

Door Security + Safety

DHI'S PUBLICATION FOR DOOR SECURITY + SAFETY PROFESSIONALS

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Advancements in Access Control

INSIDE:

- + ACCESS CONTROL TECHNOLOGY CONTINUES TO EVOLVE
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- + RETROFITTING DOORS FOR ELECTRONIC ACCESS CONTROL
- + SMART SOLUTIONS FOR SLIDING DOOR LOCKS

SDC
Security Door Controls

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A close-up photograph of a person's hand using a fingerprint scanner on a white electronic access control panel mounted on a door. The panel has a small screen at the top and several buttons below. The background is blurred, showing a hallway with a blue light fixture.

Retrofitting Doors for Electronic Access Control

When it comes to implementing electronic access control, security, life safety and accessibility are paramount. Consider these insights to follow these imperatives, while maximizing profit and minimizing liability.

BY KERBY LECKA

FIGURE 1: EAC PROFIT, LIABILITY & APPLICATION CONSIDERATIONS

<p>Product Availability Budget Requirements</p> <ul style="list-style-type: none"> • Timing/Delivery affects profit • Good, Better, Best Solutions to match project budget 	<p>Retrofit Project</p> <ul style="list-style-type: none"> • Single or multi-door • Standalone or integrates into EAC system/network
<p>Life Safety Codes</p> <ul style="list-style-type: none"> • City • State • National • Local Jurisdiction 	<p>Type of Door & Frame</p> <ul style="list-style-type: none"> • Aluminum • Off-set • Center Hung • Slide or Swing
<p>Level of Security</p> <ul style="list-style-type: none"> • High Security - Failsecure • Low Security - Failsafe • Monitoring Features 	<p>Aesthetics</p> <ul style="list-style-type: none"> • Concealed • Surface Mount • Architectural Housing • Available Finishes

As a door professional, chances are it isn't your first rodeo when converting a door from mechanical to electronic access control (EAC). This article is intended as a reference primer, regardless of expertise level, certification or experience.

What's the Objective?

First, you'll need to understand what the access control objective is for the door. It usually falls into three main categories with corresponding considerations or requirements:

- **Security:** Includes risk and asset management, personal protection and crime prevention
- **Life safety:** Includes fire, crisis management, crowd control, senior and infant protection, and hazardous material/contamination/disease control
- **Accessibility:** Includes compliance to the Americans with Disabilities Act (ADA), human and vehicle traffic control, and the actual building function

Consider the Profit Potential

Will your solution need to integrate with other technologies to maximize the benefit? Is there an opportunity for customer revenue, beyond this door, from options and upselling? Is this project right for you? With an understanding of EAC objectives, you can determine the full profit potential for the EAC retrofit project.

Determining the best suited EAC hardware is central to your profit potential and requires a review of many factors. Figure 1 offers some of the most important considerations.

Consider Liability Issues

Make sure you've identified the code compliance requirements specific to the EAC hardware and supply them to your customer. This information may be a deterrent to having an inspector reject the installation, which could occur today or at a later date when code changes take effect.

Code compliance includes any performance certifications (ANSI/BHMA), lab listings (UL) and product or service warranties. Noncompliant components could lead to potential liability, should a fire or life safety emergency occur where you installed them. Know and understand the products you're installing.

Before You Continue

With the proliferation of EAC hardware, products and systems in the market, understanding their proper use and purpose can be confusing. As a manufacturer, we've encountered many instances of misapplication in the field. This can range from a deviation from the intended use or under/over utilizing the security, life safety and accessibility features designed into these EAC solutions.

