

THE TECHNICAL RESOURCE FOR THE PHYSICAL & ELECTRONIC SECURITY SPECIALIST

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## MECHANICAL to Electronic

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Are Key Before Making the Switch

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# Bringing Electronics to the Door

How you upgrade the door is key to minimizing liability and maximizing profit potential.

Volumes have been written and various training courses designed to educate security pros about the proper ways to convert door openings to electronic access control (EAC). This overview is a short summary of recommendations to consider when upgrading any door from mechanical to electronic. Before doing anything, you have to determine

<b>Level of Security</b> <ul style="list-style-type: none"> <li>• High Security - Fail-secure</li> <li>• Low Security - Fail-safe</li> <li>• Monitoring Features</li> </ul>	<b>Aesthetics</b> <ul style="list-style-type: none"> <li>• Concealed</li> <li>• Surface Mount</li> <li>• Architectural Housing</li> <li>• Available Finishes</li> </ul>
<b>Life Safety Codes</b> <ul style="list-style-type: none"> <li>• City</li> <li>• State</li> <li>• National</li> <li>• Local Jurisdiction</li> </ul>	<b>Type of Door &amp; Frame</b> <ul style="list-style-type: none"> <li>• Aluminum</li> <li>• Off-set</li> <li>• Center Hung</li> <li>• Slide or Swing</li> </ul>
<b>Product Availability</b> <b>Budget Requirements</b>	<b>New Construction</b> <b>or Retrofit</b>

All images courtesy of SDC

» Application Considerations chart

the access control objective for the door, which falls into three main categories: security, life safety and accessibility.

Security considerations include risk and asset management, personal protection and crime prevention. Life-safety requirements cover fire, crisis management, crowd control, senior and infant protection, and hazardous material or disease control. Accessibility concerns human and vehicle traffic control, the actual building function and Americans with Disabilities Act (ADA) compliance.

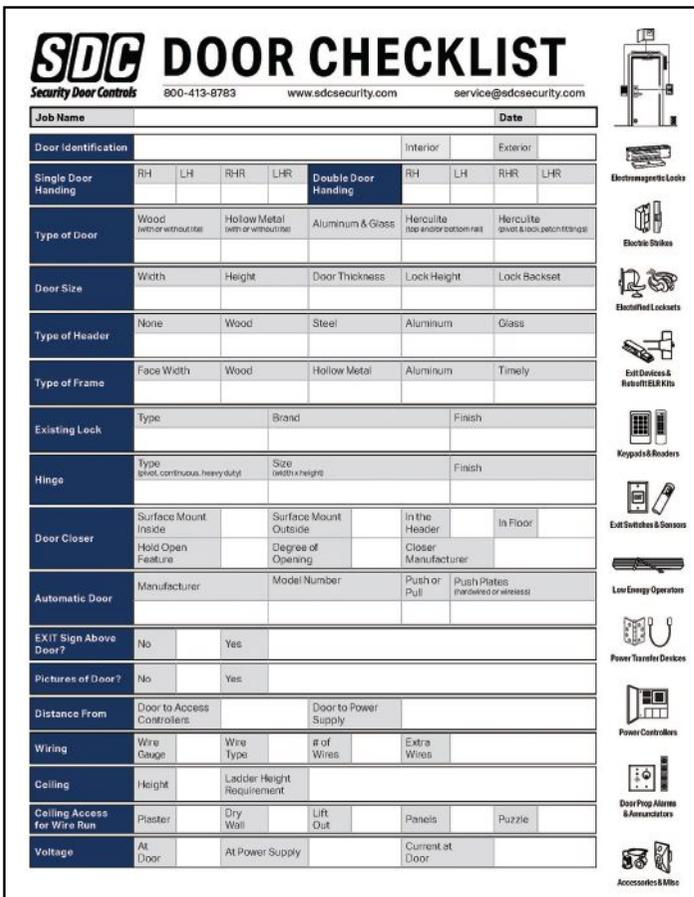
With an understanding of EAC objectives, you can identify the full potential for the upgrade. Will your solution have to integrate with other technologies to maximize the benefit? Is there an opportunity for customer revenue beyond this door from options and upselling? Is this project right for you?

