

# Medio L400

## User's Guide

Revision 3.1



July 2010

# Publishing Information

## Disclaimer and Limitation of Liability

All information herein is either public information or is the property of and owned solely by TAGSYS who shall have and keep the sole right to file patent applications or any other kind of intellectual property protection in connection with such information.

Nothing herein shall be construed as implying or granting to you any rights, by license, grant or otherwise, under any intellectual and/or industrial property rights of or concerning any of TAGSYS' information.

This document can be used for informational, non-commercial, internal and personal use only provided that:

- The copyright notice below, the confidentiality and proprietary legend and this full warning notice appear in all copies.
- This document shall not be posted on any network computer or broadcast in any media and no modification of any part of this document shall be made.

Use for any other purpose is expressly prohibited and may result in severe civil and criminal liabilities.

The information contained in this document is provided "AS IS" without any warranty of any kind. Unless otherwise expressly agreed in writing, TAGSYS makes no warranty as to the value or accuracy of information contained herein. The document could include technical inaccuracies or typographical errors. Changes are periodically added to the information herein. Furthermore, TAGSYS reserves the right to make any change or improvement in the specifications data, information, and the like described herein, at any time.

Therefore TAGSYS assumes no liability and is not responsible for customer applications or product or software which includes TAGSYS products.

**TAGSYS HEREBY DISCLAIMS ALL WARRANTIES AND CONDITIONS WITH REGARD TO THE INFORMATION CONTAINED HEREIN, INCLUDING ALL IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, TITLE AND NON-INFRINGEMENT. IN NO EVENT SHALL TAGSYS BE LIABLE, WHETHER IN CONTRACT, TORT OR OTHERWISE, FOR ANY INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES OR ANY DAMAGES WHATSOEVER INCLUDING BUT NOT LIMITED TO DAMAGES RESULTING FROM LOSS OF USE, DATA, PROFITS, REVENUES, OR CUSTOMERS, ARISING OUT OF OR IN CONNECTION WITH THE USE OR PERFORMANCE OF INFORMATION CONTAINED IN THIS DOCUMENT.**

TAGSYS does not and shall not warrant that this product/system/equipment will be resistant to all possible attacks, and shall not incur, and disclaims, any liability in this respect. Even if each product is compliant with current security standards in force on the date of their design, security mechanisms' resistance necessarily evolves according to the state-of-the-art in security and notably under the emergence of new attacks. Under no circumstances shall TAGSYS be held liable for any third party actions, and in particular in case of any successful attack against systems or equipment incorporating TAGSYS products.

TAGSYS disclaims any liability with respect to security for direct, indirect, incidental or consequential damages that result from any use of its products. It is further stressed that independent testing and verification by the person using the product is particularly encouraged, especially in any application in which defective, incorrect, or insecure functioning could result in damage to persons or property, denial of service, or loss of privacy.

© 2000-2010 TAGSYS. All rights reserved.

Microsoft, Visual C++, Windows, and Windows NT are either registered trademarks or trademarks of Microsoft Corporation in the U.S.A. and/or other countries.

I-Code is a registered trademark of Philips.

Tag-It is a registered trademark of Texas Instruments.

TAGSYS and E-connectware are registered trademarks of TAGSYS

Printed in France.

TAGSYS – 785 Voie Antiope, Athéla III, 13600 La Ciotat, France.

Tel: +33 (0) 4.42.18.89.00 / Fax: +33 (0) 4.42.18.89.01

Document Reference: DOC12451C1

# Read This First

Welcome to the TAGSYS range of products operating at the 13.56 MHz frequency. This range of products is used to implement high-quality RFID systems for demanding applications.

This document provides information about how to install and use the Medio L400 reader.

## Audience

This document requires familiarity with RFID technology. It is intended for people in charge of installing and using the product.

## 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 performs a task or obtains 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 42 18 89 00

Fax: +33 (0) 4 42 18 89 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 42 18 89 00

Fax: +33 (0) 4 42 18 89 01

E-Mail: [info@tagsysrfid.com](mailto:info@tagsysrfid.com)

Please remember to quote the Document Reference Number **DOC12451C1**, 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.

Telephone: +33 (0) 4 42 18 89 36

Fax: +33 (0) 4 42 18 89 01

## Table of Contents

<b>PUBLISHING INFORMATION</b>	<b>2</b>
DISCLAIMER AND LIMITATION OF LIABILITY	2
<b>READ THIS FIRST</b>	<b>3</b>
AUDIENCE	3
CONVENTIONS	3
IF YOU NEED ASSISTANCE	3
CONTACT FOR COMMENTS	3
QUALITY ISSUES	4
<b>1 FOR YOUR SAFETY</b>	<b>7</b>
1.1 GENERAL USE	7
1.2 CARE AND MAINTENANCE	7
1.3 IMPORTANT SAFETY INFORMATION	8
1.3.1 OPERATING ENVIRONMENT	8
<b>2 CERTIFICATION</b>	<b>9</b>
2.1 OCCUPATIONAL HEALTH AND SAFETY NOTICES	9
2.2 REGULATORY NOTICES	9
2.2.1 IN EUROPE (CE AND RTTE DIRECTIVES)	9
2.2.2 FCC ID CROSS REFERENCE TABLE	10
2.2.3 IN USA (FCC DIRECTIVE)	13
2.2.4 IN CANADA	14
2.3 ROHS AND WEEE DIRECTIVES	14
2.3.1 ROHS (RESTRICTION OF THE USES OF CERTAIN HAZARDOUS SUBSTANCES)	14
2.3.2 WEEE (WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT)	14
<b>3 OVERVIEW</b>	<b>15</b>
3.1 KEY FEATURES	16
3.2 DELIVERY	16
3.3 PHYSICAL DESCRIPTION	17
3.3.1 FRONT PANEL	17
3.3.2 REAR PANEL	20
<b>4 INSTALLATION</b>	<b>21</b>
4.1 MECHANICAL ASPECTS	21
4.2 CABLING REQUIREMENTS	21
4.3 USING USB INTERFACE	22
4.3.1 INSTALLING USB DRIVERS	22
4.3.2 USING THE USB INTERFACE	22
4.4 USING RS-232 INTERFACE	22
4.5 USING 10/100 ETHERNET INTERFACE	22

4.6 RESTORING FACTORY CONFIGURATION	23
4.7 RUNNING TAGSYS EXPLORER FOR THE FIRST TIME	23
4.7.1 INSTALLING TAGSYS EXPLORER	23
4.7.2 CONNECTING TO A DEVICE USING TAGSYS EXPLORER WIZARD	25
4.7.3 READING THE UID OF ISO 15693 TAGS	31
4.7.4 READING AND WRITING ISO 15693 TAG MEMORY	32
4.7.5 UPGRADING SYSTEM OR RADIO FIRMWARE	33
<b>5 ADVANCED NOTIONS</b>	<b>36</b>
5.1 READER ARCHITECTURE	36
5.2 READER TO HOST PROTOCOLS	37
5.2.1 TAGSYS STXNG	37
5.2.2 HEARTBEAT	37
5.2.3 TELNET	38
5.2.4 SERIAL CONSOLE	38
5.2.5 STANDALONE MODE	39
5.3 READER OPERATION PRINCIPLES	39
5.3.1 NOTION OF READ MODES	39
5.3.2 NOTION OF EVENTS	40
<b>6 TECHNICAL SPECIFICATIONS</b>	<b>42</b>
6.1 TECHNICAL DATA	42
6.2 MECHANICAL DATA	43
6.3 RS232 CONNECTOR	44
6.4 GPIO CONNECTOR	45
6.4.1 PIN ASSIGNMENT	45
6.4.2 ELECTRICAL CHARACTERISTICS	45
6.4.3 USING INPUTS	45
6.4.4 USING OUTPUTS	47
<b>7 WARRANTY CONDITIONS</b>	<b>48</b>
7.1 WARRANTY	48
7.2 WARRANTY EXCLUSIONS	48
7.2.1 GENERAL PROVISIONS	49
7.2.2 HOW TO RETURN DEFECTIVE PRODUCTS	49

# 1 For Your Safety

## 1.1 General Use

The Medio L400 reader is designed to be reliable and to provide continuous, 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.
- Protect the device from extreme temperatures. For example, do not place the device in a windowed area where the sun may cause extreme temperatures, and keep it away from heaters and other heat sources.
- 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 should be handled with care. The suggestions below will 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 and will void the TAGSYS warranty.
- Handle the device with care. Shock and vibration 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. Paint with metallic contents may limit device performances.
- If the device or any accessory are not working properly, take it to your nearest qualified TAGSYS representative.

## 1.3 Important Safety Information

### 1.3.1 Operating Environment

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 mode described in this document.

## 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 Medio L400 as described in 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 standards and will void the TAGSYS warranty.

An RF fields survey has been carried out on all the TAGSYS 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  $\mu$ W/cm<sup>2</sup>.

### 2.2 Regulatory Notices

An RFID system typically composed of an RF emission device such as the Medio L400 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 $\mu$ A/m in Europe and 38 dB $\mu$ A/m in US.

The Medio L400 meets these limits.



It is the responsibility of the TAGSYS Partner to install the Medio L400 as described in this User's Guide or in TAGSYS Documentation.

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

The Medio L400 complies (CE Declaration of Conformity granted) with the European EMC directive.

The Medio L400 complies with the requirements of the Telecommunication Terminal Equipment Act (FTEG) and the RTTE Directive 1995/5/EC.

It is the responsibility of the TAGSYS Reseller to install the Medio L400 as described in this Reference guide or TAGSYS Documentation.

Any modification of the Medio L400 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 Medio L400 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 FCC ID Cross Reference Table

It is the responsibility of the TAGSYS Partner to install the Medio L400 as described in the table below, taking care of only installing the right antenna configuration with the right power settings.

**Table 1: Medio L400-2 FCC ID Cross reference Table**

Antenna	Outside Dimension	Channel Setting	Multiplexer	Max. Output Power	Power Supply	FCC ID
Aero LB Antenna	250X250	Single Channel	No	4W 	FDF0453-A FRA045E-S24-4 A2-50S18R-V	QHKMEDIOL400CHAN2
Aero LC Antenna	400X500	Single Channel	No	2W 	FDF0453-A FRA045E-S24-4 A2-50S18R-V	QHKMEDIOL400CHAN2
TR-HA1 Antenna	200X100	Single Channel	No	2W	FDF0453-A FRA045E-S24-4 A2-50S18R-V	QHKMEDIOL400CHAN2
TR-SA1 Antenna	400X500	Single Channel	No	2W	FDF0453-A FRA045E-S24-4 A2-50S18R-V	QHKMEDIOL400CHAN2
L-SA3 Antenna	250X330	Single Channel	No	1.5W	FDF0453-A FRA045E-S24-4 A2-50S18R-V	QHKMEDIOL400CHAN2
L-SA4 Antenna	220X220	Single Channel	No	1W	FDF0453-A FRA045E-S24-4 A2-50S18R-V	QHKMEDIOL400CHAN2
Aero LI Antenna	250X250	Single Channel	No	1W	FDF0453-A FRA045E-S24-4 A2-50S18R-V	QHKMEDIOL400CHAN2
MAT Antenna	130X480	Single Channel	No	4W	FDF0453-A FRA045E-S24-4 A2-50S18R-V	QHKMEDIOL400CHAN2
Aero R200/300	200X300	Single Channel	No	4W 	FDF0453-A FRA045E-S24-4 A2-50S18R-V	QHKMEDIOL400CHAN2



To comply with band edge regulation, when used in vertical upright position the Aero LB and Aero LC antennas can read tags in the following RFID uplink protocols configurations



To comply with band edge regulation, when reading ISO15693 tags in vertical upright position the Aero R200/300 antenna can read tags in the following RFID uplink protocols configurations