Make sure you understand how the EAC solution matches the service the door opening provides. For example, the door opening might accommodate:

- Public or private access
- Single or unidirectional traffic control
- Restricted access or egress
- Frequent use
- Designated egress or fire exit
- ADA accessibility
- Traffic types dictating special consideration

SDC DOOR CHECKLIST
 Security Door Controls 800-473-8783 www.sdsecurity.com service@sdsecurity.com

Job Name				Date			
Door Identification	Interior	Exterior					
Single Door Handling	UL	ULR	ULRL	ULRL	UL	ULR	ULRL
Type of Door	Wood	Metal/Metal	Aluminum & Glass	Metallic	Metallic	Metallic	Metallic
Door Size	ULR	Height	Door Thickness	Lock Height	Lock Backset		
Type of Header	Steel	Wood	Steel	Aluminum	Glass		
Type of Frame	Free Wall	Wood	Metal/Metal	Aluminum	Energy		
Existing Lock	Type	Brand	Finish				
Hinge	Type	Size	Finish	Finish			
Door Closer	Surface Mount	Surface Mount	ULR	ULR	ULR	ULR	ULR
Automatic Door	Manufacturer	Model Number	Power	ULR	ULR	ULR	ULR
EXIT Sign Above Door?	Yes	No					
Picture of Door?	Yes	No					
Distance from	Door to Access	Door to Power					
Wiring	ULR	ULR	ULR	ULR	ULR	ULR	ULR
Ceiling	Height	Location	ULR	ULR	ULR	ULR	ULR
Ceiling Access for Wire Run	Yes	No	ULR	ULR	ULR	ULR	ULR
Voltage	ULR	All Power Supply	Current at Door				



Door Checklist

A great way to understand the right questions to ask is through continuing education courses offered by EAC manufacturers and industry associations. DHI’s “COR101: Fundamentals of Architectural Doors and Hardware” and “COR102: Introduction to Building Codes” are two online courses that can help inform your EAC considerations.

Assess the Door Opening

If you don’t already, use some sort of door assessment checklist. It helps capture the necessary details for recommending an appropriate upgrade to the door.

SDC developed a comprehensive door checklist in interactive and downloadable versions (<https://sdsecurity.com/Door-Checklist.htm> and <https://sdsecurity.com/docs/door-checklist.pdf>). Your trade association or EAC manufacturer may also have an alternate resource.

The checklist will help capture key door details that will figure into proper application and installation of an EAC component upgrade. Door handling, type of door and size, as well as type of door header and frame, are important to confirm. Also record existing lock, hinge, door closer (if any), ceiling type and height, distance from power supply and more.

Comprehend the Opening

It’s important to note the condition of the door on your checklist. Does it close properly without binding or rubbing? Does it positively center? What are the current environment and conditions the door is operating in? If there are issues, they’ll need to be resolved before installing the EAC upgrade.

Identify the Function

Identifying the function of a door helps determine appropriate retrofitting. Ask these questions to determine how the EAC will be used.

- What is the current door hardware function for the opening (i.e., a storeroom, classroom, entry or passage)?
- Can existing hardware (such as a mechanical exit device) be modified for electric operation?
- Will existing hardware need to be replaced to operate in an EAC system?
- Is a field electrification kit available?
- If adding an auxiliary electrified lock, will it integrate with existing hardware like an electric strike or electromagnetic lock?
- Is a factory installed modification required to maintain a UL listing?

Fire-Rated Openings

Fire-rated openings are common in stairwell and elevator lobby door situations. They will need to comply with the Authority Having Jurisdiction (AHJ) that enforces the codes. Here, we recommend you are familiar with the NFPA 101: Life Safety Code, among others. Some key requirements are:

- Code requires self-closing and latching
- Free egress is critical for life safety
- Fail-safe electrified hardware is mandated
- Modifications to install hardware might require recertification of door or frame
- Electrified hardware is typically tied into the fire system to release in the event of fire, power failure or other emergency

Identify the EAC Solution

HOW WILL I GET IN?

In the old mechanical days, staff employees were given a key to a door or facility. Doors were manually unlocked during business hours.

Today, an easy way to provide EAC is by installing a keypad and/or reader at the door to control who can gain access. This can require a pin code, swiping or placing a credential near the reader, or using a smartphone. Keypads and readers come in standalone models or with outputs to connect them to an access control system. They usually release some type of electric door lock to gain entry.

There are also battery-powered standalone electric locksets combined with keypads and readers that don’t require hardwiring to an access control system. They are available in cylindrical, mortise or rim exit device configurations. Also included are Bluetooth and Wi-Fi enabled models.

Wall-mounted key switches may be used for some applications. These include roll-up door or automatic gate



Electromagnetic Locks

operation to control access versus keypads and readers.

