

Factors to consider for

Choosing the right RFID reader

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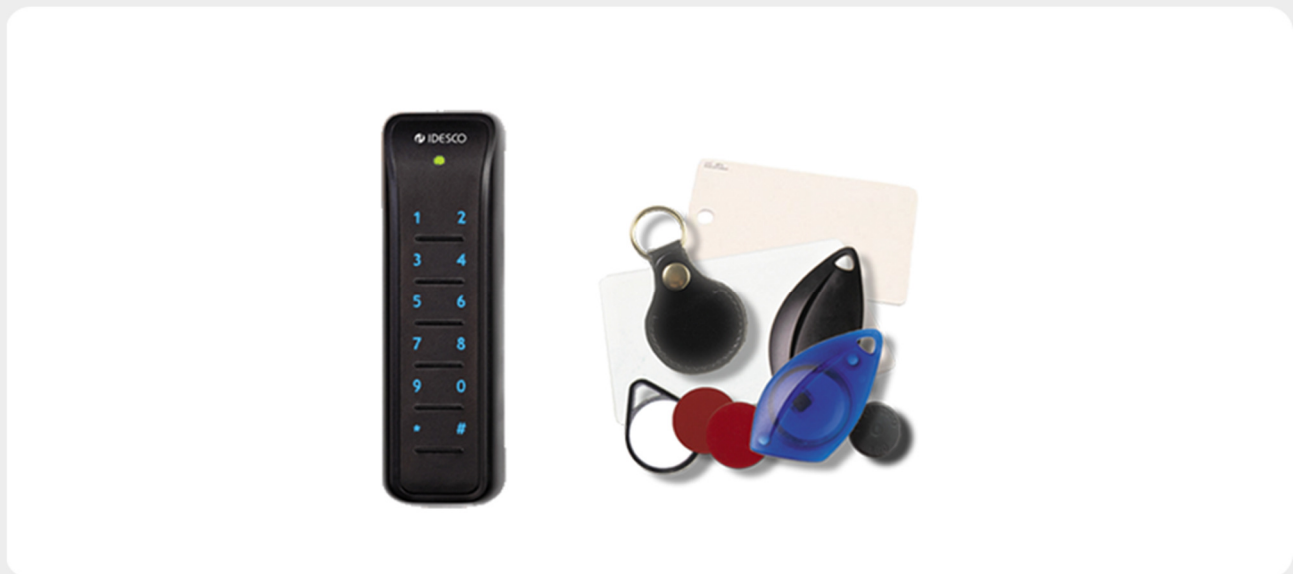
1 Introduction

Radio Frequency Identification (RFID) is an accurate, cost-effective and secure identification technology that needs neither contact nor even line of sight between an identified object and a reader. Because of this, RFID allows accurate tracking of moving people, vehicles, commodities and components, reducing required resources in comparison to manual tracking.

At its most basic, an RFID system consists of a transponder containing data, and a reader to query its data when the transponder comes close enough. They are usually paired with a database, most often in a host server. RFID comes in a great many different technologies and device types. Together, they offer wide differences in reading distance, data capacity, security, interfaces, durability and other characteristics. Your site’s unique requirements and environment will define which technologies and devices you should consider deploying.

This guide helps you navigate through the different factors that will ultimately narrow your options when choosing an RFID solution and devices.

We’ll also tell about the primary features of Idesco readers that reveal why they could be the best choice for your system.



RFID readers and tags

2 Requirements of your setting

RFID installations can vary widely, from indoor office environments to the harshest industrial or outdoor settings, where readers and transponders are exposed to extremes of heat, cold, sun, moisture, dirt and different chemicals. This range of conditions correspondingly place widely different demands on readers.

A reader’s technical features determine its suitability to your planned deployment, today as well as in the future. How will your reader interface with the system? Is it enough that readers only communicate one way, by sending data to system, or do you need two-way communication to and from the system? At what distance will end-users be

expected to present their transponders? What security requirements does your planned system place on the reader? Will transponders and credentials need to be encrypted, or not? If not encrypted today, are you certain that this could never change in the future? Need for mobile access is also rapidly increasing, so mobile-compatible readers could be a considerable option for your site.

All these factors (and more, see below) determine whether a particular reader's technical features and capabilities make it suitable for your planned system. So, careful consideration and determination of all these factors will ensure your system's reader choice is a wise one.

2.1 Reading distance and frequencies

RFID readers operating at frequencies of 125 kHz (LF, Low Frequency) and 13,56 MHz (HF, High Frequency) offer read distances that are usually a couple or a few centimeters. By contrast, 868 MHz (UHF, Ultra High Frequency) readers permit transactions at much greater distances, even out to tens of meters depending on whether you choose an active or passive UHF technology. However, because UHF technologies are more expensive and not well-suited for short-range applications they are usually chosen only for deployments where such distance capability is necessary. A good example is vehicle identification, for toll booths and parking entrances, or logistics, for example.

2.2 Interfaces

RFID systems always have specific requirements determining how readers must connect and interact with them. Readers usually physically connect to the system via cable, or via connector. RFID readers send and receive data via their inputs and outputs. Your system defines which kind of inputs and outputs your reader must have. Your reader must also accommodate the precise communication protocols and parameters your system needs to reliably and consistently interact with it. For example, Wiegand-interfaced system's parameters might require not only parity bits, but also specific bit timings to ensure a reliable data communication between the system and its readers. All these reasons are why most Idesco readers support a range of interfaces and protocols such as Wiegand, RS232, RS485, C&D, OSDPv2, etc.

