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Product Focus: Safety Products

Safety systems protect your personnel and your bottom line

Factory equipment automation can be deemed a critical application, yet it is clear that properly designing the safety aspect is even more crucial. This has typically meant applying safety components to the fundamental automation system. The purpose of a safety system is to bring a machine to a safe state as quickly as possible if a safety sensor is triggered, an e-stop pushbutton is activated, or any other safety-related anomaly is detected.

The first step is to perform a risk assessment following methods outlined in various industry standards. Potential unsafe conditions must be identified, along with ways for bringing the equipment to a safe state.

Most often, a safe state is achieved by removing sources of energy such as electricity and compressed air but sometimes mechanisms must be engaged to slow or lock the equipment, or power may need to be maintained to hold the equipment in a safe state.

There are options for the heart of a machine safety system, most notably safety relays or safety controllers.

Industrial automation electronics have enabled a progression from basic safety relays to stand-alone safety controllers. They can be all-in-one devices with inputs and outputs (I/O), or they may be modular with connectable components for the controller, inputs, outputs, and communications. This expandability enables safety controllers to easily connect with many more field devices.

Safety controllers are typically software-configurable. Users can assign and even overlap safety zones, or they can modify the configuration without wiring changes. Safety controllers are far more advanced than basic relays, with additional protective features, configurability, expandable I/O options, and even communication capabilities. Digital communication options enable these controllers to be conveniently monitored by non-safety rated systems. For larger I/O counts, a safety controller solution can become comparatively less expensive than using basic safety relays.

Modern safety relays are a tried-and-true approach using standardized components. Safety relays are easy for design and operations personnel to work with, but are less suitable for complex designs, require significant field wiring, and are harder to modify. Hardwired safety relays are the original method of providing machine safety, and these components can be arranged to de-energize many types of systems. They can integrate with simple devices like emergency stop buttons, or more advanced sensors like light curtains.
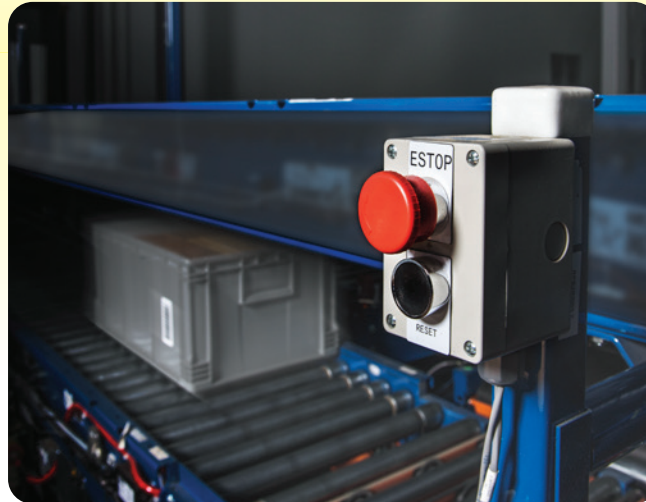
Safety Controller
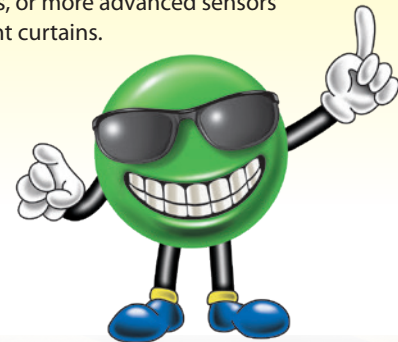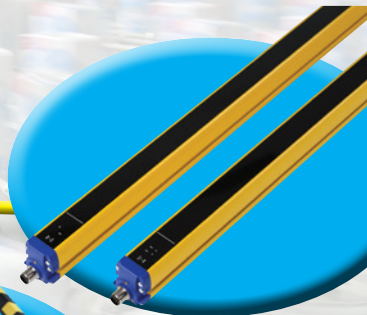
IDEM tongue interlock safety switch
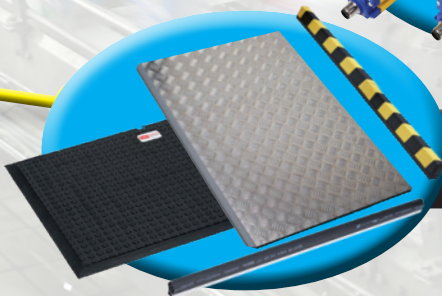
IDEM E-Stop pushbutton control station

