Medio P013 Reader

Integrator's Guide

Revision 1.1



TAGSYS

March 2005

Publishing Information

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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 Medium Range Medio P013 TAGSYS RFID Tag Readers.

Audience

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

Conventions

Symbol	Meaning
	**CAUTION**: A note that advises users that a specific action could result in the loss of data or damage the hardware. **WARNING**: 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.

Abbreviations and Acronyms

AFI	Application Family Identifier
AON	All Or None
API	Application Programming Interface
ASK	Amplitude Shift Keying
CPU	Central Processing Unit
CRC	Cyclic Redundancy Check
DLL	Dynamic-Link Library
DPU	Digital Processing Unit
DSFID	Data Storage Format Identifier
DSP	Digital Signal Processor
EAS	Electronic Article Surveillance
ETX	End of Text
HPI	Host Port Interface
I/O	Input/Output
IFD	Interface Device

LED	Light Emitting Diode
LSB	Least Significant Bit
MSB	Most Significant Bit
OS	Operating System
PC	Personal Computer
PCB	Printed Circuit Board
RAM	Random Access Memory
RF	Radio Frequency
RFID	Radio Frequency IDentification
RFU	Reserved for Future Use
RPU	Radio Processing Unit
RTC	Real Time Clock
RTF	Reader Talks First
SAM	Security Access Module
STX	Start of Text
TTF	Tag Talks First
TTL	Transistor-Transistor Logic
TTY	TeleTYpe
UID	Unique Identifier

Glossary

Anti-Collision Tag capability making it readable while other tags are present in the RF field.

Antenna An aerial that receives and/or transmits radio frequency signals. Aerials are manufactured in a variety of forms, shapes and sizes.

Baud A unit of measure of data transmission speed representing the number of signal changes per second.

BNC Connector Cylindrical metal connector with a copper core that is located at the tip of a coaxial cable, and is used to connect cables together. It attaches by pushing and twisting the outer cylinder on to two locking pins.

Coupler See Reader.

Data Storage Format Identifier Identifies the structure of the data stored in the TAGSYS RFID Tag.

Digital Signal Processor This part of the Radio Processing Unit (RPU) performs real-time TAGSYS RFID Tag decoding and manages the Medio L200 configuration.

Dynamic-Link Library Executable routines that are stored as separate files with DLL extensions and executed only when needed by the program.

Host Port Interface Interface used to access the DSP memory.

IEC Connector Three-pin connector used on sockets that carry mains electricity to the computer. All PCs use a male IEC connector and mains lead with a female IEC connector.

Interrogation Pulse A signal transmitted by the coupler to activate the TAGSYS RFID Tag's transponder.

Monitoring Port Parallel Port granting access to the HPI. It communicates directly with the Radio Processing Unit

Multi-Read See Anti-Collision

Nibble Half a byte (4 bits)

Packaged Reader A reader in its casing.

Phase Shift Difference of phase between the 13.56 MHz field emitted by two antennas. This feature is dedicated to rotating field applications and three-dimensional volume TAGSYS RFID Tag detection.

Protocol A set of rules governing a particular function, such as the flow of data/information in a communication system (communication between a TAGSYS RFID Tag and a reader or a reader and a PC or host computer).

Radio Frequency Identification System (RFID) An automatic identification and data capture system comprising one or more readers and one or more TAGSYS RFID Tags in which data transfer is achieved by means of suitable modulated inductive or radiating electromagnetic carriers.

Radio Processing Unit This unit controls the main features of the Medio L200, such as the RF channels, the multiplexer and the TAGSYS RFID Tag decoding.

Reader Electronic system for the communication between TAGSYS RFID Tags and host computers.

Reader Talks First Chip protocol for exchanges between the reader and the chip, whereby the chip waits for a command from the reader to which it responds.

RS-232 Electronic Industries Association (EIA) standard for serial interfaces between computers and peripherals which defines the function, the electrical characteristics and the timing of signals.

RS-485 Electronic Industries Association (EIA) standard for multipoint, differential data transmission. It allows multiple nodes to communicate bi-directionally over 1 or 2 twisted pairs.

TAGSYS RFID Tag Small, flexible tag from the 13.56 MHz TAGSYS product line. A TAGSYS RFID Tag is made of a chip connected to an etched antenna.

Tag See TAGSYS RFID Tag

Tag Talks First Chip protocol for exchanges between the reader and the chip, whereby the tag sends information continuously, without waiting for a specific command from the reader.

Transceiver A combined transmitter and receiver.

Transponder A combined receiver/transmitter that automatically transmits a signal when a 'trigger' is received by it. The trigger is often a pulse, called an interrogation pulse.

If you need assistance

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

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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 Certification

1.1 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 CIT (Certified Integrator of TAGSYS) to install the Medio P013 TAGSYS RFID Tag Reader 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 standards and will void the TAGSYS warranty.

1.2 Regulatory Notices

An RFID system typically composed of an RF emission device such as the Medio P013 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 dBµA/m in Europe and 38 dBµA/m in US.

The Medio P013 TAGSYS RFID Tag Reader meets these limits.



It is the responsibility of the CIT (Certified Integrator of TAGSYS) to install the Medio P013 TAGSYS RFID Tag Reader as described in this Integrator’s Guide or in TAGSYS Documentation.

1.2.1 In Europe (CE and RTTE Directives)

The Medio P013 TAGSYS RFID Tag Reader complies with the European EMC directive.

The Medio P013 complies with the requirements of the Telecommunication Terminal Equipment Act (FTEG) and the RTTE Directive 1995/5/EC.

Any modification of the Medio P013 TAGSYS RFID Tag Reader 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 P013 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.

1.2.2 In USA (FCC Directive)

The Medio P013 TAGSYS RFID Tag Reader has been designed to comply with Part 15 of the FCC Rules. Furthermore typical configurations based on a Medio P013 have been successfully tested with Part 15 of the FCC rules.

Medio P013 TAGSYS RFID Tag Reader

WARNING TO USERS IN THE UNITED STATES

FEDERAL COMMUNCIATIONS 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 library system devices must accept any interference received, including interference that may cause undesired operation.