**Table 2: Medio L400-4 FCC ID Cross reference Table**

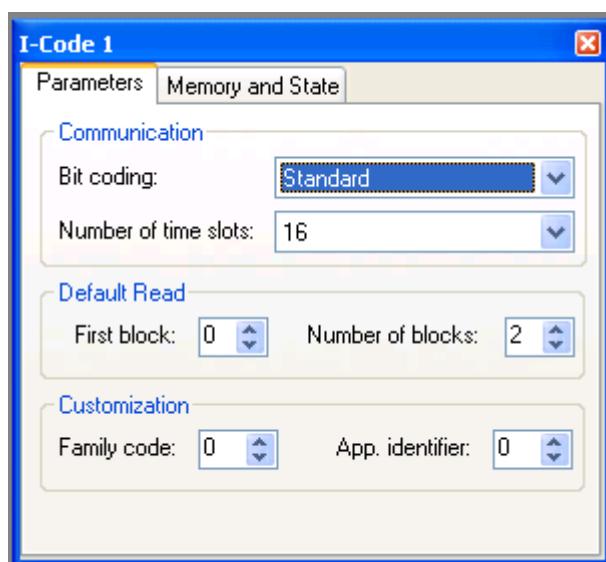
Antenna	Outside Dimension	Channel Setting	Multiplexer	Max. Output Power	Power Supply	FCC ID
TR-CAU Antenna	170X900	Quad-Channel	Yes	2W 	FDF0453-A FRA045E-S24-4 A2-50S18R-V	QHKMEDIOL400CHAN4
Aero LB Antenna	250X250	Quad-Channel	Yes	2W 	FDF0453-A FRA045E-S24-4 A2-50S18R-V	QHKMEDIOL400CHAN4
Tunnel antenna	500X500	Quad-Channel	Yes	2W	ABL 7RM24025	QHKMEDIOL400CHAN4
SCH400	300x300	Dual-Channel	Yes	2.5W	FDF0453-A FRA045E-S24-4 A2-50S18R-V	QHKMEDIOL400CHAN4



To comply with band edge regulation, when used in vertical upright position the Aero LB antenna can read tags in the following RFID uplink protocols configurations

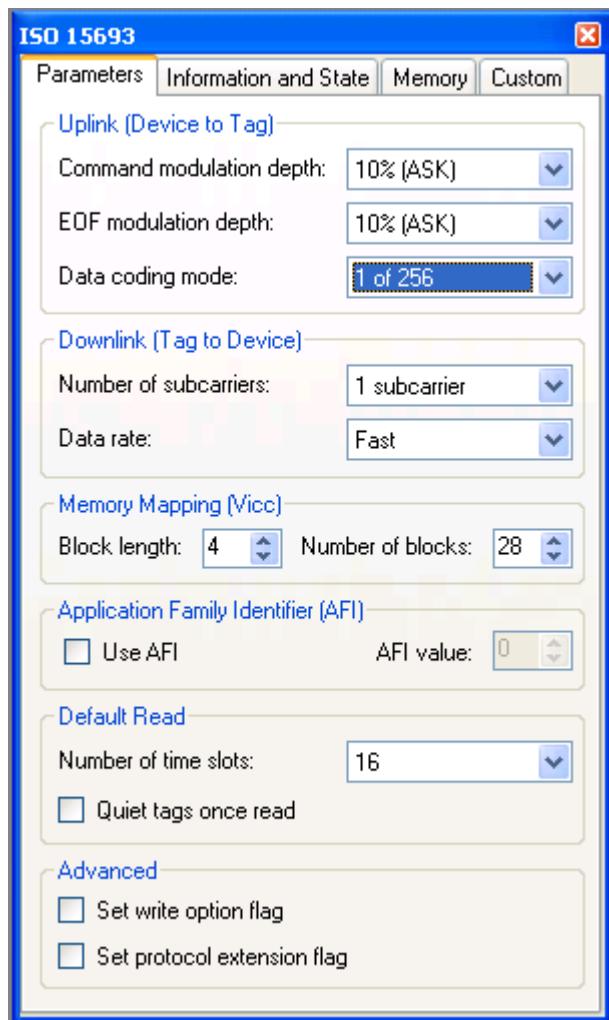


To comply with band edge regulation, when reading ISO15693 tags TR-CAU antenna can read tags in the following RFID uplink protocols configurations



In I-Code 1 (C270) parameters window set the uplink parameters as follow:

Bit Coding: "Standard" (1 out of 256 pulse)



In ISO15693 Parameters window set the uplink parameters as follow:

Command modulation depth: 10% (ASK)

EOF modulation depth: 10% (ASK)

Data coding mode: 1 of 256

### 2.2.3 In USA (FCC Directive)

The Medio L400 has been designed to comply with Part 15 of the FCC Rules. Furthermore typical configurations listed in section 2.2.2 have been successfully tested with Part 15 of the FCC rules (FCC ID Numbers are listed on all system-mounted TAGSYS Antennas).

#### Medio L400-2 and Medio L400-4

##### *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.

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

## 2.2.4 In Canada

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropic radiated power (e.i.r.p) is no more than that permitted for successful communication.

The Medio L400-2 device has been designed to operate with the antennas listed below, and having a maximum gain of -25 dBi. Antenna not included in this list or having a gain greater than -25 dBi are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.

Aero LB and Aero LC antennas meet this requirement with a gain less than -25dBi.

## 2.3 RoHS and WEEE Directives

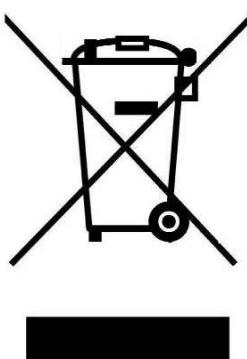
### 2.3.1 RoHS (Restriction of the uses of certain Hazardous Substances)

TAGSYS certifies that this product 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

The Medio L400 is a long-range 13.56MHz RFID reader intended for RFID applications requiring a high performance, long range RFID infrastructure.

The L400 uses advances in Digital Signal Processing (DSP) and RF Front End technology to achieve breakthrough performance in read range and read speed with industry leading signal to noise ratio. The L400 has been specifically designed to operate in noisy environments such as manufacturing plants and distribution facilities while maintaining the highest levels of data integrity for item level track and trace, inventory management and security. Designed as a network device, the L400 conserves critical network bandwidth by filtering tag data to remove redundancies before transmitting to enterprise systems.

With breakthrough sensor technology and self diagnostic capability, the L400 is the industry's first self-correcting intelligent RFID reader. The L400 can be remotely managed and administered to ensure you get the highest levels of performance from your RFID infrastructure. The L400 and e-connectware, TAGSYS' comprehensive set of management and administrative tools, create an intelligent platform to allow you to manage your RFID infrastructure just as you do a voice or data network to enable scalable, secure and persistent RFID Quality of Service.

## 3.1 Key Features

**Table 3: Medio L400 Key Features**

<b>Description</b>	Medio L400
Operating Frequency	13.56 MHz
Chip Compatibility	C210 C220 ISO15693 ISO18000-3 Mode 1 C370 (I-Code SLI) C370L (I-Code SLI-L) C370S (I-Code SLI-S) C270 (I-Code 1) I-Code ePC I-Code UID Upgradable to the anticipated EPCglobal HF Gen2 Standard
Number of channels	2 (Medio L400-2) 4 (Medio L400-4)
RF Output Power	500mW to 5W (+/- 10%)
Communication Interfaces	RS232 (up to 115200 bauds) USB 1.1 10/100 Ethernet
Communication Protocols	TAGSYS StxNG Telnet & Serial Console Standalone Mode Heartbeat
I/O Ports (GPIO)	4 Inputs 4 Outputs
User Interface	LCD Screen With Backlight (2x16 Characters) Keypad (Up, Down, Select)
Remote Monitoring	Many health indicators are remotely accessible, such as : <ul style="list-style-type: none"> <li>. System uptime,</li> <li>. Read/Write count (per channel),</li> <li>. RF power amplifiers consumption,</li> <li>. RF power amplifiers operating temperature,</li> <li>. Antennas tuning status,</li> <li>. Real-time Raw signal capture, ...</li> </ul>
Firmware	Remotely upgradeable

## 3.2 Delivery

The Medio L400 reader kit contains the following items:

**Table 4: Package Contents**

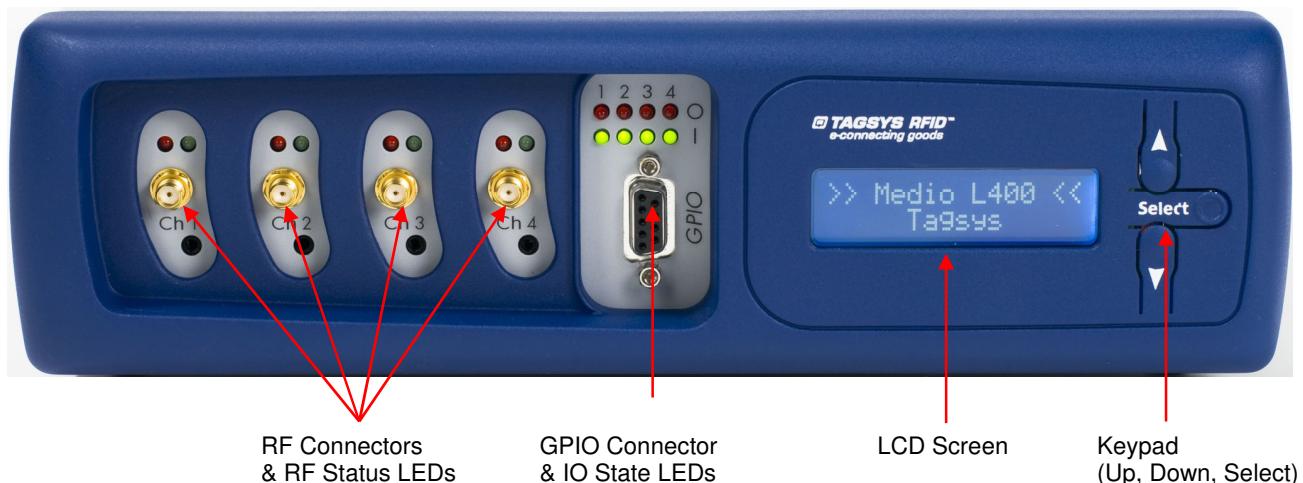
Quantity	Item
1	Medio L400-2 or Medio L400-4 reader
2 (Medio L400-2) 4 (Medio L400-4)	SMA/BNC adapter
1	USB cable
1	24 V power supply
2	CD-ROMs : <ul style="list-style-type: none"> <li>• Medio L400 User's Guide &amp; Designer's guide</li> <li>• USB Drivers for Windows® 2000, 2003, XP, Vista &amp; Seven</li> <li>• Tagsys Explorer software (reader configuration and upgrade on Windows® 9x, NT®, 2000, XP, Vista &amp; Seven platforms)</li> <li>• Software development kits (SDKs) including documentation and sample codes (Win32 Native DLL, .NET component, JAVA archive)</li> </ul>
1	Welcome Letter / Product Return Form

### 3.3 Physical Description

#### 3.3.1 Front Panel

The front panel is dedicated to RF & I/O connectors as well as a LCD & Keypad.

**Figure 1: Front panel**



- **RF connectors and status LEDs :**

The Medio L400 can handle up to 2 (Medio L400-2) or 4 (Medio L400-4) antennas. The connectors provided are SMA (SMA/BNC adapters are supplied with the reader). RF output power is software selectable from 500mW to 5W (+/- 10%) in 250mW increments.

Two LEDs indicate current RF channel status (see [Table 5](#))

**Table 5: RF Status LEDs Description**

Green	Red	Description
OFF	OFF	RF field is OFF.
ON	OFF	RF field is ON and channel antenna tuning and operating temperature are correct.
ON	BLINKING	RF field is ON but channel is close to maximum operating temperature.
ON	ON	RF field is ON but channel antenna tuning is incorrect. Check antenna.
OFF	ON	RF field was ON but was automatically turned OFF to protect reader's hardware because a major antenna failure was detected (such as open-circuit or short circuit).
OFF	BLINKING	RF field was ON but was automatically turned OFF to protect reader's hardware because channel exceeded maximum operating temperature.

- **GPIO connector and status LEDs :**

A Female DB-9 connector on the reader's front panel implements 4 digital inputs and 4 digital outputs (N-Channel Open Drain). Please see [Technical Specifications section](#) for more details.

Four red LEDs (one for each output) indicate the current outputs state, see [Table 6](#)

**Table 6: Outputs State LEDs description**

Red	Description
OFF	Corresponding output is OFF.
ON	Corresponding output is ON and properly operating.
BLINKING	Corresponding output was ON but was automatically turned OFF to protect the reader's hardware because an overload condition was detected.