2.3 Temperature

Most RFID reader manufacturers guarantee basic storage and operational temperature ranges for their readers. However, if your site will be exposed to temperature extremes, it's essential you check a reader's rating before making a purchase. Most Idesco readers withstand temperatures from -40...+55 °C as documented from testing.

2.4 Shock, vandalism and wear

Some sites often find themselves more prone to vandalism. Or you might need to install a reader in a position where it could sustain other kinds of impact. It's always wise to plan for such possibilities when choosing a reader for potentially exposed locations.

Idesco's Basic housing provide the highest durability class IK-10 of the EN 62262 standard, proven to withstand impacts of 20 joules. Idesco's Slim, Slim Pin, VS, VS Pin, VM, VM Pin and Desktop housings belong to the next highest durability class, IK-09, withstanding impacts of up to 10 joules. Such toughness is achievable because all Idesco reader electronics are cast in epoxy inside their housings, making them uncommonly resistant to shock

impacts, while also making them impenetrable to liquids. Note that a plastic cover filled with tough, hardened epoxy will prove more resistant to impact than hollow metal housings.



Epoxy filling inside the reader

2.4.1 Tamperers

Tampers in readers can be an essential security feature. Tamper is embedded to activate and send an alarm to your system when someone tries to pry a reader away from its surface. This often happens if someone seeks to access a reader's inner electronics or its connection to the host system. So, tamper alarms provide your site and system with an additional level of protection. Idesco readers use optical instead of mechanical tampers. Optical tampers offer greater reliability than mechanical tampers that are prone to false alarms. In turn, false alarms inevitably require costly maintenance visits. It's another reason we employ optical tampers: to help keep your costs down.

Idesco embeds tampers in all its most popular access control readers. Tamper sensitivity is also configurable, e.g. with Idesco Mobile Coder app.

2.5 Moisture, dust and chemicals

In general, RFID readers and transponders can be designed to work reliably in harsh conditions and industrial settings. However, a reader's IP-rating is the best indicator of whether it is suitable for outdoor conditions with moisture or dust. All Idesco readers with cable connection possess IP67 protection classification, meaning they are suitable for all environments and can even be sunk in water.



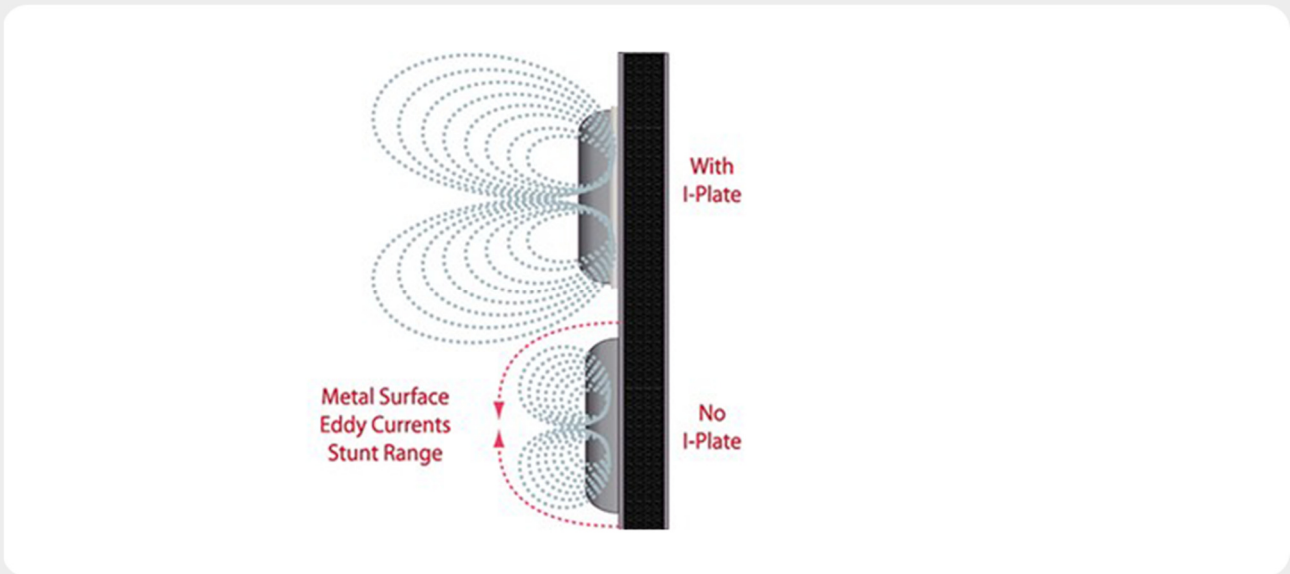
Manufacturers usually guarantee minimum IP ratings, temperature ranges and durability classes for their devices. These tell you in what conditions you can reliably deploy their readers.

2.6 Metal surfaces

Installing over metal surfaces may disturb an RFID reader's performance. The issue with metal surfaces arises because metal's conductivity combines with the energy a device emits, creating electromagnetic eddy currents beneath the device, often significantly shortening its reading zone (see illustration, next page). For example, while all Idesco's smart card readers can be installed over metal surfaces, their specified interrogation distance can be shorter on them than over non-conducting surfaces.

Idesco installation plates address this problem. Installation plates, installed under Idesco readers, lift them just high enough above a metal surface, significantly minimizing the eddy currents that may degrade read distances on such metal surfaces.

