

# **L-SA4 Antenna**

## **User's Guide**

**Revision 1.0**

January 2007

# Publishing Information

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Document Reference: 12241A0

# Read This First

Welcome to the TAGSYS RFID System. This User's Guide is designed to help you get up and running quickly using this high-quality Radio Frequency Identification (RFID) system. It describes all you need to know about how to install and use the TAGSYS system and its associated applications.



It provides a step-by-step guide for the following procedures:

- Installation of the L-SA4 Antenna
- Configuring the product for use within your library system

This guide is designed for all TAGSYS partners and for TAGSYS Expert Network customers implementing a low-cost and high-performance RFID solution.

This document does not assume any previous knowledge of Radio Frequency Identification (RFID) technology.

## Conventions

Symbol	Meaning
	<b>CAUTION:</b> A note that advises users that a specific action could result in the loss of data or damage the hardware. <b>WARNING:</b> A note that advises users that a specific action may result in physical harm.
	A note that provides additional information that helps the user perform a task or obtain the best performance from the product.

## If you need assistance

Please contact your nearest TAGSYS sales representative or the TAGSYS welcome desk at:

Telephone: +33 (0) 4 91 27 57 00  
Fax: +33 (0) 4 91 27 57 01  
E-Mail: [info@tagsysrfid.com](mailto:info@tagsysrfid.com)  
Website: <http://www.tagsysrfid.com>

## Contact for Comments

We welcome your feedback to help us provide high quality documentation.

For technical comments, please contact our welcome desk:

Telephone: +33 (0) 4 91 27 57 00  
Fax: +33 (0) 4 91 27 57 01  
E-Mail: [info@tagsysrfid.com](mailto:info@tagsysrfid.com)

Please remember to quote the Document Reference Number **12241A0**, your job title and your company.

## Quality Issues

TAGSYS implements stringent quality controls at all stages of its manufacturing process. However, should you find a defect with this product, please notify your TagSys Quality Service representative using the dedicated Product Return Form.

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# 1 For Your Safety

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## 1.1 General Use

The L-SA4 Antenna is designed to be rugged and reliable and to provide years of trouble-free service. Please observe the following general tips:

- Take care not to scratch the device. Keep the device clean. When working with the device, use only TAGSYS-approved accessories.
- This device is not waterproof and should not be exposed to rain or moisture. Under extreme conditions, water may enter the circuitry.
- Take care not to drop the device or subject it to any strong impact.
- Protect the device from extreme temperatures.
- Do not store or use the device in any location that is extremely dusty, damp, or wet.
- Use a soft, damp cloth to clean the device. If the surface of the device becomes soiled, clean it with a soft cloth moistened with a diluted window-cleaning solution.

## 1.2 Care and Maintenance

This device is a product of superior design and should be handled with care. The suggestions below will further increase the lifetime of this device.

- Keep the device and all parts and accessories out of the reach of small children.
- Keep the device dry. Precipitation, humidity and liquids contain minerals that will corrode electronic circuits.
- Do not use or store the device in dusty, dirty areas. Its moving parts can be damaged.
- Do not store in hot areas. High temperatures can shorten the life of electronic devices, damage batteries and warp or melt certain plastics.
- Do not store in cold areas. When the device warms up (to its normal temperature), moisture can form inside the device, which may damage electronic circuit boards.
- Do not attempt to open the device. Non-professional handling of the device may damage it.
- Handle the device with care. Shocks may break internal circuit boards.
- Do not clean the device with harsh chemicals, cleaning solvents or strong detergents. Gently wipe the device with a soft cloth slightly dampened in a mild soap-and-water solution.
- Do not paint the device. Paint may clog the device's moving parts and prevent proper operation.

## 1.3 Important Safety Information

### 1.3.1 Operating Environment

Follow all special regulations that are applicable in any area and always switch off the device whenever its use is prohibited, or when it may cause interference or danger.

When connecting the device or any accessory to another device, read its user's guide for detailed safety instructions. Do not connect incompatible products.