1.2.3 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 Introduction

2.1 General

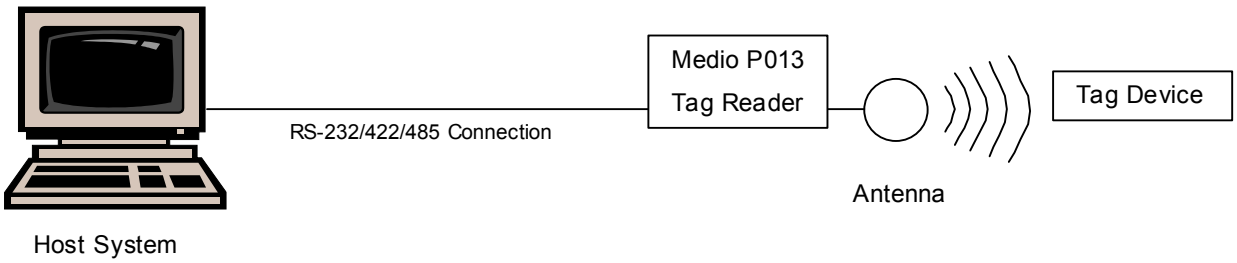
This document provides information about how to install and use the Medium Range Medio P013 TAGSYS RFID Tag Reader.

2.2 Product Description

TAGSYS Medio P013 RFID Tag Reader is intended for Original Equipment Manufacturer (OEM) applications. The Medio P013 is Medium Range 13.56 MHz RFID reader designed to operate with any TAGSYS RFID Tag using any TAGSYS chip (C210 or C240).

Medio P013 reader requires minimal computing power from the host workstation (Windows®-based PC or UNIX environment). It communicates easily with this host at a high speed, using the simple TAGSYS enhanced communication protocol (STX-E) that has already been proven on many TAGSYS readers (Medio S001/S002/S003/S011/S012/S013 and Medio L100/L200).

Figure 1: Medio P013 TAGSYS RFID Tag Reader Application Overview



The Medio P013 TAGSYS RFID Tag readers are easy to integrate because of its :

- small size
- standard communication links

2.3 Medio P013 Key Features

Table 1: Medio P013 Key Features

Description	Medio P013
Operating Frequency	13.56 MHz
Compatibility	TAGSYS (C210 and C240)
Stand-alone Mode	TAGSYS (C210 and C240)
Selectable Serial Link	RS-232, RS-422, RS-485 (Half or Full duplex)
Network Operating	Yes
I/Os	1 input and 1 output
Firmware upgradeable	Yes

2.4 Delivery

The Medio P013 TAGSYS RFID Tag Reader kit contains the following items:

Table 2: Package Contents

Quantity	Item
1	Medio P013 TAGSYS RFID Tag Reader
1	SMA/BNC Adaptor
4	Configuration jumpers
1	CD-ROM including: • Medio P013 Integrator's Guide • Medio P013 Command Set • User-friendly Px Explorer software provided for test and debug operations on Windows® 9x, NT®, 2000 and XP platforms • Medio STX Windows® DLLs to facilitate the development your own applications on Windows® 9x, NT®, 2000, XP and Windows® Pocket PC 2002 platforms • Medio STX Windows® DLL Programming Guide • One set of Microsoft® Visual C++® source code and executable samples using the Medio STX Windows® DLLs
1	Welcome Letter / Product Return Form

3 Functional Overview

This section provides an overview of the architectural structure and peripheral devices of the Medio P013 TAGSYS RFID Tag Reader. It also provides a summary of the special functions used to drive the reader board and describes the automatic features managed by the Central Processing Unit (CPU).

3.1 Functional Block Diagram

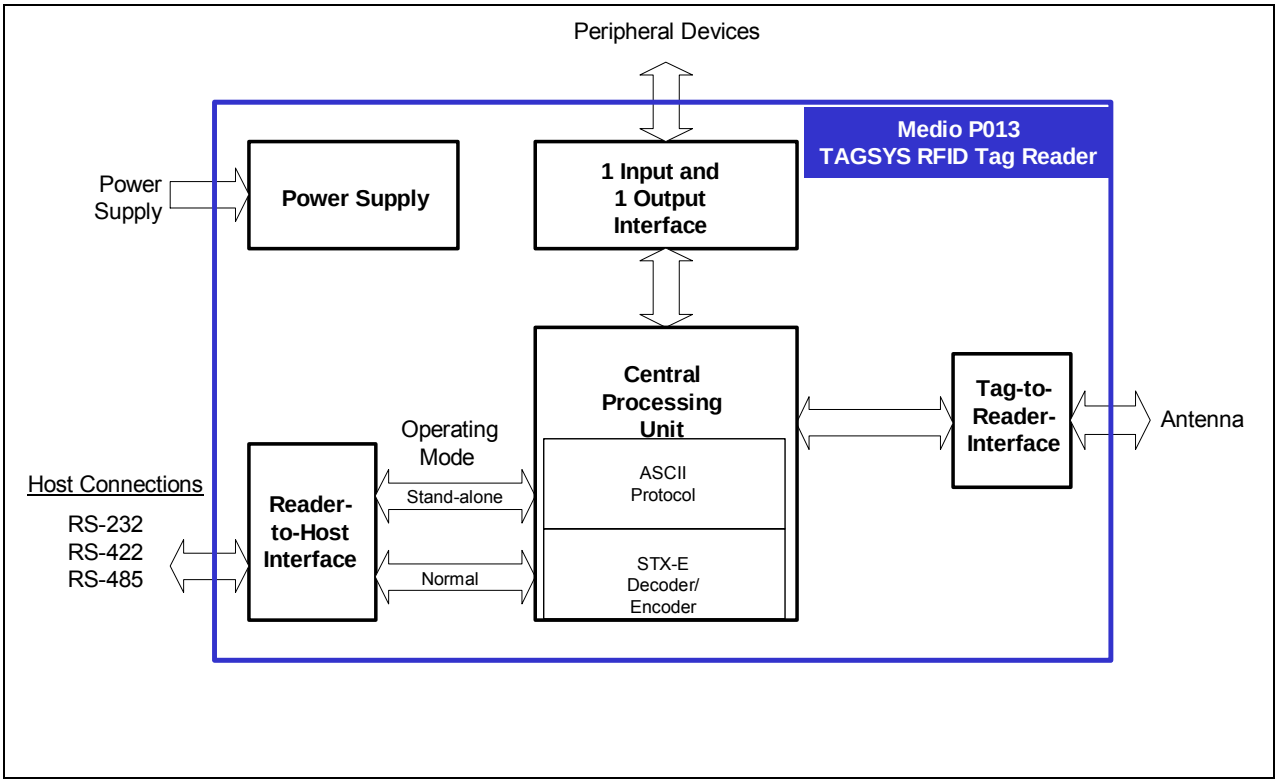
The Medio P013 architectural structure is based on a CPU that drives all reader functions.