## Application Considerations

Identifying the best suited EAC hardware requires a review of many factors. (See “Application Considerations.”)

### Avoid potential liability issues.

Know and understand the products you install. Make sure you’ve identified the code-compliance requirements specific to the EAC hardware and supply them to your customer. This includes any performance certifications (ANSI/BHMA), lab listings (UL) and product or service warranties. This information might be a deterrent to having an inspector



**SDC DOOR CHECKLIST**  
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Job Name		Date	
Door Identification			
Single Door Handling		Double Door Handling	
Type of Door	Wood (with/without)	Hollow Metal (with/without)	Aluminum & Glass
Door Size	Width	Height	Door Thickness
Type of Header	None	Wood	Steel
Type of Frame	Face Width	Wood	Hollow Metal
Existing Lock	Type	Brand	Finish
Hinge	Type	Size	Finish
Door Closer	Surface Mount Inside	Surface Mount Outside	In the Header
Automatic Door	Manufacturer	Model Number	Push or Pull
EXIT Sign Above Door?	No	Yes	
Pictures of Door?	No	Yes	
Distance From	Door to Access Controllers	Door to Power Supply	
Wiring	Wire Gauge	Wire Type	# of Wires
Ceiling	Height	Ladder Height Requirement	
Ceiling Access for Wire Run	Plaster	Dry Wall	Lift Out
Voltage	At Door	At Power Supply	Current at Door

» SDC Door Checklist



» Keypad for access control

reject the installation today or at a later date when code changes take effect. In addition, noncompliant components could lead to potential liability in the event of a fire or life-safety emergency. **Use a door checklist for each opening.**

If you don't already use some sort of door-assessment checklist, we recommend you start with any trade association or EAC manufacturer you deal with as a resource. (SDC has developed a comprehensive Door Checklist in interactive [[sdsecurity.com/Door-Checklist.htm](http://sdsecurity.com/Door-Checklist.htm)] and downloadable [[sdsecurity.com/docs/door-checklist.pdf](http://sdsecurity.com/docs/door-checklist.pdf)] versions.)

A door checklist will help you



» Wall-mounted key switch

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

**Evaluate the opening's condition.**

While you fill out your door checklist, it's important to note the condition of the door. Does it close properly without binding or rubbing? Does it positively center? What environment and conditions does the door operate in? If there are issues, they'll have to be resolved before installing the EAC upgrade.

**Identify existing hardware.**

What's the current door hardware function — storeroom, classroom, entry or passage? Can existing hardware, such as a mechanical exit device, be modified for electric operation or will it have to be replaced to operate in an EAC system? Is a field electrification kit available? If you add an auxiliary electrified lock, will it integrate with existing hardware, such as an electric strike or maglock? Is a factory-installed modification required to maintain a UL listing?

**Determine fire-rated requirements.**

Fire-rated openings are common in stairwell and elevator lobby door situations and must be code-compliant and approved by the Authority Having Jurisdiction (AHJ). Some key requirements:

- Code requires self-closing and latching equipment.
- Free egress is critical for life safety.



» Battery-powered stand-alone electric lockset combined with keypad and reader

- Fail-safe electrified hardware is mandated.
- Modifications to install hardware might require recertification of the door or frame.
- Electrified hardware typically is tied into the fire system to release in the event of fire, power failure or other emergency.

**Identify the EAC Solution**

In the old days, doors were unlocked manually during business hours, or staff employees were given a key to a door or facility. One way to provide EAC now is by installing a keypad or reader at the door to control who can gain access by entering a PIN code, swiping or placing a credential near to the reader or using a smartphone. Keypads and readers



» Low-energy automatic door operator

# Cover Focus: Mechanical to Electronic



» Bollard-mounted REX switch

come in stand-alone models or have outputs to connect them with an enterprise system and typically release some type of electric door lock to gain entry.