As with all RF equipment, users are advised that the equipment should only be used in its normal operating position.



## 2 Certification

### 2.1 Occupational Health and Safety Notices

TAGSYS Products have been designed not to exceed the limits given in the European Standard EN 50364 "Limitation of human exposure to electromagnetic fields from devices used in Electronic Article Surveillance (EAS), Radio Frequency Identification (RFID) and similar applications" in conjunction with the European Standard EN 50357 describing how to evaluate the exposure level.

It is the responsibility of the TAGSYS Partner to install the L-SA4 Antenna as described in TAGSYS Product Manuals or TAGSYS Documentation and with the appropriate antennas.

Modification of any TAGSYS System is prohibited without the written consent of TAGSYS. Unauthorized modifications may void the conformity of the equipment to safety norm and will void the TAGSYS warranty.

An RF fields survey has been carried out on all the System components, in accordance with AS/NZS 2771.1: Radio Frequency Radiation, Part 1. According to this standard the maximum allowable RF exposure levels (non-occupational) at 3 kHz to 300 GHz are 200  $\mu\text{W}/\text{cm}^2$ .

### 2.2 Regulatory Notices

An RFID system typically composed of an RF emission device such as the L-SA4 Antenna is subject to national regulations that may differ by country.

One important item to consider is the maximum permissible magnetic field intensity at a distance of 10 meters from the antenna that must not exceed 42 dB $\mu\text{A}/\text{m}$  in Europe and 38 dB $\mu\text{A}/\text{m}$  in US.

The L-SA4 Antenna meets these limits.



It is the responsibility of the TAGSYS Partner to install the L-SA4 Antenna as described in this User's Guide or in TAGSYS Documentation.

#### 2.2.1 In Europe (CE and RTTE Directives)

The L-SA4 Antenna complies (CE Declaration of Conformity granted) with the European EMC directive.

The L-SA4 Antenna complies with the requirements of the Telecommunication Terminal Equipment Act (FTEG) and the RTTE Directive 1995/5/EC.

Any modification of the L-SA4 Antenna is prohibited without the written consent of TAGSYS. Unauthorized modifications may void the conformity of the equipment to CE and RTTE Directives and will void the TAGSYS warranty.



If a L-SA4 Antenna is further integrated in a different product, it is the responsibility of the manufacturer of this complementary product to obtain the required approvals for this product.

#### 2.2.2 In USA (FCC Directive)

The L-SA4 antenna has been designed to comply with Part 15 of the FCC Rules when used with LP-101 reader. The certified base configuration is L-SA4 connected to the LP101 reader which

have been successfully tested with Part 15 of the FCC rules (FCC ID Number: QHKLIBREADERLP101).

## **L-P101**

### **WARNING TO USERS IN THE UNITED STATES** **FEDERAL COMMUNICATIONS COMMISSION (FCC) RADIO** **INTERFERENCE STATEMENT 47 CFR Section 15.105(b)**

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and if not installed and used in accordance with the instructions may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different to that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

### **NO UNAUTHORIZED MODIFICATIONS**

47 CFR Section 15.21

**CAUTION:** This equipment may not be modified, altered, or changed in any way without signed written permission from TAGSYS SA. Unauthorized modification may void the equipment authorization from the FCC and will void the TAGSYS warranty.

### **ANTENNA REQUIREMENT**

47 CFR Section 15.203

**CAUTION:** This equipment must be professionally installed. The installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded. Non-professional installation or installation of the equipment with an improper antenna may void the equipment authorization from the FCC and will void the TAGSYS warranty.

The L-P101 has been designed to comply with FCC 47 CFR Part 15 Rules to apply with the Aero-LI, L-SA3 and L-SA4 antennas.

Operation is subject to the following two conditions: (1) The system devices may not cause harmful interference, and (2) The library system devices must accept any interference received, including interference that may cause undesired operation.