Idesco also developed metallic installation plates to solve another problem. Readers installed back-to-back on opposite sides of a wall without shielding may similarly degrade each other's reading zone. Metallic shield plates prevent this by thoroughly shielding readers from each other



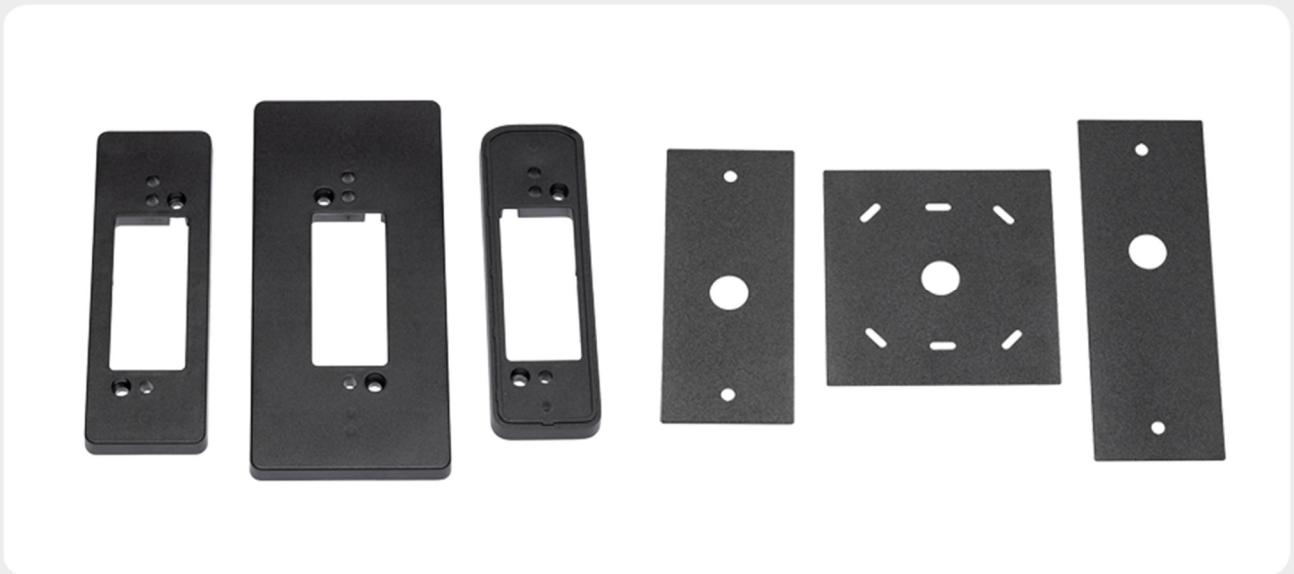
Eddy currents (red arrows)

2.7 Installability

Planning a reader’s location to address factors like user convenience will occasionally limit the reader dimensions you can reliably accommodate there.

For installation on narrow doorframes Idesco makes Basic, Slim, Slim Pin, VS and VS Pin readers, whereas VM and VM Pin housings fit over and replace standard electrical sockets. When you install VM or VM pin readers over sockets, you can freely use existing electrical socket holes to connect your device. Lastly, when replacing old readers with Idesco readers, the abovementioned installation plates are useful by covering the old readers’ screw holes, making installation faster and more convenient.

Idesco also provides an integrated RFID module for embedding in other devices like automates, vending, machinery, etc., letting you collect data, control access or identify users in a variety of settings.



Installation and shield plates

2.8 Readers' appearance and design

In particularly distinguished buildings an access control reader is often seen as part of structure's aesthetic. In such settings, it can be important to choose a manufacturer whose array of housings gives your customer options for meeting any aesthetic concerns they have.

Idesco designs all its access control readers to be both elegant while still robustly reliable in outdoor settings that experience hostile, inclement conditions. However, we have also designed and offer refined smooth, quality stone housings and finely-crafted wood housings specifically designed for refined indoor settings with only IP60 protection class.

3 Access control

Access control, for identifying persons, almost always deploys either 125 kHz and 13,56 MHz frequency readers. The major difference between these two frequencies is the amount of data that can be transferred during an interrogation. Since the data transmission speed of 125 kHz is essentially 100 times slower than 13,56 MHz, 125 kHz low frequency transponders rarely contain more than a short unique serial number for identifying the user.



Access control

The relative ease of cloning 125 kHz transponders has triggered a noticeable shift away from 125 kHz technologies in access control. By contrast, the wide array of security features available to the most secure 13,56 MHz technologies' has effectively made transponder cloning impossible. These features are discussed in more depth below.

868 MHz readers normally tend to be larger in size which has limited their deployment in access control settings. However, the 'hands-free' 868 MHz access control readers are intentionally designed smaller. While this tends to shorten their effective reading distances somewhat, it still makes them a viable solution in settings requiring their read-at-distance capability. They are used in so called hands-free access control solutions, where user must access the door without needing to stop and show their tags to a reader. Idesco's EPC Compact 2.0 is one such reader, with a reading distance out to 4 meters.

3.1 Security

Today, access control security is becoming more and more important. Traditional access control technologies may not be the most secure choice, as there are more modern, encrypted technologies to cover your card data, and more secure data transfer methods to protect your card data all the way from card to system host.

The oldest 125 kHz card technologies are at risk of getting cloned or hacked, and they should be used only in settings where the site owners are ready take that risk.

3.1.1 Secure card-reader communication – MIFARE DESFire

125 kHz technologies rely almost entirely on reading nothing more than a transponder's factory-coded unique serial number (S/N or UID). The simplicity of this technology is why, today, it is increasingly considered a very vulnerable, insecure access control technology.

By contrast, the much greater data capacity of 13,56 MHz technologies enables transmitting more data to be transmitted during interrogations. That allows, at the highest end, truly robust encryption to protect interrogation

transactions. For example, most 13,56 MHz readers today can provide one of the industry's most secure encryption protocols: the 128-bit AES cipher. This cipher is what is used to give users' credentials essentially unbreakable protection.