IS IT ADA COMPLIANT?

People who are physically handicapped or disabled are guaranteed equality under the Americans with Disabilities Act (ADA), a civil rights law. Title III of the law covers public accommodations and is a directive to ensure accessibility within public buildings. Retail storefronts, office buildings, campuses and health care facilities typically need to meet ADA compliance at points of access and egress as well.

Public door accessibility for ADA applications can be met through the use of low-energy automatic door operators. ADA compliant actuators—like wireless and hardwired push plate switches to activate the door opener—can be used for handicap access and request-to-exit applications.

Some ADA compliant actuators are wall mounted, while others are placed within bollard posts at the entry or exit to the door. The use of touchless exit switches to control automatic doors for a hands-free experience has increased dramatically. This correlates with demands to increase public health and safety during the COVID pandemic.

Identify the Locking Solution

WHAT WILL THE LOCK SECURE?

Electric locking devices come in a variety of application configurations to meet local, regional and national fire



Electrified Cylindrical Lockset

and life safety code requirements. From electromagnetic locks to electric strikes, electrified locksets and electric bolt locks, there's an EAC solution to meet just about any need to secure a door.

If you have participated in online continuing education through DHI, the following courses on hardware and electrified hardware applications can be of help:

1. "COR117: Door, Frame and Architectural Hardware Applications"
2. "COR133: Electrified Architectural Hardware"

Electromagnetic locks are appropriate for interior doors, perimeter exit doors and entrances that require fail-safe emergency release capability. Depending on the level of security required, they usually come in several levels of holding force.

Electromagnetic shear locks are available in concealed, semi-concealed and surface-mount models. They provide high security with a fail-safe locking mechanism for openings that



Electric Bolt Lock

require an architecturally superior appearance.

Electric strikes enable the electrical release of a locked mechanical latch or bolt and are well matched for new and retrofit construction. Electric strikes are available in a variety of configurations. They can accommodate several types of mechanical locksets and door and frame styles. They also permit fail-safe and fail-secure applications.

Electrified cylindrical or mortise locksets are used to meet building and fire life safety code compliance. They are for fire-rated office doors,

corridor doors, lobby doors, exit doors and stairwell doors. Whether fail-safe or fail-secure, controlled access and remote control capability is provided while the door stays latched even when unlocked. This maintains fire door integrity.

Unlike electric strikes, electric bolt locks need no other mechanical lock device to provide security. Electromechanical bolt locks are available in fail-safe and fail-secure modes. Applications include high security interior doors and cabinets where electromagnetic locks are not required.

Identify the Power and Door Control Solution

HOW WILL THE DOOR BE CONTROLLED?

Hardware control and door control modules are offered by many manufacturers to control separate electrified locking devices, multiple doors, relay operating and system modes. They provide system logic for lock control, monitoring, and communicating door status. They are normally installed in the power supply cabinet and provide a centralized wiring location, simplify installation and provide easy troubleshooting.

Power transfer devices are required to power EAC components and include

power transfer loops, concealed power transfer hinges and devices.

Don't forget to consider the power supply itself. Door hardware and locksmith professionals should know that power requirements for EAC hardware are different from other systems such as CCTV. Access control systems require steady low-voltage DC current. They generally draw higher current during access control-related events, such as when an electric strike is released.

Before selecting a power supply, plan ahead. Evaluate your project carefully to avoid common installation and operating problems. Consider the following questions:

- What power is required and what power is available (if retrofitting)?
- If retrofitting, what modifications have been made over the years to affect the capacity of the power supply?
- How old is the power supply? If it's more than 10 years old, replace it.
- Do all products really work together?
- What regional and national codes might be applicable?
- Does your AHJ require the installation to be compliant with UL

294, an access control standard? Get the AHJ involved in your system design.

- How long must the system function after a power loss?
- Is a low-voltage license required in your jurisdiction?