## **2.2.3 In Canada**

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

## 2.3 RoHS and WEEE Directives

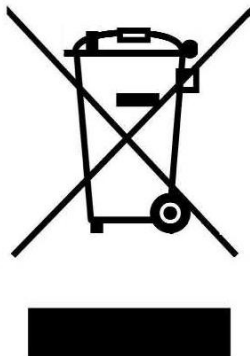
### 2.3.1 RoHS (Restriction of the uses of certain Hazardous Substances)

TAGSYS certifies that the L-SA4 antenna is compliant with the European Directive 2002/95/EC for the restriction in Electric and Electronic Equipments (RoHS) of the use of the following hazardous substances:

- Lead
- Mercury
- Cadmium
- Hexavalent Chromium
- Polybrominated biphenyl flame retardants
- Polybrominated diphenyl ether flame retardants

This declaration is based on information provided by our suppliers and subcontractors.

### 2.3.2 WEEE (Waste Electrical and Electronic Equipment)



This product bears the selective sorting symbol for waste electrical and electronic equipment (WEEE)

This means that this product must be handled pursuant to European Directive 2002/96/EC in order to be recycled or dismantled to minimize its impact on the environment.

For further information, please contact your local or regional authorities.

## 3 Overview

This antenna is composed of a PCB located on a ferrite support, providing a large area of detection ([Figure 1](#)). The L-SA4 Antenna is optimized for use with the TAGSYS L-L100 Library reader and is recommended for check in/out operations.

Due to its specific design, the L-SA4 Antenna can be safely used in proximity with other TAGSYS RFID products. It will work also, if properly installed, in metallic-type environments (see [Section 4, "Installation"](#) for more details). In this case, performance may be reduced.

The antenna is provided with rubber base pads for installation in a standard desktop configuration.

Although this antenna has been specifically designed for library applications, it can also be used for any application requiring a desktop station which has a good immunity to its environment.

The antenna has been factory calibrated to an impedance of 50  $\Omega$  which offers optimal performance when the antenna is installed on the surface of a desk or table.

It may be necessary to retune the antenna once installed if the environment is highly metallic or if the antenna is installed underneath the table or desk. For more information about tuning antennas, refer to [Section 6.2, "Antenna Tuning"](#).

Optimal performance is achieved when the smart labels to be read are placed parallel to the antenna surface and centered on the antenna surface.

**Figure 1: L-SA4 Antenna**



### 3.1 Delivery Kit

The items listed in [Table 1](#) are included in the delivery kit.

**Table 1: Contents of the Delivery Kit**

Quantity	Description
1	L-SA4 Antenna with 1 coaxial cable 6m long and fitted with 4 ferrite beads
1	Mounting Kit including 4 brackets and associated screws and nuts
1	CD-ROM including user documentation, product software and example application

## 4 Installation

### 4.1 Standard Installation

The recommended installation for the L-SA4 Antenna is the desktop configuration. Its thin shape is ergonomically designed for discreet use at the circulation desk for multiple check in/out operations.

The L-SA4 Antenna is designed for indoor use.

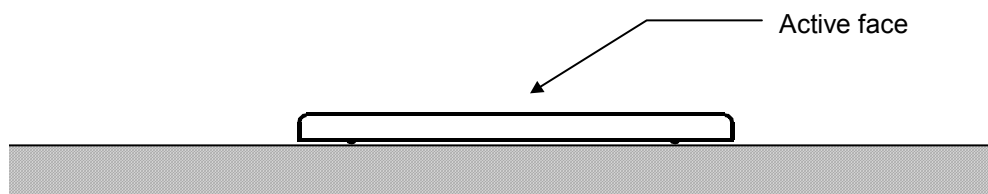
### 4.2 Desktop Configuration

The antenna is specially designed to operate:

- On wooden, synthetic or metallic desks (or those including metallic parts),
- In close proximity to other antennas.

Place the antenna on the desk and connect the BNC connector to the RF output of the LP-101 Library Reader.

**Figure 2: Standard Desktop Installation**



**CAUTION:** Always ensure that the reader unit is switched off before connecting or disconnecting the antenna. Also, the antennas **MUST** be connected to the reader unit before it is switched on.