DataLogic safety light curtains

ASO safety bumper, mats and edge

Schmersal two-hand control panel

e-stop Relay

Light Curtain Relay

Safety Mat Relay

Two Hand Relay

Safety Controlling Devices are the Heart of your Safety System

If you have a simple system and you want to monitor just a few safety sensors or perform one specific safety function, safety relays are a good choice. Safety relay modules use monitoring logic, as well as overvoltage and short-circuit protection, in combination with redundant relays and force-guided contacts, to provide a high level of fail-safe operation.

Safety relays are available for simple E-stop and safety gate monitoring, safety mat and edge monitoring, light curtain monitoring (including models that perform muting functions), as well as speed/standstill safety monitoring. Models are also available that perform several possible functions; some have more than one relay per package; falling between a traditional safety relay and a safety controller.

The benefits of using a safety controller begin when comparing it to the cost and effort of integrating two or more safety relays. In many cases, a safety controller costs about the same as two to three safety relays and eliminates the integration effort.

Some safety controllers are standalone, but most can be expanded with modules to add significant capabilities. For example, with the proper modules specified, ReeR Mosaic safety controllers can support over 100 inputs, 30 or more safety outputs, and dozens of status outputs.

While some safety relays may include a fieldbus option for limited status monitoring, expansion units in safety controllers permit connection of the master unit to most of the commonly used industrial fieldbus systems to communicate a wide variety of parameters.

This enables diagnostics, I/O point monitoring and safety output status to be digitally communicated to automation controllers using EtherNet/IP, Modbus TCP, EtherCAT, Profinet, Profibus, CANopen, DeviceNet, CC-Link, Modbus RTU and other protocols.

The fieldbus capabilities of safety controllers can save a significant amount of wiring by eliminating the discrete status signals (status outputs) often connected to an automation controller. The fault monitoring capabilities built into the safety controller can also save on wiring. If any point fails, the safety controller will put the system into a fail-safe state and can be programmed to only shut down certain parts of the overall system.

Assembled ReeR MOSAIC modular Safety Controller system

There are many sensors and functions used in a safety system to protect personnel and machines, and the ability to handle a wide range of safety functions is another benefit of a safety controller.

Whether it is used for managing all the safety functions of a single machine or in an entire plant, the programmable features in a safety controller can scan multiple safety sensor inputs to create multi-zone and multi-function safety systems. The software in these safety controllers can be used to create complex safety functionality using logical safety blocks such as safety guard lock, muting, timer and counter.

When selected and configured correctly, a safety controller is often the best solution, particularly as complexity and the required number of safety relays increase. Care must be taken when configuring and testing the controller, but programming software provides several functions to aid in the performance of these tasks.
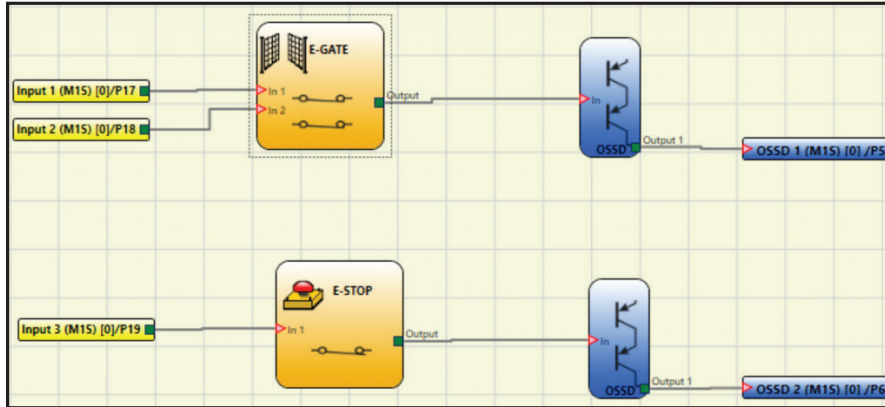
The software allows configuring, programming, simulation and monitoring of the safety system using a simple and intuitive graphical interface. The application safety software is used to configure logic diagrams of the connections between the master unit and the expansion modules, as well as the safety sensor inputs and safety and status outputs. This configuration is performed offline on a PC and downloaded to the master unit.