Idesco provides MIFARE DESFire readers, operating in 13,56 MHz technology. They protect the card data with the most effective AES128 and TDES encryptions. MIFARE DESFire is also an open standard technology providing the option to purchase compatible devices and cards from several manufacturers.

MIFARE DESFire is also a future-proof and secure choice as several companies are developing the technology and constantly improving its security features, simultaneously providing continuity and device options to choose from also in the future.

3.1.2 Transparent readers

Some organisations require access control readers complying with certain ANSSI Level 1 Architecture. ANSSI (Agence nationale de la sécurité des systèmes d'information) is a French access control security authority, and its Level 1 Architecture is recommended for organizations requiring the highest system security. Transparent readers don't store system host data, they only transmit data, so they are used in some secure settings. Idesco Transparent reader 9 CD 2.0 Slim Pin T complies with ANSSI Level 1 Architecture. It is a highly secure MIFARE DESFire reader with a pin pad. Also OSDPv2 readers provide a similar transparent mode functionality.

3.1.3 Secure reader-host communication – OSDPv2

It is important to protect also data transfer between reader and system host. Traditional Wiegand data transfer interface is not secure, as even the card-reader connection was encrypted, the data in Wiegand line is unencrypted. In addition to a range of secure card technologies, Idesco also offers its award-winning AESCO solution for encrypting reader-host communication. AESCO easily embeds in your current controller, so your credential database and system will remain unchanged.

Secure data transfer protocols, like OSDPv2, the latest version of OSDP, take care of data security also inside the system. Open Supervised Device Protocol (OSDP) is an access control communications standard developed by the Security Industry Association (SIA). It improves interoperability among access control and security products. In addition to security enhancements, OSDPv2's secure, bi-directional data flow also enables downstream data file transfers from system hosts, simplifying and speeding onsite device configurations and even firmware updates. We provide OSDPv2 readers verified by Security Industry Association SIA, ensuring certified compatibility with other OSDPv2 products.



Idesco provides SIA verified OSDPv2 readers

3.2 Open standard or proprietary technology?

Several manufacturers provide proprietary or closed technologies, that also can be secure. However, they are technologies that bind you to a single manufacturing source. Their technology is structured in a way that forces you to purchase additional readers and transponders only from them. In this manner, you let yourself be bound to a sole source, leaving you vulnerable to their pricing and to possible supply shortages.

By contrast, open technologies (e.g. MIFARE®, EPC, OSDPv2) are supported by consortia of manufacturers around a commonly accepted standard. A common standard ensures when you choose readers and transponders, from among a variety of different manufacturers and suppliers - you can rest confident they will be fully compatible. It ensures you won't be at the mercy of a sole source's pricing, availability or experience constrained access to support if your customer's system needs expansion, enhancement or reader unit replacement.

All Idesco's current range of readers use MIFARE®, EPC and Legic open technologies, ensuring their compatibility with systems currently using or migrating to them.

3.2.1 Security keys

One of MIFARE DESFire technology's most powerful open standard advantages is letting you purchase compatible cards, tags and reader devices from several different suppliers.

Nevertheless, a crucial feature of MIFARE DESFire and any other secure access control technology is their reliance on security keys. Security keys are how your readers and transponders recognize each other, through mutual authentication, once you program those keys into them.

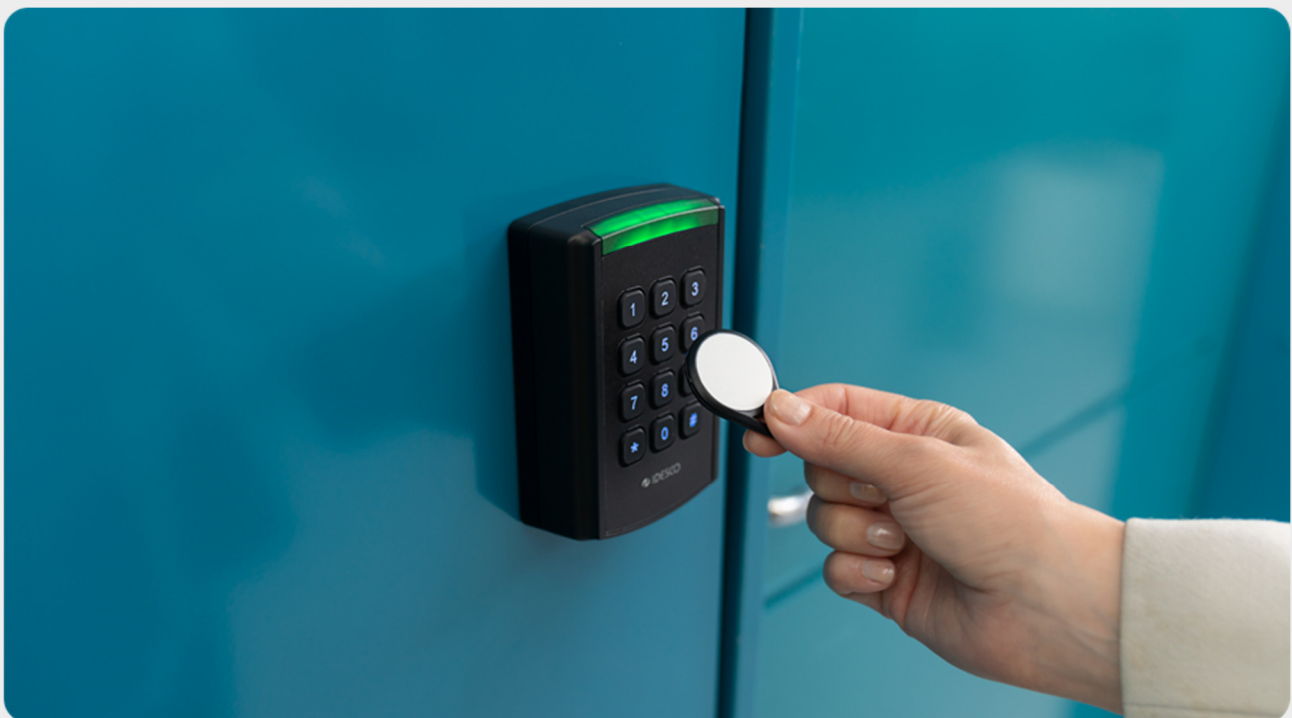
It also means that whoever controls your site’s security keys could limit where your future readers and tags – to be programmed with your keys – get purchased. If you haven’t agreed upon security keys at the beginning, it could pose a problem if your supplier considers your security keys as their own property, refusing to assign them to another supplier or manufacturer if you decide to switch. If there is no agreement about security keys, MIFARE DESFire can become a similar solution than some proprietary access control products, profoundly limiting your business.