It manages communications between the host system (connected to the “Reader-to-Host interface”) and one or more TAGSYS RFID Tags using an antenna (connected to the “Tag-to-Reader interface”).

It also drives 1 Universal Input and 1 Universal Outputs.

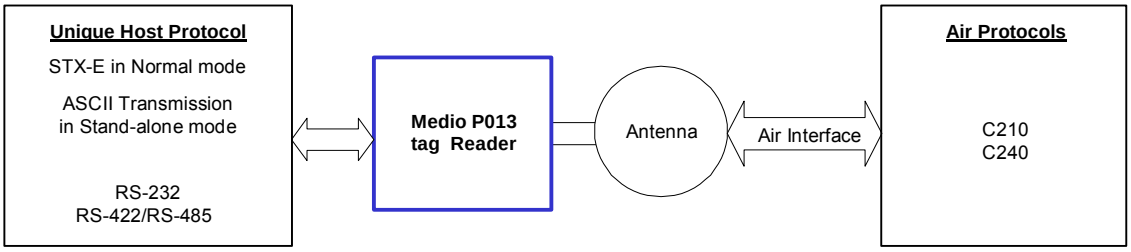
Figure 2 illustrates the general architecture of Medio P013 TAGSYS RFID Tag Reader.

Figure 2: Overall Medio P013 Architecture



3.2 Communication Protocols

Figure 3: Medio P013 Reader Communication Protocols



3.2.1 Tag-to-Reader Interface

To read from TAGSYS RFID Tags, to write to their memory, or to activate their functions, a wide command set is available. For a complete list of embedded commands and their description, please refer to the Medio P013 Command Set document.

Each range of TAGSYS RFID Tags has its own specific set of commands.

Table 3: TAGSYS RFID Tag Dedicated Commands

TAGSYS RFID Tag Family	Available Commands	Comments
C210	Read the ID	
C240	Read Pages	
	Set Password	
	Write Page	

3.2.2 Reader-to-Host Interface

When the Medio P013 reader is connected to an antenna, it acts more as a protocol converter due to the wide range of tasks it can perform. For more information about these tasks, refer to the Medio P013 Command Set document.

Depending on the task requested by the user through the host interface, the reader retrieves information from the TAGSYS RFID Tag or provides it with information using its own communication protocol. The reader then converts the result of the operation into STX-E protocol and returns the information to the host via the Reader-to-Host interface. For more information, refer to the Medio P013 Command Set document.

The Reader-to-Host interface has two operating modes:

1. Normal Mode

   The Reader-to-Host interface is the slave of the master host system. It waits for a valid command from the host, performs the task and responds. This bi-directional communication is achieved via the STX-E protocol. (For more information, please refer to the Medio P013 Command Set document.)

2. Stand-alone Mode

   The Reader-to-Host interface is independent from the host system. Stand-alone mode is used by the Medio P013 reader to read tags and send their identification data to the host system. This transmission takes place in ASCII format. While in this mode, the reader cannot receive any commands.

For more information, please refer to Section 7, “Stand-alone Mode”.

3.3 Peripheral Devices

The I/O interface manages 1 input and 1 output that can drive or check external peripherals.

Inputs are compliant with open collector drivers, TTL/CMOS voltage levels and industrial levels (up to 25V).

Outputs consist of a gate controlled MOSFET transistor driver that can drive up to 1.5A. It is safe from current and thermal overloads. +5V current limited option is available to give TTL/CMOS compliant levels.

The I/O pins are mainly used for static applications such as reading sensors or driving LEDs, relays or buzzers. For more information, refer to Section 6.1 “Using the Universal Input pin” and Section 6.2 “Using the Universal Output pin”.

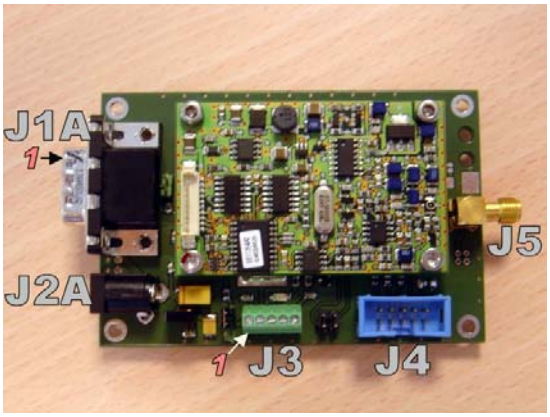
4 Installing the Reader

This section explains how best to install the Medio P013 TAGSYS RFID Tag Reader board. The physical description of the reader board is given in Section 9, “Mechanical Characteristics”.

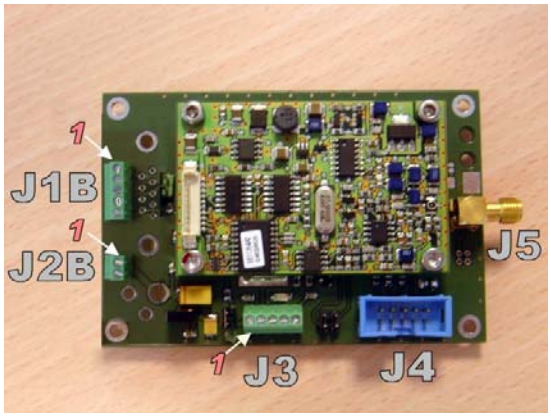
4.1 Pin Connections

The reader is available in with standard or industrial connection system.

Standard Connection System



Industrial Connection System



Communication connector

J1A : Sub-D9 Male

- #2 : Data transmitted to the reader for RS232 Mode (TD signal for PC)
  A signal for RS422 or RS485 mode
- #3 : Data sent by the reader for RS232 mode (RD signal for PC)
  Y signal for RS422 or RS485 mode
- #5 : Ground
- #6 : B signal for RS422 or RS485 mode
- #9 : Z signal for RS422 or RS485 mode

All other pins are not connected.