Battery-powered stand-alone electric locksets can be combined with keypads or readers that don't require hard-wiring to an EAC system in cylindrical, mortise or rim exit device configurations, as well as Bluetooth and

Wi-Fi-enabled models.

For applications such as a roll-up door or automatic gate, wall-mounted key switches may be used to control access instead of keypads and readers.

An important factor is whether the door must conform with ADA requirements. ADA is intended to guarantee equality for those who have disabilities. Title III of the law covers Public Accommodations and is a directive to ensure accessibility within public buildings. Retail storefronts, office buildings, campuses and healthcare facilities typically have to meet ADA requirements at points of access and egress.

Low-energy automatic door operators can be used to maximize

» Touchless REX switch

public door accessibility for ADA applications. ADA-compliant door-opener actuators, such as wireless and hard-wired push plate switches, can be used for handicap access and request-to-exit (REX) applications.

Some are wall-mounted, while others are placed within bollard posts at the entry or exit to the door. The popularity of touchless exit switches to control automatic doors for a hands-free experience has increased dramatically as a means to increase public health and safety in the wake of the COVID pandemic.



## The Right Lock

Locks all provide security, but not all are suitable for every door.

Maglocks are suited for interior doors, perimeter exit doors and entrances that require fail-safe emergency-release capability and typically come in several levels of holding force, depending on the level of security required. Electromagnetic shear locks are available in concealed, semi-concealed and surface-mount models to provide high security and a fail-safe locking mechanism for openings that require an architecturally superior appearance.

Electric strikes enable the electrical release of a locked mechanical latch or bolt and are well-suited to new and retrofit applications. Electric strikes are available in a variety of configurations to accommodate

several types of mechanical locksets and door and frame styles, as well as fail-safe and fail-secure applications.

Electrified cylindrical or mortise locksets are used to meet building and fire life-safety codes 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, which maintains the integrity of a fire door.

Unlike electric strikes, electric bolt locks require 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 maglocks aren't required.



» Electromagnetic shear lock



» Electromagnetic lock

## Powering the EAC

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

Power-transfer devices are required to power EAC components and include power-transfer loops, concealed power-transfer hinges and devices.

Not to be forgotten is the power supply itself. Security pros should know

# Cover Focus: Mechanical to Electronic

## » Electric strike

that power requirements for EAC hardware are different from other systems, such as CCTV. EAC systems require steady low-voltage direct current. EAC systems generally draw higher current during access control-related events, such as when an electric strike is released.

Before selecting a power supply, plan ahead. This means you should 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, which is an EAC 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 Egress?

Key-switch assemblies provide an economical method of controlling a variety of applications at the door. Most assemblies use U.S.-standard 1-inch or 1-3/8-inch mortise-key and interchangeable-core cylinders to maintain compatibility with a new or existing mechanical key system.

Many manufacturers also provide a variety of push-button styles and contact configurations to fit several REX application requirements. Wave-to-open switches and motion sensors provide hands-free compliance and convenience for touchless applications through the use of proven infrared-detection technology.

Egress devices are designed for the release of maglocks and the activation of delayed-egress locks installed on nonlatching doors. REX push bars provide uninhibited egress through access-controlled openings equipped with maglocks, which enables egress by a single natural motion.

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

The electric locking and unlocking of the exit device is controlled in one of two ways. Through electric latch retraction (ELR), a solenoid or motor retracts the latch and holds it in the “dogged” position until power is interrupted. The door operates in a push-pull manner.

The second method controls the operating



## » Electrified lockset

trim, which allows 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 mode.

Electrified exit device manufacturers offer a variety of available trim options: rim mount, surface vertical-rod and concealed vertical-rod device types. Panic and fire exit device solutions are available for virtually any door opening application. Cost-saving modification kits can convert existing mechanical exit devices to electronic in the field.

## Features and Functions

Up to this point, we've discussed retrofitting or upgrading a door opening for EAC without regard to whether the door opening must integrate with an enterprise EAC system or network. To give this subject matter its proper due requires a more comprehensive review better suited to a separate article at a future date.