A completed safety program must be validated and tested. Some controllers provide rules-based guidance and safety reports to help define the system and programming, which helps with validation once the safety program is complete. After validating and downloading the program to the safety controller, and connecting all the safety devices in the field, the system must be tested to verify correct operation.

IDEM and Dold safety relays

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Safety Light Curtains – the transparent brick wall

Safety light curtains are an advanced method of safeguarding personnel around hazardous machines through the use of photoelectric technology and a concept known as Control Reliability. Safety light curtains are a great alternative to other traditional guarding methods such as mechanical barriers, sliding gates and pull-back restraints; they reduce operator fatigue and offer flexibility and freedom to the operator as well.

How Do They Work?

Safety light curtains consist of a transmitter and a receiver. A photoelectric transmitter projects an array of synchronized, parallel infrared light beams to a receiving unit. When an object breaks any area of the beams of light, the logic circuit in the light curtain removes a signal going to the safety system of the machine, stopping the hazardous movement.

The transmitter contains light-emitting diodes (LEDs) which emit pulses of invisible infrared light. The receiving units are designed to detect only the specific pulses and frequency from the matched transmitter unit.

To meet the OSHA and ANSI requirements for control reliability, safety light curtains are continuously doing self-checks; if the self-checks detect an internal fault, the light curtain immediately sends a stop signal to the machine's safety system. The light curtain then becomes locked in a safe condition until the faulty component is replaced and an appropriate reset is done.

Safety light curtains also have a set of two relays to provide a redundant circuit. If one relay fails, the second will still provide the stop signal. There are two basic types of outputs for light curtains: mechanical relays with force-guided contacts and electronically cross-monitored, self-checking solid-state devices known as Output Single Switching Devices (OSSD).

In What Applications Are They Used?

Light curtain applications are typically categorized by the type of guarding required. Light curtains are used in guarding machines such as mechanical and hydraulic power presses, molding presses, stamping, forming and automated assembly machinery. Safety devices are typically selected to protect the operator's finger or hand from the pinch point of the machine.

If there is a perimeter or boundary defined by a machine, robot or other equipment, then a perimeter guard style light curtain may be selected.

The main difference between a light curtain designed to protect a finger versus a hand, and one designed to protect a perimeter, is the spacing of the actual beams. A unit designed to protect a finger utilizes 14mm spacing between each beam while one for hand protection is designed with 30mm between the beams. Perimeter-style light curtains can have beam spacing from 300mm to 500mm.

How Do I Select The Proper Light Curtain System For a Given Application?

Several factors must be addressed to make the proper selection, including:

- The size of the object or body part being detected or protected will determine what resolution of beam spacing is required.
- Determining the height and length of the area and the protected field to be guarded will determine the required maximum protective height of the light curtain system.
- The time required for the machine or process to stop after an interruption of the light curtain system will determine the required response time needed.
- The minimum/maximum distance or range needed to separate the emitter and the receiver in the application must be considered.
- What safety level or safety control category does the application's risk assessment indicate is required? Can a basic type 2 rated light curtain unit suffice or do you need the more robust type 4 units for the most protection and reliability for the application?

When an object breaks the beam array between the sender and receiver, the OSSD signal to the light curtain controller will be removed and the machine will be put into a "safe state".
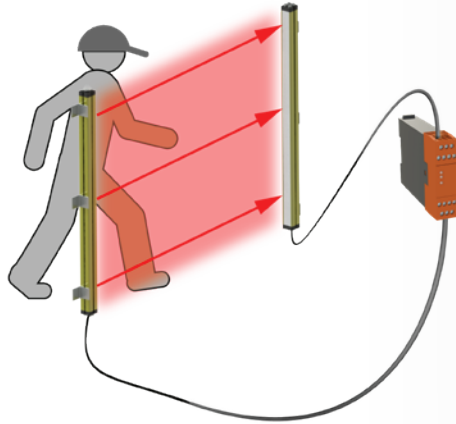
Safety light curtains can be used in a variety of different modes which can range from providing a stop signal to a machine's safety control circuit to more sophisticated functions such as muting, fixed blanking and floating blanking. These functions can be part of the logic circuitry in the light curtain units themselves, or certain functions such as muting can be handled by an external safety control relay module.