J1B : Industrial terminal block (screw connections)

- #1 : Z signal for RS422 or RS485 mode
- #2 : Data sent by the reader for RS232 mode (RD signal for PC)
  Y signal for RS422 or RS485 mode
- #3 : Ground
- #4 : Data transmitted to the reader for RS232 Mode (TD signal for PC)
  A signal for RS422 or RS485 mode
- #5 : B signal for RS422 or RS485 mode

Power supply connector

J2A : 2.5mm Jack type (positive connection on the center pin)

J2B : Industrial terminal block (screw connections)

#1 : Positive connection to a power supply

#2 : Negative connection to a power supply

IO Connector

J3 : Industrial terminal block (screw connections)

#1 : Configurable supply output

#2 : High power output

#3 : Ground for output

#4 : Universal input

#5 : Ground for input

Programmation Connector

J4 : HE10 type

RF antenna connector

J5 : SMA type

4.2 Power Supply

A DC power supply must be connected to J2 connector and must be able to withstand a peak current of 600 mA (for 10V supply) when the reader is powered on. Please refer to Section 10, “Electrical Characteristics” for more details about reader consumption.

The power pins accept an input voltage between 10 and 24 V DC.

4.3 Antenna

The J5 connector is dedicated to an antenna that is required for reading TAGSYS RFID Tags. This can be a TAGSYS antenna or a custom-made model. The choice of the antenna must take into account the following considerations:

- Physical area (size) of the TAGSYS RFID Tag
- Strength of the reader
- Compliance with electrical characteristics (see Electrical Characteristics chapter)

The antenna has a passive design that features 50 ohm, 0° impedance characteristics at 13.56 MHz frequency.

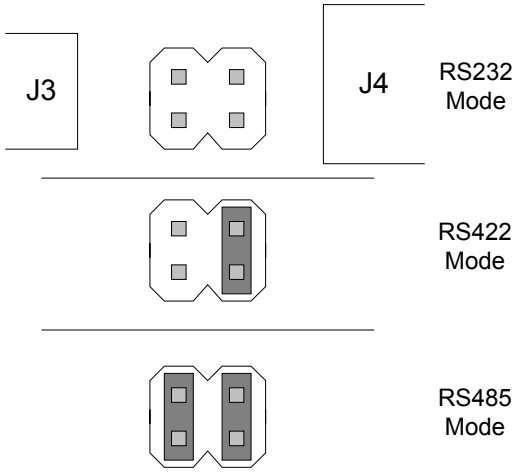
5 Serial Communication Links

Medio P013 TAGSYS RFID Tag Readers are based on a Master-Slave communication system where the host system acts as the master and the reader as the slave.

In Stand-alone mode, the reader is used as a master and the host system becomes the slave.

The Host-to-Reader interface accepts an RS-232, RS-422 or RS-485 (Full or Half Duplex) communication links. The communication type is selected using the jumpers on the Serial communication selector :

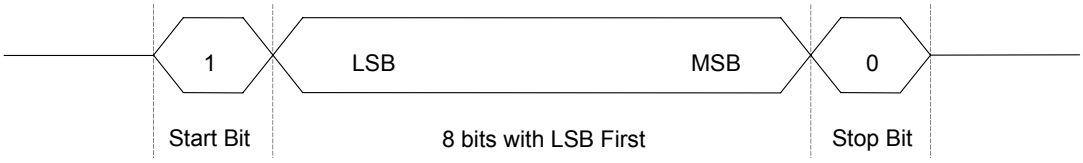




5.1 General Information on Data Acquisition

Communication takes place by sending frames (bytes) on the communication link. The bytes are transmitted LSB first with one start bit and one stop bit as shown in Figure 4.

Figure 4: Structure of a Byte on the Communication Link



Communication parameters are listed in Table 4. These parameters cannot be modified.

Table 4: Parameters for the Transmission of a Byte

Parameter	Value
Allowed Baud Rates	4800, 9600, 19200 or 38400 (depending on the reader settings)
Start Bit	On
Number of data bits	8
Parity	None
Stop bit	1

The maximum period between the transmission of bytes is 10 ms, regardless of the applicable baud rate.

5.2 RS-232 Interface

5.2.1 Installing the reader in RS-232 mode

To use the RS-232 interface, you can connect a NULL-MODEM RS232 cable to the suitable COM port of a PC .

Please configure the Serial Communication Selector as shown in Chapter 5.

5.2.2 Setting the Host System RS-232 Communication Link

The host system RS-232 communication link must be set as shown in Table 5.

Table 5: RS-232 Allowed Settings on the Host System

Parameter	Value
Allowed Baud Rates	4800, 9600, 19200 or 38400
Start bit	On
Number of data bits	8
Parity	None
Stop bit	1
Data flow	None

5.2.3 Electrical Signal Requirements

Table 6 shows the electrical characteristics of the RS-232 interface pins.

Table 6: RS-232 Interface Pins - Electrical Characteristics

Parameters	Conditions	Min.	Typ.	Max.	Unit
RS232 Input Voltage Range		-25		+25	V
RS232 Input Voltage Low	25°C			0.8	V
RS232 Input Voltage High	25°C	2			V
RS232 Input Hysteresis			0.6		V
RS232 Input Resistance		3	5	7	kΩ
RS232 Output Voltage Swing	Loaded with 3 kΩ	±5	±6.5		V
RS232 Output Short-circuit current			±60		mA

5.3 RS-422 / RS-485 Interface



The RS-422 interface is compatible with EIA/TIA-422 standards.

The RS-485 interface is compatible with EIA/TIA-485 standards.

The RS-485 permits a balanced transmission line to be shared in Party Line or Multi-drop mode. As many as 32 receiver (readers or repeaters) pairs can share a Multi-drop network. If more readers are needed in the network, balanced line repeaters can be used (a repeater takes the place of a reader on the network).

