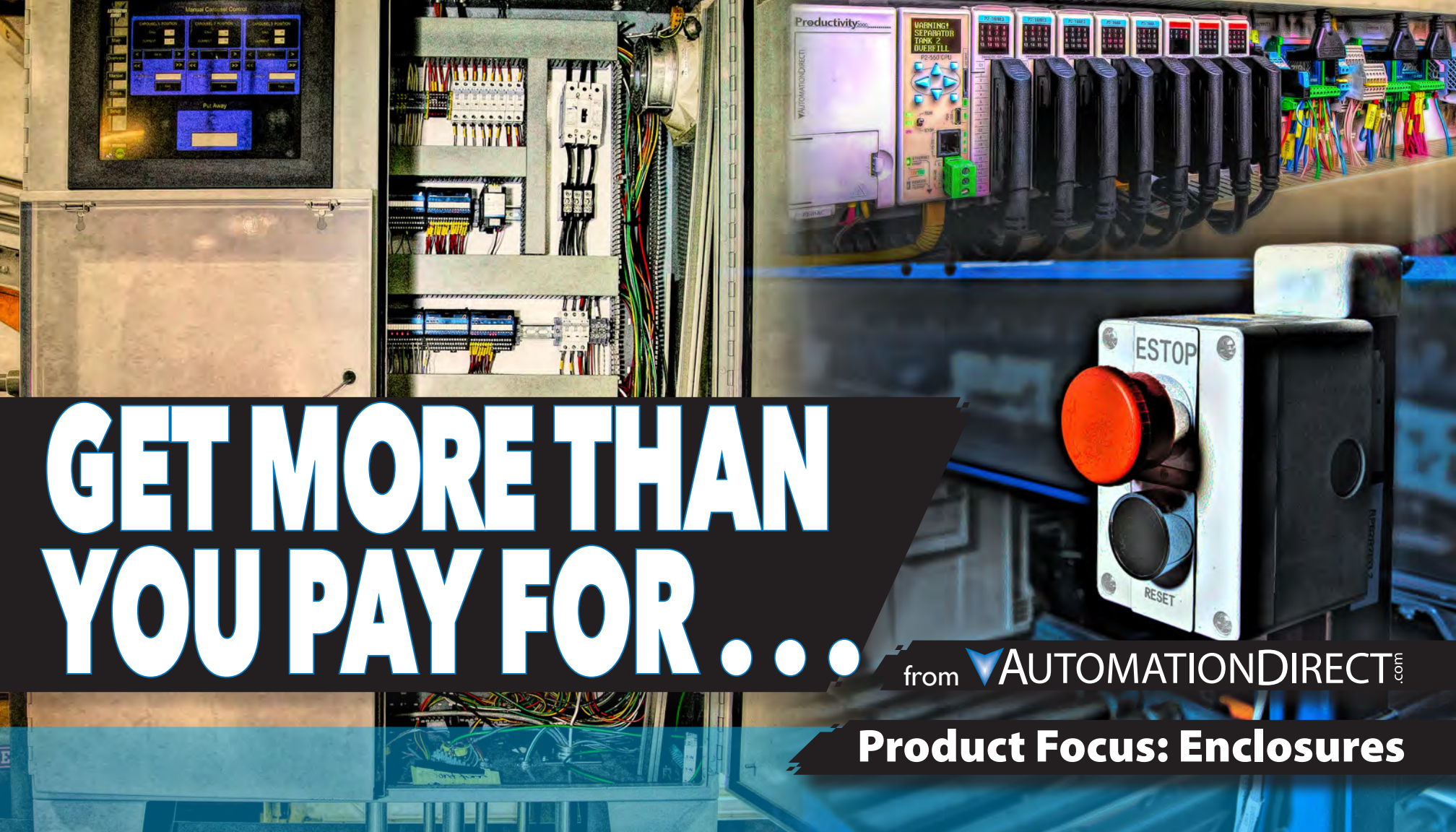


GET MORE THAN YOU PAY FOR . . .

from AUTOMATIONDIRECT.com

Product Focus: Enclosures

Enclosures

Enclosures Today

Enclosures are widely used to house electrical or electronic equipment along with switches, knobs and displays while providing a safe installation that prevents electrical shock to equipment users and protects the contents from the environment.

