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THREE-STATE RFID e-SEALS

#securityrevolution
#eseals

LeghornGroup®

Protection – Control – Identification – Tracking – RFID Solutions

RFID e-seals

Logistics 4.0

RFID electronic seals or **e-seals** are the key to enter in a new dimension of freight transport and meet the requirements of industry players for future international trade flows based on a higher level of security and information.

LeghornGroup offers **RFID e-seals** to increase physical security - such as ensuring no possible replica of the seal - and inform in real time on how the goods are stored, tracked, routed, maintained and delivered to customers.

RFID e-seals provide the automatic identification of the truck/container's seal.

They can be quickly and accurately read by static gateway reading systems or by handheld devices assigned to check point personnel.

Any tampering event to the seal is permanently stored in its chip's memory.

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New revolutionary RFID e-seals

In addition to the wide range of RFID electronic seals that LeghornGroup manufactures, available either in LOGISTIC or TAMPER EVIDENT versions, in September 2020 the company launched on the market a **new revolutionary product that operates in passive RFID technology**.

This new RFID e-seal allows remote reading, for complete automation of Terminal operations at the entry / exit gates, and is able to detect any event that occurs with it by interrogation:

- **unlocked** seal
- **correctly locked** seal
- **tampered** seal

For this peculiar behaviour, unique among all the security seals existing in the reference market, LeghornGroup commercially identifies this family of products as **"Three-state" e-seals**.

The tamper evidence functionality is built-in within the RFID IC and the e-seal STATUS or ALARM information are permanently stored in the IC memory, which immediately provides the status of the seal **UNLOCKED/LOCKED/TAMPERED** when interrogated by the readers at the gate.

The adopted RFID chip can also be used to store further information and its user memory can be written by using any RFID reader/writer devices (both fixed and handheld ones) available in the global market and compliant with the standard ISO18000-6, whose specifications apply to the e-seals as well. Further added information can be password protected.

Seal security is grounded at HW level – thanks to the technical features of the innovative RFID chip deployed – and isn't transferred to any external SW systems and algorithms, as for competing products.

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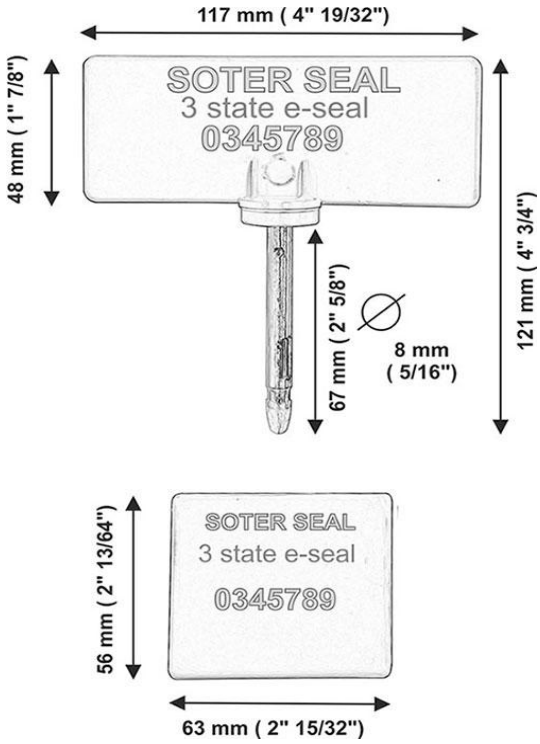
SOTER SEAL – bolt lock HSS

UHF RFID Three-State bolt-lock seal
it can provide its status information, **UNLOCKED**, **LOCKED** or **TAMPERED**, which is stored in the RFID chip. Compliant with ISO 17712:2013, High Security Seal for international container freight.

LeghornGroup **SOTER SEAL** is a sturdy **UHF RFID bolt-lock seal** that combines high mechanical security with the electronic security offered by RFID, automatic radio frequency identification technology.

It is the first RFID bolt seal – compliant with ISO 17712 technical standards – available on the market that is able to provide its status information; **UNLOCKED, LOCKED and TAMPERED,** which is stored in the RFID chip. For this reason, the product has been named "**three-state**".