5.3.1 Installing the RS-422 Interface

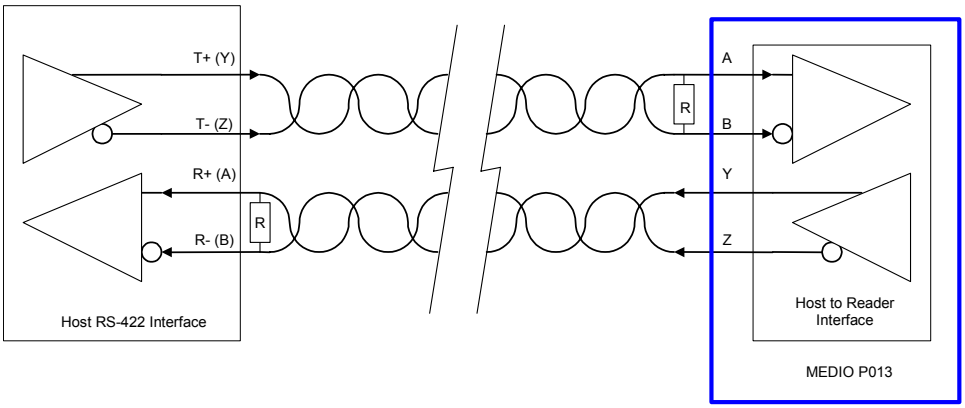
Figure 5 shows how to connect the RS-422 interface. The balanced line A and B corresponds to the reader receiver and must be connected to the transmitter of the host. The A pin is the non inverted line (+) and B is the inverted line (-). The balanced line Y and Z corresponds to the reader transceiver and must be connected to the receiver of the host. The Y pin is the non-inverted line (+) and the Z pin is the inverted line (-).

A 120-Ohm resistor should be added at the end of a transmission line in compliance with RS-422 specifications. This resistor can be connected by connecting a jumper on the RS422 Terminaison selector.



When set to communicate according to RS-422 specifications, the reader always holds its transceiver active and never switches it into Tri-state mode. The Host-to-Reader Interface should not be unplugged.

Figure 5: Connection of the RS-422 Interface



5.3.2 Installing the RS-485 Full Duplex Interface

The RS-485 Full Duplex Standard requires 2 pairs of balanced lines, one for transmitting and another for receiving data.



When testing your network installation, make sure that all the connected readers are :

- correctly supplied
- correctly configured (Communication link selector and Terminaison resistor)
- correctly connected (cable connections)

If one reader is faulty on the network, all the network may be mute to any command sent over the network.

Make sure that all the readers are preset with a different network address to avoid network conflicts. By default, a MEDIO P013 is preset with address 0.

The balanced line A and B corresponds to the reader receiver and must be connected to the transmitter of the host (and other reader receivers or repeater). The A pin is the non-inverted line (+) and the B pin is the inverted line (-).

Figure 6: Connection of the RS-485 Full Duplex Interface

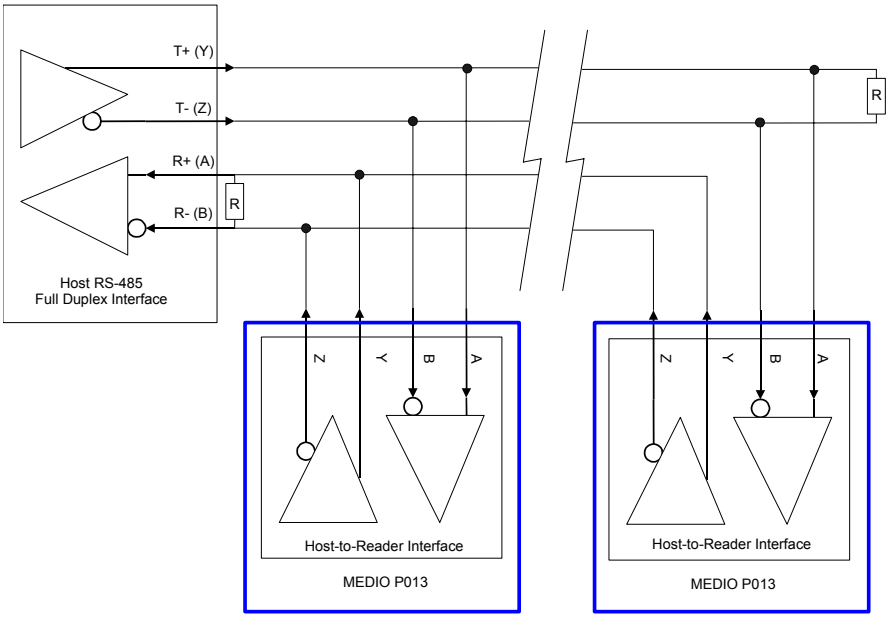


Figure 6 shows how to connect the RS-485 Full Duplex Interface in a Multi-drop network.

The balanced line Y and Z corresponds to the reader transceiver and must be connected to the receiver of the host (and other reader transceivers or repeater). The Y pin is the non-inverted line (+) and the Z pin is the inverted line (-).

A 120-Ohm resistor should be added at the end of the two transmission lines in compliance with RS-485 specifications. This resistor can be connected by connecting a jumper on the RS422/RS485 Termination Selector on the end-line reader.

When set to communicate using the RS-485 interface, the reader always holds the transmission lines before the start of any communication and returns to Tri-state mode at the end of communication. The host system should do the same. The reader can be unplugged from the balanced lines.

5.3.3 Installing the RS-485 Half Duplex Interface

RS-485 Half Duplex Standard requires only 1 pair of balanced lines, for both transmitting and receiving data.



When testing your network installation, make sure that all the connected readers are :

- correctly supplied
- correctly configured (Communication link selector and Termination resistor)
- correctly connected (cable connections)

If one reader is faulty on the network, all the network may be mute to any command sent over the network.