What Is Muting?

Muting is the provisional and automatic overriding of the light curtain safety output function during normal, uninterrupted machine cycle operation. This function allows the light grid to be interrupted by some part of the machine or material being processed without stopping the operation or process.

An example of this would be a palletizing system within which the palletized product must be allowed to pass through the opening protected by the light curtain, while the entry of a person must safely stop the machine.

Muting is typically accomplished by using an external safety control relay module and additional sensing devices such as safety limit switches or photoelectric sensors in conjunction with an external signaling light to show when the muting function is activated. However, all of this can be accomplished with light curtain models that offer muting as a built-in feature.

What Is Fixed Blanking And Floating Blanking?

Fixed blanking is when a specific set of adjacent light beams are set to be permanently inactive to allow product or part of the process to enter that sensing area without deactivating the light curtain safety outputs.

Floating blanking is when a set number of adjacent beams are allowed to ignore the presence of an object within their portion of the protected field. Unlike the fixed blanking method where there is a specific set of inactive beams, floating blanking allows the set number of adjacent beams to "float" within the protective field. This allows the object to be seen and ignored while moving within the protected field without deactivating the light curtain safety outputs.

These functions are typically designed into the logic of the safety light curtain units themselves and require some sort of programming or dip switch settings.

The use of safety light curtains allows the protected machine to run more safely and more productively than with other protection devices. You may find many brands of light curtains that will suffice for your application. However, the most important consideration when choosing a brand is to make certain they meet all requirements of the relevant safety standards, such as EN/ISO 13849-1:2008 (former EN 954-1) and EN/IEC 61496-1:2004/-2:2006. Also, it is important to verify these light curtains have been tested and certified by an independent, recognized third party such as TUV to make sure they are compliant with these standards.

Safety Laser Scanners – making safety painless

There are many devices available to ensure machine safety and to detect personnel entering unsafe areas. Cable-pull switches, safety light curtains and interlock switches (non-contact and the many types of tongue interlock switches) are just a few of them. One of the newer devices available is the safety laser scanner, which has a very wide monitoring window that can detect people or objects in its protected area. When connected to a safety controller, these scanners will put the machine into a safe state upon an intrusion of this protected area.

In short, a safety laser scanner is similar to a motion detection sensor for a home security system but much more sophisticated. Instead of just detecting motion, it detects if there is a person, animal or object, etc. in the area it is set to protect. These scanners also use lasers, not infrared light or sound waves, to determine an intrusion, and can detect both motion and non-motion presence.

Safety laser scanners are intelligent devices that can be programmed to have multiple levels of protection, configurable alarms, dust filtering and even muting on some models. Their wide-angle monitoring area, approximately 275 degrees around the unit, can detect objects up to 40 meters away.

If only considering the price of a safety laser scanner for an application, it can seem expensive. However, there are several cases where they make the most sense to use over other devices.

One situation would be a mobile application, in particular an automated guided vehicle (AGV). Normally, AGVs operate in areas where personnel are walking and where other machinery could be present, including other AGVs. How do you prevent these bots from hurting someone or another piece of equipment? To ensure a wide range of coverage, you could place sensors all over them and run all of those wires on a tiny mobile unit to one or more relays or a safety controller. However, a much cleaner and less cumbersome alternative would be installing a safety laser scanner on the vehicle and connecting it to a safety controller. You might need two safety scanners if the vehicle needs complete horizontal protection that covers 360 degrees or even more if the AGV is something specialized like a forklift. However, for most applications, just one or two scanners will get the job done.

Another common application for a safety laser scanner would be in a robot cell. The traditional method of protection around a robot cell is to use safety gates or cages around the cells and have the doors interlocked with safety interlock switches. Another method is to use multiple light curtains around the cell. One or two safety laser scanners can do the job of either of those approaches and cost not just less money but a lot less time.

Think of your typical modern manufacturing facility. Often these facilities are going through minor to moderate changeovers every year and major overhauls every 3 to 5 years. Just moving light curtains and lining them up again can be complicated and taking down and putting gates and cages back up takes a lot of time. Relocating a safety laser scanner is a cinch; basically, you just place it in its new location and connect it back up.