For optimum performance, always ensure that all metallic or conductive parts are located under the antenna.

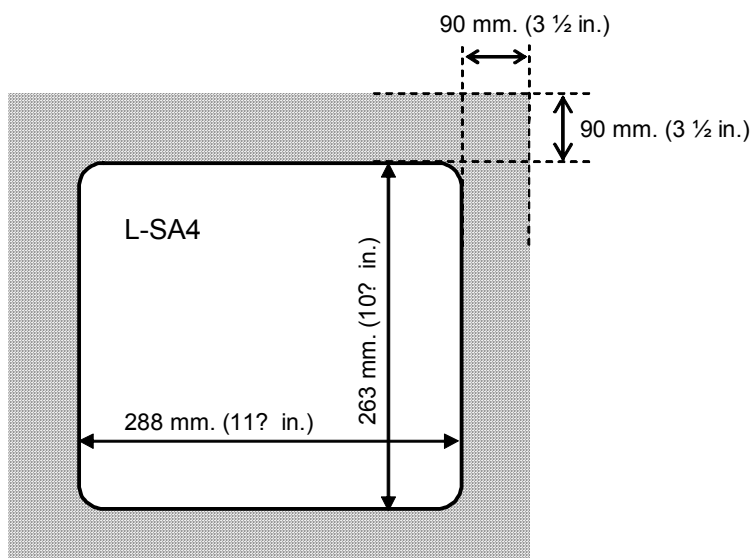
Do not shorten or extend the supplied cable as this may affect performance.

Do not place the antenna cable close to other cables, especially power cables.

### 4.3 Active Area in Desktop Configuration

Due to the magnetic field radiated by the antenna, a restricted area must be preserved around the antenna to prevent unwanted reading or programming tags during check in and check out operations.

Items must be kept out from the limited active area as shown in [Figure 3](#).

**Figure 3: Active Area in Standard Configuration**

## 4.4 Specific Installation using the Mounting Kit

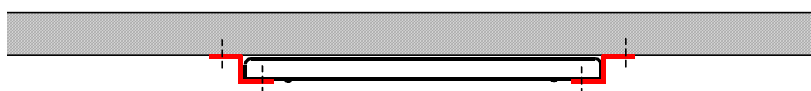
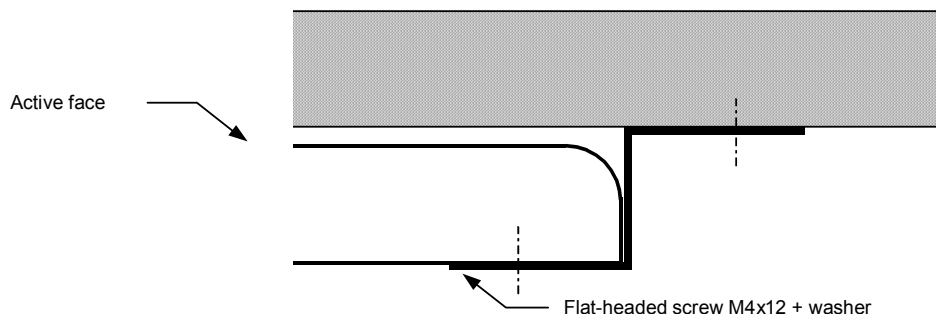
The L-SA4 Antenna is provided with a mounting kit for specific installations. This mounting kit can be used to orient the active face of the antenna depending your application.



Metallic or conductive parts must not be present in front of the active face of the antenna.

For best performance, always request an installation compliance agreement from TAGSYS Custom Services regarding your specific installation.

The TAGSYS Antenna Tuning Kit Device may be required to verify the tuning of antennas for a specific installation.

**Figure 4: Using the Mounting Kit (Overview)****Figure 5: Using the Mounting Kit (Close-up View)**

This configuration reduces reading or writing performance (distance). For optimum performance, the antenna must be placed above the desk and not underneath.

Always ensure that metallic or conductive parts are located under the antenna.

## 5 Operation

L-SA4 antenna can be set-up in several different ways. The antenna configuration and the choice of its components depend on the individual library.