Today's enclosures are designed with features and materials that allow safe and protective use in hazardous areas, but also designed to be pleasing to the eye. Enclosures can experience high demands for heat dissipation, radio frequency interference and electrostatic discharge protection, as well as functional, esthetic and commercial constraints.

An important product development related to enclosures is climate control. These systems were created to manage the heat growth due to higher cabinet heat loads and the use of more sophisticated electrical drives and equipment. In addition, enclosures are being installed closer to production lines and equipment, exposing them to harsher environments.

To withstand all this, enclosures today are available in a variety of materials and NEMA ratings designed to protect against surrounding conditions.

Types of Enclosures

Wall-Mount Enclosures
Designed to house electrical controls, terminals, instruments and components. Provide protection from dust, dirt, oil, and water.

Junction Boxes
Designed for use as surface-mounted junction boxes, service boxes, switch boxes and cutout boxes.

Pushbutton Enclosures
Pushbutton enclosures with standard openings to fit 30.5mm and 22.5mm mount pushbuttons, switches and pilot lights. Available in various NEMA ratings for dirt, dust, oil and water protection.

Floor-Mounted and Freestanding Enclosures
Commonly used for machine tool applications to house motor starters, drives, contactors, and PLCs, as well as a wide variety of other electrical and electronic equipment.

Disconnect Enclosures
Used to house disconnects from many manufacturers, these enclosures offer NEMA 4, 4X or 4/12 protection in a wall-mount style, and are also available in NEMA 12 wall mount, floor mount and free-standing versions.

Consoles and Consolets
Typically used to house electrical and electronic controls and/or instruments. Sloped surface models can be used to mount push-buttons, pilot lights, meters, switches and other devices. Heavy duty construction protects contents from dirt, dust, oil and water.

Custom Cutout Enclosures
A selection of enclosures that can be customized with factory cutouts designed to your specifications, then shipped ready to install components to get up and running quickly.

Wireway and Fittings
Designed to protect wiring against rain, sleet and snow for outdoor installations, or protect against dripping water indoors.

Slope Top Enclosures
Designed to house and protect electrical and electronic components from harsh, dirty environments. Stainless steel models are perfect fit for mounting electrical or high-tech electronic equipment in a variety of indoor and outdoor settings.

Windowed and Clear Covered Enclosures
Enclosures with a window or clear cover allows a view of the inside of the enclosure without opening the door and exposing the internal components.

Types of Enclosures (continued)

Enclosures with Knockouts

Designed for use as wiring boxes and junction boxes to house and protect electrical and electronic components from harsh, dirty environments.

Dual Access Enclosures

Designed to protect electrical and electronic controls, components, and instruments in typical industrial environments with dust, dirt, oil and dripping water. Dual access enclosures are designed to provide additional access from the rear side of the enclosure if necessary.

Flush-Mount Enclosures

Enclosures with an external frame that allows it to be recessed in wall. These enclosures are typically used in applications where external space is limited or in high traffic areas.

Padlocking Enclosures

Enclosures with door or a latch that includes a padlock hasp where additional security is required.

Keylocking Enclosures

Enclosures with keylocking latches that provide controlled access for additional security.

Enclosure NEMA Ratings

Those of us who have worked professionally in the U.S. electrical control industries have a good understanding of, and a certain level of comfort with, NEMA standards; most notably as they pertain to electric motors, motor controllers and enclosures. For the most part, American-based companies require that the electrical components and enclosures used in any given project adhere to NEMA standards.

When working with American manufacturing facilities, NEMA standards are still king. NEMA standards describe each type of enclosure in general and functional terms, and specifically omit reference to construction details. In other words, NEMA specifies what an enclosure must do, not how to manufacture it.