Another way a safety laser scanner can be beneficial is to set it up to behave like a very large light curtain. Most models of safety laser scanners support horizontal and vertical monitoring which allows them to be applied in this manner. A safety laser scanner can be set up in a vertical mode and take the place of what would require a very large safety light curtain.

These specialized safety monitoring devices offer a practical, cost-effective way to protect a specific area when used in the right application.

Popular Sensors and Other Components to Complete a Safety System

Non-Contact Safety Switches
Non-contact safety switches are interlocking devices designed to protect both people and machines. They are preferred in certain applications where no physical contact (under normal conditions) takes place between the switch and actuator.

Two-Hand Control Systems
Two-hand control systems are used with a two-hand control monitoring relay and require an operator to use both hands at the same time when initiating a hazardous operation.

Magnetic Locking RFID Switches
Magnetic locking RFID safety switches combine magnetic locking and radio-frequency identification (RFID) sensing technology to provide non-contact operation and anti-tamper coding.

Interlock Safety Switches
Interlock safety switches can be used to detect if a guard, gate or door is open or in a safe position or even lock the opening. This is accomplished with a tongue switch and locked with a solenoid.

Safety Edges
Safety contact edges are pressure-sensitive sensors used to ensure the safety of closing edges at possible crushing or shearing points that are prone to accidents. They may be installed near automatic gates, machines and other facilities for handling equipment to detect conditions that could cause bodily harm or damage to machinery.

Safety Bumpers
Safety bumpers are typically used to detect presence of heavy equipment in applications involving transport vehicles, industrial trucks, high-shelf warehouses, production lines, or mobile systems. When used in conjunction with a safety relay, they provide fail-safe triggering of an intended safety function.

Safety Mats
Safety contact mats are floor-mounted sections used to safeguard dangerous areas in industrial and production automation settings. Stepping on the mat triggers an immediate "stop" signal to prevent endangering movements.

Safety Limit Switches
Safety limit switches provide positively operated switching contacts to verify the position of machine elements or other moving parts for safety-related purposes. A variety of actuation mechanisms are available, such as plungers, rollers and levers, all with precise operating points.

Cable-Pull Safety Switches
Cable-pull safety rope switches, also known as E-Stop pullcords, allow operators to initiate an E-stop from any point along the installed cable length, providing robust protection for exposed conveyors or machines, or wherever equipment cannot be protected by guards.

Safety Isolators
Safety isolators provide a compact, easy-to-connect and user-friendly way to provide intrinsic safety and galvanic separation between the control system and field device in a hazardous location.

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If it's in your cabinet . . .
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Programmable Controllers

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

Universal Field I/O

- Distributed I/O with Modbus TCP, EtherNet/IP, Modbus RTU, DeviceNET communication options
- Various combinations of discrete (AC, DC, relay, high-speed) and analog inputs and outputs available

HMI/Operator Interface

- 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
- C-more and C-more Micro HMI design software free to download
- ViewMarq® LED message displays
- ATLAS® industrial monitors

CPU and I/O Comparison	AutomationDirect Productivity2000	VS.	Allen-Bradley CompactLogix
Base (if required)	$92.00 P2-04B		N/A N/A
Power Supply	$89.00 P2-01AC		$542.00 1769-PA4
CPU	$310.00 P2-550		$3,370.00 1769-L33ER
16 AC Inputs	$128.00 P2-16NA		$343.00 1769-IA16
16 24VDC Inputs	$84.00 P2-16NE3		$289.00 1769-IQ16
8 Relay Outputs	$61.00 P2-08TRS		$354.00 1769-OW8I
8 Analog Input Channels (mA)	$252.00 P2-08AD-1		$943.00 1769-IF8
ASCII Comm Module	$0.00 Built in to CPU		$851.00 1769-ASCII
Modbus RTU Comm Module	$0.00 Built in to CPU		$940.00 1769-SM2
Total Hardware Cost w/USB, Ethernet and Serial	$1,016.00		$7,632.00
Programming Software	FREE PS-PGMSW		$935.00 9324-RLD200ENE

All prices are U.S. published estimated retail prices. AutomationDirect prices as of 04/06/2022.
Allen-Bradley hardware prices taken from www.wernerelectric.com 11/5/2020.
Allen-Bradley software price taken from www.wernerelectric.com 11/5/2020.

