



ST Electronic Lock



ACCESS
CONTROL

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1. INTRODUCTION

When Talleres de Escoriaza, S.A.U. committed itself to the development of a new access control system, one of the essential requirements that it established was to satisfy the needs of the customer.

Thus, it had to face many challenges, such as the development of a system easy to install and manage which was compatible with any door and/or mechanical element that it may have, that used the most advanced identification technologies and which offered us the same features as any access control system: identification of users, register of openings, controlled access depending on time zones, flexibility, etc.

As a result the Smartair electronic lock was born.



The lock has all the elements required by an access control system inside it: the control unit with memory and real-time clock and calendar, the reader, the power supply and the closing element, in this case a motorised clutch that allows us to activate or not activate the spring of the mortise lock when turning the handle of the lock.

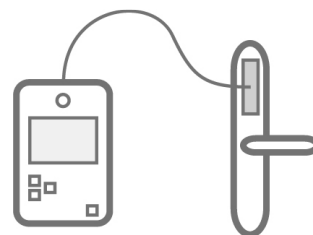
All the elements (except the reader) are allocated in the inside part of the lock. Which means that they are protected against any possible vandalism act.

As identification technology the lock uses a contact less read and write chip technology (named by TESA as Smartair Technology). The contact less technology has allow the development of an electronic lock with shorter dimensions comparing with conventional electronic locks. Something that makes easiest the installation of the electronic lock in any kind of door in addition to improve its aesthetics.

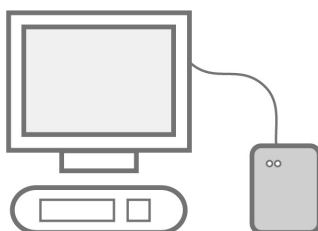
2. THE Smartair LOCK IN THE TS1000 SYSTEM

The Smartair electronic lock is part of the access control system of TESA. It is managed by the TS1000 management system where we will define the locking plan of the lock. That means: users and access time zones. See the User's Manual.

As the lock is completely stand alone, there is no physical connection between the lock and the computer, and hence the Portable Programmer must be used. With this device we transfer the information from the computer to the locks and vice versa



Once the locking plan has been programmed and transmitted to the lock, we would provide to all the users an identification carrier. That carrier will have a contact less chip and of course, it would be previously encoded with the information related to the user.



The encoding process will be made from the TS1000 management software using the Smartair encoder.

Once the setup of the system it's done, the lock will be an operative lock in the installation.

The users will approach their carriers (previously recorded with the necessary information) to the reader of the locks. The reader will check whether that user has authorisation to open the door, and will or will not allow him/her to open it. Added to that, the lock will register that event in its memory.

3. IDENTIFICATION TECHNOLOGIES

The used identification technology is a contact less read and write chip of 13,56MHz.

In TESA, we have named as Smartair to all the products that use a contact less technology.



That is the reason because the name for the new lock is Smartair Electronic Lock.

3.1 ST Microelectronics

At present the used chip is the LRI512 from ST Microelectronics,

For more information: www.st.com/stonline/products/literature/ds/7686/lri512.htm

4. TYPE OF LOCKS

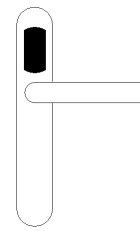
We explain now the different options and models that the Smartair electronic lock can be supplied.

4.1 External Plate

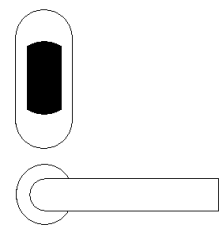
In the external part of the lock we will have obviously the reader module. And the reader can be allocated in two type of plates:

- Long Plate

The reader is allocated in the same plate as the handle, following a similar plate like the conventional long plates for the handles.



- Short Plate



The reader is allocated in an independent plate. That allows us the possibility to install rosette handles..

In both cases, the internal part of the lock is the same.

4.2 Electronic Privacy

The electronic privacy function is a typical feature in the electronic locks. For that feature the lock must have a thumbturn with a micro switch in the inside part of the it.

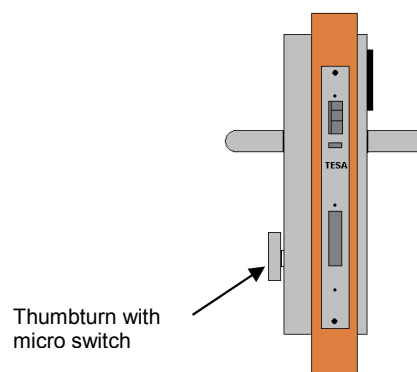
When one user blocks the door using the inside thumbturn, the micro switch will send a signal to the unit control meaning that the door has been blocked. With this the electronic lock knows when the door is blocked or not.

That will give us the possibility to define that there will be users with authorised access only when the door is not blocked from inside.