Four green LEDs (one for each input) indicate current inputs state (see [Table 7](#))

**Table 7: Inputs State LEDs description**

Green	Description
OFF	Corresponding input is OFF (low level).
ON	Corresponding input is ON (high level). This is default state when nothing is connected to the inputs (inputs have internal 3.3V pull-up resistors).

- **LCD and Keypad :**

A LCD and Keypad are available on the reader's front panel. They can be used to display reader status information (status mode) or display custom user messages sent by the host system (user message mode).

In "user message mode", the host system controls the LCD and keypad and can display custom messages or read keypad state by sending specific commands to the reader.

In "status mode", the reader controls the LCD and keypad and displays various reader state information (see [Table 8](#)). Information is organized in pages. Pressing the "Up" key jumps to the

previous information page, pressing the “Down” key jumps to next information page, Holding the “Select” key displays more information (if available).

**Table 8: LCD Screen Pages description**

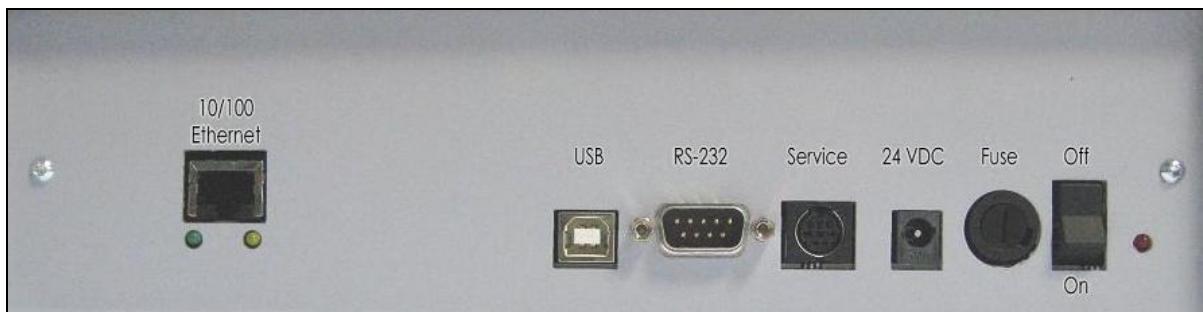
Page	Description (“Select” key not pressed)	Description (“Select” key pressed)
1	Product name	N/A
2	Operating system version	N/A
3	Radio firmware version	N/A
4	Date and Time	N/A
5	Current Ethernet IP address, or “Interface down” if ethernet interface is not active (for example because cable is not connected)	Ethernet MAC address
6	<u>Heartbeat service status :</u> . “Running...” indicates heartbeat is enabled . “Inactive” indicates heartbeat is disabled . “Interface down” indicates ethernet interface is not active (for example because the Ethernet cable is not connected).	N/A
7	<u>Telnet service status :</u> . “Connected” indicates a host is currently connected to the reader using the telnet protocol. . “Waiting...” indicates telnet service is running and ready to accept incoming connections . “Interface down” indicates Ethernet interface is not active (for example because the Ethernet cable is not connected).	N/A
8	<u>StxNG service status :</u> . “Connected (P)” indicates a host is currently connected to the reader using TAGSYS StxNG protocol on primary TCP port. . “Connected (S)” indicates a host is currently connected to the reader using TAGSYS StxNG protocol on secondary TCP port. . “Connected (P+S)” indicates 2 hosts are currently connected to the reader using TAGSYS StxNG protocol on both primary and secondary TCP ports. . “Waiting...” indicates StxNG service is running and ready to accept incoming connections on either primary or secondary TCP ports. . “Interface down” indicates Ethernet interface is not active (for example because the Ethernet cable is not connected).	N/A
9	<u>Serial port status and speed :</u> . “Waiting...” indicates <u>no</u> host is currently communicating with the reader using serial port. . “Connected” indicates a host is currently communicating with the reader using serial port (either console or StxNG protocol)	N/A
10	<u>USB port status :</u> . “Waiting...” indicates <u>no</u> host is currently communicating with the reader using USB I port. . “Connected” indicates a host is currently communicating with the reader using USB port (either console or StxNG protocol) . “Interface down” indicates USB interface is not active (for example because the USB cable is not connected).	N/A

11	<u>Standalone mode status :</u> . “Inactive” indicates standalone mode is not active . “Running...” indicates standalone mode is currently active and reader automatically reports tag reads through its serial port.	The total number of tag reading events since standalone mode activation.
----	---	--

### 3.3.2 Rear Panel

The rear panel is dedicated to the power supply and communication connectors.

**Figure 2: Rear panel**



- **10/ 100 Ethernet Connector**

RJ 45 connector (Please refer to the Ethernet network cabling rules).

- **USB Connector**

USB connector type B. Use standard A/B cable to connect to the host.

- **RS-232 Connector**

Male DB-9 connector. Use a standard crossed RS-232 cable (NULL-MODEM) to connect to the host. Please see [Technical Specifications section](#) for more details.

- **Service Connector**

For TAGSYS internal use only. Do not connect any cables here.

- **24VDC Connector**

A power supply bayonet connector. Only connect the provided power supply here.

- **Fuse holder**

Fuse holder. Use only T2A, timelag rated fuses (24VDC minimum)

- **Off / On Switch**

Power on/off switch.

# 4 Installation

This section describes how to install the Medio L400 reader.

## 4.1 Mechanical Aspects

The Medio L400 is delivered with four rubber pads on the bottom of the package for installation on a table or desktop. The rubber pads can be removed to access the screw cutting hole that can be used to mount the unit in various positions. Please see **Technical Specifications section** for more details.

## 4.2 Cabling Requirements

Ensure product is turned off (power switch in upper position).

- Connect the provided power supply bayonet connector to the connector on the product (to connect the power bayonet connector to the product, push it carefully then turn it 90 clockwise to lock it),
- Connect the power supply to the mains supply.
- Connect the reader to the host system using one of the available interfaces (USB, RS-232 or Ethernet),
- Connect one or several antennas to reader channels.
- Power-up reader (power switch in on position).

 All cables must be correctly shielded. The shielding effectiveness of the material used should be of good performance (60 dB minimum), especially in the frequency range of 10 to 60 MHz. The addition of ferrite clamps near the reader unit will increase common mode rejection. TAGSYS antenna products are delivered with good performance shielded coaxial cables with 6 ferrite beads already mounted to increase shielding effectiveness at low frequencies.

 Power cable must be purchased separately in accordance with local requirements.

	<p>For USA and countries under FCC Part 15 regulation only use the Antenna and Power Supply Unit combination tested and specified in the cross reference table of the corresponding Medio L400 (see <b>section 2.2.2</b>). The use of any other combination of reader version, antenna type and Power Supply Unit is subject to obtaining a specific FCC ID either by TAGSYS or by its Qualified Partner under TAGSYS supervision.</p> <p>For other countries, only use Power Supply Units FDF0453-A, FRA045E-S24-4, A2-50S18R-V or EA1050D-240. If using any other Power Supply Unit, the selected Power Supply Unit must meet all following criteria:</p> <ul style="list-style-type: none"><li>• UL Listed UL60950 and CB Certified for Information Technology Equipment</li><li>• Class B Emission CISPR22 EN55022</li><li>• CE marked</li></ul>
---	--

## 4.3 Using USB Interface

### 4.3.1 Installing USB Drivers

At first connection to the PC USB port, Windows® will detect the TAGSYS Medio L400 reader and will ask to install a driver. The USB drivers are located into the USB Drivers folder on the product CD-ROM.

Two drivers will be installed:

- The USB device driver.
- The virtual COM port (VCP) driver. The VCP driver emulates a standard PC COM port.

After installation of the drivers, power up and connect your Medio L400 to a spare USB port on your PC to launch the Windows Found New hardware Wizard

- Select “No, not this time” and click next to proceed with the installation.
- Select “Install from a list or specific location (Advanced)” and then click “Next”.
- Select “Search for the best driver in these locations” and click the Browse button to select the TAGSYS USB Drivers folder on the Product CR-Rom. Then click “Next” to proceed.
- Windows should then display a message indicating that the installation was successful. Click Finish to complete the installation.

Repeat the procedure above when Windows® asks for drivers again (virtual com port).

To confirm that the installation has completed successfully, open the Device Manager and select “View > Devices by type”. The TAGSYS Medio L400 reader now appears as an additional COM port.



Drivers for Windows 98 are not provided. They are available upon request (please contact TAGSYS).

### 4.3.2 Using the USB interface

Once the USB drivers are properly installed, the reader appears as a new COM port. Simply connect to this COM port at 115200 Bauds to access the reader.



Virtual COM port speed is always 115200 Bauds and can not be changed.

## 4.4 Using RS-232 Interface

RS-232 interface does not require specific drivers' installation. Default RS-232 speed is 115200 bauds, and can be modified by software. Supported baud rates are 4800 bauds, 9600 bauds, 19200 bauds, 38400 bauds, 57600 bauds and 115200 bauds.

## 4.5 Using 10/100 Ethernet Interface

10/100 Ethernet interface does not require specific drivers installation. Default TCP/IP configuration is the following:

**Table 9: Default TCP/IP configuration**

Parameter	Value
<b>DHCP</b>	Active (The reader will try to automatically configure using DHCP. If it fails, the reader will use the following fallback configuration)
<b>Fallback IP Address</b>	169.254.0.100
<b>Fallback Netmask</b>	255.255.0.0
<b>Fallback Gateway</b>	169.254.0.1

## 4.6 Restoring Factory Configuration

To restore factory configuration, please follow these steps:

- Turn reader off.
- Press and hold simultaneously the “Up”, “Down” and “Select”.
- Turn reader on.
- After 3 seconds, the reader displays a message asking for confirmation. Press “Select” to confirm, or any other key to cancel.

Default configuration is now restored.

## 4.7 Running Tagsys Explorer for the First Time

The Medio L400 reader is delivered with the Tagsys Explorer software tool intended to easily setup the reader, test it and perform RFID reading and writing operations. In addition, the L400 Explorer can be used to display additional information about the reader (Firmware and hardware versions and revisions) as well as to upgrade reader firmware. This section describes how to start with L400 Explorer.

### 4.7.1 Installing Tagsys Explorer

Tagsys Explorer is based Microsoft's .NET technology and requires the following minimum system configuration:

- IBM-PC compatible computer with a 400 MHz or higher processor (1 GHz recommended) ;
- Microsoft® Windows 2000 SP 3, Windows Server 2003, Windows XP SP 2, Windows Vista or windows Seven operating system recommended. Microsoft® Windows 98, Windows 98 SE, Windows ME legacy operating systems are supported but not recommended ;
- Microsoft® .NET Framework version 2.0 or 3.0 ;
- 128 megabytes (MB) of RAM (256 MB recommended) ;
- 300 MB of free hard disk space. This includes .NET Framework requirements ;
- 1024x768 16-bits (1280x1024, 32-bits recommended) ;
- CD-ROM drive ;
- 1 serial port and/or 1USB port and/or 1 Ethernet port.

To install the Tagsys Explorer software on your PC:

1. Insert the product CD-ROM into the disk drive on your PC.

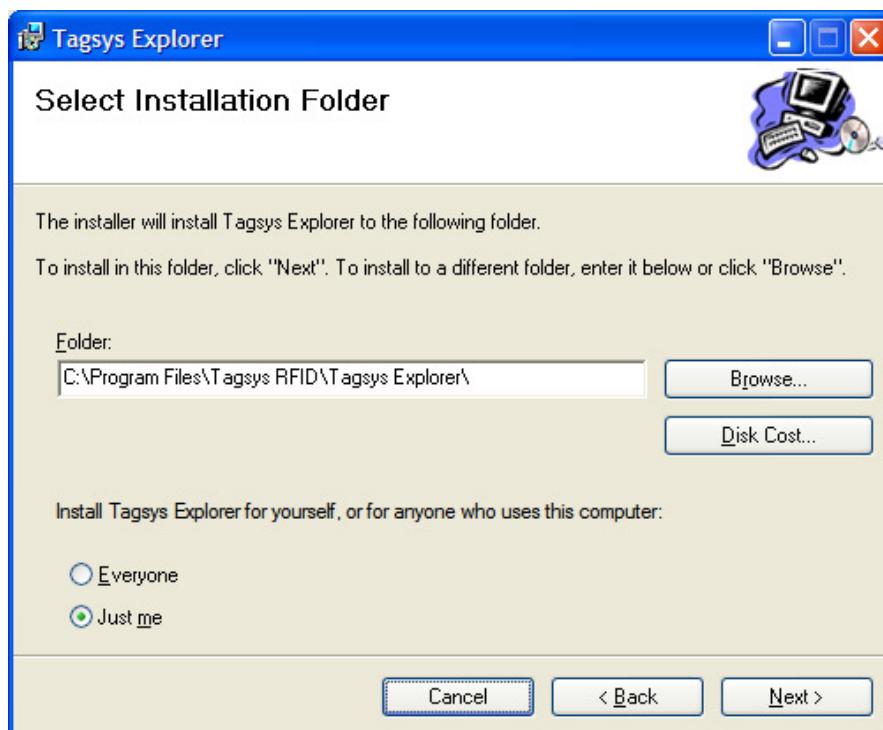
2. In Windows Explorer, open the CD-ROM drive window and run "Tagsys Explorer Installer.msi" in "Tagsys Explorer" folder.