NEMA performance criteria and test methods are used by Underwriters Laboratories (UL) and the Canadian Standards Association (CSA) as guidelines for investigation and listing of electrical enclosures. The tested enclosures are then authorized to carry a label by UL or CSA to prove they have passed the required tests and meet the applicable UL and/or CSA standard.

NEMA Ratings	
NEMA	**Provides a degree of protection against:**
1	Incidental contact with the enclosed equipment for indoor enclosures
2	Small amounts of falling water and dirt for indoor enclosures
3	Windblown dust, rain, sleet, and external ice formation. Intended primarily for outdoor enclosures but also for indoor enclosures.
3R	Falling rain, sleet, snow, and external ice formation when used outdoors, and for dripping water when used indoors. Typically used for wiring and junction boxes.
3S	Windblown dust, rain, sleet, and provides operation of external mechanisms when ice laden. Intended primarily for outdoor enclosures but also for indoor enclosures.
4	A pressurized stream of water where an ocassional washdown or where machine tool cutter coolant is used. For indoor/outdoor use.
4X	Corrosive materials and caustic cleaners. These enclosures are made of stainless steel, aluminum, fiberglass, or polycarbonate and used for food and beverage or applications where total washdowns with disinfectants occur repeatedly. For indoor/outdoor use.
5	Settling airborne dust, falling dirt, and dripping non-corrosive liquids. Intended for indoor use.
6	Water entry during a temporary submersion at a limited depth. Intended for indoor/outdoor use.
6P	Water entry during a prolonged submersion a a limited depth. Intended for indoor/outdoor use.
12	Falling dirt, dripping non-corrosive liquids, airborne contaminants and non-pressurized water and oil. These enclosures have no knockouts and are used for indoor applications such as automatioin control, drives systems, packaging, material handling and manufacturing applications.
12K	Dust, falling dirt, dripping non-corrosive liquids (except at knockouts). These enclosures with knockouts are used for indoor use.
13	Dust, spraying of water, oil, and non-corrosive coolant. Intended for indoor use.

Importance of Enclosure Thermal Management

Most automation and electrical devices must be housed in a control enclosure when used in industrial environments. This includes controllers, drives, power supplies, disconnects, fuses, terminals, relays, contactors and more. Changing temperatures in the plant or outside may demand use of both cooling and heating to maintain an optimal temperature or devices' safe operation.

There are many reasons to cool or heat an enclosure, some related to unique, site-specific needs. However, the most consistent and common reasons are:

Reasons for Cooling Enclosures

- Remove excessive heat caused by devices housed inside the enclosure
- Extend component life by maintaining low maximum operating temperatures
- Prevent malfunction due to overheating

Reasons for Heating Enclosures

- Control relative humidity inside the enclosure, typically below 65%
- Maintain a consistent temperature inside the enclosure to guarantee optimal operating conditions and prevent condensation.
- For situations where the enclosure may need to be cooled during the day and heated at night

Enclosure
Heat Exchangers

Enclosure
Air Conditioners

Enclosure
Heaters

A Few Tips When Selecting an Enclosure

What kind of environment is your enclosure going to be in and what level of protection do you need?

Your enclosure's primary function is to protect the equipment inside it from the surrounding environment. Refer to the previous section "Enclosure NEMA Ratings" and select a rating that protects against the type of environment where the enclosure will be located. Keep in mind that it is just as important not to over-specify the protection level of your enclosure as it is to under-specify, as increasing the protection level typically increases the cost of the enclosure.