In that way, we can have two type of locks:

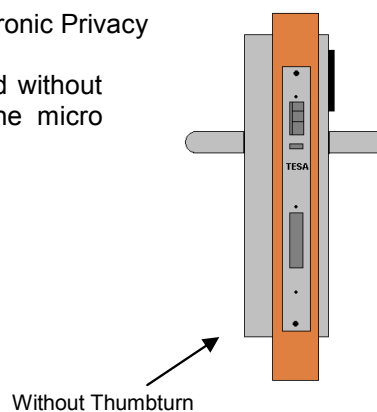
- Electronic Locks with electronic privacy

The lock is supplied with the internal thumbturn and the micro switch.



- Electronic Locks Without electronic Privacy

The electronic lock is supplied without the thumbturn and without the micro switch..

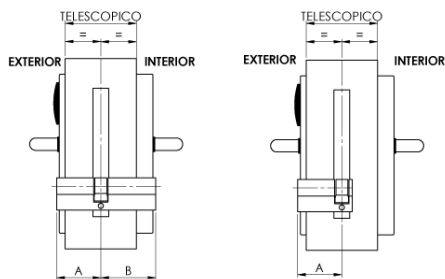
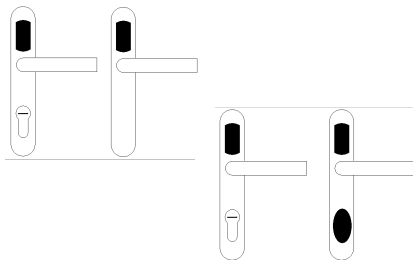


4.3 Mechanical Emergency Opening

The Smartair electronic lock is compatible with mechanical cylinders. That give us the possibility to install the lock in an existing door where already exists a mechanical cylinder. Thus, we can keep it installed and use it as the mechanical emergency opening for the electronic lock.

We can have electronic locks with or without mechanical emergency opening.

And also, when the mechanical cylinder exists, it can be visible or hidden.



Obviously the lengths of the mechanical cylinders should adjust to the door thickness.

And the possibility of one half cylinder or double cylinder will depend if we have the inside thumbturn or not.

In the Annexe IV of this manual we will find the rules to fix the length for the cylinders by the different door thickness.

4.4 Extreme Weather Conditions Resistance

The Smartair electronic lock is supplied in two different versions:

- Standard. For internal doors. No protected against extreme weather conditions.
- Extreme. For external doors. The electronic components are protected by a gasket.

4.5 Summary

Due to all options, there are a lot of different available models of Smartair electronic locks. In the Annexe I of these manual there is a summary chart where we can find all the options.

5. OPTIONS

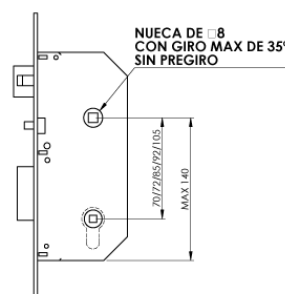
The Smartair electronic lock is supplied without mortise lock, because it can be installed with the majority of European mortise locks. This allows the installation in existing doors without the necessity to remove the existing mortise lock.

Nevertheless, there are some limitations.

5.1 Mortise Locks

The Smartair electronic lock can be installed with any European mortise lock that fulfills the following requirements:

- Distance between axes must be between 70mm y 105mm.
- The thickness of the spindle must be 8mm or 9mm.
- The needed turn angle to withdraw the latch must be no higher than 35°.



In the Annexe II of this manual we will find an explanation of the requirements for the mortise lock.

5.2 Handles

The handle in the Smartair electronic lock is fixed through a spindle and offers a typical feature in the TESA electronic locks.

When the door is closed or when the lock does not allow the access, the external handle is free running and it does not actuate through the mortise lock.

For that, the handle must have a special spring that will give us the possibility to turn the handle when the door is closed and that will return it to the original position.

This “free running” feature makes that the clutch of the electronic lock is more secure against possible vandalism acts.

But for this specific feature the handle must fulfill some requirements, which are described in the Annexe III of this manual.

Bearing this in mind, the Smartair electronic locks offer two possibilities:

- Fixed External Handle

The external handle is built-in the external plate..

Does not exist any fixation screw.

In this way, to take apart the external handle we must take apart first the electronic lock from the door.

It offers a high security level.

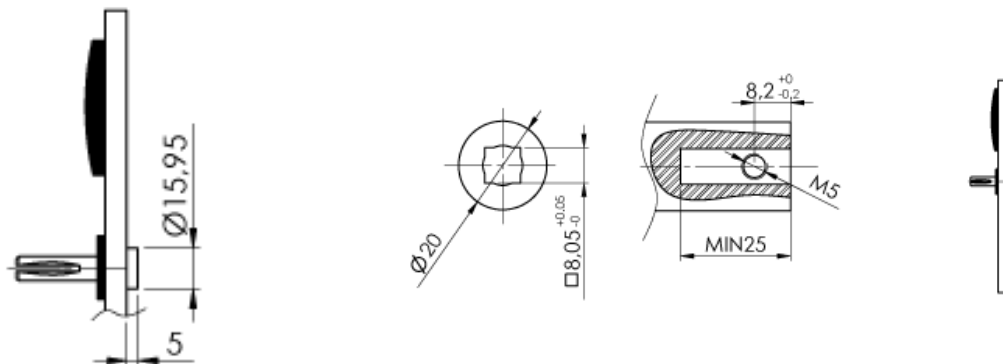


- External Handle with Universal Adapter.