The outer **polypropylene plastic housing** of the seal – customizable with laser mark and numbering on request – **embeds an unique and last generation electronic chip**, that has its own univocal coding, which cannot be replicated.
This allows for secure and reliable automatic identification of the seal applied to the container or vehicle.

- It has univocal ID code and read/write user memory capabilities.
- It offers at the same time the immediate and accurate seal identification and the status of the seal i.e. unlocked/locked and evidence of tamper occurred if any.
- It is an ideal solution for guaranteeing cargo security and tamper evidence along the shipping and supply chain.

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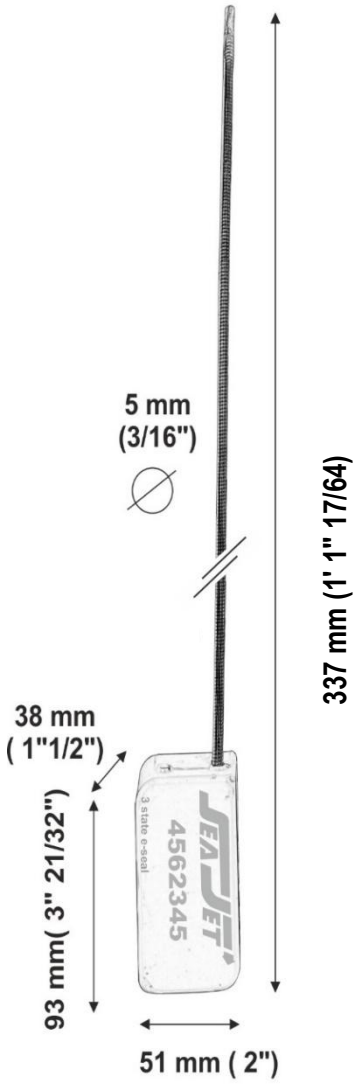
MYRMIDON SEAL – cable lock HSS

UHF RFID cable-lock seal, it can provide its status information, **UNLOCKED, LOCKED or TAMPERED**, which is stored in the RFID chip. Compliant with ISO 17712:2013.

LeghornGroup **MYRMIDON SEAL** is a sturdy **UHF RFID cable-lock seal** that combines high mechanical security with the electronic security offered by RFID, automatic radio frequency identification technology.
It is the first RFID cable seal – compliant with ISO17712 technical standards – available on the market that is able to provide its status information, **UNLOCKED, LOCKED and TAMPERED,** which is stored in the RFID chip.

The outer **polypropylene plastic housing** of the seal – customizable with laser mark and numbering on request - **embeds an unique and last generation electronic chip**, that has its own univocal coding, which cannot be replicated. This allows for secure and reliable automatic identification of the seal applied to the container or vehicle.



- It has univocal ID code and read/write user memory capabilities.
- It offers at the same time the immediate and accurate seal identification and the status of the seal i.e. unlocked/locked and evidence of tamper occurred if any.
- It is an ideal solution for guaranteeing cargo security and tamper evidence along the shipping and supply chain.

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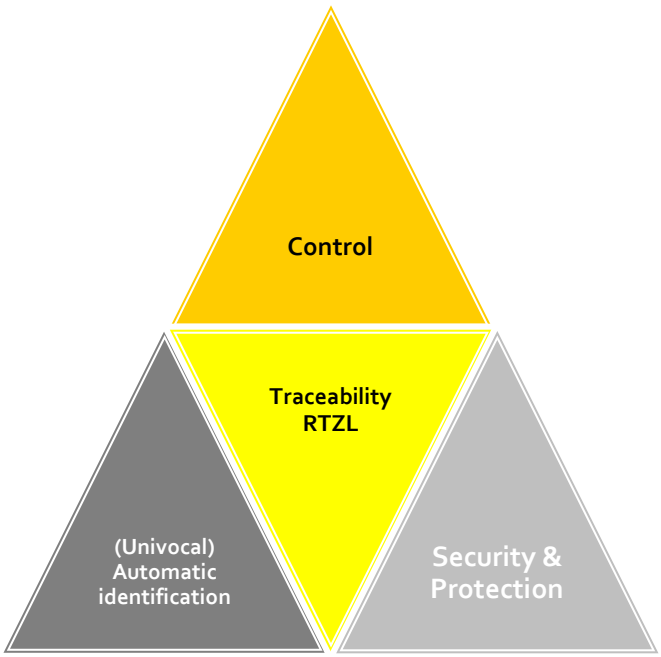
Three-State RFID e-seals - Key features