Determine the Security Required

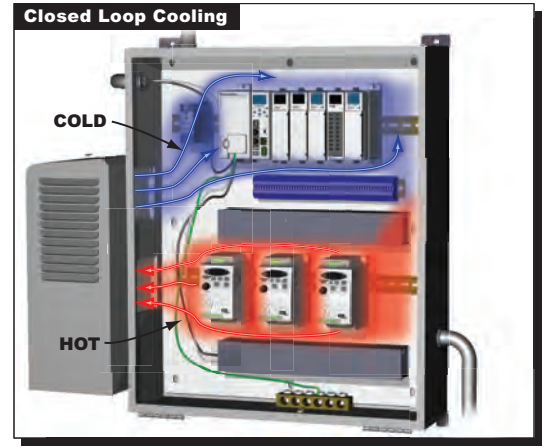
Your enclosure needs to protect its contents from unauthorized access to the components it houses. For low-risk installations, a screw cover, lift-off cover, or single door with clamps may be sufficient. In higher-risk installations, an enclosure with keylocking and/or padlocking capabilities may be needed.

Determine the Enclosure Size

Physical space for your components is not the only requirement. Considerations like heat dissipation and venting must be taken into account. First, determine the height and width for your enclosure by laying out the footprint space needed for your control components. The size of the enclosure will determine if you have the option of a single-door, two-door or wall-mount style. The height and width of your enclosure will determine whether it can or needs to be a wall-mount, floor-mount, or freestanding style enclosure. Next, determine the panel depth and remember that the subpanel mounting takes up a small portion of the depth. Also, any pushbuttons, operator interfaces, indicators, meters, etc., that you plan to mount on the enclosure door will occupy some enclosure depth.

Finally, allow for heat dissipation [see next item].

Determine Enclosure Thermal Management Needs



Your enclosure must be able to dissipate the heat generated by the components inside of it either alone or by adding a cooling device. You might be able to side-step additional cooling by upsizing your enclosure to increase the surface area through which heat is transferred to the atmosphere. Always remember that the heat dissipation method you select must be compatible with the enclosure's NEMA rating. Simple applications may use a simple louver plate for adequate heat dissipation and others will require a fan kit and louver combination for an economical ventilation option. Small enclosures can use a vortex cooler using compressed air. Sealed enclosures may require a heat exchanger or an air conditioner controlling the internal temperature without introducing outside air and its contaminants.

Refer to our enclosure sizing and selection white paper for more information:
http://go2adc.com/enc-size

Common Enclosure Accessories (visit www.AutomationDirect.com to see our complete selection)

Floor Stand Kits
Used to set a wall-mount style enclosure on the floor, or to elevate a freestanding enclosure.

Mounting Feet
Provide an easy way to securely mount an enclosure on a surface.

Pole Mounting Kits
Provide an easy way to mount enclosures to various pole sizes.

Casters
Casters can be installed on enclosures to provide enclosure mobility.

Deep-hinged Doors
Universal deep-hinged doors with concealed hinges offer a viewing polycarbonate window for clear visibility.

Window Kits
Available in various materials and compatible with NEMA 4, 4X, 12 and 13 enclosures.

Folding Shelves
Provide temporary support inside or outside an enclosure and fold down when not in use.

Locks and Latches
Provide a means to latch only or latch and lock an enclosure door.

Electrical Interlocks and Defeaters
Prevent enclosure door handles from being turned or non-handled doors from being open. Defeaters are key-operated switches that disable the interlocks to allow operator access.

Swing-out Panel Kits
Allow mounting of switches, pilot lights and other components near enclosure front for easy access.

Panel Support Kits
Provide support for panels containing heavy equipment, instruments or other components

Rack Mounting
Allow installation of rack-style equipment.

DIN Rails
Provides a mounting surface for DIN mounted snap-on devices in enclosures.

Enclosure LED Lighting
Provide bright lighting inside enclosures.

Looking for FREE online PLC training? We have that too!

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Access free video libraries that explain the fundamentals of PLC control as well as provide in-depth training on AutomationDirect's families of PLCs.