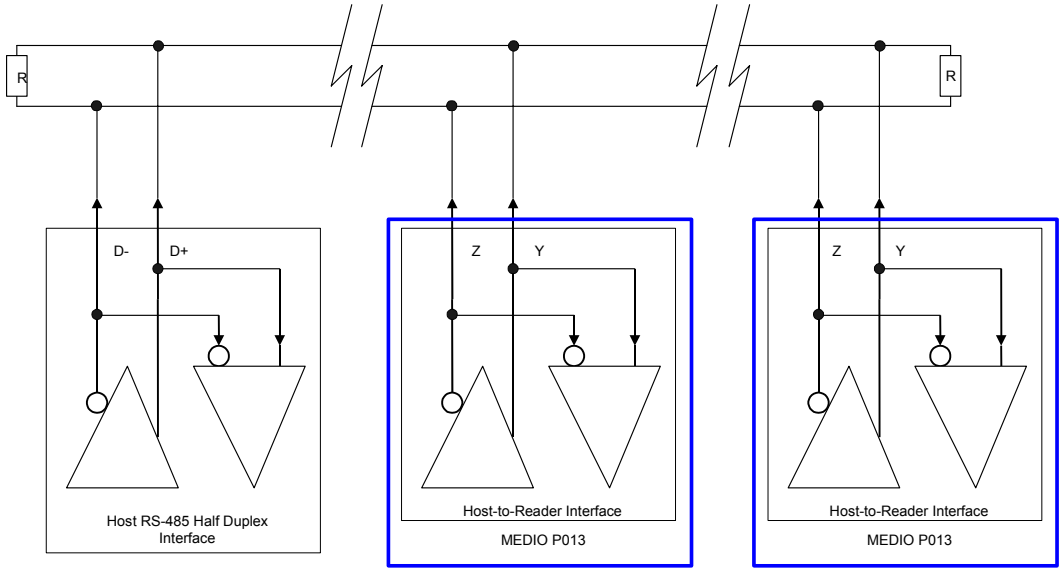
Make sure that all the readers are preset with a different network address to avoid network conflicts. By default, a MEDIO P013 is preset with address 0.

The balanced line Y and Z corresponds to the reader driver and must be connected to the driver of the host (and other reader drivers or repeater). The Y pin is the non-inverted line (+) and the Z pin is the inverted line (-).

The RS-485 Half Duplex interface is configured by setting the reader in RS-485 Full Duplex mode and connecting pins A and B to pins Y and Z pins respectively on each reader of a network.

Figure 7 shows how to connect the RS-485 Half Duplex Interface in a multi-drop network.

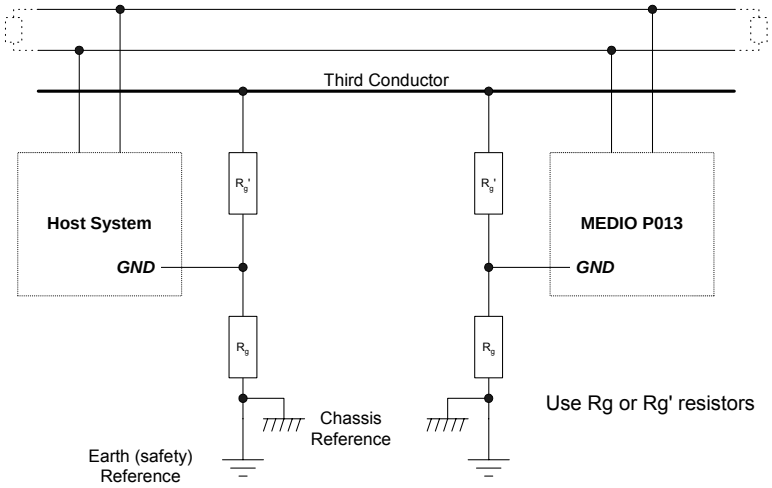
Figure 7: Connection of the RS-485 Half Duplex Interface



5.3.4 Grounding Arrangement

In order for the generator and the receiver to operate correctly, a signal return path must exist between the reader grounds of the equipment at each end of the interconnection. The reader reference may be established by a third conductor connecting the common leads of the devices, or it may be provided by the connection from each equipment item to a ground reference. Where the reader reference is provided by a third conductor, the connection between the reader common and the third conductor must contain a certain amount of resistance (e.g. 100 ohms) to limit circulating currents when other ground connections are provided for safety.

Figure 8: Grounding Arrangement for RS-422 / RS-485



5.3.5 Electrical Signal Requirements

The following table shows the electrical characteristics of the RS-422/RS-485 interface pins.

Table 7: RS-422/ RS-485 Interface Pins - Electrical Characteristics

Parameters	Conditions	Min.	Typ.	Max.	Unit
Receiver Input Resistance	-7V < V_{CM} < +12V	12	24		kΩ
Receiver Input Current	V_{CM} = +12V			1	mA
	V_{CM} = -7V	-0.8			
Receiver Input Differential Threshold		-200		200	mV
Receiver Input Hysteresis			40		mV
Transceiver Differential Output Voltage	RS-422	2		6	V
	RS-485	1.5		6	
Change In Magnitude of Transceiver Differential Output Voltage for Complementary Output States		-0.2		+0.2	V
Transceiver Output Short-circuit Current			±250		mA
Output Leakage Current			±5	500	µA

6 Connecting Peripheral Devices

6.1 Using the Universal Input pin

The reader input can be driven by a voltage source from 0V up to 24V referring to the input ground.

A relay (open chain transistor, switch…) can also be used to connect the input pin and its ground.

- Low level input voltage is defined to be in the range of 0 to 1.5V
- High level input voltage is defined to be in the range of 3 to 25V

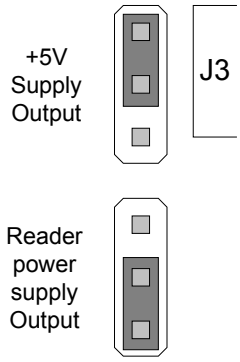
6.2 Using the Universal Output pin

The output pin is an open drain power transistor that can drive a current up to 1.5A. When activated, the power transistor connects the output pin and its ground.

The output transistor is protected against heating and current overload. If an overload happens, the output stops driving current automatically. The output must be turned off to be re-activated.

You can use the Configurable Supply Output pin of the IO connector to deliver a supply to an active system connected to the output. You can set it to deliver the supply used to power the reader or a +5V supply limited by a 470 Ohms serial resistor by using the Supply Output Pin Selector with a jumper.