The L-SA4 antenna operates best when connected to the LP-101 Library Smart Label Reader for library applications.

- Minimum book thickness of 15 mm.
- Maximum stack height of 150 mm with a maximum of 5 books.
- 4 different tagging positions

Performance is based on these parameters and may vary in function of the operating conditions.



These tests have been performed using books and CDs/DVDs with Folio 370 tags only. If CD tags are used, we recommend spreading CDs/DVDs over the antenna area with minimum overlapping of items as the metallic content of CDs/DVDs may prevent correct tag reading by the antenna. We recommend use of BiblioDiscpack® and/or SCANAVO® for up to 4 CDs/DVDs.

**Table 2: Minimum Antenna Performance**

Parameter	L-SA4
Using a single Folio 370 tag	6 in. (150 mm.)
CDs/DVDs with 370 CD tag	4 in. (100 mm.)
Folio 370 ISO	7 in (175 mm.)

These performances have a minimum achievable. According to operating conditions they will improve.



According to the thickness and coverage metallization of the CDs/DVDs performance will be reduced especially when dealing with multiple CDs/DVDs packs.

## 6 Maintenance

### 6.1 Servicing the L-SA4 Antenna



**CAUTION:** The L-SA4 Antenna contains no operator serviceable parts and must only be serviced by qualified personnel.

No regular servicing is required, except for keeping the unit clean.

It is recommended that the antenna unit be inspected at least once per year by an approved TAGSYS technical representative.

### 6.2 Antenna Tuning

When the L-SA4 antenna is installed underneath the table or desk with the supplied mounting kit, the reading performances can be significantly reduced. If this happens, it means that the table or the desk contains metallic parts or other magnetically conductive materials.

In such cases, it is strongly recommended to use a different table made of a different material that does not present such attenuation, or to change the location of the antenna under the table.

If this is not possible, the antenna may be re-tuned for a limited range with an aim to improve the reading range.

To re-tune the antenna, you have to use the TAGSYS Antenna Tuning Kit and perform the procedure described in the TAGSYS Antenna Tuning Kit documentation. The tuning capacitor of the L-SA4 antenna is accessible from the bottom side of the antenna and is located under the TAGSYS logo located at the top left corner of the label which specifies the product type and serial number (Figure 6).

Two separate tuning capacitors are used to tune both phase and amplitude of the antenna signal.



Optimum tuning and electrical cable length are necessary to allow multiple CDs/DVDs operation.

**Figure 6: Position of the Tuning Capacitor on L-SA4 Antenna**



When re-tuning the antenna, please turn the tuning capacitor with care.



Any re-tuning of the antenna will damage the label but will not void the warranty of the L-SA4 antenna provided the tuning procedure defined in the antenna tuning kit has been followed.

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**CAUTION:** When retuning the antenna, make sure that the antenna is not connected to the reader and that the reader is switched off.