No time or viewing limitations, simply enter your email address to register your account or continue your training.

www.AutomationDirect.com

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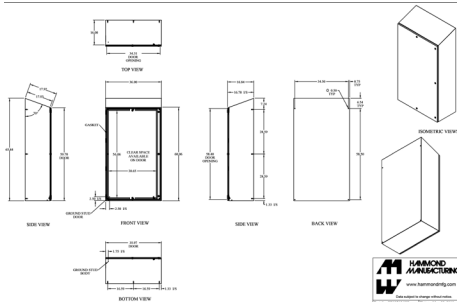
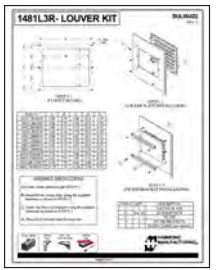


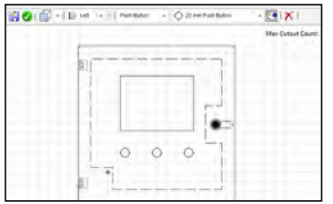
Tens of thousands of photos and CAD drawings

Many FREE resources are available 24/7

GO! Support.AutomationDirect.com

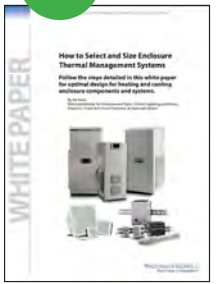


Manuals



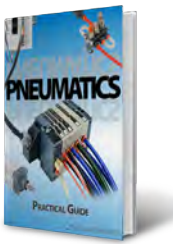
Software for many products
(downloadable)
- full-featured and ready to use

GO! Library.AutomationDirect.com



Whitepapers

Application article library



E-books

GO! Join the discussion at: Forum.AutomationDirect.com

If it's in your cabinet . . .
. . . it's online at AutomationDirect.com

- ProductivityOpen Arduino-compatible industrial controller
- Productivity1000® micro-modular PLCs
- Productivity2000® micro-modular PLCs
- Productivity3000® modular PLCs
- Do-more® BRX®, H2 and T1H series PLCs
- CLICK® micro brick PLCs
- Numerous I/O expansion modules available including discrete, analog, temperature and high-speed (depending on model)
- Think & Do® PC control software
- DirectLOGIC® components still available for maintaining legacy systems.

Programmable Controllers

CPU and I/O Comparison	AutomationDirect CLICK	AutomationDirect Do-more! (BRX)	AutomationDirect Productivity2000	vs. Allen-Bradley CompactLogix
Base (if required)	N/A N/A	N/A N/A	$81.00 P2-04B	N/A N/A
Power Supply	$41.50 C0-01AC	N/A N/A	$79.00 P2-01AC	$508.00 1769-PA4
CPU	$145.00 C0-10ARE-D (Ethernet built in)	$489.00 BX-DM1E-36ER3 (Ethernet built in)	$273.00 P2-550 (Ethernet built in)	$7,600.00 1768-L45 (Serial port only)
16 AC Inputs	$42.00 C0-08NA (8-point AC Input)*	$60.00 BX-16NA	$113.00 P2-16NA	$325.00 1769-IA16
16 24VDC Inputs	$47.00 C0-16ND3	$0.00 Included with CPU	$74.00 P2-16NE3	$277.00 1769-IQ16
8 Relay Outputs	$42.50 C0-08TR	$0.00 Included with CPU	$54.00 P2-08TRS	$327.00 1769-OW8I
8 Analog Input Channels (mA)	$95.00 x 2 (2) C0-04AD-1	$188.00 BX-08AD-1	$222.00 P2-08AD-1	$895.00 1769-IF8
Total System Price	$447.00	$556.00	$896.00	$9,932.00

*C0-08NA used in conjunction with eight AC inputs on CPU gives the 16 points needed

All prices are U.S. published prices. AutomationDirect prices as of 11/4/2019. Allen-Bradley prices taken from www.rockwellautomation.com 4/16/2019

Distributed I/O with Modbus® TCP, EtherNet/IP, Modbus RTU, DeviceNET and Profibus® support