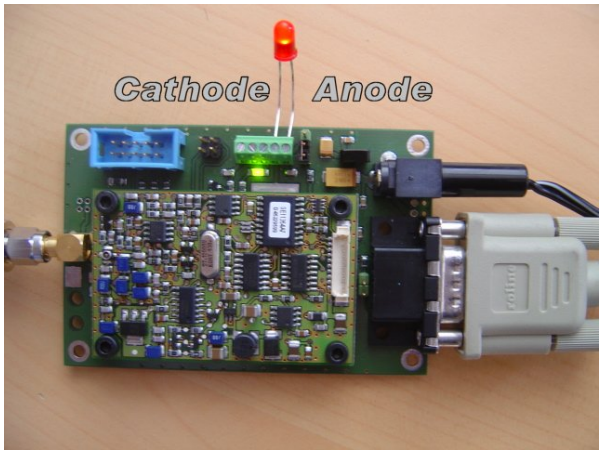






When the output is activated by the reader, a green led near the IO connector turns on. Beware that the LED will stay on while the output is in thermal or current overload state.

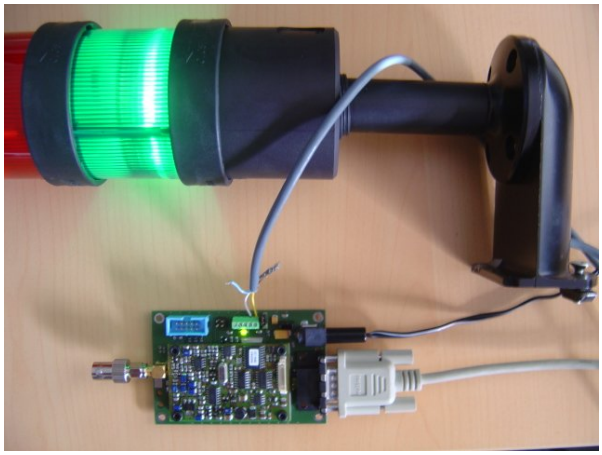
Example 1 : Connecting a LED to the Output



The LED's cathode is connected to the Output pin and its anode to the Output Supply Pin. Note that the Output supply selector is configured to deliver 5V to supply the LED. The internal serial resistor limits the current delivered to the LED.

Example 2 : Connecting a Lamp (5W under 24 V) to the Output using the reader supply





The Commun wire of the lamp is connected to the Output pin and its supply to the Output Supply Pin. Note that the Output supply selector is configured to deliver the Power of the reader to the lamp. The lamp needs a 24V power supply, so the reader is supplied with 24V. The consumption of the lamp is less than 1 Ampere, so it can be connected directly to the reader output.

6.3 I/O Electrical Signal Requirements

Table 8 provides the electrical DC characteristics.

Table 8: I/O Interface Pins - Electrical Characteristics

Parameters	Conditions	Min.	Typ.	Max.	Unit	Note
Input Voltage Low		0		2	V	
Input Voltage High		3		25	V	
Output Current				1.5	A	

6.4 Reader programmation

Plug the TAGSYS Reader Programmer to the J4 connector with the dedicated cable and follow the TAGSYS Reader Programmer User's Guide.

7 Stand-alone Mode

Stand-alone Mode is designed to use the reader without using any command set. While in this mode, the reader is limited to tag reading.

The reader sends the tag ID to the Host System using ASCII protocol via the Reader-to-Host interface.

ASCII protocol is used in order to provide hexadecimal data that can be read by a variety of terminal programs (e.g. Microsoft® HyperTerminal).

7.1 Stand-alone Mode Features

Table 9 lists the available features for each TAGSYS RFID Tag reader in Stand-alone mode.

Table 9: Available Features in Stand-alone Mode

Features	MEDIO P013
Customized tag type reading	C210 C240
Serial Communication Type	RS-232 RS-422
Baud Rate	4800, 9600, 19200 or 38400 bps
Repetition Option	Available
Customized ASCII message format	STX/ETX Characters Header String Chip Description String ID String (variable length) End of Message String
Input Trigger	Available
Output for active trigger information	Available
Output for tag reading information	Available

Customized Tag Type Reading

When using Medio P013 readers, tags to be scanned can be configured using the “Set Stand-alone Mode” command. For more information, refer to the Medio P013 Command Set document.

Serial Communication Type

When used in Stand-alone mode, Medio P013 readers can communicate via the RS-232, RS-422 or RS-485 link types.



Stand-alone is not recommended in a network configuration.

Customized ASCII Message Format

When a TAGSYS RFID Tag is read, its data is transmitted to the host in the form of an ASCII character frame.

Table 10: Customized ASCII Message Format (TAGSYS RFID Tag is read)

	Start of Text	Header String	Chip Description String	ID		End of Message String	End of Text
Description	<STX> (0x02)	"TAGSYS-" (Default)	Chip name			<CR/LF> (Default)	<ETX> (0x03)
Size	1 character	0 to 16 characters	0 to 16 characters	C210	2 to 16 characters	0 to 16 characters	1 character
				C240	2 to 16 characters		
Medio P013	Optional	Optional	Optional	Required		Optional	Optional

Medio P013 readers can decode all chips in Standalone mode. Only the ID field is required in the return ASCII message. All other fields are optional. The ID field length is programmable, the default lengths are given in Table 11.

Table 11: Default ID Field Lengths

Chip Type	Default ID Field Length
C210 chip	16 (Total memory)
C240 chip	16 (Block 0 Page 0)

Repetition Option

The reader constantly attempts to read any chips present in the field. When a chip ID is detected, the reader can send the information to the host in one of 2 modes:

1. In “Repeated Read” mode, the reader returns a chip’s ID to the host with each successful read operation.
2. In “Read Once” mode, the reader only returns the ID of a chip if the previous read corresponds to a different chip, or if all reading attempts have failed 4 times (this feature makes it possible to detect a chip’s potential exit out of the field).

Trigger Input

When the trigger capability is enabled, a trigger state is used to start and stop the RF scanning. The trigger is connected to the input of the reader.

Depending on the reply settings of the trigger, the ASCII message can be sent during the trigger activity (Repeated Read mode and Read Once mode are available) or at the end of the trigger. In this last case, a message is always sent to the host system:

- if a tag has been read, the message contains its ID,
- if a tag has not been read, the message contains a No Message string (that can be defined) as shown in Table 12.