**Figure 3: Setup Welcome window**



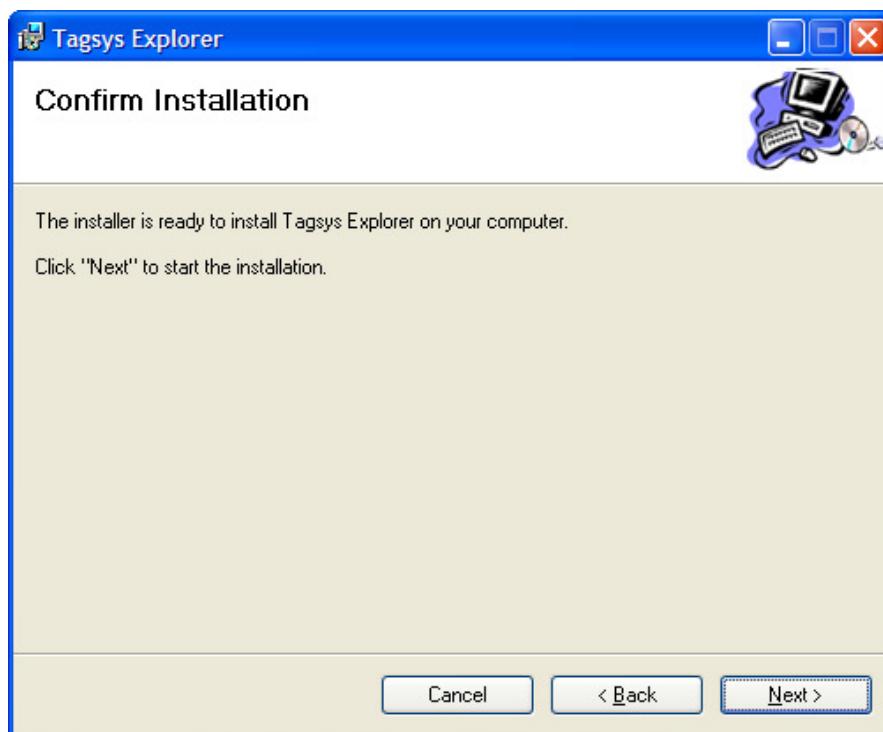
3. Click Next to view the license agreement, then click Next again if you agree with the terms.
4. The Destination Location window is displayed. Select the folder where Tagsys Explorer will be installed.

**Figure 4: Select Installation Folder window**



- Once the correct folder is selected, click Next.

**Figure 5: Confirm Installation window**



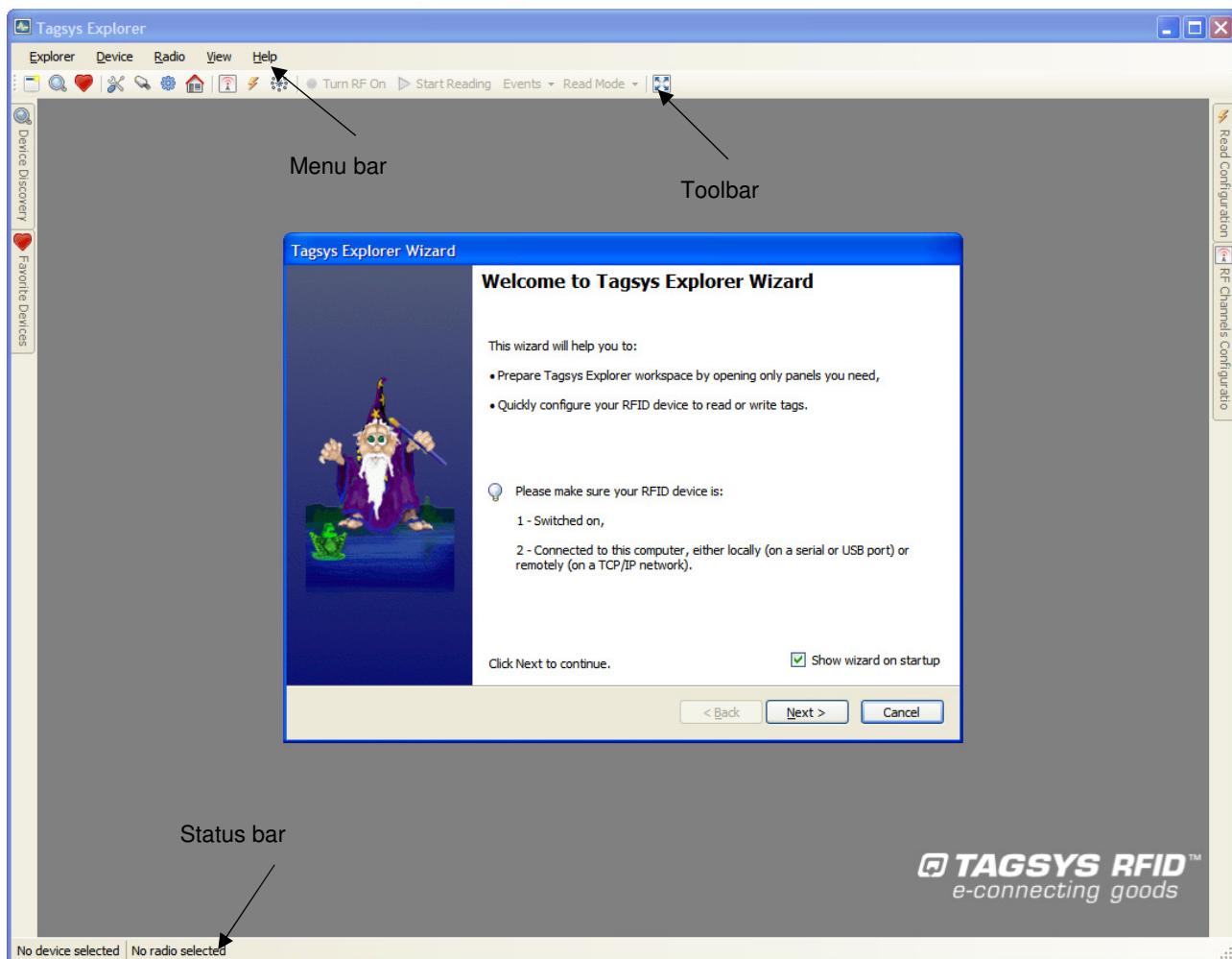
- Click Next to start the installation process. A shortcut will be created on your desktop and a program group will be created in the start menu.

#### **4.7.2 Connecting to a device using Tagsys Explorer Wizard**

This section describes how to get started using the Tagsys Explorer software and configure it.

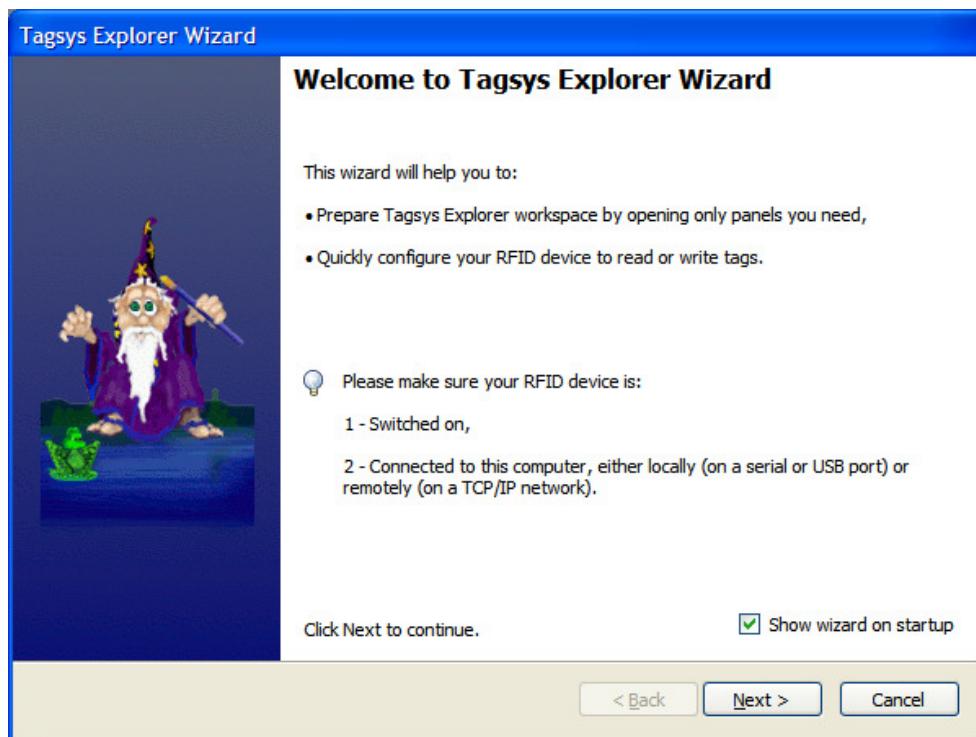
Before running Tagsys Explorer, connect your RFID reader to the serial/USB port of the PC or to your TCP/IP network. Connect an antenna to the reader (Channel 1) and turn reader on.

Once the reader is ready, run the Tagsys Explorer program and the main window will be displayed.

**Figure 6: Tagsys Explorer window**

The “Tagsys Explorer Wizard” opens automatically when Tagsys Explorer is started for the first time. This wizard allows you to quickly set up the Tagsys Explorer to perform basic tasks such as configuring your RFID device and read or write tags.

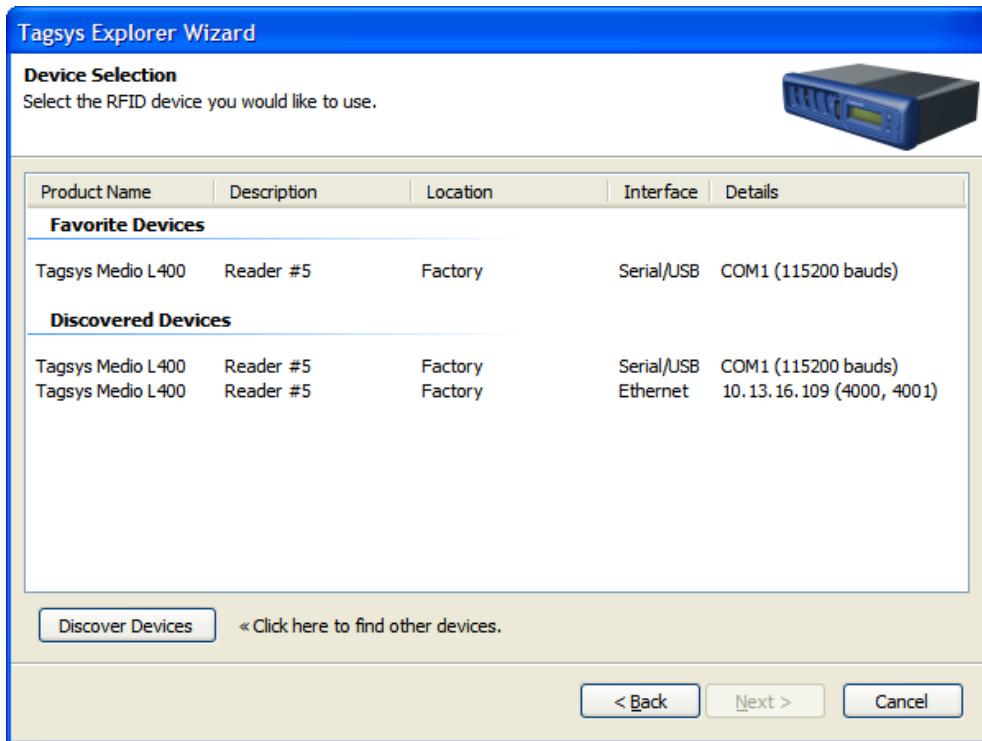
**Figure 7: Tagsys Explorer Wizard**



If the “Tagsys Explorer Wizard” does not open automatically, click on the “Wizard” icon  in the toolbar or choose “Wizard...” in the “Explorer” menu.