In this case the fixation of the handle is done to a special spindle through a security screw. The special spindle is named at TESA as "Universal Adapter".

Obviously the fixation of the handle is visible and for that reason not as secure as the fixed one.

Nevertheless, this option gives us the possibility to install any handle from the market that fulfills the requirements that are explained in the Annex III of this manual.



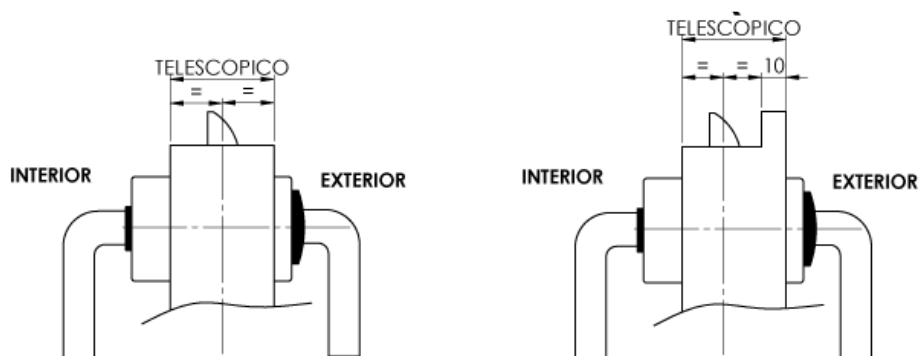
In both cases, the handles that TESA offers are:

Vector
Sena

5.3 Door Thickness

The door thickness and the type of door (rebated or non rebated door) are two critical aspects for the correct working of the electronic lock. Both aspects are directly related with the length of the spindle.

In the Annexe IV of this manual we can see the needed length for the different door types and thickness.



5.4 Finishes

The Smartair electronic lock is available in the following finishes:

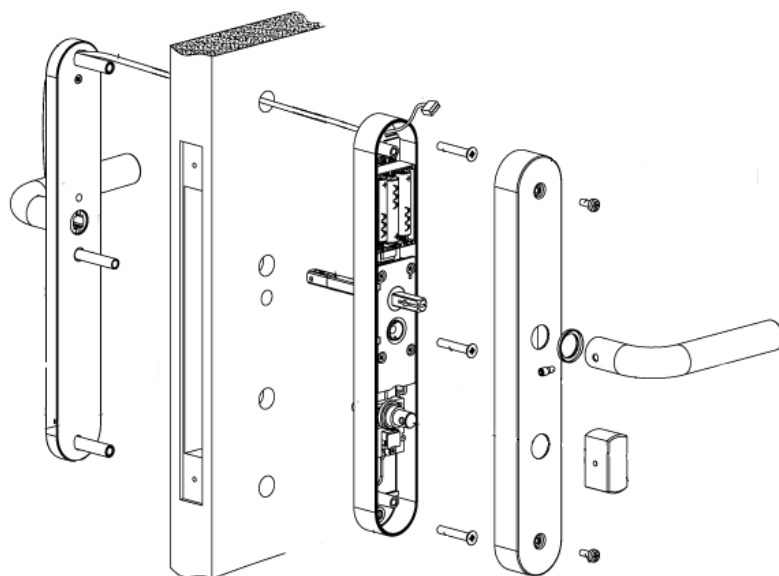
- Inox
- Satin Brass PVD
- Polished Brass PVD

6 TECHNICAL FEATURES

All the different types of Smartair electronic locks have the same components.

6.1 General Aspects

The electronic lock is always supplied complete, including all the elements needed for its installation (excluding the mortise lock and the cylinder).