AC and DC Drives

DURAPULSE® variable frequency AC drives up to 300hp, featuring GS20, GS20X, GS3 and GS4 series

WEG CFW100 and CFW300 AC drives up to 5hp

IronHorse® DC drives up to 3hp

Cost-effective GS1 series VFDs up to 2hp

Drive accessories

Soft starters up to 480A

Motors and Motor Controls

- IronHorse general purpose AC motors up to 300 hp
- Stainless steel AC motors
- IronHorse Farm Duty up to 10 hp
- IronHorse three-phase ODP motors up to 50 hp
- Marathon inverter duty AC motors up to 100 hp
- Marathon single-phase ODP motors up to 5 hp
- Compressor duty AC motors up to 5 hp
- DC motors up to 2 hp
- Motor controls and contactors up to 300 hp

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Software

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- FREE Process control configuration software (download)
- Free motion control software (download)

- Free C-more and C-more Micro HMI programming software (download)
- Free AC drive configuration and programming (built-in PLC) software (download)

Process

- Temperature and process controllers
- Digital and process panel meters
- PID, Batch PID, and Loop Control
- Temperature sensors and transmitters
- Pressure sensors and gauges
- Level sensors and controllers
- Flow sensors and transmitters
- Signal conditioners
- Pipeline valves
- Solenoid /media separated process pipeline valves
- Current to pneumatic (I/P) transducers
- Timer relays, counters and tachometers
- Power monitoring
- Cloud data logger with I/O

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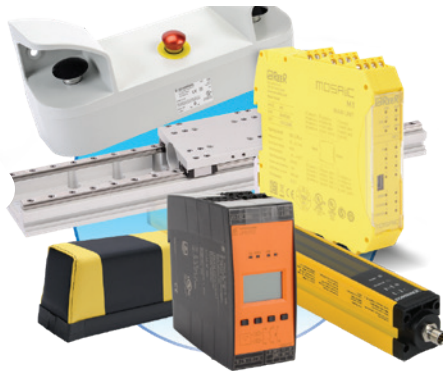
Safety

- Reer MOSAIC safety controllers
- IDEM® and Dold® safety relays
- Speed/Standstill safety relay modules
- Safety laser scanners
- Magnetic safety switches
- Magnetic coded safety switches
- RFID coded safety switches
- Light curtains from Contrinex, ReeR and Datalogic
- Two-Hand controls
- Trapped key interlocks
- Safety mats and edges
- Safety bumpers
- Intrinsically safe isolators
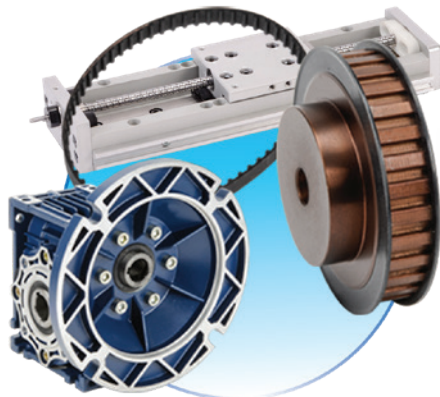
Power Transmission

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

Jose in SAN DIEGO, CA wrote:

"I have been customer for about 15 years, I like a lot that is here. I can find almost all the devices for developing a full automation and control system project. I recommend working with AD!!! best regards."

Nathan in BELLEVUE, OH wrote:

"I've been using AutomationDirect as a supplier for over 10 years and have had nothing but good experience with them. Their product availability and value is by far the best in the industry. It's exciting to see their product line expanding rapidly and I've been choosing them more and more often because of it."

Relays & Timers

- Electro-mechanical relays
- Intrinsically safe relays
- Phase monitoring relays
- Alternating relays
- Optocoupler relays
- Pump seal failure relays
- Solid state relays
- Relay sockets and accessories
- Timer relays
- Counters
- Tachometers
- Motor control relays
- Force-guided relays

Tools

- Multimeters and testers
- Wera screwdrivers and torque tools
- Wera wrenches, ratchets and sockets
- Pliers, stripping and crimping tools
- Cable tie tools
- Hole cutting tools
- RUKO grinders and burrs
- SapiSelco® wire ties
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A Complete 2-axis SureStep® Stepping System* for less than just the competition's stepping drives.