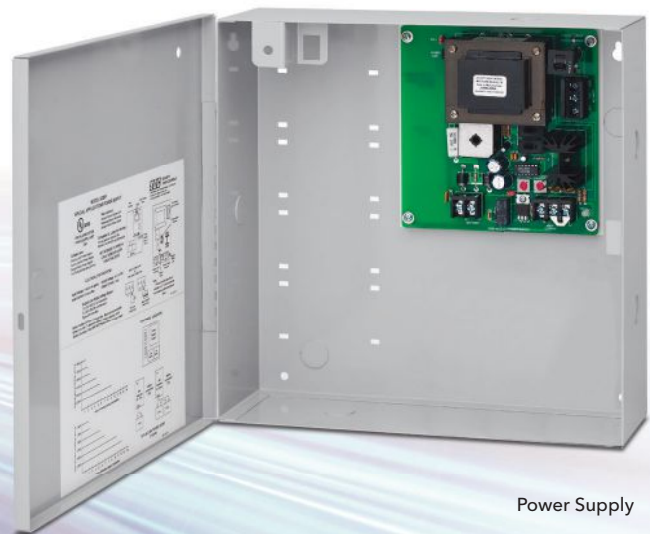
WHAT ABOUT POWER OVER ETHERNET SOLUTIONS?

We've focused on retrofitting or upgrading a door opening for EAC without regard to whether it must integrate with a PC-operated access control system or network. Some of you may be adept at integrating a door opening with a larger enterprise AC network, either through experience, training and/or familiarity with reselling or installing access control systems available on the market today.

You're the door expert, not the IT and software expert. Perhaps you have the opportunity to provide retrofits for access control, but are uncomfortable when it comes to hooking up to the network. You may be reticent to take on jobs that can potentially open a whole new bag of snakes. They could include callbacks for software and hardware conflicts, incorrect settings or even general liability for IT issues that may not be the result of your installation.

You have options. At the risk of sounding redundant, consider online

Don't forget to consider the power supply itself. Access control systems require steady low-voltage DC current. They generally draw higher current during access control-related events, such as when an electric strike is released.



Power Supply

training courses. They will help you become more proficient in the best practices for integrating door openings into an access control network. Check out the Electronic Security Association at esaweb.org, SecurityCEU.com or the online modules offered by many industry manufacturers.

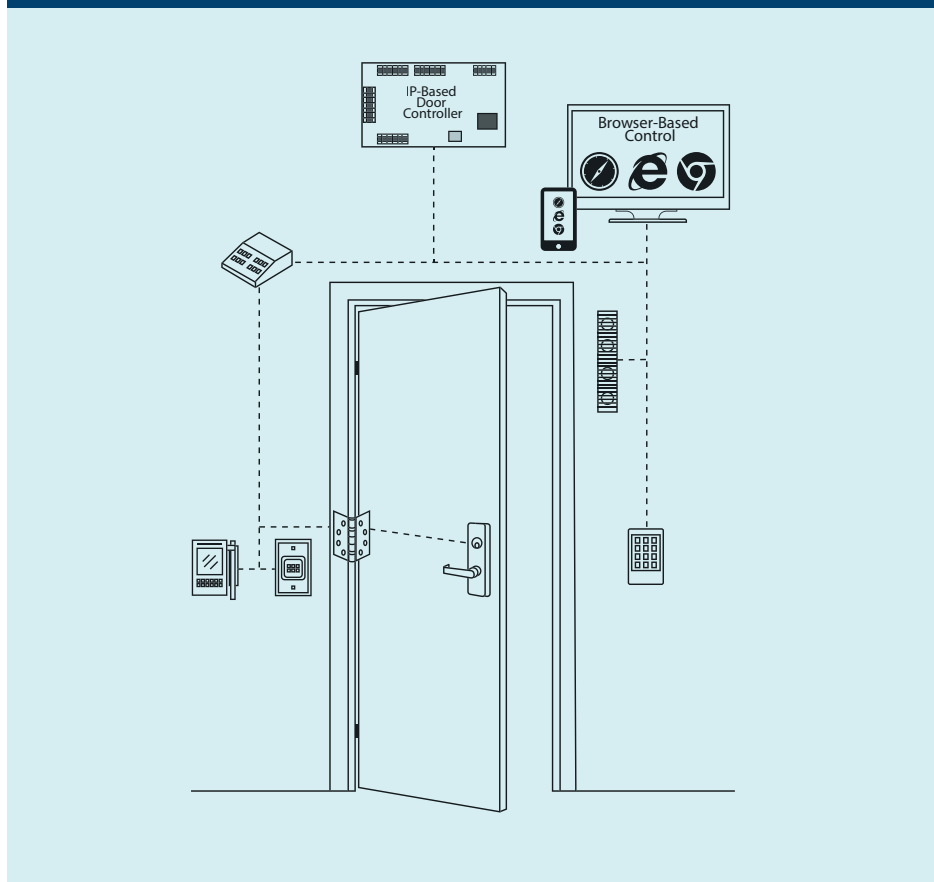
You will learn and become familiar with networks and access control—and you still have choices for integrating your door opening into an EAC system without being an enterprise IT expert. Leading among these alternatives are power over ethernet (PoE) hardware and components that connect to an IP-enabled controller using the ethernet cable that already exists in the facility. This way, heavy cost commitments associated with complex, oversized, enterprise-wide systems can be avoided.