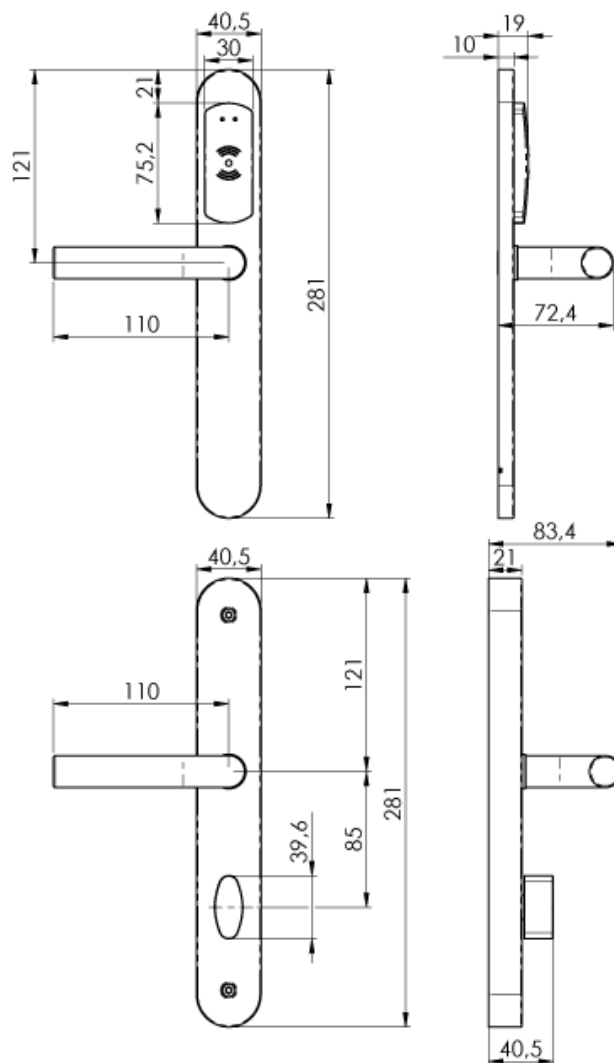


These are the elements that form it:

- **External Escutcheon** The external escutcheon is where the reader module is allocated. The cable for the connection of the reader module to the control unit is built-in the escutcheon.
- **Internal Plate** It has all the control elements: the unit control, the battery module, the clutch and the motor.
- **Internal Escutcheon** It will cover the internal plate.
- **Internal Handle** It will be fixed in the internal spindle.
- **Thumbturn** Only with electronic locks with electronic privacy.
- **Screws** Bag with all the necessary screws to install the lock
- **Template** For the installation of the electronic lock in the door
- **Card** Construction Mode Smartair Card.

6.2 General Dimensions

In the following picture we can see the general dimensions of the electronic lock:



6.3 Control Elements

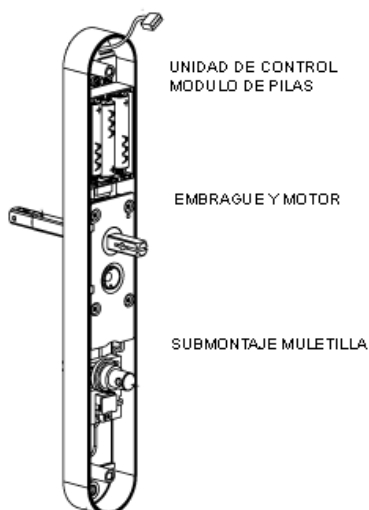
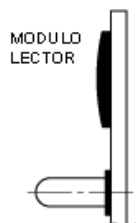
The control elements in the Smartair Electronic Lock are:

In the external escutcheon:

- Reader Module

In the internal escutcheon:

- Unit Control and Battery Module
- Clutch and Motor
- Thumbturn sub-assembly (only in locks with electronic privacy)



This three modules are fixed to the internal plate. Each one is independent from the other and they are connected.

6.4 Reader Module

The reader module has the reader for the contact less chips. The chip used at present is the LRI512 chip from ST Microelectronics.

The reader module is always in alert (with a minimum consumption of the batteries). That means that the readers is always waiting for a Smartair carrier.

The reading distance is between 10mm and 20mm.

When the reader module, detects the presence of one contact less chip, it wakes up the electronic lock. Starting the process of reading the information written in the chip and sending that information to the control unit in order to analysed it.

6.5 Unit Control

The control unit is made up of a non volatile memory chip, a real-time clock and calendar and two warning LEDs (one green and the other red). It is powered by the battery module.

6.5.1 Storage Capacities

The non-volatile memory involves that if the control unit ceases to be powered (if its batteries run down) it will not lose any of the information stored in its memory.

The control unit stores two types of information: information about the locking plan of the installation where it belongs (users, time zones, calendar, etc.) and information about the register of openings/events.

Regarding the storage capacity of the control unit there are two operating modes: the standard mode and the extended mode. The capacities are summarised in the following table:

Standard Mode	Up to 1,500 users and 600 events
Extended Mode	Up to 1,000 users and 1,000 events
No. of Time Zones	Up to 14 with 5 periods each
Calendar	1 year
Expiry and Activation dates of the cards	
DST (Winter - Summer)	

An event is everything that has happened in a lock: an opening, a failed attempt to open a door (out of timetable, expired card, cancelled card, unauthorised user, etc.), an updating with the portable programmer, etc.

The type of mode is selected from the configuration screen of the management software of the system.

For further information see the User's Manual

6.5.2 Clock and Calendar

The Control Unit has a real-time clock and calendar. They are set by means of the portable programmer, which is given the time of the computer where the management software of the system is being executed. Therefore the date and time of the locks is the same as the date and time of the computer.

The lock recognises every day of the week from Monday to Sunday. However, it does not "know" which days are public holidays in the installation. Public holidays can be personalised in every installation, and this is done with the management software of the system. The memory of the control unit can store a year of public holidays. That is, the next 365 days after the day in which the locks are initialised or updated.