AutomationDirect	*VS.*	Competition
Ours includes:		
• **Two Microstepping Drives** (STP-DRV-6575)		
• **Two Stepper Motors** (STP-MTR-23079)		$880.00
• **One Power Supply** (STP-PWR-3204)		(p/n E-DC)
• **Two Extension Cables** (STP-EXT-020)		For 2 Drives
$486.00 Complete 2-axis system SureStep® NEMA 23 System Long Stack		

All prices are U.S. published prices. AutomationDirect prices as of 04/06/2022.
Parker prices are from http://buy.compumotor.com 11/5/2020. * All components sold separately.

Motion Control

- SureServo® drives and motors, up to 15kW
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- Leadshine® stepper drives
- Linear slides
- Koyo® encoders
- CUI Devices® Kit Encoders
- XYZ Gantries

Jason in WOLCOTTVILLE, IN wrote:

"A-D is a good source for a huge variety of automation and control. AutomationDirect is one of our primary suppliers for a large variety of components, and the first place we go looking if we need something new for a project. We use their VFDs, motors, many types of sensors, servo systems, PLCs, HMIs, and more. I have called in quite a few times for tech support, and have always found their people to be knowledgeable about the products, and able to very quickly and efficiently get me the answers and assistance I need. I'd say my favorite product from AD is the BRX line of PLCs."

Sensors

- Proximity sensors
- Photoelectric sensors
- Limit switches
- Precision limit switches
- Dark and shiny object sensors
- 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
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- Industrial managed and unmanaged Ethernet switches
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- Pocket Portal IIoT remote I/O
- MQTT gateways
- Modbus gateways
- Network adapters/ converters
- Ethernet cables
- Power over Ethernet (PoE) 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

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
- Hazardous location control stations
- Captron capacitive pushbutton switches
- WERMA audible devices and visual signals
- WERMA and Patlite stacklights
- IP69K-rated Patlite stacklights
- Patlite signal towers and LED lighting
- Foot switches
- Enclosure and work area LED lighting

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, transmitters, and transducers
- Pneumatic pushbuttons and limit switches

Water (Potable) Components

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

Circuit Protection

- 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
- Socomec Manual Transfer Switches

Terminal Blocks and Wiring

- 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

Types of cable we offer:

- Flexible portable cord
- Bulk data cable (RS232/ RS422/ RS485)
- Flexible control cable
- VNTC tray cable
- 600V control cable
- Servo motor cable
- Large gauge MTW
- High flex continuous flexing control cable
- Variable frequency drive (VFD) cable
- Instrumentation cable
- Continuous flexing control 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
- Cat5e industrial Ethernet cable
- VNTC tray cable
- Thermocouple and extension cable
- Continuous flexing motor supply cable

Minimum lengths of 10ft unless otherwise indicated

Enclosures

Enclosures	AutomationDirect Wiegmann Price/Part Number	VS.	Hoffman Price/Part Number
NEMA 1 wall mount 24 x 24 x 08"	$296.00 N1C242408LP		$354.01 A-24N24BLP
NEMA 12 wall mount 20 x 16 x 08"	$376.00 N12201608		$491.96 A-201608LP
NEMA 12 free-standing mount 60 x 60 x12"	$2,547.00 N12606012		$2,849.47 A-606012LP
NEMA 4 wall mount 20 x 20 x 06"	$514.00 N4202006		$622.59 A-20H20ALP
NEMA 4X wall mount 20 x 20 x 06"	$914.00 SSN4202006		$1,518.12 A-20H2006SSLP
NEMA 4/12 wall mount 36 x 24 x 08"	$447.00 N412362408C		$621.03 C-SD36248

*All prices are U.S. published prices. AutomationDirect prices as of 04/06/2022. Hoffman prices are taken from www.alliedelec.com 11/5/2020. Prices may vary by dealer. Many other part numbers are available from all vendors.

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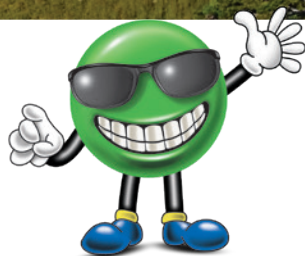
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