

# Object Security in Museums

## Application Note

ZOMOFI®

ZOMOFI--Application\_Note--Object-Security-in-museums--en.doc

## The "million dollar robbery" at the Louvre could have been prevented.

Art galleries, state museums and national cultural institutes all have secured buildings and facilities. They possess intrusion, theft and fire safety systems that are installed and operated and continuously updated to meet state-of-the-art technology standards.

The security systems for the pieces of art themselves, however, are often inadequate and to date, technologies have proven to be complicated in procurement, installation and operations.

The ZOMOFI RFID components allow for permanent surveillance in real time using transponders affixed to the pieces of art. The readers can be installed in the exhibition area independent of other systems.

In summary, the solution offers the following functions and added value:

- Each object of art is individually monitored. If it is touched, the alarm is triggered
- There are no cables, which makes it particularly appropriate for paintings, showcases, sculptures, etc.
- Little or no installation is required and there is a high level of flexibility for alternating exhibitions
- Alarms are evaluated through the existing intrusion/theft reporting system
- The security personnel receive report messages that include the location of the incident

Several such systems are operating in European museums and have proven to be both reliable and maintenance-free. Security agents, exhibition managers and visitors of the art collections alike greatly appreciate the flexibility achieved for theme-based exhibitions.

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The logo for Albis Technologies, featuring the word "albis" in a bold, blue, sans-serif font with a green swoosh above the "i", and the word "technologies" in a smaller, blue, sans-serif font below it.

## Background

Theft prevention installations on objects of art can be affixed using a frame rail and suspension cords, showcase security fittings or other technical fixtures.

→ These components are inflexible, time-consuming and expensive to operate.

The *requirements* for securing paintings, sculptures and valuable objects have changed and currently demand the following:

- No cables connected to the object of art - i.e., wireless systems
- Simple solutions for alternating exhibitions, securing items on loan and objects in open-design spaces
- Security fittings for paintings without frame rail and suspension cords
- Highly flexible design of exhibition security concepts
- Monitoring objects of art in open areas
- Individually secured objects - and where relevant - location and automatic inventorying

The present "Application Note" explains how the system is used in practice.

## Concept and solution

### *OBJECTS TO BE SECURED*

The objects to be secured include objects of art such as paintings, pictures, showcases, sculptures, figures, etc. that are exhibited in art galleries and museums. They are tagged and monitored using Z-Tag Motion Detection.



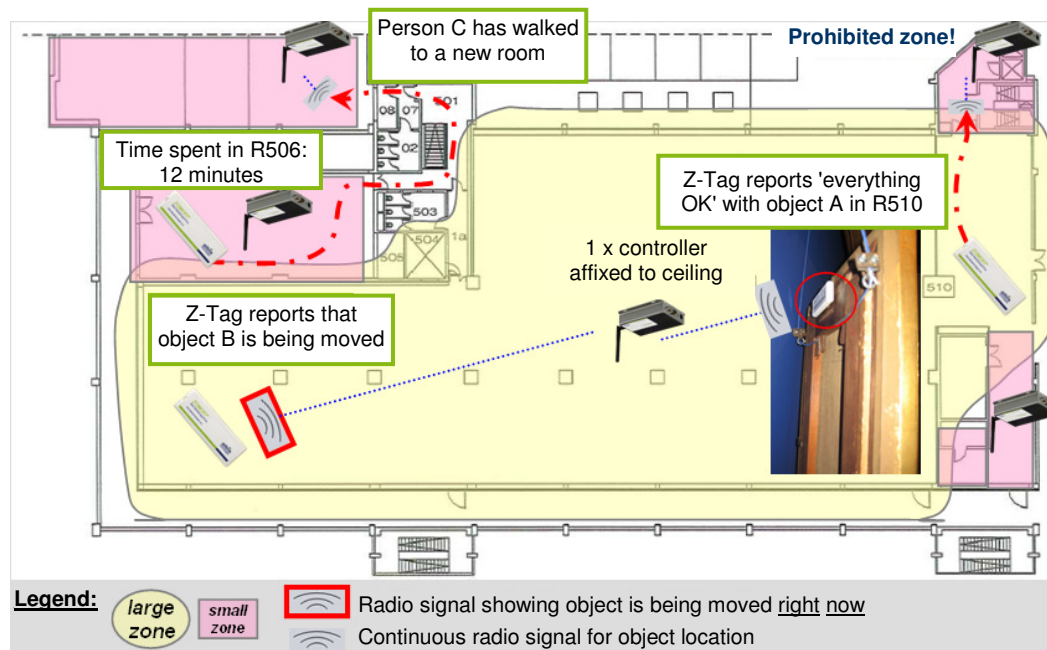
The necessity for flexible object surveillance is one of the key reasons to deploy a RFID system for object surveillance.