At Idesco we always agree to whatever security key disposition our customers prefer. Either device supplier, system integrator or end-customer can define and code a site’s security keys. They can be freely changed by re-configuring the reader and, if needed, new access cards can be coded. We let you define the security keys you prefer for your readers and cards with our DESCoder programming tool. Or we can provide a comprehensive security key service and define them for you.

3.3 Access Control Identification protocols

An access control system can use different forms of verifying authorized access at access points. The identification is based on something a person carries or has, identifying them as individuals who have been given access rights. Typical methods are card or transponder, smartphone, pin code or a combination of pin code and tag, card or smartphone.

There are also biometric identification protocols like fingerprint or facial recognition. Biometric readers are more expensive and may not function as reliably as traditional readers in outdoor settings.



Transponder identification with reader able to accept pin codes

3.3.1 Cards and transponders

Cards or transponders (keyfobs, tags) come in different forms. Cards are programmable credit card size plastic RFID cards that can also be printed, Keyfob is a programmable RFID tag with printable marking that you attach to your keyring. For applications other than access control there are also other kinds of tags you can attach to an object you need to identify.

You can purchase cards and tags from different manufacturers, but usually your system provider or RFID reader manufacturer can supply you with programmed keyfobs or cards compatible with your readers and your whole access control system.

3.3.2 Powerful security enhancement: Pin Codes

Personal user pin codes are an inexpensive way to powerfully enhance the security of an RFID access control system's security. This can be especially important in systems most vulnerable to cloning, which use only UID credentials, and no interrogation encryption. Such unprotected systems benefit the most in security when they integrate pin codes into their identification protocol. Additionally, pin codes can be flexibly deployed whenever users raise concerns over convenience. A system can require them only on certain days or after hours on workdays, for example. Be sure, however, to choose a reader configurable to the pin code length (number of digits) that your system and security manager require. Because, once again, not all reader brands are alike. Some readers will either not be configurable at all for pin length or will only support a couple of pin length choices.



Adding pin codes can be a powerful way to bolster access control security

3.3.3 Mobile credentials

Smartphone access is becoming more and more popular. Everyone is carrying a mobile phone with them, and access using a personal smartphone is both easy and very secure. Delivery of mobile credentials to phones is simple, as it can be done remotely and digitally, and you don't need to issue physical cards or tags to your users anymore. If needed, unlocking the phone provides an additional security step to identification.

3.4 How to migrate to mobile identification?

For mobile identification, you'll need mobile compatible readers, mobile phone app for your users and a method to manage mobile credentials and deliver them to your users' phones. Mobile access security is as high as any found in conventional access control. Data transmitted between phones and readers is protected by effectively unbreakable AES 128-bit encryption.

Idesco's 8 CD 2.0 MI reader supports mobile device transactions. In addition to reading conventional transponders, it reads access credentials you can store on your smartphone, then forwards them to the reader host for authentication. It supports Bluetooth (BLE) and NFC (Near Field Communication) transactions. Bluetooth settings of this reader can be conveniently configured with Mobile Coder mobile application installed in a smartphone.

Idesco's 8 CD 2.0 MI readers let you assign different security levels for every door they are deployed at, while giving you three authentication options. For convenient and hygienic hands-free access, authentication occurs when the phone is in the users' pocket, at a reading distance you choose out to ten meters. For the most secure settings, unlocking your phone's own security lock (e.g. pin code or fingerprint) may be required.

8 CD 2.0 MI works together with Idesco ID mobile access app. You can download Idesco ID mobile access app from Google Play or AppStore.

In addition to mobile compatible readers and a user app, you'll need a method to deliver credentials to your users' phones and decide how it works with your setting.



3.4.1 Mobile credential management

If you need to add new mobile credential users to your system only occasionally, you might find Idesco ID Entry Level useful. Downloading Idesco ID creates a unique device ID that serves as your phone’s mobile credential. This UID is enrolled to your access control system using Enrollment Station. Combined with 8 CD 2.0 MI readers and free Idesco ID mobile access app, Enrollment Station gives you a cost-effective pathway to offer mobile access to your organization.

By contrast, organizations that frequently need new mobile credentials and/or with larger user populations, find Idesco ID service greatly beneficial. Simply, Idesco ID service lets you distribute mobile credentials to phones from your own access control system via Idesco Portal. With Idesco Portal, both mobile access for users and the management of their credentials becomes faster, easier and simpler. It is also possible to deploy customer specific solutions with REST API integration to customer’s own system.