Read the instructions given by the wizard and click “Next >” to continue.

Figure 8: Device Selection page



The Tagsys Explorer Wizard can automatically discover and display RFID devices plugged into your computer's serial or USB ports or connected on a TCP/IP network.

Discovered devices are displayed under the "Discovered Devices" group. The same device can be displayed one or more times depending on the number of communication interfaces (Serial/USB, Ethernet) this device is connected to. The preferred connection is the "Ethernet" interface when available as it is the fastest communication interface.

You can restart a discovery at any time by clicking "Discover Devices".

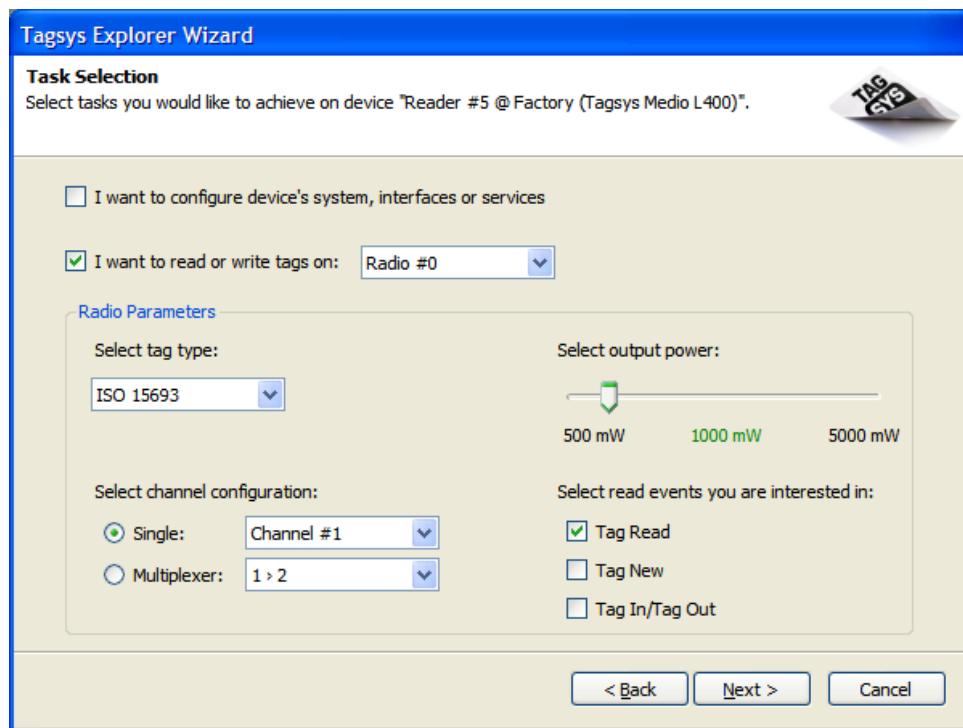
Devices that have been previously registered in Tagsys Explorer will appear under the "Favorite Devices" group. Favorite Devices are shortcuts to devices you are working with often and can be managed using the "Favorite Devices" panel. See *Tagsys Explorer User's Guide* for more information.

To continue, choose the device you would like to use and click "Next >". If necessary, this device will be automatically added to your "Favorite Devices".



If a device with the same interface details appears both in "Favorite Devices" and in "Discovered Devices" groups, it does not matter in which group you select this device.

Figure 9: Task Selection page



If you want to set up your device parameters, such as changing its description or its interfaces settings, check “I want to configure device’s system, interfaces or services”.

If you want to read tags, write their memory or send specific tag commands, check “I want to read or write tags on:” You can then choose the radio that should be used for emitting and receiving. Medio L400 only supports one radio (Radio #0).

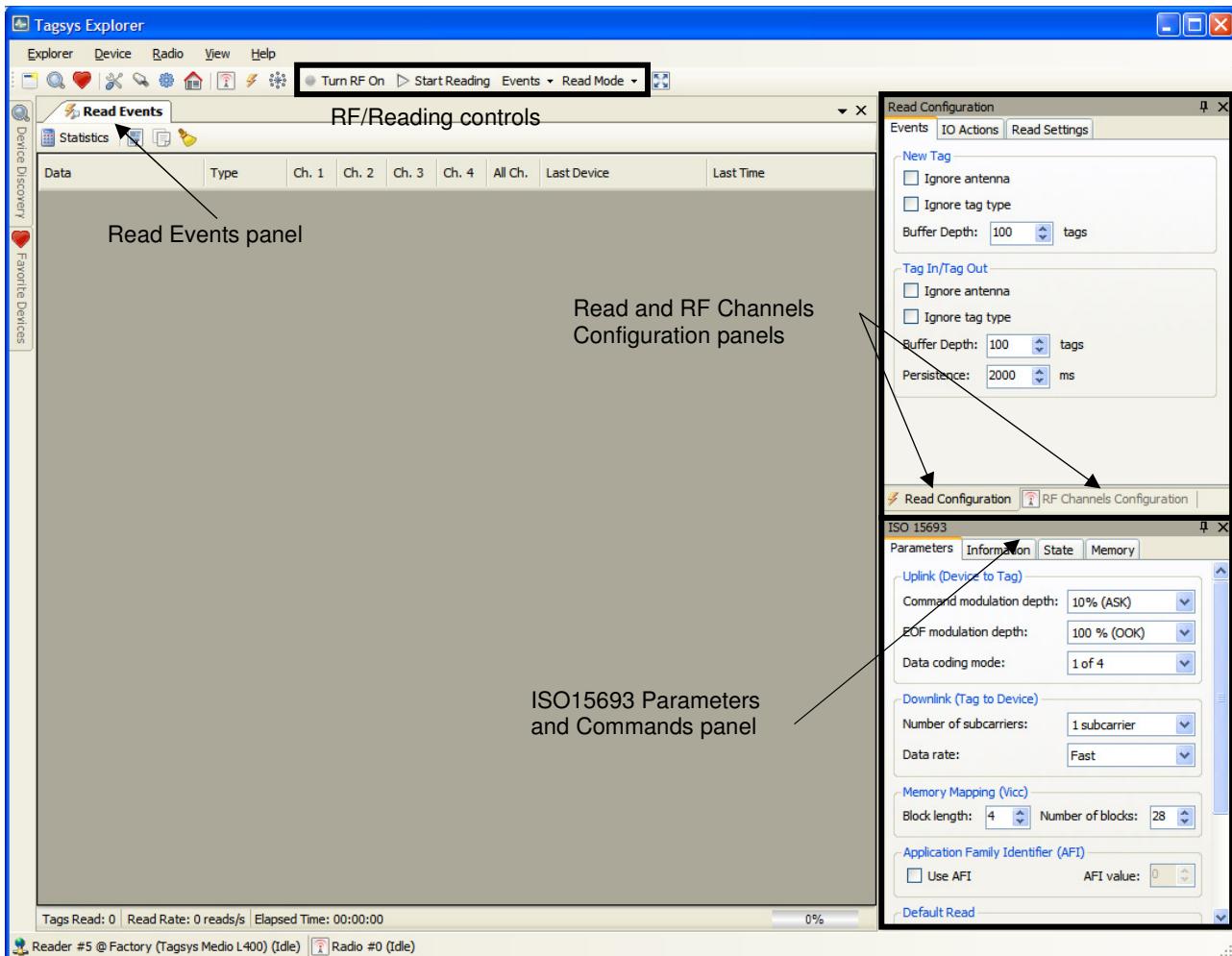
In the “Radio Parameters” section, choose the settings you would like to use.

For demonstration purposes, please select the same settings as shown in previous figure. Then, click “Next >” to continue.

**Figure 10: Wizard Summary page**

Verify the summary of all selected parameters chosen and click “Finish” to confirm. Tagsys Explorer will then automatically open the panels you need and apply the radio configuration you have chosen. The following screen appears:

Figure 11: Tagsys Explorer workspace configured



#### 4.7.3 Reading the UID of ISO 15693 tags

If you have not configured your device using the Tagsys Explorer wizard as explained in section [Installing Tagsys Explorer](#), please do so before proceeding.

To start reading using the configuration the wizard has applied:

1. Click button in the tool bar to turn the radio field on.



**CAUTION:** Make sure an antenna is plugged in the channel that will be used for reading before turning the radio field on. Turning on the radio field on a channel without an antenna reduces the lifetime of the reader.

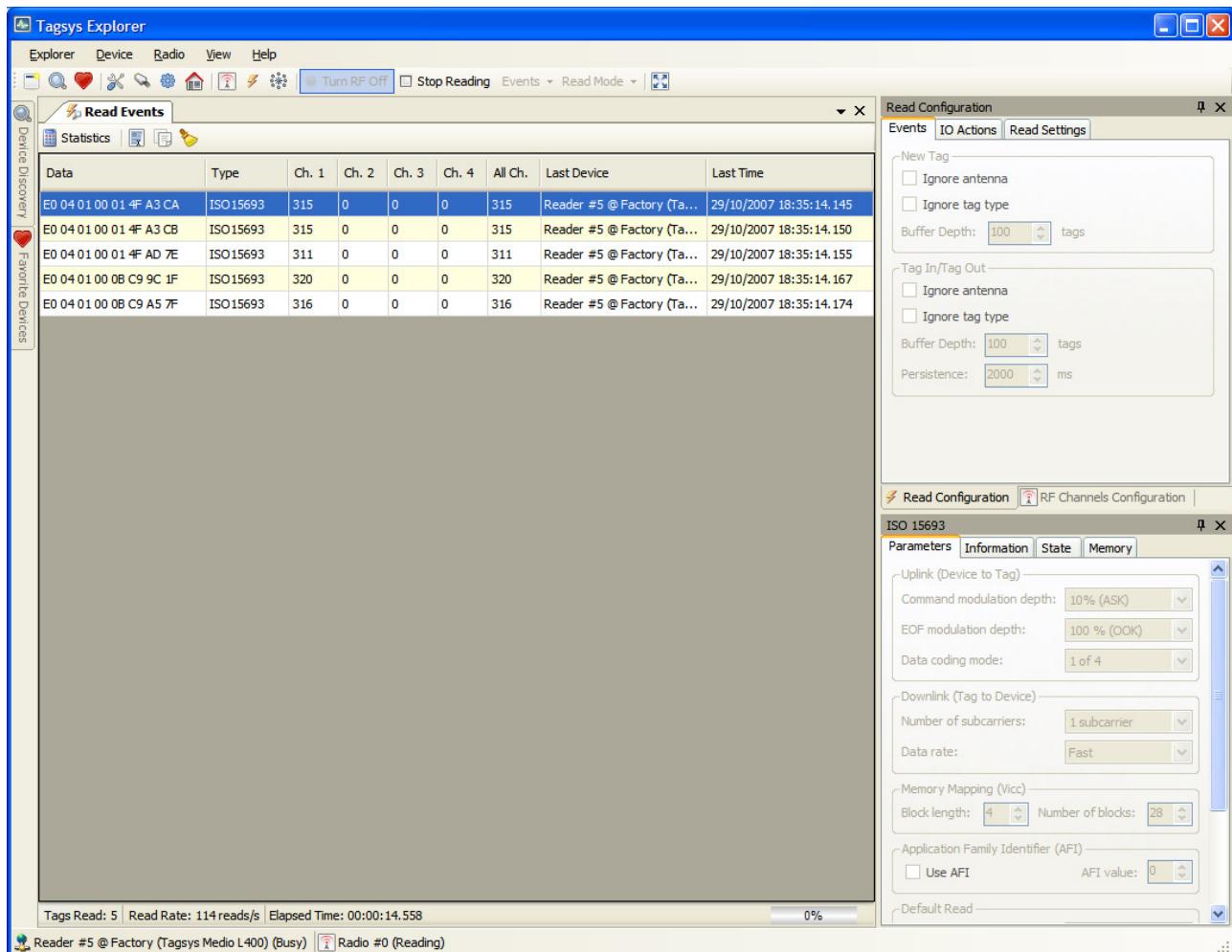
2. Click button in the tool bar to start reading tags.