### *SPACES*

The spaces to be monitored can have any dimensions and furnishings. Typically, the following space types are monitored:

- Entrance and exit areas
- Special exhibition rooms
- Main exhibition spaces covering several floors
- Prohibited areas (e.g. stairwells, emergency exits and other areas in which objects of art should never be)

## MODE OF OPERATION OF ZOMOFI RFID



The transponder sends an alarm signal to the system application via a Z-Controller as soon as an object (painting, sculpture or showcase) is touched. The system application immediately relays the information to the mobile display devices and to the stationary display units, for example, in the entrance area. The security staff receives an immediate report summary of the room/position of the object that was touched - and they can take further steps using their mobile display devices or the stationary display units.

## DISPLAY UNITS

Display units in museums and art galleries principally serve the following purpose:

- To inform, guide and notify exhibition visitors
- To inform the security personnel (museum employees or security staff) of status and incidents

The display units deployed for object surveillance presented below are only for the security staff.

The system allows for the integration of mobile and stationary display units into the surveillance solution. The stationary display units are typically installed in the following areas:

- Administration offices
- Security control center, day or night porter's desk
- Exhibition rooms or special purpose rooms
- Engineering room

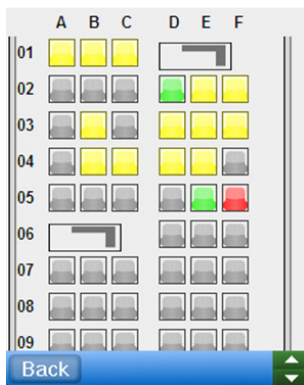
### Mobile display device

Security staff members carry a mobile display device with them and are thus connected to the central system via a radio transmission system. The system is comparable to a modern pager. A variety of sizes and models are available.

The location of each object is shown on the building floor plan.

Incidents (objects touched or vibrations measured) immediately cause alarms that are shown on the building floor plan. Consequently, the security staff is immediately shown the location and type of incident.

The display can support text and/or graphical representation and generally has a very simple design to prevent operating errors and confusion.



Reported incidents/alarms can be:

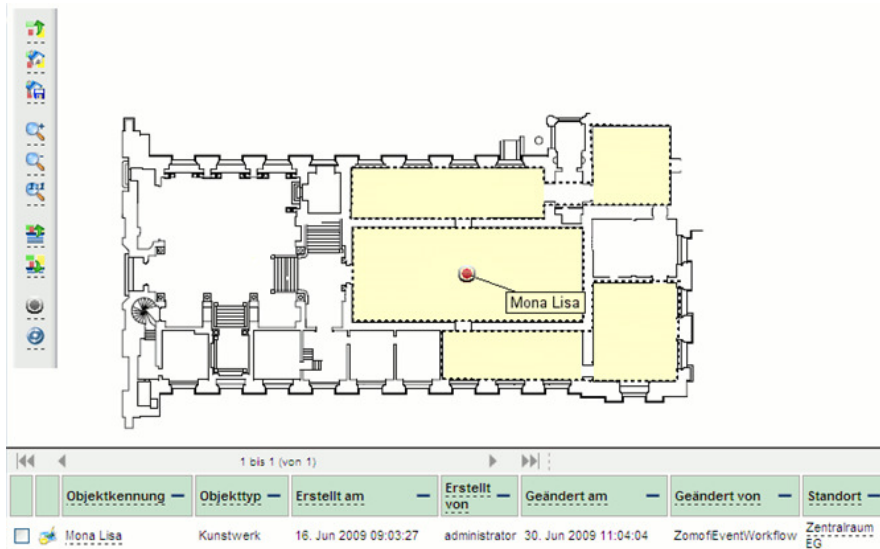
- Acknowledged
- Forwarded to the main alarm
- Signaled using vibration or sound

... further options also are possible.