Lastly, mobile access security is as high as any found in conventional access control. Data transmitted between phones and readers is protected by effectively unbreakable AES 128-bit encryption.

3.5 Access control and cyber security

Today’s security threats don’t come only from the hacking of access control cards and tags. When you are purchasing RFID readers especially for access control on security sensitive sites, you should pay attention not only to reader technologies and encryptions, but also their secure sourcing. Who has access to your devices during their manufacturing phase, and who knows what components there are in your devices?

You should also pay attention to information security, and how your supplier handles your security keys when they program your readers and access cards. Idesco Oy has ISO27001 information security certificate as a proof of high level information security.

3.5.1 NIS2 and two-factor authentication

NIS2 (Network and Information Security Directive 2) is the European Union’s latest update to its cyber security directive. Its mission is to strengthen cyber security for critical infrastructure across the European Union.

Security is obviously a critical EU business sector, with access control systems vital to the physical and digital security of countless EU organizations. NIS2 emphasizes the necessity of strong, two-factor authentication. That’s easily fulfilled by requiring user pin codes as well as cards or tags.

NIS2 also emphasizes the transparency and trustworthiness of your security components’ supply chain. Increasing global tensions have raised risks for EU businesses with global sourcing exposures. That’s because opportunities for state actors to embed backdoors in one’s components and devices at the beginning of their supply chain is a risk assessment factor that cannot be ignored. You can reduce your risk by sourcing security-related devices as access control readers and components from European vendors.

3.6 Interactive identification solutions

If you anticipate needing to accommodate a much wider range of user interactivity, Idesco also offers a reader with a detailed LCD display [shown below] to provide users with more detailed information, and with function keys above its pin pad, to widen the range of users’ response during transactions.



Display reader with LCD display, pin pad + function keys for enhanced user interactivity

3.6.1 Readers for settings with tags triggering applications

Note that you can assign users’ transponders other tasks besides opening doors or vehicle gates. With the right reader installed, transponders can trigger PC applications to initialize, activate machinery and even start vehicles. In many such cases, housing the reader inside a card holder is preferable. Readers can be installed to trigger the activation of vehicles or machinery when an authorized card is inserted.



Card-holder desktop reader

3.7 Accessibility

RFID readers usually offer some type of programming options for configuring the behavior and color of their LED indicator lights, and the behavior of a buzzer. When these options are included, they let you provide users a visual, aural, or both visual and aural indicator when a reader is powered and usable, and to notify them after interrogation if access was either granted or denied. Of course, the greater the programmability of these options, the more customizable a reader is and thereby able to satisfy concerns about certain (or even sensitive) access points.

An RFID reader can be designed with special features to enhance their usability in different, unique settings and for various user groups. For example, a keypad backlight can make the reader’s keypad easier to use in the dark. Or it might let you program keypad backlighting to activate automatically when an authorized tag is shown to the reader, or when a key is pressed. Of course, most such backlit pin pad readers should also be expected to support programming of backlights to be powered continuously, or to follow a time schedule provided by its host. Sound indicates when a key has been pressed. All these can be configured for different settings.

All of these features and more are supported by Idesco’s most popular pin pad readers. For example, to further improve usability, Idesco also offers pin pad housings with slightly raised, depressable keys and a raised dot on 5 key for the visually impaired, wherever haptic feedback or key orientation is required.

Idesco also provides angled installation plates in different sizes and angles. These installation plates enable installing readers in lower heights and improve their usability for all user groups if they are installed lower.



Haptic keypad with raised keys. Inclined installation plate optimizes reader angle for convenient use when installed at lower elevation.



8 CD 2.0 VM Pin ja 8 CD 2.0 VS Pin readers provide users tactile feedback when they press a key

3.8 Combining Time & Attendance with Access Control

Time and attendance is the collection of employee work time data for use by payroll and personnel administration. A growing trend in workplaces is to provide a graphical user interface where employees can timestamp their entrances and departures with a transponder. Such RFID touchscreens also let them review past work hours and independently document planned or previous absences, lunch breaks, overtime, etc., with considerable payroll administration cost savings.

Equally important, an organization’s population of access control transponders can usually be assigned to interface with a planned Time and Attendance console, as long its RFID reader is compatible with (can read) the technology of the access control transponders. Such RFID touch screen devices are also often deployed in cafeterias as payment terminals, letting employees select and even pay for their meals with their access control transponder.

Idesco’s RFID touch screen terminal, Access Touch 4.0 supports numerous technologies, compatible with a wide and diverse range of transponders from 125 kHz to 13,56 MHz.



Idesco Access Touch 4.0 time and attendance terminal

3.9 Identification without system connections

It’s also possible to assign an RFID reader to control a door, for example, without connecting it to a hosting system. Such readers (known as ‘Standalone Readers’ in the industry), function by reading encoded transponders and communicating with the door opening system via reader output. Standalone readers can be made very secure if their interrogation protocol is encrypted, like DESFire interrogations are. In addition to controlling door locks, standalone readers are also often ideal for securing diggers, tractors or other large machinery by controlling ignition. Standalone identification can be mediated by transponder only, transponder and pin code, or pin code only. This is because keypads without an RFID reader can also control doors using only a pin code.

3.10 Write-able transponder data

If you anticipate your deployment may require changes to a transponder’s data during an interrogation, you will need to deploy read/write (R/W) readers. R/W readers are often used in payment or vending applications. For example, a certain value stored in the transponder will be programmed to represent how many times its user will be

entitled to access a certain place, or the number of tokens remaining they can spend on a vending machine's stored product or products. After the R/W reader determines the current value in the transponder, it will overwrite it with a new, lower value. This method can also be used to limit users access to a controlled area to a finite amount of access events, for example, boarding a mass transit bus using a token-storing transit card.