Universal Field I/O

- C-more® operator interface HMI touch panels in various sizes up to 15 inches with wide screen options available
- C-more headless HMI - same functionality as C-more touch panels without display size restrictions
- C-more Micro® text and touch panels - 3, 4, and 6-inch models available starting at only $101
- ViewMarq® LED message displays
- ATLAS® industrial monitors

HMI/Operator Interface

AC and DC Drives

- DURAPULSE® variable frequency AC drives up to 300hp
- WEG CFW100 and CFW300 AC drives up to 5hp
- IronHorse® DC drives up to 3hp
- Cost-effective GS2 series VFDs up to 10hp
- Drive accessories
- Soft starters up to 480A

Motors and Motor Controls

- IronHorse® general purpose AC motors up to 300hp
- Stainless steel AC motors
- DC motors up to 2hp
- Marathon® inverter duty AC motors up to 100hp
- Compressor duty AC motors up to 5hp
- ODP motors
- 4-IN-1 motors
- Motor controls and contactors up to 300hp

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www.automationdirect.com/workplace

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What our current customers think:
www.automationdirect.com/reviews

Software

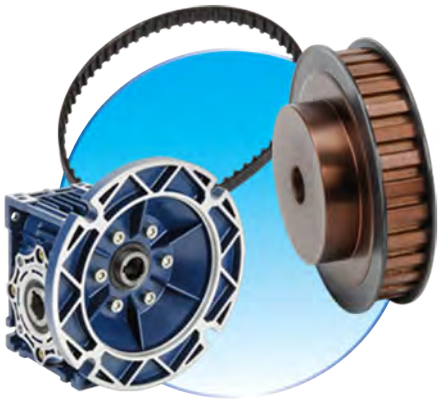
- Free PLC programming software (download)
- System configuration
- Free motion control software (download)
- Free Micro HMI programming software (download)
- Free AC drive configuration and programming (built-in PLC) software (download)

Process

- Temperature controllers
- Digital panel meters
- Temperature sensors and transmitters
- Pressure sensors and gauges
- Level sensors and controllers
- Flow sensors and transmitters
- Signal conditioners
- Pipeline valves
- Current to pneumatic (I/P) transducers
- Timer relays, counters and tachometers

Safety

- Reer MOSAIC safety controllers
- IDEM® and Dold® safety relays
- Speed/Standstill safety relay modules
- Magnetic safety switches
- Magnetic coded safety switches
- RFID coded safety switches
- Light curtains
- Safety relays
- Trapped key interlocks
- Safety mats and edges
- Safety bumper



Power Transmission

- Worm gearboxes
- Helical gearboxes
- Precision gearboxes
- Shaft mount gearboxes
- Timing belts and pulleys
- Couplings and bushings
- Shafting and shaft supports
- igus polymer bearings

Michael in TAMPA, FL wrote:

"I have been purchasing electronic parts for over 10 years and the products and service I have received from Automation Direct have never disappointed me. I will continue to purchase from here, keep up the good work ! I wish other vendors I have were as good as you."

Mike in EDMONTON, AB wrote:

"I'm an OEM and just started using the products. So far so good. Delivery was quick to Canada as well. "

Dennis in BERLIN, CT wrote:

"Great company. Second to none. Excellent prices. When I first started to use AD prox switches I was warned that anything that low a price won't last. That was 20 years ago. Since then two failures out 120 switches. This is a machine that runs 50 hours a week. I recommend their products to anybody. Pneumatic fittings are a bargain as well."

Relays & Timers

- Electro-mechanical relays
- Solid state relays
- Relay sockets and accessories
- Timer relays
- Counters
- Tachometers
- Motor control relays
- Force guided relays

Tools

- Wera screwdrivers and torque tools
- Wera wrenches, ratchets and sockets
- Knipex® pliers, stripping and crimping tools
- Cable tie tools
- Hole cutting tools
- RUKO grinders and burrs
- SapiSelco® wire ties
- AutomationDirect interchangeable die crimping tool, self-adjusting crimper and rotatable die crimpers