If the radio field is not turned on, Tagsys Explorer will request your permission to turn it on; click "OK" to accept. Again, make sure an antenna is plugged in to the channel before accepting.

3. Place ISO 15693 tags in the radio field of channel #1 antenna. Tags appear in the "Read Events" panel as they are read. A counter indicates how many times they have been read on each device's channel since the read session beginning.

Figure 12: Tagsys Explorer reading ISO 15693 tags



4. Click the  **Stop Reading** button in the tool bar when you are finished reading. You may want to turn the radio field off as well by clicking the  **Turn RF Off** button.

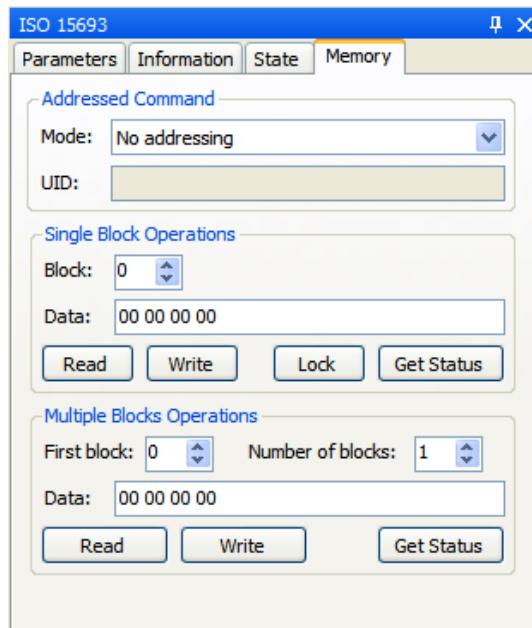
#### 4.7.4 Reading and Writing ISO 15693 tag memory

If you have not configured your device using Tagsys Explorer wizard as explained in [section 4.7.2](#), please do so before proceeding.

This section shows how to read and write ISO15693 tag memory.

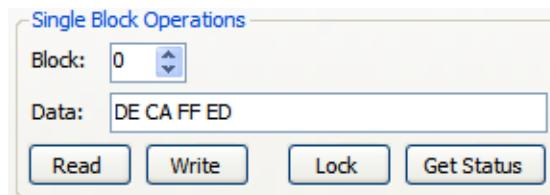
1. Radio field must be turned on. Click the  **Turn RF On** button in the toolbar to turn the radio field on.
2. Click the "Memory" tab of the ISO15693 panel. This tab contains all memory-related commands.

Figure 13: Memory tab of ISO 15693 panel



3. In the “Single Block Operations” box, select the block and data you want to write (data is hexadecimal). You can pad bytes with whitespaces if you wish, but this is not required.

Figure 14: Single Block Operations



The length in bytes of a single block depends on the tag manufacturer, but most ISO 15693 tags use four bytes blocks. See *Tagsys Explorer User's Guide* for more information.

4. Place a single ISO15693 tag in the radio field of the channel 1 antenna.
5. Click “Write” to write data to the block. If writing is successful, no error message appears. To check block data, clear the “Data” field and click “Read” to read data back from the block.

#### 4.7.5 Upgrading System or Radio Firmware

If you have not configured your device using Tagsys Explorer wizard as explained in [section 4.7.2](#), please do so before proceeding.

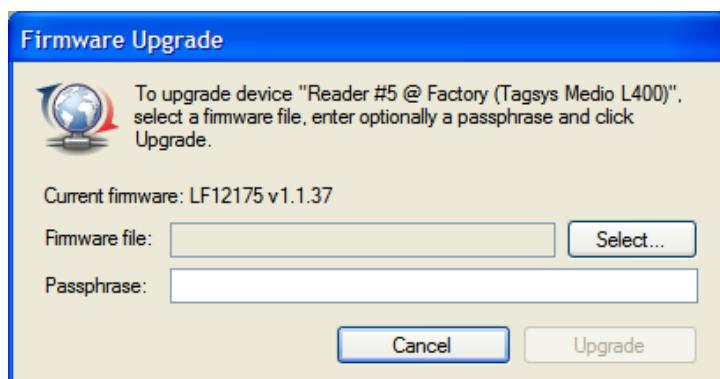
Two different firmware sets can be upgraded in your RFID reader:

- System firmware (The system is in charge of interfacing one or several radios to a host through various interfaces and protocols)
- Radio firmware (The radio is in charge off all RFID operations).

To upgrade system firmware:

1. Open “Favorite Devices” panel by clicking on the  icon in the tool bar or by choosing “Favorite Devices” in the “Device” menu.
2. Connect to the device you want to upgrade by selecting it and clicking on the  icon.
3. In the  drop down menu, choose “Upgrade System Firmware...”  
 Alternatively, you may also right-click the device and choose “Upgrade System Firmware...”
4. In the “Firmware Upgrade” dialog box, select the firmware file, enter its associated passphrase if necessary and click “Upgrade”.

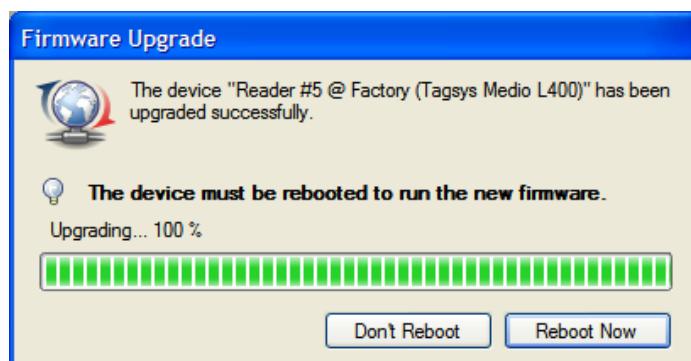
**Figure 15: System firmware upgrade**



**CAUTION:** Do not turn off the device during the upgrade as this may permanently corrupt the system firmware.

5. Once the upgrade is completed, click “Reboot” to reboot the device immediately. If you need to upgrade another set of firmware of the device click “Don’t Reboot”.

**Figure 16: System firmware upgrade completed**

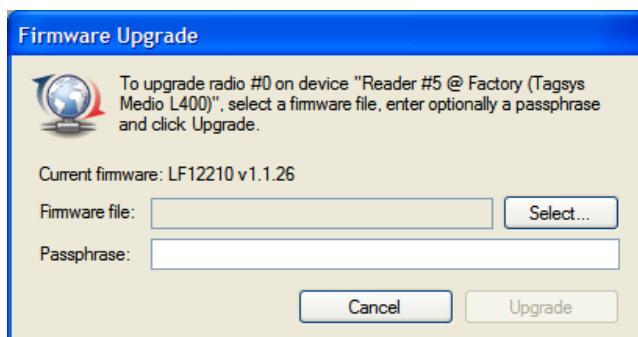


To upgrade radio firmware:

1. Open “Favorite Devices” panel by clicking on the  icon in the tool bar or by choosing “Favorite Devices” in the “Device” menu.

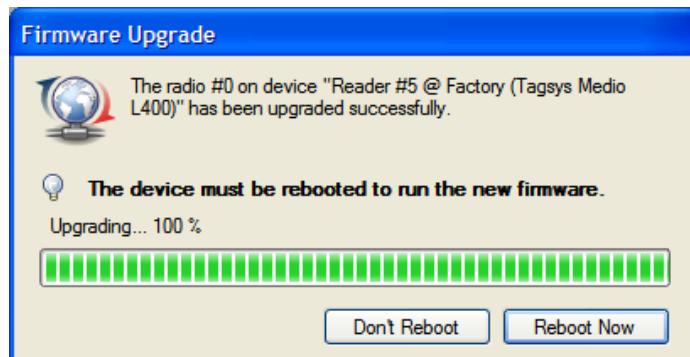
2. Connect to the device that you want to upgrade the radio on by selecting it and clicking on the  icon.
3. Click on the radio to upgrade and in the  drop down menu, choose “Upgrade Radio Firmware...”  
Alternatively, you may also right-click the radio and choose “Upgrade Radio Firmware...”
4. In the “Firmware Upgrade” dialog, select the firmware file, enter its associated passphrase if necessary and click “Upgrade”.

**Figure 17: Radio firmware upgrade**



6. Once the upgrade is completed, click “Reboot” to reboot the device immediately. If you need to upgrade another set of firmware of the device first, click “Don’t Reboot”.

**Figure 18: Radio firmware upgrade completed**



# 5 Advanced Notions

## 5.1 Reader Architecture

Figure 19: Medio L400 Architecture

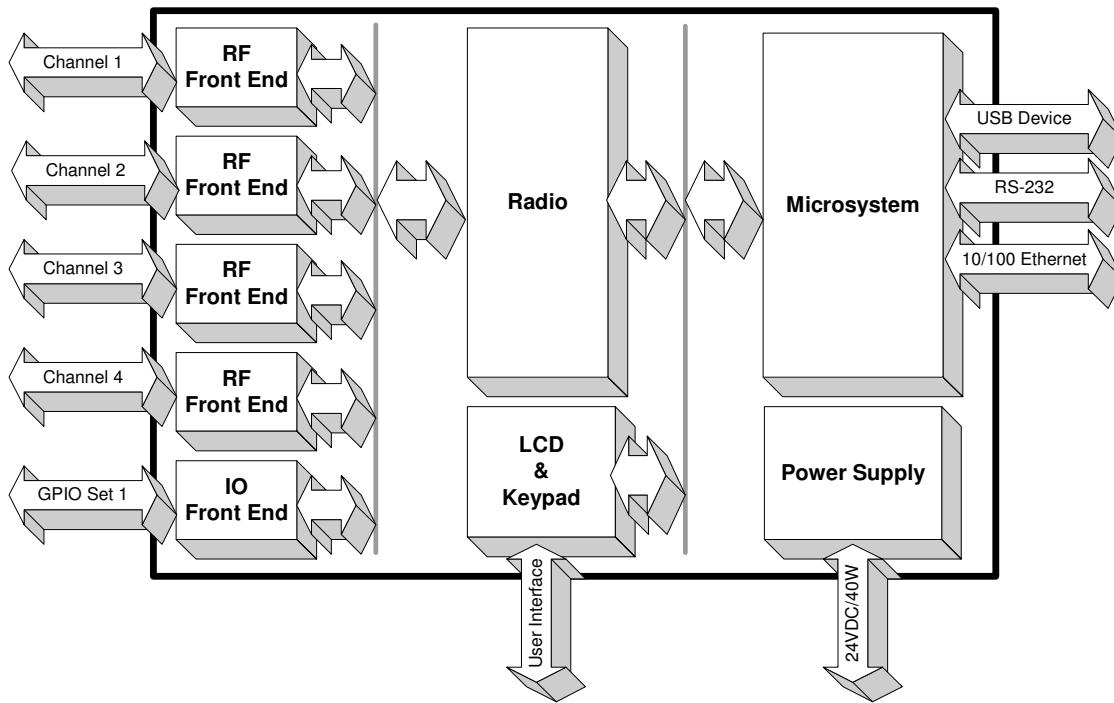


Figure 19 above shows the Medio L400 functional blocks:

- The RF Front Ends are analog subsystems responsible for generating and modulating the RF field for uplink communication to the tags. They also demodulate signal from tags for downlink communication and provide monitoring information such as operating temperature and antenna tuning status. They are controlled by the Radio Subsystem.
- The IO Front End is responsible for providing 4 protected digital inputs and 4 protected digital outputs. It is controlled by the Radio Subsystem and can be used as general purpose IOs directly accessed by the host system, or to automatically trigger readings and signal reading activity (by light stacks for example) without intervention from the host system.
- The Radio Subsystem is responsible for managing the RF and IO Front Ends, encoding and decoding signals to/from tags, filtering tag data (for example removing duplicate reads) and providing RFID-related primitives to the Microsystem (like "Activate channel 1", "Set output power to 1 Watt", "Read UID from ISO15693 tag", ...). It is DSP based and is controlled by the microsystem.
- The Microsystem is responsible for interfacing the Radio Subsystem to the host system through various physical interfaces (USB, RS-232, 10/100 Ethernet) and protocols (Tagsys StxNG protocol, standalone mode, telnet server, serial console and heartbeat). It also controls the LCD and keypad.