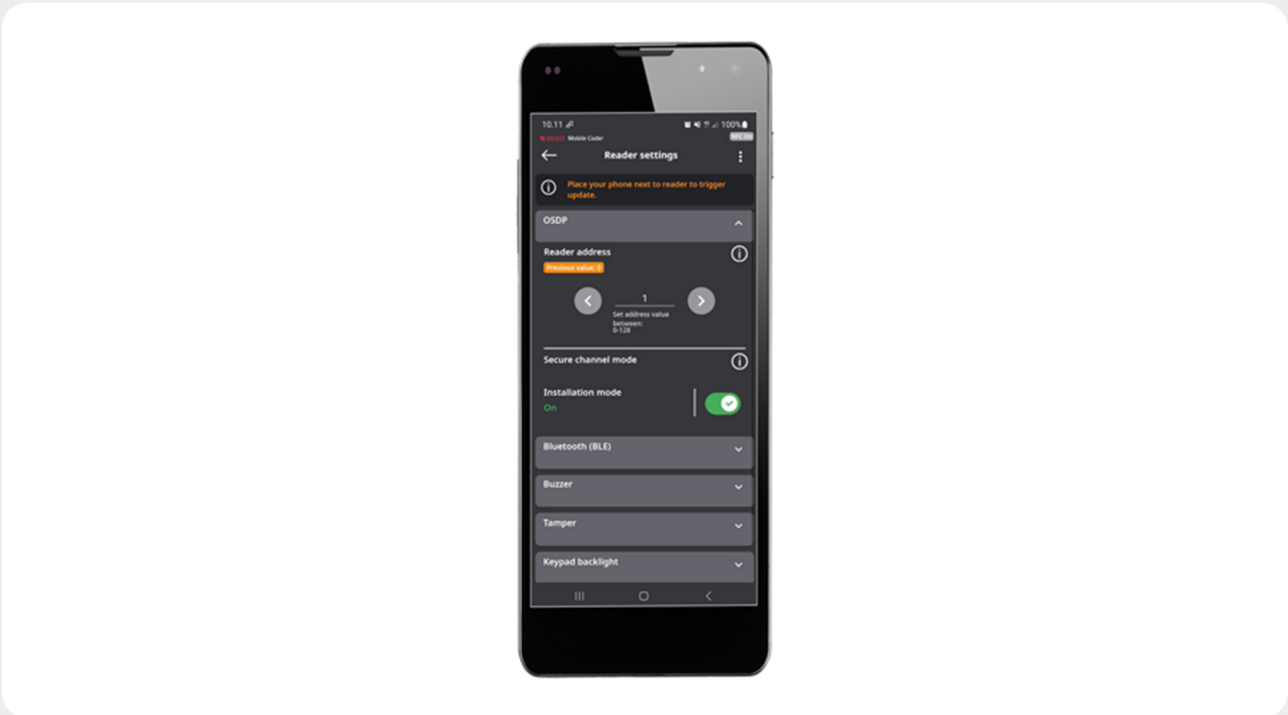
4 Configurability and system evolution

Certain reader technologies, particularly the MIFARE® DESFire readers, offer greater flexibility and freedom to configure and even update readers. This is particularly important if you want to offer your customers a system able to adapt to changing system requirements. For starters, many of the readers are designed to be backwards-compatible with older, legacy technologies so you can deploy them to read an older system's tag population. Then, when the need to update your customer's system arrives, you simply re-configure (or migrate) their readers to the more modern, more secure technology. Such updatable readers support a system's evolution without themselves ever needing replacement.

Besides being able to support such important technology updates, a reader's ease of configuring other parameters can be vitally important (pin code length, tamper alarm, LED, buzzer, etc.). That is because, in addition to ensuring the reader's best performance fit within a planned system, such parameters will also determine how adaptable you can be to your customer's change requests.

Idesco's access control readers let you configure a nearly-unmatched variety of parameters, in addition to being able to update them to a new technology. Best of all, this is done by merely exposing them to a configuration card, without ever uninstalling or even powering them down. OSDPV2 readers are also configurable centrally with a command from the system.

Idesco 8 CD 2.0 readers can also be configured with Mobile Coder mobile app. Installation specific reader settings such as reader address, reader name, Bluetooth range, buzzer sound, keypad backlight, LED colour etc, and also even reader firmware can be configured conveniently by phone.