The clock is fed by the battery module of the lock and must be fed ALWAYS. When the batteries of the lock run down the clock stops. When we replace the batteries, the clock starts to work again but with a time taken randomly. Therefore we must set the clock by means of the portable programmer.

6.5.3 Warning LEDs

The control unit controls two warning LEDs: a green one and a red one. Depending on the event taking place in the lock they will light up in different ways. The luminous indicators of the lock are explained in detail later in this manual.

Added to that, the warning LEDs tell the user when the battery level in the battery module is low and about to run down. This way the user will have enough time to change the batteries before they run down completely.

6.6 Battery Module

The Battery Module feeds the reader module of the lock. It has three completely standard alkaline batteries. In the case of the extreme lock it is possible install it with lithium batteries because they are more resistant to weather conditions.

The lock has a consumption of 20mA at rest, which is needed to feed the clock of the reader module.

Smartair ELECTRONIC LOCK	
Type of batteries	3 alkaline batteries of 1,5V LR03 AAA
Consumption	20mA at rest

6.7 Clutch

It is a motorised clutch which, in the case of authorised access, drags the square bar of the lock with the turn of the handle. The square bar withdraws the spring or lever of the mortise lock and allows the door to open.

The Clutch Module is made up of two elements: the clutch itself and the motor.

7 WORKING CONDITIONS

As any product, in order to work properly it must be correctly installed and each door must have the most suitable lock. If the installation is carried out correctly the lock will work properly and we will extend its life.

The ideal operating conditions are the following:

7.1 Temperature Conditions

Depending on the kind of batteries used in the lock the range of temperatures that the lock will be able to withstand will vary considerably, as alkaline batteries cannot resist temperatures below 0°C. The table below shows the temperature ranges:

	Alkaline Batteries	Lithium Batteries
Temperatures	0° / 65°C (32° / 149° F)	-40° / 75°C (-40° / 167° F)

7.2 Humidity

In all cases the lock can withstand a moisture of 85% without condensation.

7.3 Water Resistance

The extreme version of the Smartair Electronic lock has been especially protect to withstand any extreme weather condition, including water. Hence, in those places where the door is exposed to rain or any other factor related to water, we recommend the installation of the EXTREME lock.

7.4 Vandalism Resistance

Because the used technology is a “contact less” technology, the reader must not have any slot in order to introduce the cards. For that reason we can say that the Smartair electronic lock is more secure against the malicious introduction of elements to jam the reader: silicon, glue, etc.

8 INSTALLATION AND INITIALISATION OF THE LOCKS

We will now see the steps needed to install the Smartair locks.

8.1 Construction Mode

When they are supplied, the electronic locks are in the so-called "Construction mode". In this state the locks are not loaded with any locking plan or program and they will open the door to all the cards in an "construction mode". All locks are supplied with 1 cards in an construction mode.

Thanks to this state we can install the locks on the doors without having to program (initialise) them. That is, we can install the locks, and once they are all installed and the locking plan is established in the management software, we can "start up" (program) the installation.

Once the locks have been initialised they cease to be in the construction mode and operate according to the locking plan loaded on them.

Cards in the construction mode open doors 24 hours a day every day of the year.

8.2 Installation on the doors

The locks are supplied with all the elements needed for their installation. This includes an assembly template.

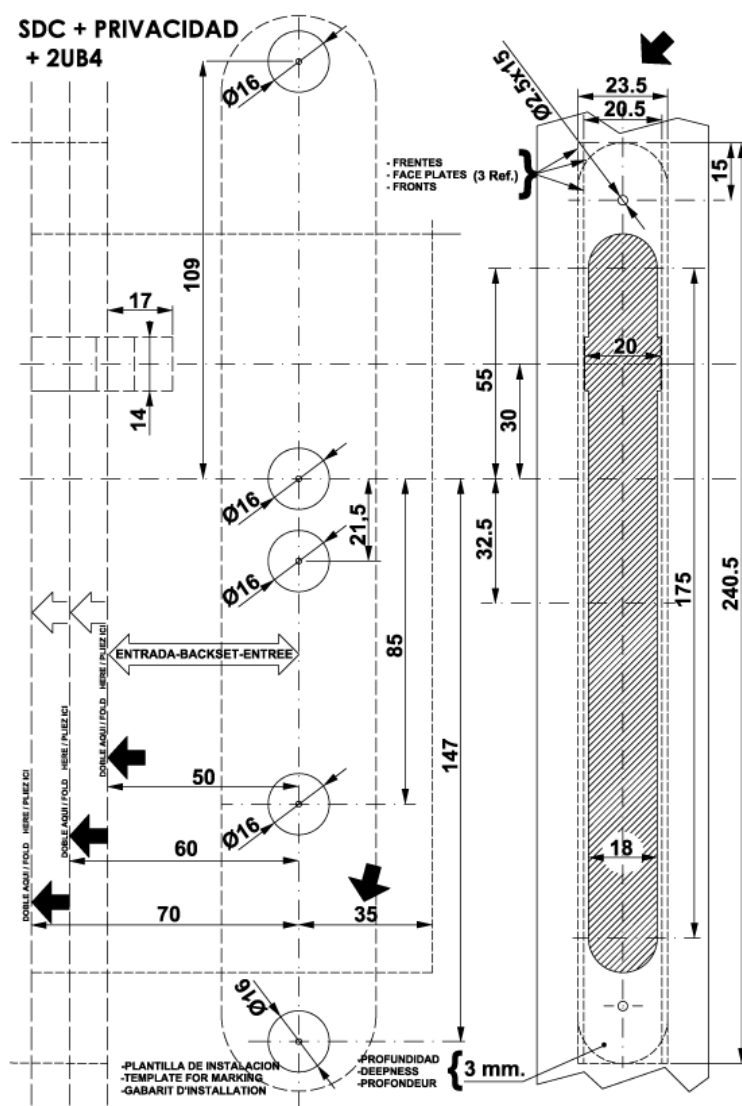
- External Escutcheon
- Internal Plate
- Internal Escutcheon
- Internal Handle
- Thumbturn
- Screws
- Installation Templates
- Construction Cards