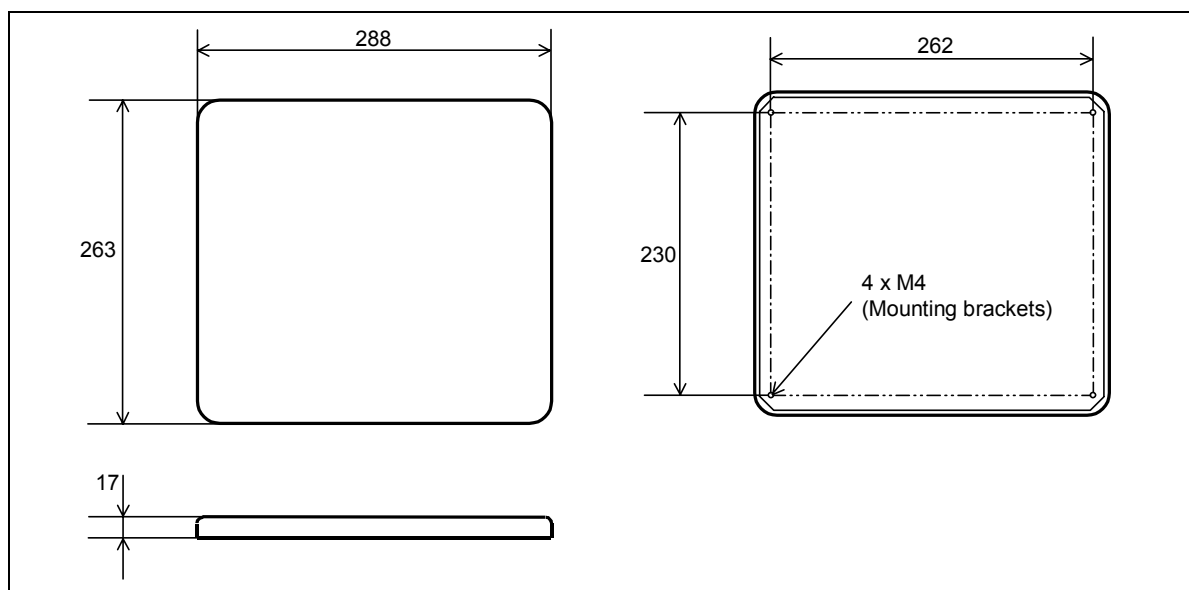
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## 7 Technical Data

### 7.1 Mechanical Characteristics

Description	Value
Housing	Blue Plastic ABS UL 94-V0
Dimensions (with Cover)	288 x 263 x 17 mm. (11 $\frac{1}{3}$ x 10 $\frac{1}{3}$ x $\frac{2}{3}$ in.)
Weight	2.0 kg. (4.4 lb.)
Color	Pantone P536 Blue
Protection Class	IP 21
Operating Temperature	0 °C to 55 °C (32 °F to 131 °F)
Storage Temperature	-25 °C to +60 °C (-13 °F to 140 °F)

**Figure 7: L-SA4 Antenna Dimensions (in millimeters)**



### 7.2 Electrical Characteristics

Description	Value
Maximum Input Power	1.2 W
Operating Frequency	13.56 MHz
Antenna Connection	50-Ω BNC Connection
Impedance	50 ± 5 Ω and 0 ± 5 °
Typical Performances (*)	Reading: 6 in. (150 mm.)

(\*) Tests results in laboratory with LP-101 Library reader and a Folio 370 F3 smart label in standard desktop configuration.

For multiple book transactions (1 stack of 4 books), optimal performance will be reached under the following conditions:

- Minimum book thickness of 15 mm.
- Maximum stack height of 150 mm.
- 4 different tagging positions applied

## 8 Warranty Conditions

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### 8.1 Warranty

TAGSYS warrants that its L-SA4 Antenna (Product) shall comply with the functional specifications set forth herein for a period of one year from the date of delivery to the Buyer.

This warranty is valid for the original Buyer of the Product and is not assignable or transferable to any other party.

TAGSYS cannot be responsible in any way for, and disclaims any liability in connection with the operation or performance of:

- any product in which the Product is incorporated;
- any equipment not supplied by TAGSYS which is attached to or used in connection with the Product;
- the Product with any equipment.

This warranty only applies to the Product and excludes all other equipment.

Optimal operation and performance of the Product are obtained by using TAGSYS' readers, by applying TAGSYS installation guidelines and by having your installation reviewed by a TAGSYS' technical consultant.

The TAGSYS warranty does not cover the installation, maintenance or service of the Product and is strictly limited to the replacement of Products considered as defective by TAGSYS and returned according to the return procedure defined below; in such case, TAGSYS will, at TAGSYS' option, either replace every defective Product by one new Product or refund the purchase price paid by Buyer to TAGSYS for the defective Product.