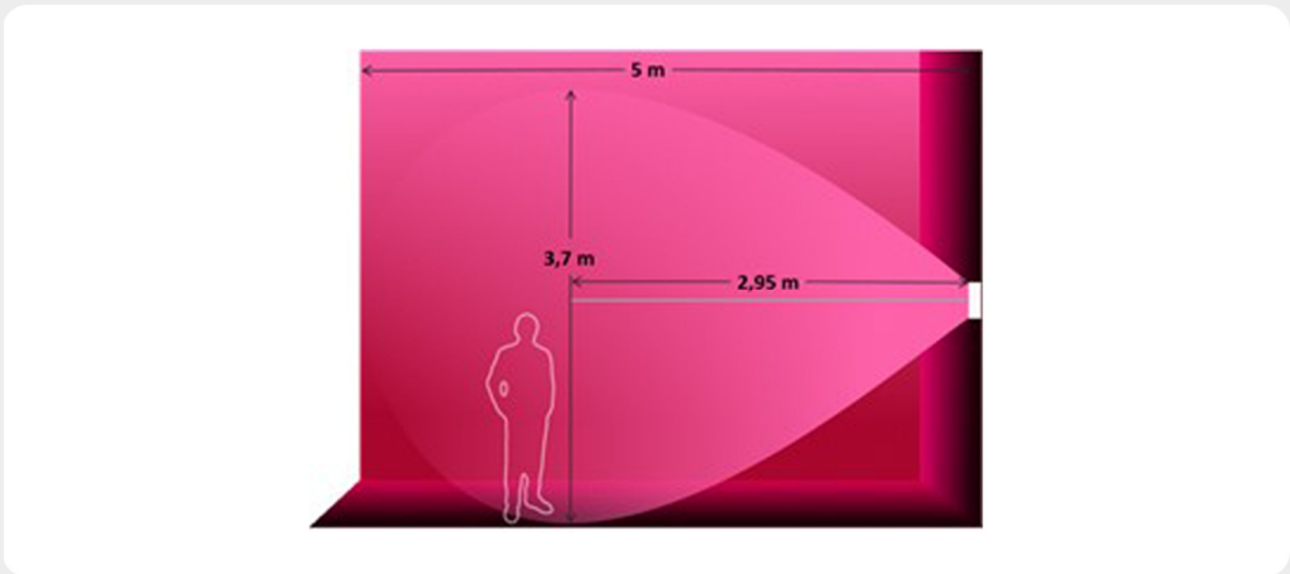
Mobile Coder app

5 Vehicle identification and logistics

By their nature, vehicle identification and logistics settings frequently require the longer identification distances that 868 MHz readers are able to provide. Occasionally, one might encounter 125 kHz and 13,56 MHz technologies being used for asset marking and similar logistics tasks requiring only the shortest interrogation distances. If you need to identify a moving object (e.g. vehicle), or simultaneously discriminate and identify vehicles transiting through opposed lanes, both tasks are prime examples of deployments that 868 MHz readers excel at solving and to which they are frequently assigned.

Not surprisingly, the siting of readers and the approaching angle of tags play a major role in determining how successful a 868 MHz deployment will be. The ‘emission cone’ of 868 MHz readers must be carefully aimed toward where transponders are expected to transit. Approaching transponders themselves should be optimally oriented toward the reader as they pass through its ‘emission cone’. Testing and satisfactorily addressing both conditions is required to ensure reliable interrogations.

Additionally, 868 MHz tags only perform well when installed specifically on the surface they were designed for. Different dedicated tags exist for metal and glass surfaces, for example. Each also has their own level of responsiveness to interrogation. This means a metal surface tag, for example, might have a greater responsive range than a glass surface tag.



Representative cone of 868 MHz reader emission

5.1 Unique 868 MHz reader features

Anti-collision is an RFID reader ability to interrogate multiple tags within its range simultaneously. Such a feature can be particularly valuable when a 868 MHz reader is tasked to monitor a zone with a finite population of tagged items or individuals (zone control).

Consider a need to determine the direction of a moving tag transiting an access point you monitor. If you could connect a second, auxiliary external antenna to your reader it would prove much less expensive than purchasing and adding a 2nd, additional reader to your deployment. Such a 2nd external antenna would let you monitor traffic on both opposed lanes simultaneously just as effectively as two purchased readers would.

An ability to adjust the transmission power (amplitude) of an 868 MHz reader can be another valuable feature. Adjusting its amplitude is a clever way to filter out replies from more distant tags (e.g. more distant vehicles in neighboring lanes) that you don't want your system to capture.

Lastly, it is also possible to integrate access control, vehicle identification and payment into single transponders. One transponder, interrogated by different readers assigned different roles, can mediate parking access, office access, and store tokens to pay for meals in an office cafeteria.

Idesco's EPC 2.0 readers support all these features, in addition to being designed with the tough, rugged reliability for outdoor settings that their wide operating temperature range and IP67 protection class provides them. They are also capable of reading encrypted EPC class 1 Gen2v2 transponders.



Vehicle identification deployment

5.2 Active vs. passive technology

Longer reading distances become achievable when you choose active instead of passive 868 MHz technology. For example, if a deployment requires consistent, reliable interrogations beyond 15 meters, active 868 MHz technology becomes a more viable solution. The caveat with choosing active transponders is they are also dependent on an internal power source (a battery) to boost the amplitude of their reply to a reader. That ‘active boost’ is what extends the range at which their reader will detect their reply.

Conversely, passive 868 MHz technology transponders don't need batteries to function, relying entirely on the energy of the reader's transmission to power their reply. Whereas the finite, depletable power source that active transponders require makes them much more expensive to purchase and to service regularly by replacing or replenishing their batteries. Furthermore, providing easy access to an active transponder's battery tends to lower their protection rating, making them more vulnerable to harsh, inclement conditions than passive transponders. Therefore, if a detection range of 10 to 15 meters is sufficient for your planned deployment, passive 868 MHz technology will prove both more cost-effective and reliable over the long term.

6 RFID reader safety standards

For some time, the manufacturing and operation of RFID devices has been regulated by international standards. In Europe, RFID products are required to comply with European regulations and standards set by the European Telecommunications Standards Institute (ETSI). ETSI's standards ensure that compliant devices will be both safe

and won't interfere with other radio communication, e.g. broadcasting or emergency services. Some countries also established their own national regulations based on ETSI standards.

6.1 Health and RFID interference with medical devices

Stringent regulations and standards limit RFID devices' power levels and frequency ranges. Correspondingly, the regulations and standards set for limiting the power of RFID devices establishes limits well below any that could cause interference with devices (e.g. pacemakers).