That said, remote controls and annunciators are designed to meet the



## » Electromechanical bolt lock



## » Relay module

# Cover Focus: Mechanical to Electronic



» Power supply

unauthorized people through a controlled door opening.

Plus, a variety of electrified accessories and specialty items can enhance any EAC conversion solution, depending on the application. (See “Basic Component Considerations” for a summary of product recommendations to consider when upgrading any door from mechanical to electronic.)

Hopefully, this article has provided practical insights for consideration when assessing a door for an EAC retrofit that will help to minimize liability and maximize the profit potential for the installation. Industry associations, such as ALOA ([www.aloa.org](http://www.aloa.org)) and ESA ([www.esaweb.org](http://www.esaweb.org)), have a wealth



» Motion sensors

demands of different control and monitoring applications without computer-based EAC capability. They provide methods for central monitoring and control of openings in a facility as well as audible or visual status supervision and notification.

Remote controls and annunciators also can include desktop modules that have switches to release a single opening and LED displays to indicate door position or lock status.

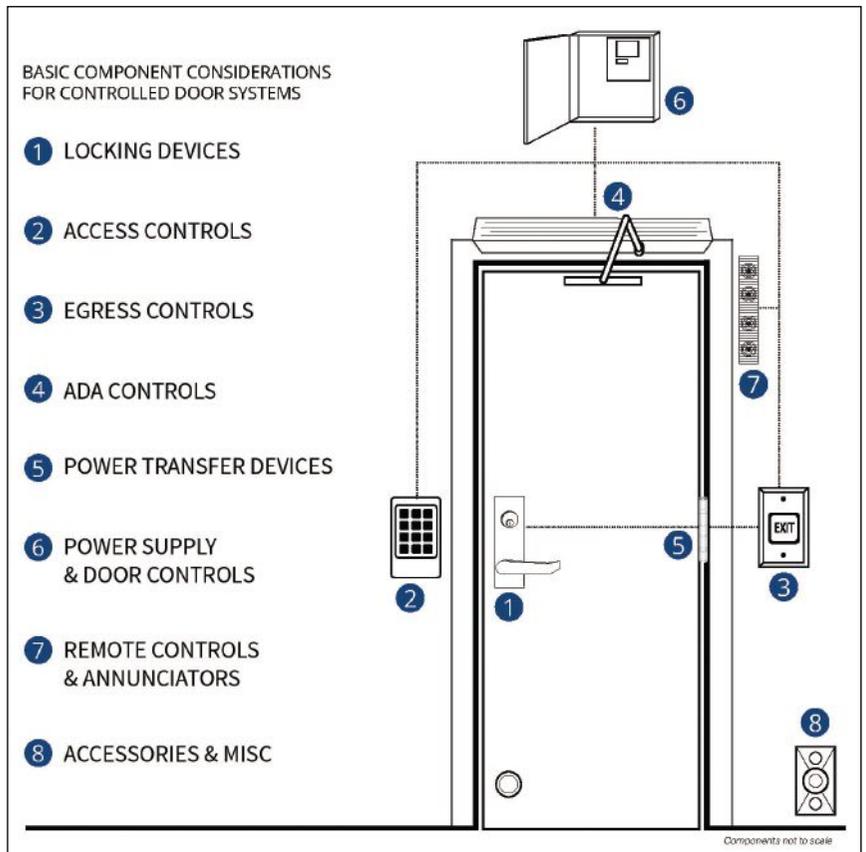
LED displays also can be placed at the door opening to provide visual status of the door. Door prop alarms that have timed delay, LED status display and buzzer alarms are available to prevent the piggybacking of

of information, tools and training to assist you in your electrified door hardware and EAC projects. ■■

*Kerby Lecka is marketing director at SDC – Security Door Controls, a manufacturer of premium-grade EAC hardware. He can be reached at [kerby@sdc-security.com](mailto:kerby@sdc-security.com).*



» ELR field modification kit



» Basic Component Considerations