PoE solutions like these can be simple, tapping into the nearest ethernet connection to power and control door access and low-voltage access and egress devices via web browser. If you become comfortable at recommending and installing PoE solutions, you can carve out a niche. You can serve the smaller company or single facility that doesn't require a full-blown, complex and expensive enterprise-wide system. The same smaller company that also wants the convenience and 24/7 access of a PC-based access control system.

Most of the industry's manufacturers offer low-voltage, PoE hardware and components for access control. The list includes magnetic locks, key and exit switches, electrified exit devices, electrified locksets, electric bolt locks and automatic door operators. There are even cabinet locks to attach to a network system via ethernet cable.

There are also several manufacturers that offer IP-based door access controllers that are powered by ethernet cables. They connect to the existing network structure and are browser-based. They require no software to install. Simply plug

FIGURE 2: SINGLE DOOR PoE SOLUTION EXAMPLE USING AN IP-BASED DOOR CONTROLLER



the controller into a wired LAN connection, then use the web browser on a computer or smartphone to set up and manage the system.

These PoE/IP-based controller solutions allow you to get in and out of a job quickly. Otherwise, it can be very time consuming to consult with the IT manager and find a suitable computer at a customer site.

Figure 2 displays a typical PoE door control solution using an IP-based door control.

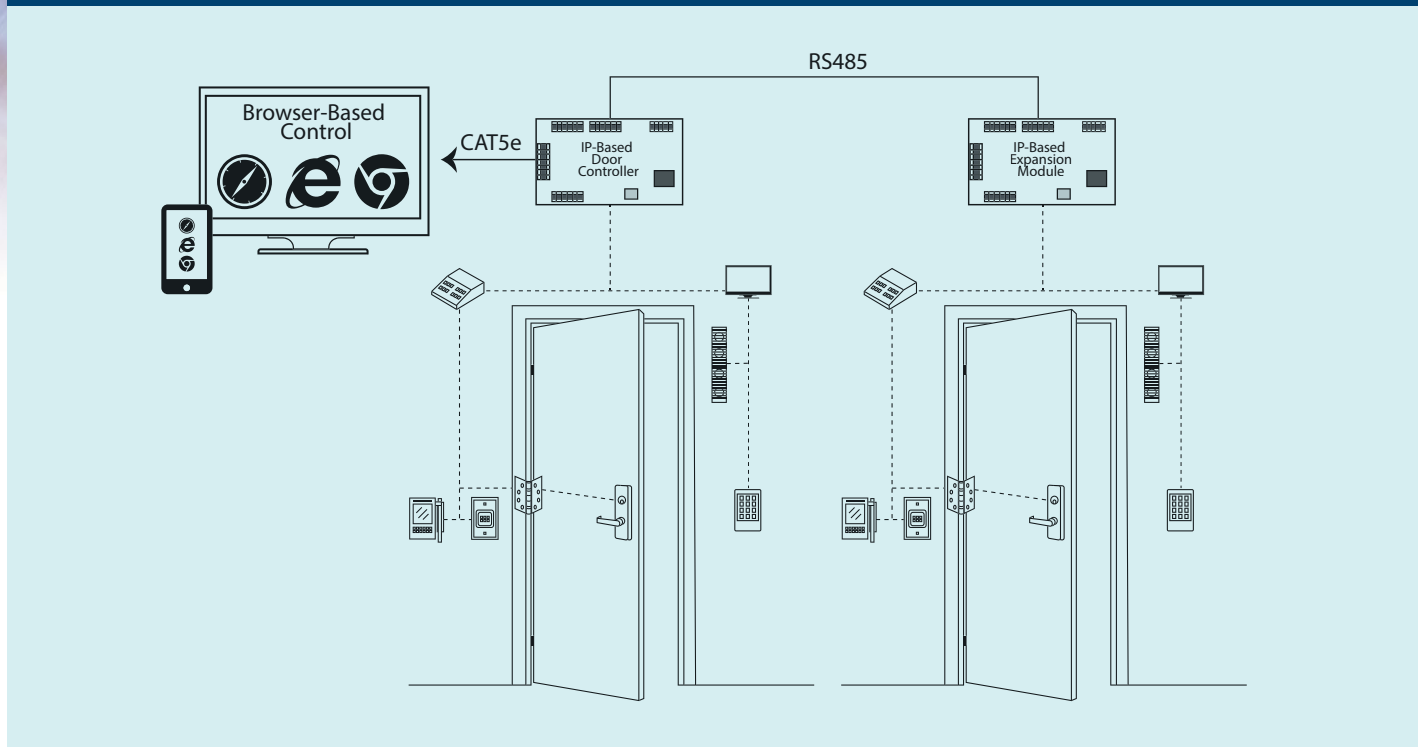
Physical electronic access control solutions utilizing low-voltage PoE hardware, components and IP-based door controllers are particularly suited to tenant improvement and retrofit projects. They provide the ability to purchase and install just what's needed without having to