Obviously, the first thing to do is to mortise the mortise lock and the electronic lock on the door. To do this we will use the assembly template.

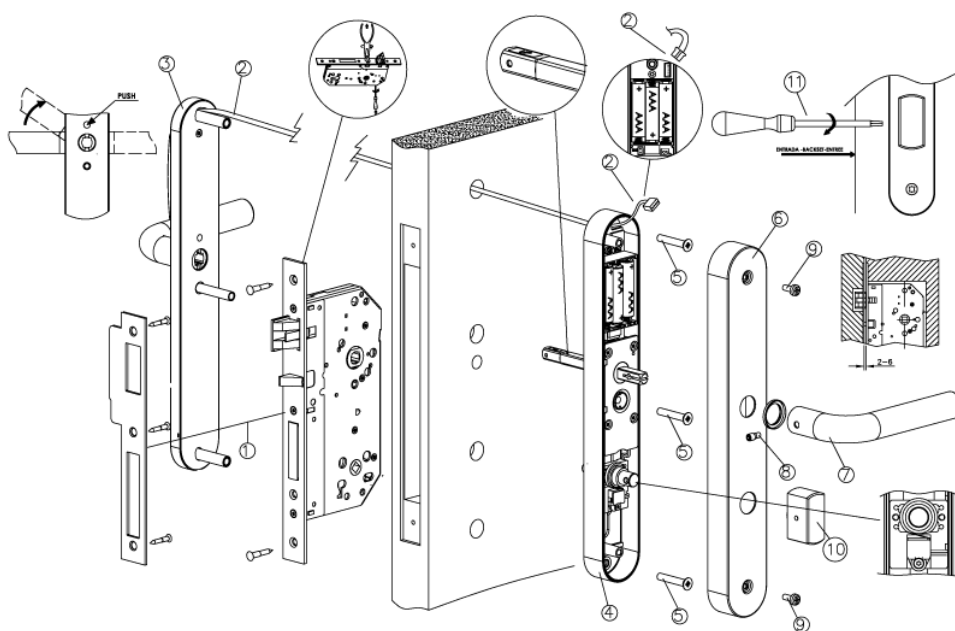
8.2.1 Assembly templates

The assembly templates include the plan of the mortising needed on the door, with all the measurements and options and the instructions for the installation of the electronic lock.

The following illustrations show some assembly templates with the plan of the mortising:



Once we have finished the mortising we can install both the mortise lock and the electronic lock. On the other side of the template we can see the assembly of the lock with the steps to follow, which are numbered:



In order to place the handles we need to use the "TORX" screwdriver supplied in every order as an "accessory".

To work properly, the Smartair lock must be installed correctly on the door.

Important

The batteries must be installed after connecting the cable that goes from the reader to the control unit. If we install first the battery, the battery consumption will be very high meaning that the battery life will be very short.

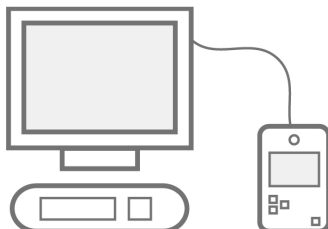
When the lock is installed on the door it is in the construction mode, and hence we will need a card in the construction mode to open the door. These cards will be used until the locks are programmed.

8.3 Initialisation and updating

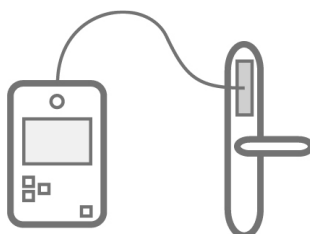
The "Initialisation" of the locks consists in transmitting them the locking plan of the door where they have been installed.

To do this we must design the locking plan of the installation in the management software of the system. In that locking plan we will give a name to the doors where the locks are installed and the users who will use them, added to including the access timetables and the calendar. Of course, we will also establish which users will have authorised access and when.