### Stationary display units

The results are simultaneously displayed on the stationary touch-screen units. Users can select amongst various display and audio settings.

These units offer the same functions as the mobile devices - and add-on applications can be easily installed.





Object code	Object type	Created on	Created by	Modified on	Modified by	Location
Mona Lisa	Piece of art				Zomofi Event Workflow	Central room - ground floor

## Components and implementation

### RFID TRANSPONDERS and READERS


Specifications of the transponders that are equipped with special sensors:

	<p><b>Z-Tag Motion Detection – S3135-K530.</b></p> <p>Transmits the following information as radio signal:</p> <ul style="list-style-type: none"> <li>▪ Identification number for each object</li> <li>▪ 'Everything OK' signal sent every 15 seconds</li> <li>▪ Vibrations immediately trigger an alarm signal (sensitivity is adjustable).</li> </ul> <p>Battery life = 4-6 years. Exterior dimensions: 31x90x10.5mm.</p>
	<p><b>Z-Tag Contact Sensor – S3135-K560.</b></p> <p>Transmits the following information as radio signal:</p> <ul style="list-style-type: none"> <li>▪ Identification number for each object</li> <li>▪ 'Everything OK' signal sent every 15 seconds</li> <li>▪ Disconnecting or (re)connecting the contact immediately triggers an alarm</li> </ul> <p>Battery life = 4-6 years. Exterior dimensions: 31x90x10.5mm and 2-wire exit for contact sensor.</p>




The ZOMOFI product line contains other sensor tags (that measure temperature, humidity, etc.)

Specifications of the readers deployed with this system:

- They are integrated into a network, read the information of the Z-Tag Motion Detection/Contact, evaluate this information within milliseconds and transmit the data, alerts/alarms, etc. to the central server
- There are also function enhancement options for inventory administration and management

	<p><b>Z-Controller WiFi / LAN – S3135-H200.</b></p> <p>Interface: either WiFi (802.11) or Ethernet RJ45 (10/100MBit). The dimensions of the area to be monitored can be set using the software.</p> <p>Typical area sizes within a building:</p> <ul style="list-style-type: none"> <li>▪ small: 100m<sup>2</sup></li> <li>▪ medium: 400m<sup>2</sup></li> <li>▪ large: 1600m<sup>2</sup></li> </ul> <p>Reliably reads the identification number and data of the ZOMOFI transponders.</p> <p>1000 transponders within a single area can be read by 1 controller</p>
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The easy-to-use 360° dipole antenna can be used as reader antenna. The following antennae have proven very suitable for indoor transmission.

	<p><b>Z-Antenna (Ceiling, 360°)</b> - V4077-Z2-X7.</p> <p>The monitored area starts at the ceiling of the room and extends downward in all directions. The dimensions are set for each reader/antenna through system configuration.</p>
	<p><b>Z-Antenna (Patch, Directional)</b> – V4077-Z2-X4.</p> <p>The monitored area extends forward of the directional antenna. It is often positioned in the corner of a room. The dimensions are set for each reader/antenna through system configuration.</p>
	<p><b>Z-Antenna (Circular, Directional)</b> – V4077-Z2-X15.</p> <p>See V4077-Z2-X7.</p>

## NETWORK

Typically, a specifically configured LAN network is used for the Z-Controller readers. Readily available standard components, connectors, network tools, etc. allow for economical and secure installation.