invest in a more costly enterprise system designed for larger facilities. The beauty of this approach is they are usually easy to expand as needs grow without the front-end commitment to an oversized solution.

Multi-door applications are also supported by several manufacturers. Some simply offer IP-based door controllers in 2, 4, 6, 8 door configurations that support brand-specific access and egress control hardware. Others provide the door controller and optional expansion boards for additional door openings that are non-brand specific to the access or egress control hardware.

Most offer free, pre-installed software. That provides the functionality of a full PC-based access control system managed via web browser from a desktop, tablet or smartphone.

FIGURE 3: MULTI-DOOR POE SOLUTION EXAMPLE USING AND IP-BASED DOOR CONTROLLER + EXPANSION MODULE



You will need to survey where the ethernet cable is and/or where electricity is available to power the system. This will depend on the type of installation and whether it's a single door or multiple doors. If using the existing ethernet cable, you may need to install a PoE splitter to provide power to your components. If additional power is required from a power supply, you may need to install a PoE injector to provide the additional power to the system.

As with any tenant improvement or low-voltage implementation via ethernet cable, we recommend that installers are comfortable with ethernet network best practices (see our training recommendations from above). We also recommend testing any installation using an inexpensive ethernet cable tester before startup.

Also, by following industry standards—ANSI/TIA-1005-M.I.C.E and ANSI/TSI-569C.0 (cable lengths)—many issues can be eliminated that may be residuals of previous installations.

A word of warning: Do not forget that any PoE access and egress solution using IP-based door control still needs to meet all existing fire and life safety code compliance. This includes using UL 294 approved hardware where required.

Using existing legacy ethernet cable with PoE hardware and an IP-based controller will save time, money and manpower. And you're not required to be an enterprise network expert.

You may be able to bring safe, secure, easy to implement door access control to the network's edge without the headaches of costlier, more complicated enterprise solutions. You can also usually expand from a single door up to 100 or more doors in the future, depending on the manufacturer's solution you choose.

This is a great way to upgrade the door without being an IT expert. You can use PoE-capable locking hardware and IP-based door controllers to bridge

the gap between traditional locking hardware and IT networks.