Servo Systems

	AutomationDirect Price/Part Number	VS.	Allen-Bradley Price/Part Number
Digital Servo Drive	$483.00 SVA-2040		$1,418.00 2098-DSD-005
100W Servo Motor with connectorized Leads	$322.00 SVL-201		$643.65 TLY-A130T-HK62AA
Breakout Board Kit for CN1 Control Interface	$84.00 ZL-SVC-CBL50 + ZL-RTB50		$316.05 2090-U3BK-D4401
10′ Motor Feedback Cable	$56.00 SVC-EFL-010		$96.68 2090-CFBM6DF-CBAA03
10′ Motor Power Cable	$33.50 SVC-PFL-010		$109.00 2090-CPBM6DF-16AA03
Configuration Software	FREE SV-PRO*		$85.02 2098-UWCPRG

***SureServo Pro software is FREE when downloaded and is also available for $9.00 on a CD**

Complete 1-axis 100W System $978.50 $2,668.40

All prices are U.S. list prices, AutomationDirect prices as of 11/4/2019.
The Allen-Bradley 100W system consists of part numbers shown in table above with prices from www.wernerelectric.com, www.todaycomponents.com 4/25/2019.

Joseph in FAIRLAND, IN wrote:
"Great web site. Everything is easy to find. I like the fact that you place PDF and information next to the product I am researching. This is very helpful in understanding all the details necessary to determine if the item I am looking at will work in my project. Large selection of Automation devices, quality products at affordable prices. I am a maintenance technician and purchase items for my home test bench to work out problems at home, as well as buying product for work projects."

Motion Control

- SureStep® drives and NEMA motors
- SureServo® drives and motors, up to 3kW
- Encoders
- Linear slides
- Stepper and servo gearboxes

VOTED Best in SERVICE 15 YEARS

FREE Technical Support
Located in USA

Sensors

- Proximity sensors
- Photoelectric sensors
- Limit switches
- Precision limit switches
- NEMA limit switches
- Laser sensors
- Color and contrast sensors
- Area sensors
- Encoders
- Current and voltage sensors
- Pressure sensors and gauges
- Temperature sensors, switches, transmitters and thermometers
- Liquid level sensors
- Flow sensors
- Ultrasonic sensors
- Fork sensors

AUTOMATIONDIRECT.com

Pushbuttons, Switches and Lights

- KILLARK® hazardous location control stations
- IDEM emergency stops
- Fuji®, Schmersal and Eaton metal/ plastic 22 and 30mm pilot devices
- IP69K-rated selector switches, pilot devices and pushbuttons from Schmersal
- WERMA audible devices and visual signals
- WERMA and Patlite stacklights
- IP69K-rated Patlite stacklights
- Patlite signal towers and LED lighting
- Foot switches

Communications

- Industrial managed and unmanaged Ethernet switches
- StrideLinx Secure Remote Access
- Pocket Portal IoT Bridge
- MQTT Gateways
- Modbus gateways
- Network adapters/ converters
- Ethernet cables
- VPN routers and cloud services for secure remote access
- Power over Ethernet (PoE) switches

Pneumatics

- Tubing, hose and fittings in a wide variety of configurations
- Air cylinders and position switches
- Solenoid valves
- Rodless air cylinders
- Modular solenoid valves (Ethernet or hardwired)
- Air preparation and air relief valves
- Pushbutton valves
- Total Air Prep (TAP) all-in-one units
- Rotary actuators and grippers
- Pressure switches, transmit-ters, and transducers
- Pneumatic pushbuttons and limit switches

Power Products

- Acme Electric®, Hammond and Jefferson Electric® transformers
- Rhino® DC power supplies and converters
- Mersen surge protectors
- Roxburgh and Eaton line filters and surge protectors
- Roxburgh power outlets
- ACME Electric encapsulated transformers
- Edison® power distribution blocks
- Bryant® electrical plugs, connectors and receptacles, and other wiring devices
- AcuAMP® AC current transformers
- Socomec multifunction power meters
- Trumeter graphical panel meters