#### 8.1.1 Warranty Exclusions

The following conditions are not covered under the warranty:

- Defects or damages resulting from storage of the Product under conditions that do not comply with TAGSYS specifications or normal usage.
- Defects or damages resulting from use of the Product in abnormal conditions (abnormal conditions being defined as any conditions exceeding the ones stated in the product specifications).
- Defects or damages from misuse, accident or neglect.
- Defects from improper testing, operation, maintenance or installation.
- Defects from alteration, modification except modifications or adjustments specifically described in this Product reference guide, adjustment or repair, or any attempt to do any of the foregoing, by anyone other than TAGSYS.
- Any action on the product that prevents TAGSYS to perform an inspection and test of the Product in case of a warranty claim.
- Tampering with or abuse of the Product.
- Any use or incorporation by the Buyer or a third party of TAGSYS' Product into life saving or life support devices or systems, or any related products; TAGSYS expressly excludes any liability for such use.

### **8.1.2 General Provisions**

This warranty sets forth the full extent of TAGSYS responsibility regarding the Product.

In any event, TAGSYS warranty is strictly limited to (at TAGSYS' sole option) the replacement or refund of the Products purchase price to TAGSYS, of Products considered as defective by TAGSYS.

The remedy provided above is in lieu and to the exclusion of all other remedies, obligations or liabilities on the part of TAGSYS for damages, whether in contract, tort or otherwise, and including but not limited to, damages for any defects in the Products or for any injury, damage, or loss resulting from such defects or from any work done in connection therewith or for consequential loss, whether based upon lost goodwill, lost resale profits, impairment of other goods or arising from claims by third parties or otherwise.

TAGSYS disclaims any explicit warranty not provided herein and any implied warranty, guaranty or representation as to performance, quality and absence of hidden defects, and any remedy for breach of contract, which but for this provision, might arise by implication, operation of law, custom of trade or course of dealing, including implied warranties of merchantability and fitness for a particular purpose.

### **8.1.3 How to Return Defective Products**

The Buyer shall notify TAGSYS of the defects within 15 working days after the defects are discovered.

Defective Products must be returned to TAGSYS after assignment by a TAGSYS Quality Department representative of an RMA (Return Material Authorization) number. No Products shall be returned without their proof of purchase and without the acceptance number relating to the return procedure.

All Products shall be returned with a report from the Buyer stating the complete details of the alleged defect.

Call +33 4 91 27 57 36 for return authorization and shipping address.

If returned Products prove to be non-defective, a charge will be applied to cover TAGSYS' analysis cost and shipping costs.

If the warranty does not apply for returned Products (due to age, or application of a warranty exclusion clause), a quote for replacement will be issued, and no replacement will be granted until a valid purchase order is received. If no purchase order is received within 30 days after the date of TAGSYS quote, TAGSYS will return the products and charge the analysis cost and shipping costs.

All replaced Products shall become the property of TAGSYS.

The Product Return Form is included on the following page. This form should accompany any product you need to return to TAGSYS for analysis in the event of a problem.

# Product Return Form

**Customer Profile:**

Company: .....  
Address: .....  
.....  
City & State: .....  
Zip Code: .....  
Country: .....

Contact Name: .....  
Contact e-mail: .....  
Contact Phone: .....  
Contact Fax: .....

**Order identification:**

Product Name: .....  
Order Number (OEF): .....

Invoice Number: .....  
Return Quantity: .....

**Reason for return:**

.....  
.....  
.....  
.....  
.....

**To inform TAGSYS of this return, please email it to**

[RMA@tagsysrfid.com](mailto:RMA@tagsysrfid.com)

**Address to ship the product with this document attached:**

TAGSYS  
QUALITY DEPARTMENT  
180, chemin de Saint Lambert  
13821 La Penne sur Huveaune France

To inform TAGSYS of this return, please also fax it to your Customer Service Representative  
+33 491-275-701

**Return Procedure:**

The product returned will go through stringent quality controls.  
A final analysis report will be sent to you as soon as possible.  
Please contact your Quality Service representative for further details.

+33 491-275-736



This product bears the selective sorting symbol for waste electrical and electronic equipment (WEEE)

This means that this product must be handled pursuant to European Directive 2002/96/EC in order to be recycled or dismantled to minimize its impact on the environment.

For further information, please contact your local or regional authorities.