Once we have drawn the locking plan in the management software of the system, we must transmit that information to the Portable Programmer. See User's Manual.



Once the data are transferred to the Portable Programmer, we can initialise the lock. We connect the Portable Programmer to the lock, insert the Authorisation Key of the System on the Portable Programmer and transmit the data to the lock. See the Portable Programmer's Manual.



When we Initialise a lock, besides transmitting the locking plan we transmit the System Code of the installation to which it belongs.

Before being initialised, the lock is in an construction mode and has an initial code. When we initialise it the lock will lose the initial code and it will take the system code of the installation.

The locks can be initialised as many times as we want, but always with the same system code. This means that we can move a lock from one door to another in the same installation, initialising it with a new locking plan.

"Updating" a lock consists in transmitting the lock the changes made in its locking plan after initialising it.

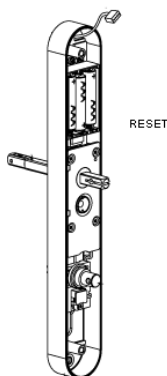
The process to follow is similar: transfer the data to the portable programmer and from there to the lock. The authorisation key of the installation will have to be inserted on the portable programmer.

The difference between Initialising and Updating is that when we initialise the lock we delete all the data stored so far except the system code. That is, we delete the loaded locking plan and the stored register of events, and we give the lock a new locking plan inside the same installation.

When we update it we do not delete anything from the memory of the lock. We simply change those data from the locking plan that have been modified in the management software of the system.

8.4 Reset of the lock

The reset of the lock is allocated below the battery module, meaning that to reset the lock we will need to remove the internal escutcheon.



Between the battery module and the clutch we can see two pins.

To reset the lock we will need to make a shortcut between the two pins.

9 OPERATION MODES

The SmartAir lock offers us different operating modes, which can be automatically programmed from the management software of the installation.

These are the operating modes:

Open
First User
Standard
Double

We will analyse them one by one:

- **Open:** The lock is completely open and anybody can open it without having to insert a card. The door is opened by simply activating the lever..

(This operating mode can be programmed manually, by inserting a card with authorised access two consecutive times. In order to cancel this operating mode and go back to the normal operation, we will have to insert an authorised card again two consecutive times. Obviously, not all users will have this option).

- **First User:** It is exactly the same as the OPEN mode, but the door does not open until an user with authorised access has opened it; this means that there is at least one person in the room.

(This operating mode is very practical when we want the door to be open early in the morning, when the staff arrive at work. By using the OPEN mode the lock could remain open without anybody arriving. With the FIRST USER mode we avoid that possibility completely).

- **Standard:** The user has to insert his/her card to open the door. It is the default operation of the lock.
- **Double:** It is a completely safe operating mode. In this mode the lock will only open when TWO users with authorised access insert their cards one after the other. When the lock is operating in this mode and a user with authorised access inserts his/her card, the lock waits until another user with authorised access inserts his/her card. The lock will only open then. The lock waits for a few seconds. If the second user does not insert his/her card during that period, the lock does not open and goes back to the previous state. With this operating mode we prevent users from entering a room without the presence of another authorised user.

From the management software we can program the lock to start working automatically according to one of the operating modes at a certain time on certain days and for the period that we choose.

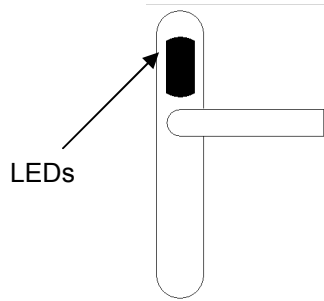
For instance, we can program the lock to start working automatically in the OPEN mode every day from Monday to Friday at 08H00MN and to go back to the NORMAL mode every day from Monday to Friday at 18H00MN.

10 WARNING LEDs

Outside, the electronic lock has two warning LEDs, a green one and a red one. We use them to know what happens in the lock every time a card is approached on it.

These are the messages that we can obtain:

- Green light: Access authorised.
- Red light (immediately after inserting the card): Access denied. The card does not have authorisation to open the door.
- Red light (a few seconds later): Access denied. The user belongs to another installation, or the card is not recorded.
- Green and red light flickering at the same time: Access denied. The user is out of his/her shift. The user is trying to open the door out of his/her established Time Zone.
- Green light flickering: Door in open mode. An authorised user has inserted the card two consecutive times in the lock, leaving it in the OPEN mode.
- Green light flickering and red light: The door goes from the OPEN mode to the normal mode. When the lock is in the open mode, an authorised user can close the lock by returning it to the NORMAL mode, inserting his/her card two consecutive times in the lock.
- Red light flickering: Lock jammed. The lock has been jammed with the jamming card.
- Red light flickering and green light: Lock released. The door has been released by inserting the jamming card.
- Green light and red light flickering: The batteries of the lock are running down. We must replace them immediately.