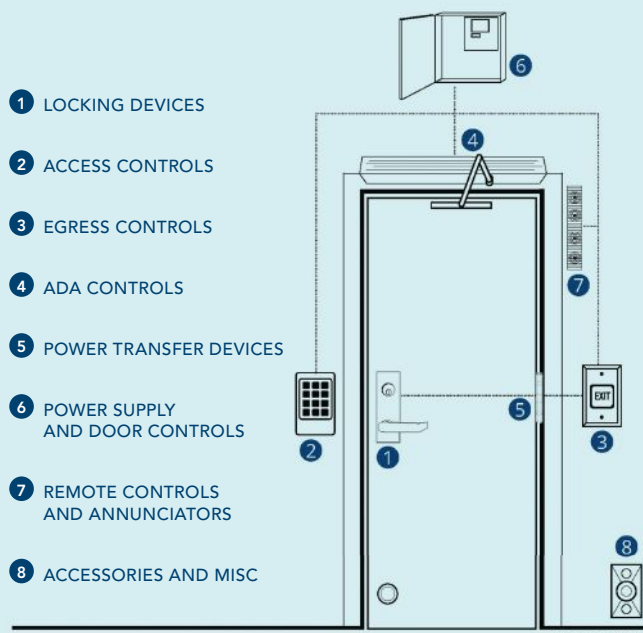
Identify the Egress Control Solution

HOW WILL I GET OUT?

Key switch assemblies provide an economical method of providing authorized control for a variety of applications and new or retrofit construction. Most use U.S. standard, 1-inch and 1 3/8-inch mortise key cylinders, and interchangeable core cylinders to maintain compatibility with a new or existing facility mechanical key system.

Many manufacturers also provide a variety of exit button and push button styles and contact configurations to fit several request-to-exit application needs. Additionally, wave-to-open switches and motion sensors provide hands-free compliance and convenience for touchless applications using proven infrared detection technology.

FIGURE 4: BASIC COMPONENT CONSIDERATIONS FOR CONTROLLED DOOR SYSTEMS



Egress devices are designed for the release of magnetic locks and the activation of delayed egress locks installed on non-latching doors. Request-to-exit (REX) push bars provide uninhibited egress through access-controlled openings equipped with magnetic locks. At the same time, they eliminate the need for prior knowledge of egress operation and enable egress with a single natural motion. The use of REX push bars eliminates the need for wall-mounted exit switches that require prior knowledge. Also eliminated is a manual secondary action to unlock the door.

Exit devices are essential hardware components for safety and security and are found in almost every building. Electrified exit devices allow for greater control of the opening. They can also interface with other electronic equipment. Electrified exit devices either control the latch bolt of a device or control the locking of the operating trim.

There are two ways to control the electric locking and unlocking of the exit device. First, a solenoid or motor retracts the latch (electric latch retraction—ELR). It is held retracted or in the “dogged” position until power is interrupted. The door operates in a push-pull manner.

The second method controls the operating trim, allowing the exit device to remain latched. The exterior level, knob or thumbpiece is electrically locked or unlocked for entry control in either fail-safe or fail-secure modes.

Electrified exit device manufacturers offer a variety of available trim options. Selections can also be made about rim mount, surface vertical rod and concealed vertical rod device types. As a result, panic and fire exit device solutions are available for virtually any door opening application.

There are also cost-saving ELR field modification kits available. These

can be used to convert existing mechanical exit devices to electronic. Electric access control, simultaneous latch retraction and dogging operation are all enabled.

Features and Functions

WHAT ELSE DO I NEED?

There are remote controls and annunciators designed to meet the demands of different control and monitoring applications without PC-based access control capability.

They provide methods for central monitoring and control of openings in a facility. They also enable audible and/or visual status supervision and notification. They can include desktop modules with switches to release a single opening.

LED displays indicate door position or lock status. LED displays can also be placed at the door opening to provide visual status of the door.

Door prop alarms with timed delay, LED status display and buzzer alarm are available to prevent piggybacking of unauthorized students or employees through a controlled door opening.

Plus, there are a variety of electrified accessories and specialty items to enhance any EAC conversion solution, depending on the application. For reference, Figure 4 is a visual summary of the categories of product recommendations to consider when upgrading any door from mechanical to electronic.

Hopefully this article has given you practical insights for consideration when retrofitting a door for EAC, ultimately helping to minimize liability and maximize the profit potential for the installation.

As always, consult your local AHJ for compliance requirements before starting any door installation project. +

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