## 5.2 Reader to Host Protocols

### 5.2.1 TAGSYS StxNG

TAGSYS StxNG is the protocol used by the Medio L400 reader to communicate with the host system. Upon start up, the Medio L400 reader starts listening for incoming frames over all of its interfaces:

- USB (seen as a virtual COM port from the host side)
- RS-232
- Primary and Secondary TCP ports (default ports are ports 4000 and 4001. Only one connection per port is accepted).

After a valid frame is received from one of the interfaces, the corresponding command is executed and a reply is sent back to the host.

Below is a short description of the “command” and “response” frame format.

#### Host to reader frame (command):

<SOF> <Address> <Command ID> <Nb Data> <Data> <Checksum>

#### Reader to host frame (response):

<SOF> <Address> <Error Code> <Nb Data> <Data> <Checksum>

Field	Description
<SOF>	Start Of Frame (01h)
<Address>	When RS422 or RS485 communication modes are supported, only the reader whose StxNG address matches this field executes the command and replies. This field is ignored by Medio L400.
<Command ID>	In a command frame, the ID of the command that should be executed. Command IDs are in the range 0000h-7FFFh
<Error Code>	In a response frame, the error code if an error occurred during execution. Error codes are in the range 8000h-FFFFh. If no error occurred, the command ID is repeated.
<Nb Data>	The Data field length in number of bytes.
<Data>	In a command frame, the parameters for the command. In a response frame, the return values associated to the command.
<Checksum>	A checksum. This is the arithmetic sum off all previous bytes.

The reader is never allowed to send data over its interfaces without having received a command from the host.



A simple password-based security mechanism can be activated to prevent unauthorized access to the reader. In such a case, the host system must first execute a specific command to identify itself before being allowed to send any other command.

For more information about StxNG protocol and a complete command set description, please refer to **Medio L400 Designer's guide**.

### 5.2.2 Heartbeat

The heartbeat service applies to the 10/100 Ethernet interface only. When activated, the heartbeat service periodically broadcasts Ethernet packets containing product name, description, location, IP

address and TCP ports on which reader is listening for incoming connections (see StxNG protocol).

This heartbeat is useful to:

- Show Medio L400 readers connected to the same physical network as the host.
- Check that a Medio L400 reader is operating properly (in this case, the heartbeat acts as a watchdog).

For more information about heartbeat please refer to **Medio L400 Designer's guide**.

### 5.2.3 Telnet

The telnet server applies to 10/100 Ethernet interface only. A host can connect to the reader using any standard telnet client. The Telnet server makes it possible to configure the microsystem only (serial port configuration, TCP/IP stack configuration, date/time configuration, version query...).



RFID configuration and control (for example activating a channel and reading a tag) is not allowed with telnet server.



A simple password-based security mechanism can be activated to prevent unauthorized access to the reader.

For more information about telnet server please refer to **Medio L400 Designer's guide**.

### 5.2.4 Serial console

The serial console applies to RS-232 and USB interfaces only. A host can connect to the reader using any standard terminal application. The serial console makes it possible to configure the microsystem only (serial port configuration, TCP/IP stack configuration, date/time configuration, version query...).



RFID configuration and control (for example activating a channel and reading a tag) is not allowed with serial console.



A simple password-based security mechanism can be activated to prevent unauthorized access to the reader.

The reader automatically detects if current data exchanges over its serial and USB ports are StxNG protocol frames or console frames and reacts accordingly. Consequently, there's no need to configure those interfaces for console or StxNG protocol operation: both are simultaneously available.

For more information about serial console please refer to **Medio L400 Designer's guide**.

### 5.2.5 Standalone mode

Standalone mode makes it possible to use the reader without the need for a host to control it. In this case, only the tag reading operation is available.

When standalone mode is activated, the reader automatically loads its last saved configuration upon start-up and initiates a read session. Each time a read event occurs, the reader sends a frame over its serial port. Frame format is as the following (all fields are ASCII, optional and customizable):

*<Header><Timestamp><Radio ID><Event Type><Channel><Tag Type><Tag Data><Footer>*

A watchdog can also be activated. In this case, a customizable frame is sent periodically over the serial port to indicate the reader is operating properly.

For more information about standalone mode operation and configuration, please refer to **Medio L400 Designer's guide**.

## 5.3 Reader operation principles

Most of the reader commands are executed in a synchronous manner. This means that the reader waits for an incoming request from the host, executes the associated operation then sends a reply containing operation execution status back to the host. Between the receptions of two consecutive commands, the reader does nothing but wait for the next command.

The following commands are examples of commands executed in a synchronous manner:

- Configuration commands (configuring the TCP/IP stack, for example).
- Tag writing commands (writing an ISO15693 tag memory block, for example).
- Most tag reading commands (reading the locking status of an ISO15693 tag memory block, for example).

Synchronous commands that actually perform an operation on tags in the RF field (such as a writing operation, opposed to a configuration command) can only use a single channel (multiplexer can not be used). The channel and RF power that should be used for any subsequent synchronous tag operation is called the default RF configuration (specific commands exist to get/set this configuration).

An exception to the mechanism described above exists: the asynchronous read (or default read). Asynchronous read (or default read) can be activated or deactivated using the appropriate commands in the command set. During asynchronous read, the reader continuously tries to read all tags in the field. When a tag is detected, one or several read events are asynchronously pushed into an internal buffer (the event buffer). The host system then needs to poll the event buffer periodically to retrieve the latest events.

One can specify the kind of read events that should be reported during asynchronous read, as well as several options (called read modes) that should be applied during asynchronous read. The following sections provide more details about the different read events, as well as the different read modes.

### 5.3.1 Notion of read modes

During asynchronous read (or default read), the reader continuously tries to read all tags in the RF field. Several options can be applied that modify the reader's behavior during asynchronous read:

- “Multiplexer” : If this mode is active, the reader uses the multiplexer instead of the default RF configuration for reading. The multiplexer makes it possible to define a sequence of

antennas, tag types and RF output powers that will be automatically used during the reading process. For example, a user can configure the multiplexer so that reader tries to read ISO15693 tags for 100ms on channel 1 at 1Watt, then ICode UID tags for 50ms on channel 1 at 2Watts, then ISO15693 tags for 100ms on channel 2 at 1Watt, then ICode UID tags for 50ms on channel 2 at 2Watts.

- “Input triggered” : If this mode is active, the reader waits for GPIO Input #1 to become active in order to activate the RF field and start reading. When GPIO Input #1 gets back to inactive state, RF field is turned off and the reader stops reading until input is active again. Active input level (low or high) is software configurable.
- “Output feedback” : If this mode is active, the reader uses GPIO Outputs #1, #2 and #3 to signal reading activity. GPIO Output #1 is activated when the reader is attempting to read tags, GPIO Output #2 is activated when the reader “sees” tags in the RF field. In input triggered read mode GPIO Output #3 is activated when the trigger condition ends and no tag was detected in the RF field. When Input triggered read mode is inactive, GPIO Output #3 remains inactive. The time an output remains active after the corresponding event has occurred is software configurable.

A user can activate one or several read modes at once, depending on the application requirements.

### 5.3.2 Notion of events

During asynchronous read (or default read), the reader continuously tries to read all tags in the RF field. When a tag is detected, one or several events are pushed into an internal event buffer. Those events contain information such as the kind of event (see below), a timestamp, the channel on which the event occurred, the tag type and the associated tag data (UID, memory...). The following events are supported:

- “Tag Read”: This event is pushed each time a valid tag frame is decoded, without further processing. When activated, this event may be triggered several hundreds of times per second and is consequently bandwidth consuming. It is often used for testing purpose only.
- “Tag New”: This event is pushed each time a new tag is detected. If the same tag is detected several times, it will be reported only once.
- “Tag In”: This event is pushed each time a tag enters the RF field.
- “Tag Out”: This event is pushed each time a tag leaves the RF field.
- “Tag No Read”: When Input triggered read mode is active, this event is pushed when the trigger condition ends and no tag was detected in the RF field. When Input triggered read mode is inactive, this event is never pushed.

A user can register for one or several events at once, depending on the application requirements.

For example, if a user registers for all events and a tag enters the RF field, stays in the field for some time and then leaves the field, the sequence of events pushed into the event buffer will be:

- “Tag Read”
- “Tag New”
- “Tag In”

- “Tag Read” (repeated as long as the tag remains in the field)
- “Tag Out”

If the same tag re-enters the RF field at a later time, stays in the field for a period of time, then leaves the field, the sequence of events pushed into the event buffer will be :

- “Tag Read”
- “Tag In”
- “Tag Read” (repeated as long as the tag remains in the field)
- “Tag Out”

# 6 Technical Specifications

## 6.1 Technical Data

Table 10: Medio L400 Technical Specifications

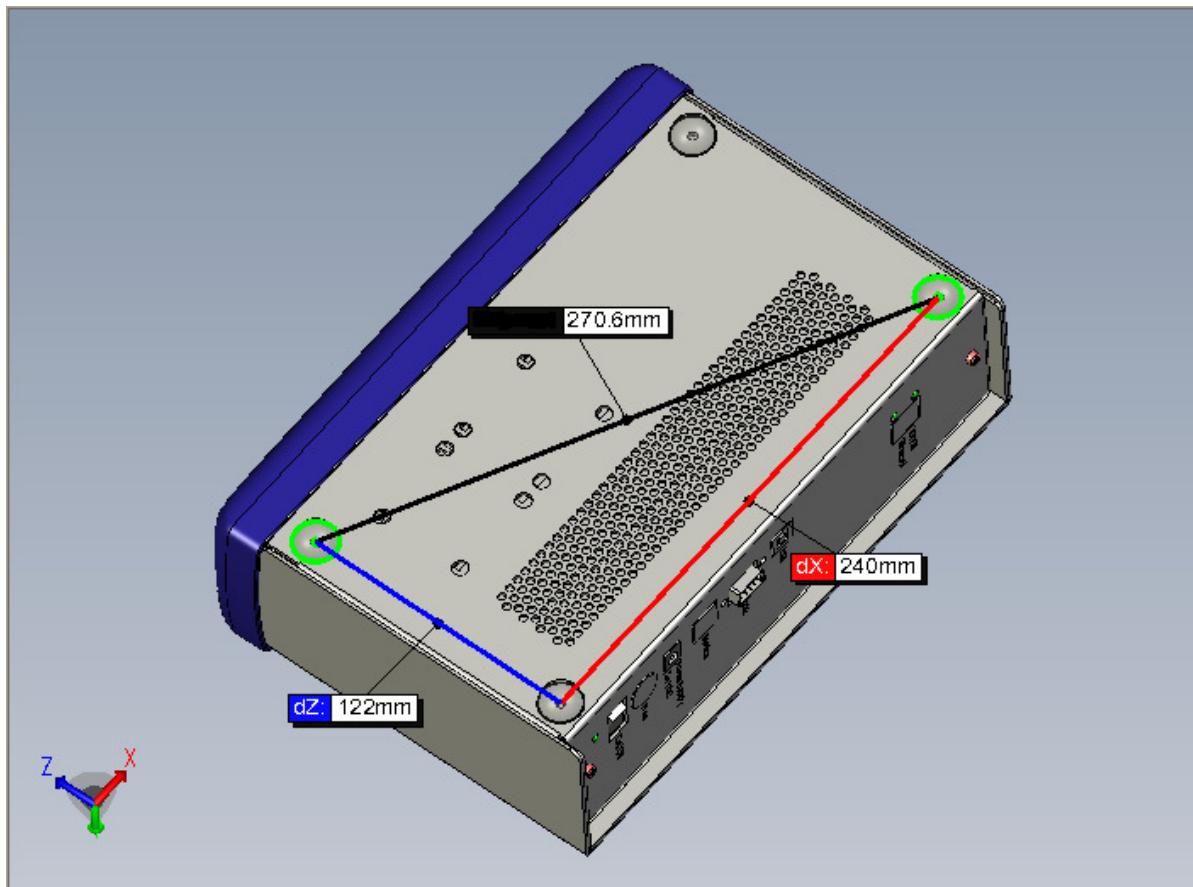
Description	Medio L400
Size (L x W x H)	285 x 195 x 90 mm (11.3 x 7.7 x 3.6 in.)
Weight	3.4 kg (7.5 lbs.)
DC power	24 VDC +/- 10% Typical
Power consumption	Up to 40 W
Operating temperature	Reader: 0°C to +55°C (32°F to 131°F) FDF0453-A Power Supply: 0°C to +35°C (32°F to 95°F) FRA045E-S24-4 Power Supply: 0°C to +40°C (32°F to 104°F) A2-50S18R-V Power Supply: 0°C to +40°C (32°F to 104°F) EA1050D-240 Power Supply: 0°C to +40°C (32°F to 104°F)
Storage temperature	-20° to +70°C (-4°F to 158°F)
Mechanical fixation	Rubber pads or screw cutting hole for vertical installation
Certification	ETSI EN 300-330, ETSI EN 300-683, FCC Part 15 (for typical configurations), UL 60950, CAN/CSA 22.2 No 60950, IEC 60950-1, CB Report with certificate.
Antenna Compatibility	50-Ohms antenna
Operating Frequency	13.56 MHz
Chip Compatibility	C210 C220 ISO15693 ISO18000-3 Mode 1 C270 (I-Code 1) C370 (I-Code SLI) C370L (I-Code SLI-L) C370S (I-Code SLI-S) I-Code ePC I-Code UID Upgradable to EPCglobal HF Gen2 protocol
Number of channels	2 (Medio L400-2) 4 (Medio L400-4)
RF Output Power	500mW to 5W (+/-10%)
Communication Interfaces	RS232 (up to 115200 bauds) USB 1.1 10/100 Ethernet
Communication Protocols	Tagsys StxNG Telnet & Serial Console Standalone Mode Heartbeat
I/O Ports (GPIO)	4 Inputs, 4 Outputs
User Interface	LCD Screen With Backlight (2x16 Characters) Keypad (Up, Down, Select)