Water (Potable) Components

- Regulators
- Solenoid valves in nylon or stainless steel bodies
- Hand valves
- Check valves
- Push-to-connect water fittings
- Lead-free brass fittings
- Tubing
- Hose
- Hose clamps

- Eaton UL 489 miniature circuit breakers
- Fuji UL 489 molded case circuit breakers
- Eaton UL1077 supplementary protectors
- Edison fuses, fuse holders and fuse blocks
- Socomec, Gladiator® and Bryant® disconnect switches
- Bryant UL 508 manual motor controllers

Circuit Protection

- Electrical hook-up wire / building wire
- Konnect-It® and DINnectors® terminal block systems
- Edison power distribution blocks
- Bryant power wiring devices
- Wire duct and tubing
- Wire end connectors cable glands, connectors and fittings
- ZIPport® connectors
- Multi-wire connectors
- Sensor cables
- DYMO XTL Label Makers and Labels
- General, latching, UV resistant, releasable, mounting head, identification, and metal-detectable cable ties

Terminal Blocks and Wiring

- Over 4,422 NEMA rated enclosures to choose from
- Stainless steel, carbon steel and aluminum enclosures
- Polycarbonate enclosures and PVC enclosures
- Thermoplastic ABS enclosures
- NEMA rated fiberglass, polycarbonate enclosures
- Custom cut-out enclosures
- Heating, cooling and climate control
- Lighting

Enclosures

Enclosures	AutomationDirect Hubbell/Wiegmann Price/Part Number	VS.	Hoffman Price/Part Number
NEMA 1 wall mount 24 x 24 x 08"	$222.00 N1C242408LP		$343.81 A-24N24BLP
NEMA 12 wall mount 20 x 16 x 08"	$290.00 N12201608		$477.51 A-201608LP
NEMA 12 free-standing mount 60 x 60 x12"	$1,966.00 N12606012		$2,813.35 A-606012LP
NEMA 4 wall mount 20 x 20 x 06"	$396.00 N4202006		$614.50 A-20H20ALP
NEMA 4X wall mount 20 x 20 x 06"	$780.00 SSN4202006		$1,447.97 A-20H2006SSLP
NEMA 4/12 wall mount 36 x 24 x 08"	$377.00 N412362408C		$602.87 C-SD36248

*All prices are U.S. published prices. AutomationDirect prices as of 11/4/2019. Hoffman prices are taken from www.alliedelec.com 4/30/2019. Prices may vary by dealer. Many other part numbers are available from all vendors.

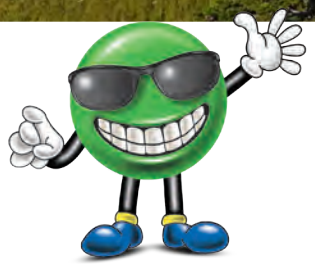
All of our cable is now available cut to your specified length so you can eliminate waste and purchase only what you need - **plus it's cut and shipped the same day!**

Types of cable we offer:

- Flexible portable cord
- Bulk data cable (RS232/ RS422/ RS485)
- Flexible control cable
- Variable frequency drive (VFD) Cable
- Instrumentation cable
- Continuous flexing control cable
- Continuous flexing motor supply cable
- Continuous flexing industrial Ethernet cable
- Control and signaling cable
- DLO, RHH, RHW-2 Heavy Duty Flexible Power Cable
- Power Machine Tray Cable
- VFD / Servo Cable with single pair
- Tray rated continuous flexing control cable
- Continuous flexing profinet cable
- Profibus cable
- Sensor / actuator cable

Minimum lengths of 10ft unless otherwise indicated

- Honest up-front pricing (no gimmicks)
- Quick delivery - order today, it ships fast!
- FREE tech support - independently rated tops in service for 15 years
- FREE shipping on orders over $49



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As a privately-held efficiently run company, we take pride in serving our customers the way they want to be served - honestly and fairly. We do everything we can to accomplish this day in and day out.

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