## ADMINISTRATION AND CONFIGURATION INSTRUMENTS

The system administration takes place in secured or isolated rooms. Configuration includes, among other things:

- Importing the building layout
- Attaching the RFID transponders to the objects to be monitored
- Location specifications
- Setting the alarm levels
- History and evaluation
- Back-up and redundancy settings

## INTRUSION ALARM SYSTEM

Incidents or alarm signals transmitted from the RFID System are usually forwarded to - or integrated into - the existing intrusion/theft alarm system. This is implemented by means of defined and secured protocols.

The integration allows standard alarm evaluations to be carried out and for signals to be relayed to the security surveillance center or to the police.

## References

These systems already secure museums and art galleries in France, Sweden and Germany. These organizations wish to remain anonymous. The components are being tested in other countries as well with the goal of achieving improved object protection.

## Technical highlights

### *HEARTBEAT*

This control signal, which is transmitted when the Z-Tag is in rest state (meaning: 'everything is OK'), ensures that the system application monitors the Z-Tag at all times. This also ensures that the entire chain of objects to be monitored, (→radio connection → controller/reader, → network → IT server) does not exhibit any malfunctions, interruptions or manipulation.

Each controller is also monitored and secured by means of a verification mechanism and software application.

### *ALARM & SENSITIVITY*

There is a distinction between the pre-alarm and the main alarm. The level and duration of touches/vibrations are measured, transmitted and evaluated every day.

### *SIZE OF ZONE*

The size of the zone can be set and adjusted using numerous variables. This allows for optimal coverage of indoor exhibition areas or outdoor spaces, corridors, prohibited areas, etc.

### *NETWORK*

ZOMOFI can be integrated into standard IT infrastructures with standard switching/routing and cabling - and without need for additional components. Users have the option of setting up dedicated networks or using existing ones.

### *OPERATING FREQUENCY*

2.4 GHz ISM license-free band.

The advantages of this choice:

- 1.) No antennae (Dimension)
- 2.) Quick, robust and secure transmission of RFID data
- 3.) GFSK modulated for optimal broadband utilization and interference resistance

### *LONG LIFE-CYCLE*

The battery life (without replacement) is between 4.5 and 6 years.

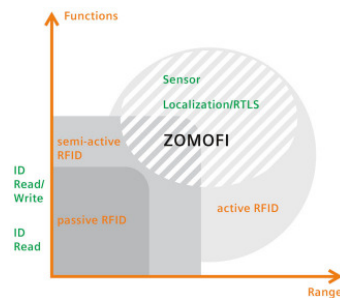
### *ADDITIONAL APPLICATIONS*

There are other transponder types that offer additional applications for art exhibitions/museums:

- Inventory Management
- Asset Tracking
- People Safety. People Tracking
- Access Control

## Profile of Albis Technologies AG, Zurich

Albis Technologies AG (<http://albistechnologies.com/>) is an MBO of Siemens Schweiz AG. It has been a force in the active RFID market for several years. Tens of thousands of transponders are deployed and in daily use. The business area of Zone Monitoring & Find represents one of the four strategic target markets. The ZOMOFI product line is developed and manufactured by Albis Technologies and distributed via European systems integrators.



An approximate **location of RFID** is achieved by comparing the transmission distance between reader and transponder as well through possible functional applications integrated into the transponder.

Systems that use "passive RFID" technology are the most suitable solutions for covering smaller distances (centimeters to several meters) with only a few functions integrated into the transponder. In this solution, the transponders are small, flat and inexpensive, while the required gates (readers) are more expensive. This approach is generally applied in situations in which hundreds of thousands - or millions - of transponder units are deployed.

Systems that use "active RFID" technology are generally deployed for solutions that cover greater distances (meters to hundreds of meters) with a requirement for additional functions such as location, integrated movement or temperature measurement transmission.

The far-reaching areas of application of "**active RFID**" include logistics and pallet/container/carrier management for transport companies, the automotive industry and manufacturing plants - as well as for person location in buildings and intrusion/theft detection for museums or extended control systems for companies.

Criteria that calls for "active RFID" solutions:

- Valuable, mobile goods
- Temperature-sensitive goods
- Intrusion and theft protection
- Access and parking control systems
- Security and emergency scenarios
- Location and automatic inventory

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