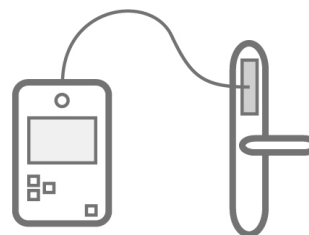


11 EMERGENCY OPENING

In the event of an electronic fault in the lock it can always be opened with the portable programmer.

The portable programmer includes an option called "opening". This option will open the lock even when its batteries have run down.

We must remember that in order to open the door with the portable programmer we need the AUTHORISATION KEY of the installation.



12 Smartair CREDENTIALS

The credentials for the users are the carriers for the read and write contact less chip.

As we know, at present we are using the chip LRI512 from ST Microelectronics.

12.1 Type of credentials

Because is a contact less technology, the credential does not need to be inserted in any element of the lock and for that reason it can be any object.

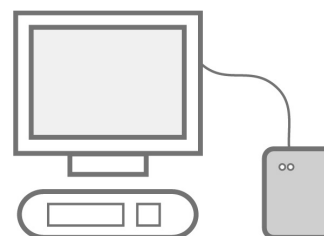
In that way it can be a card, a key ring, a watch, etc.

Ask your distributor for the different options.

12.2 Encoding Process

The cards are recorded on the Smartair encoder (connected to the computer) and from the user screen of the management software of the system.

When we initialise the locks we transmit them all the data of the locking plan: the system code, the users of the installation, the time zones and the calendar and which users have access and when (never, always or depending on one of the established time zones), etc. That is, all the information of the locking plan.



In the case of the card we only have to record the identification data of the user and the "personal" data and variables concerning that user. That is:

- System code. Identification of the installation.
- User code. Identification of the user.
- Activation date. Date from which the card will work in the system.
- Expiry date. Date from which the card will stop working in the system.
- Grant Names. Added to the locking plan, some locks will demand a special permission from the user.

13 MAINTENANCE OF THE LOCKS

In order to keep the locks in good working order we recommend to follow the ensuing guidelines

Only a dry or slightly wet cloth must be used to clean the outside of the Smartair lock. Do not ever use cloths with chemical products as this would damage the finish of the lock.

Besides the above mentioned, we also recommend to test the lock with the test of the Portable Programmer periodically.

13.1 Test of the Portable Programmer

The Portable Programmer includes a TEST option. If we execute this option in the programmer we will check the following aspects of the lock:

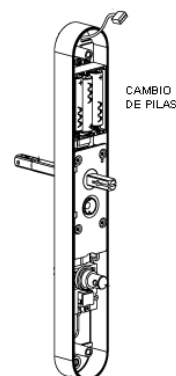
- Warning LEDs.
- Detector of the privacy lever.

For further information on the execution of the test see the Manual for the Portable Programmer.

If the checking of all the mentioned aspects of the lock has been satisfactory the lock will be in perfect working condition. If any of these aspects is not correct you will have to get in touch with your distributor which will analyse the situation and solve the problem if there is one.

13.2 Change of batteries

To change the batteries we only have to unscrew the internal handle and the internal escutcheon. As mentioned earlier in this manual, we may have to adjust the clock when replacing the batteries. To do so we only have to "update" the lock with the portable programmer.



14 GUARANTEES

The system is guaranteed for two years. Logically, this guarantee covers any fault, breakdown etc. in any of the components of the system, provided it has not been the result of a negligent use.

If the locks have a fault or break down, the faulty element will be immediately replaced. The lock will be replaced with another one with the same characteristics only when TALLERES DE ESCORIZA, S.A.U. considers it appropriate.

15 QUALITY CERTIFICATES

TALLERES DE ESCORIZA, S.A.U.'s Quality department certifies that:

- All the components of the Smartair lock have been endorsed by our Product Engineering Department.
- During the different phases of the industrial process, including the final assembly, we have carried out the device controls needed to guarantee the correct operation of the lock according to the quality requirements of the market.

In these conditions, the periodical tests conducted regarding resistance and life have resulted in the compliance of the following specifications:

Added to the above mentioned regarding the Smartair electronic lock, concerning the TALLERES DE ESCORIZA, S.A.U. company (designer, manufacturer and distributor of that lock) we certify that:

The Quality Management system of: **Talleres de Escoriza, S.A.U.** has been certified by Lloyd's Register Quality Assurance according to the following Quality Management Systems Regulations:

ISO 9001: 1994
EN ISO 9001: 1994
BS EN ISO 9001: 1994
UNE EN ISO 9001: 1994
ANSI/ASQC Q91: 1994

Approval
Certificate No: 934749

The Quality Management System is applicable to: **The design, manufacture and assembly of mechanical and electronic locks. The dying of parts for locks and other items.**

And that:

The Environmental Management System of: **Talleres de Escoriza, S.A.U.** has been certified by Lloyd's Register Quality Assurance according to the following Quality Management Systems Regulation:

EN ISO 14001: 1996

Approval
Certificate No.: 772303

The Environmental Management System is applicable to: **The design and manufacture of mechanical and electronic locks.**

**Irún
November 2005**