Remote Monitoring	System uptime // Current number of connections per interface // Date of last connection per interface // Total number of connections per interface since power-up // Total amount of bytes sent/received per interface since power-up // Internal operating temperature // Digital Output overload status // Read/Write count per channel // RF power amplifiers consumption // RF power amplifiers operating temperature // Antennas tuning status // Noise Level on I&Q receivers // Real Time raw signal capture
Firmware	Remotely upgradeable

## 6.2 Mechanical Data

The Medio L400 reader is delivered with four rubber pads on the bottom of the case for installation on a table or desktop. The rubber pads can be removed to access the M4 screw cutting holes that can be used to mount the unit in various positions. The figure below gives details about the screw cutting hole positioning.

Figure 20: Screw-cutting hole Positioning

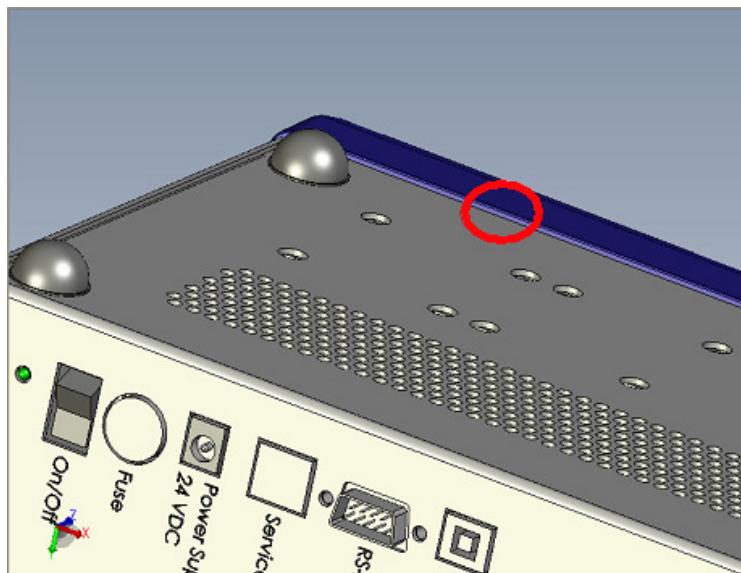


The top and bottom ventilation grids must never be blocked and must be kept clean and free of dust. Clean with a dry cloth if required.



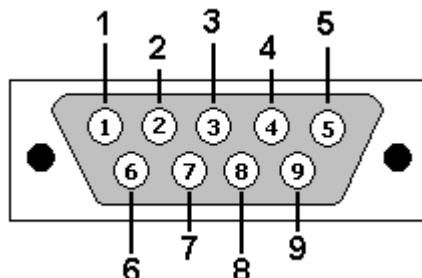
Be advised of the thickness of the plastic front frame when mounting it.  
 Please see [Figure 21](#)

**Figure 21: Back view of the Medio L400**



## 6.3 RS232 Connector

**Figure 22: RS-232 Connector (Male DB-9)**



**Table 11: RS-232 Connector Pin Assignment**

Pin	Description	Pin	Description
1	Not connected	6	Not connected
2	RXD	7	RTS (internally connected to CTS)
3	TXD	8	CTS (internally connected to RTS)
4	Not connected	9	Not connected
5	GND		

## 6.4 GPIO Connector

### 6.4.1 Pin Assignment

Figure 23: GPIO Connector (Female DB-9)

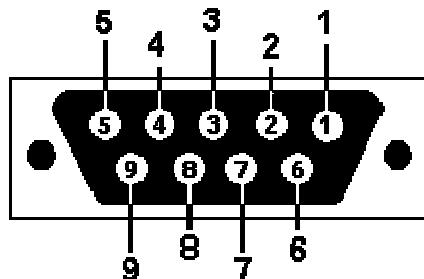


Table 12: GPIO Connector - Pin Assignment

Pin	Description	Pin	Description
1	Input #1	6	Output #1
2	Input #2	7	Output #2
3	Input #3	8	Output #3
4	Input #4	9	Output #4
5	Gnd		

### 6.4.2 Electrical Characteristics

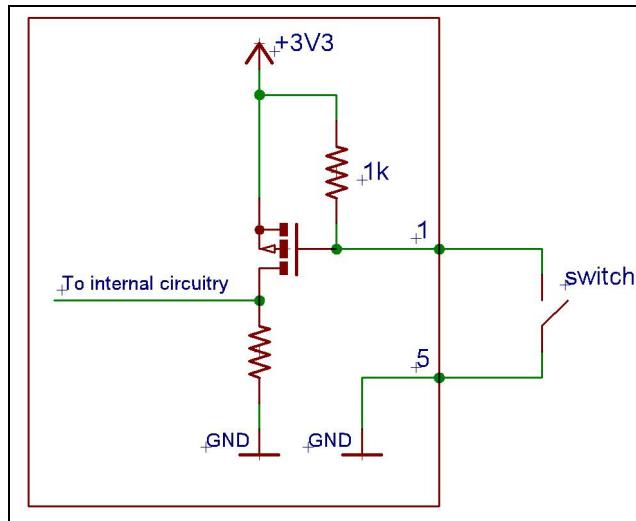
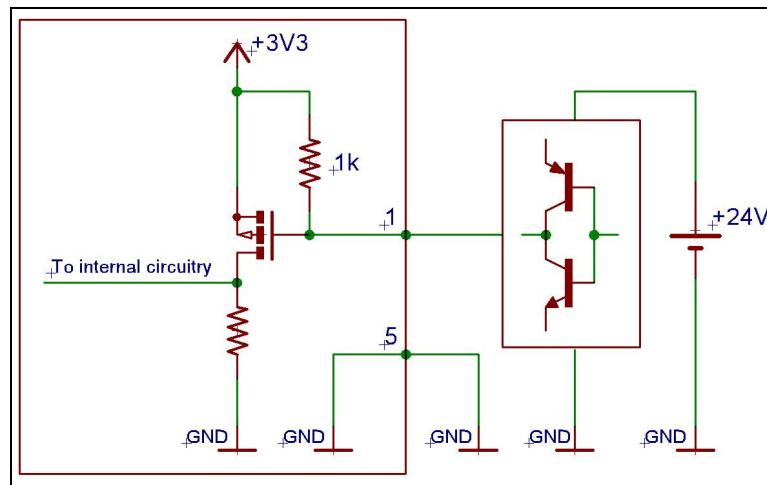
Table 13: GPIO Pins - Electrical Characteristics

Parameters	Min.	Typ.	Max.	Unit
Input Voltage Range	0	--	28	V
Input Voltage (Low Level)	0	--	0.9	V
Input Voltage (High Level)	1.5	--	28	V
Output Voltage Range	0	--	28	V
Maximum Continuous Output Current	--	--	1.4	A
Output Over Current Protection	1.9	2.8	3.8	A

### 6.4.3 Using Inputs

Reader inputs can be driven by a voltage source from 0V up to 28V referring to the ground. Voltages under 0.9V are considered as “logical low state”, voltages above 1.5V are considered as “logical high state”. Inputs are internally pulled-up to 3.3V with 1KOhms resistors. Applying negative voltage to inputs (polarity inversion) may destroy them.

**Figure 24** below demonstrates how to connect an external sensor (a simple switch or a totem pole output sensor) to an input.

**Figure 24: Connecting a simple switch to input #1****Figure 25: Connecting a totem-pole output sensor to input #1**

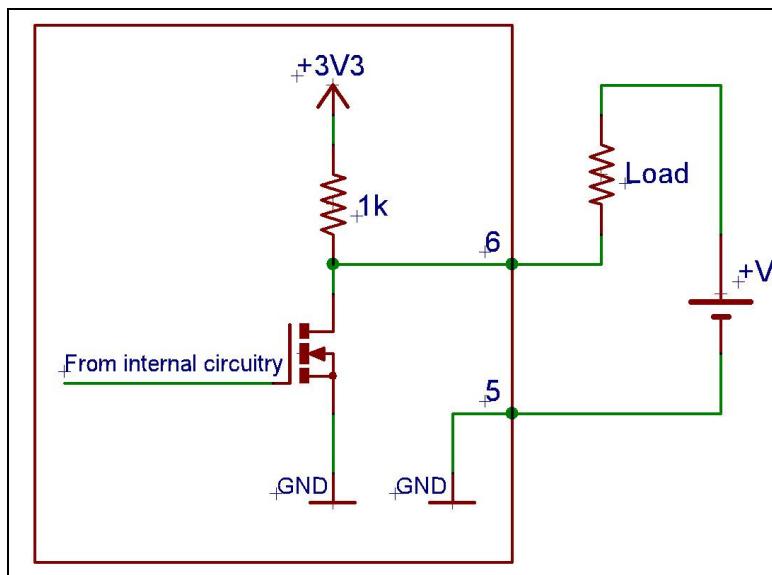
External devices must be connected to GPIOs in compliance with [Table 12](#) and SELV requirements.

#### 6.4.4 Using Outputs

The reader outputs are Open Drain, N-Channel (when activated, an output is tied to the ground). They can drive a current up to 1.4A, and accept voltages up to 28V. Outputs are internally pulled-up to 3.3V with 1KOhms resistors and are protected against overload and overheating. Applying negative voltage to outputs (polarity inversion) may destroy them.

**Figure 26** below demonstrates how to connect an external load to an output.

**Figure 26: Connecting an external load to output #1**



External devices must be connected to GPIOs in compliance with [Table 12](#) and SELV requirements.

# 7 Warranty Conditions

---

## 7.1 Warranty

TAGSYS warrants that this 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; or
- the Product with any equipment

This warranty does only cover the Product to the exclusion of any such 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.

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.

## 7.2 Warranty Exclusions

- Defects or damages resulting from storage of the Product under conditions which 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 Product that prevents TAGSYS from performing 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.

## 7.2.1 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.

## 7.2.2 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 (0) 4 42 18 89 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  
 TAGSYS – 785 Voie Antiope, Athélia III,  
 13600 La Ciotat, France

To inform TAGSYS of this return, please also fax it to your Customer Service Representative  
 +33 (0) 4 42 18 89 01

**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 (0) 4 42 18 89 36



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.