- **Univocal identification** (EPC-TID)
- **Not replicable**
- Contactless, not line-of-sight reading
- **Three types of information of the seal status: UNLOCKED/ LOCKED/ TAMPERED**
- **Long range** reading distance - full **automated operations** and checks **free from human error**
- System **interoperability** due to compliance with ISO18000-6 (including EPC Global)
- Combines **high mechanical security level offered by ISO17712:2013 compliance with electronic RFID security**
- **Any event - UNLOCKED, LOCKED and TAMPERED - is permanently stored in the RFID IC memory**

Every player in the **logistic chain of international freight of containerized goods** - Port Authority, Terminal, Shipping Line, Forwarder or Customs - can benefit from **timely, secure and standardized sharing of the transportation info along the supply chain by means of RFID e-seals**.
They are the solution **to strengthen the interoperability of the existing platforms and informative systems in use at seaports and terminals**.
Processes will be more effective, definitively leading to cost savings.



- Ensuring interoperability between new (and legacy) systems and platforms for categories of transport nodes
- Making possible the real-time interaction with the goods for control and security purposes
- Streamlining transport processes guaranteeing a paperless traceability of goods & resources' optimization
- Following the goods and not only the transport means

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Technical specifications

Radio Frequency specification

Frequency	860 – 960 MHz – UHF EPC Global
Reference RF Standard	ISO/IEC 18000-63
RF Protocol	EPC Class 1 Gen2 / ISO/IEC 18000-63
Technology	Passive
Integrated circuit	NXP G2iM+

Electronic specification

Reading distance by handheld reader	3 m (118” 7⁄64”) (depending on reader)
Reading distance by gate reader	8 m (314” 61⁄64”) (depending on reader)
Quality	100% performance tested
User read / write memory	Yes
Memory size	from 128 bit up to 448 bit of EPC Memory; up to 640 bit of User Memory
Password protection	Yes
Status Detection	Yes – Locked, Unlocked or Tampered
TID (tag unique identification)	Yes
S/N in memory (same of seal)	Yes
Read / write cycle	10000
Data retention	20 year
Integration with handheld reader	OS ANDROID and WINDOWS CE commercial readers
Integration with gate reader	ISO/IEC 18000-6 commercial industrial readers

Mechanical specification

IP Protection	IP66
Operative Temperature	– 30° C / + 80 ° C
Storage Temperature	– 30° C / + 80 ° C
ISO 17712:2013	Yes

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Integration of LeghornGroup e-seals

LeghornGroup **e-seals work in accordance to RFID ISO standards** - e.g. ISO18000-6 for UHF: their EPC code **can be read by any reader following the same technical standard** in the market.

Read/Write operations are generally performed by using the **free software that for demo purposes** is provided by the reader manufacturer.

Specific SW application is instead required to read the tamper evidence information stored in the EPC memory of LeghornGroup e-seals.

We can offer middleware, which basically interfaces to upper SW level e.g. presenting data in format suitable with the customer system (database structure).
Also, we have developed some SW applications – free of charge for our customers - to read the tamper evidence bit, which work with the following readers:

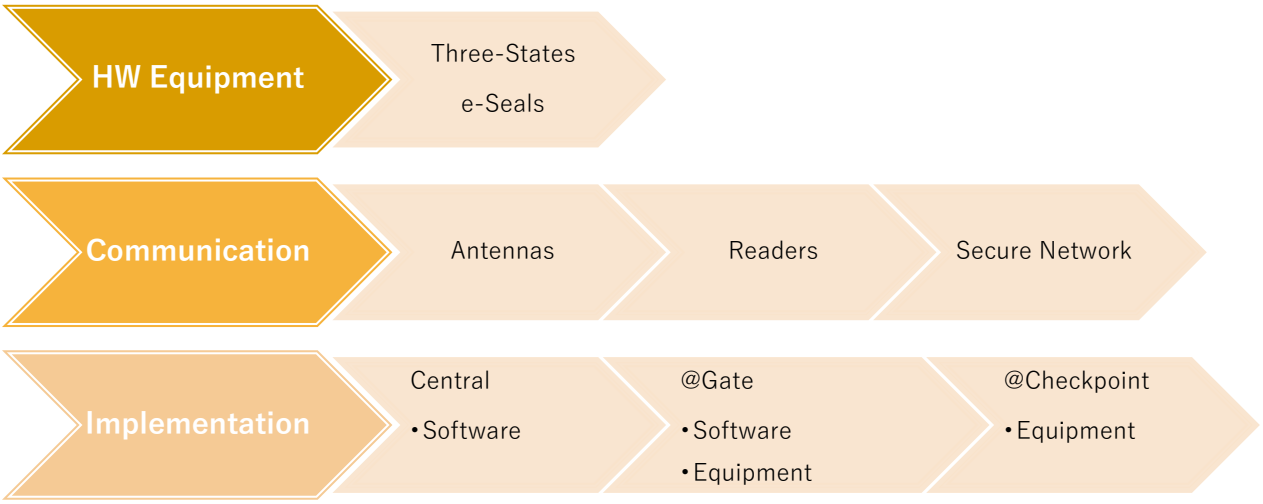
- Middleware for Impinj Speedway Revolution R420/R220
- Application for ATID 880N, handheld reader Windows CE/Mobile
- Application for Android smartphone BT connected to CAEN RFID handheld readers (QID, QIDmini, SkID)

Customers have successfully used LeghornGroup e-seals globally, by using fixed and handheld readers from ChainWay, Zebra Technologies, and Alien Technology RFID manufacturers.

LeghornGroup can:

1. **provide reader + SW app** for the tested models. If the customer is fine with using any of the mentioned reader we provide the app free of charge either it buy that reader from us or from any different suppliers in the market.
2. **suggest other reader models** and guide the customer's technical team in the integration phase. Usually the reader manufacturer makes available API or even complete SDK to develop specific app.
3. **offer SW development turn-key service** (costs depending on the customer requirements and the chosen reader).

Port use case – Application in the field



Communication details

Antennas: AWID LR-X UHF

- High resolution, high sensitivity, long range
- Circular optimization for improved reading in all orientation
- Excellent Ratio for beam width & front-to-back

UHF Reader decoder: Impinj RX000 Readers

- High performance with support for multiple antennas
- Built-in security and configuration
- Scalable, fast, highest on-reader memory

Secure & Encrypted WIFI / Cable high speed redundant connectivity

Port Application details

- **Inbound operation**
  - Reader is in sleep mode to avoid reading errors
  - Upon passage over Electronic Magnetic Strip sensor, reader is activated
  - Reader passes information to Local Server queuing operation
  - Automated Real-time Three-State interpretation of collected data

    - **Seal Tampered**
    - **Seal Closed**
    - **Seal open or missing**

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Field of action of LeghornGroup

PROTECTION: we can protect your goods and assets with security seals and various products for tamper protection. The company can create bespoke, technical solutions to meet client's requirements.

CONTROL: we ensure goods and people can be monitored using security products and integrated complete hardware and software solutions that allow the operator to monitor and intervene in real time, even remotely.

IDENTIFICATION: LeghornGroup's understanding of authentication along with their innovative technical products and solutions allow users to uniquely and securely identify, goods, vehicles, containers, animals and people.

TRACKING: LeghornGroup's real time GPS tracking devices allow users to monitor location, status and movements of vehicles and people.

“ Being up to the problem has always been our ambition.
Let our customers understand that their problems become
IMMEDIATELY our own problems: this is one of the keys to success”.

Luciano Grapsa
President *LeghornGroup*

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FINDUS@

info@leghorngroup.com

LeghornGroup – Italy
www.leghorngroup.it

LeghornGroup – U.S.A.
www.leghorngroup.com

LeghornGroup – Belgium
www.leghorngroup.be
www.leghorngroup. nl

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www.leghorngroup.ro

LeghornGroup S.r.l.

34/36, Via degli Arrotini - 57121 Livorno Tuscany Italy
Ph: +39 0586 406376 - Fax:+39 0586 407621
www.leghorngroup.com - info@leghorngroup.com

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