Table 12: Customized ASCII Message Format (TAGSYS RFID Tag is not read)

	Start of Text	Header String	No Tag Found String	End of Message String	End of Text
Description	<STX> (0x02)	“TAGSYS-“ (Default)	“????????“ (Default)	<CR/LF> (Default)	<ETX> (0x03)
Size	1 character	0 to 16 characters	0 to 16 characters	0 to 16 characters	1 character
Medio P013	Optional	Optional	Required	Optional	Optional

Output Settings

The output of the reader can be used to monitor the trigger activity or the successful reads.

7.2 Enabling Stand-alone Mode

Medio P013 can be set in Stand-alone mode by using the “Set Stand-alone Mode” command followed by a “Reset Reader” command. For more information, refer to the Medio P013 Command Set document. You can also use the Px Explorer software provided with the reader.

7.3 Disabling Stand-alone Mode

The Medio P013 can be reset in Standard mode by sending the 'S' character using the communication interface (for example, HyperTerminal).

8 Technical Specifications

8.1 Medio P013 Technical Specifications

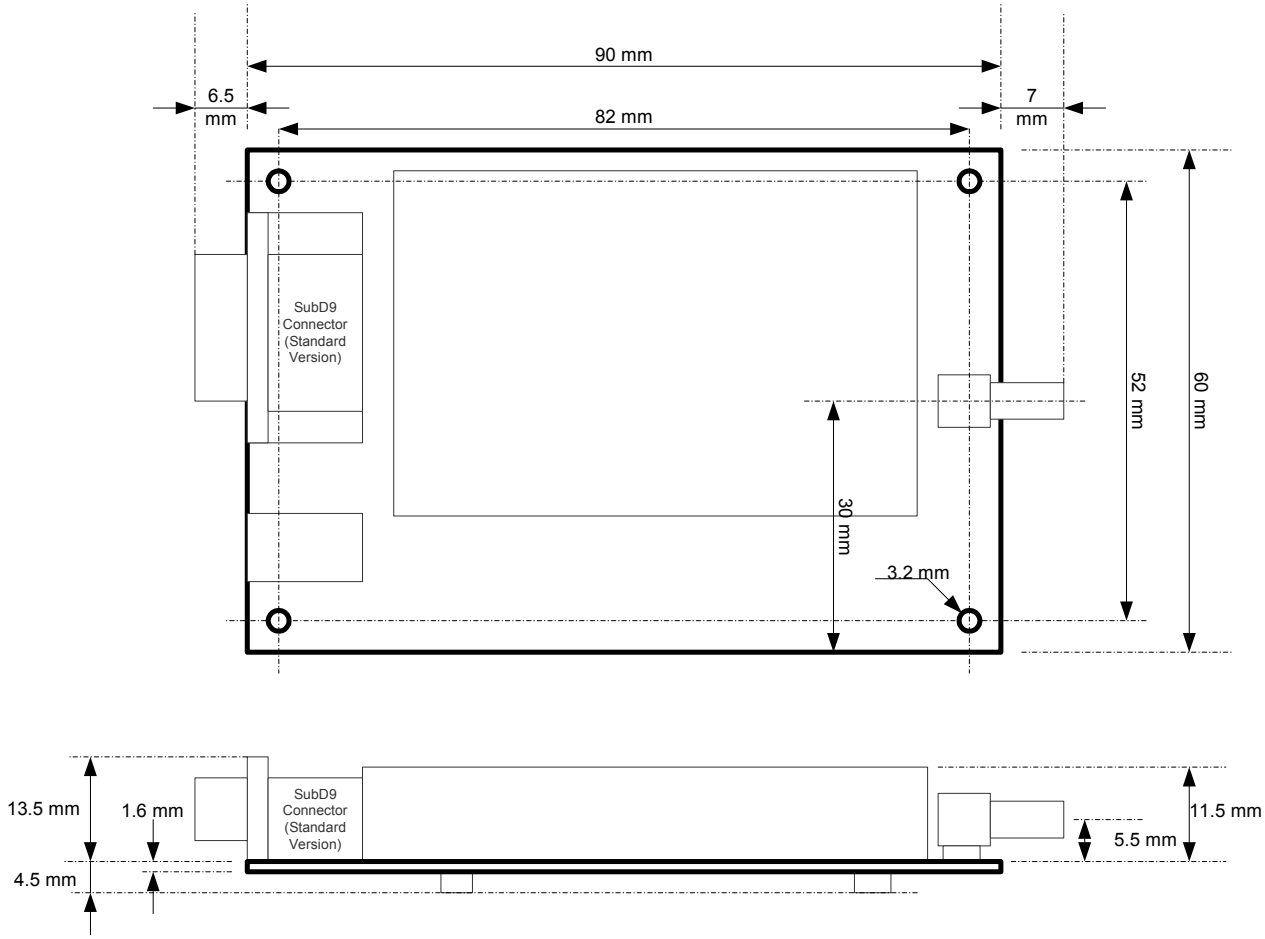
Table 13: Medio P013 Technical Specifications

Reference	Medio P013
Size (L x W x H)	Standard version : 103 x 60 x 18 mm Industrial version : 97 x 60 x 18 mm Without connectors : 90 x 60 x 18 mm
Weight	66 g
DC power	10 to 24 V
Chip compatibility	C210 C240
Communication interface	RS-232 RS-422 RS-485
RF Output Power	1W Typical
Power consumption	2.3 W
Operating temperature	0° to +55°C
Storage temperature	-20° to +70°C
Mechanical fixation	Mechanical fixation with 4 screws (M3)
Conformity	CE FCC
Communication protocol in Standard mode	TAGSYS-specific STXE-2
ASCII protocol in Stand-alone mode	Programmable (C210 / C240)

9 Mechanical Characteristics

9.1 Dimensions and General Mechanical Information

Figure 9: Medio P013 Coupler: Mechanical Dimensions



The values given have a tolerance of 0.2 mm.

9.2 Markings

The firmware application programmed in the reader and its version number are indicated on an adhesive strip on the processor unit of the reader.

10 Electrical Characteristics

This chapter provides information about AC and DC and characteristics for all pins. It also gives timing characteristics for the different interfaces.

10.1 Absolute Maximum Ratings

Parameter	Value
Ambient Operating Temperature	0°C to +55°C
Storage Temperature	-20°C to +70°C
Supply Voltage with respect to GND	25 V
Total Power Dissipation	2.3 W
Total Power Dissipation on Antenna	1 W
DC Current Allowed on Power Pin	400 mA
Peak Current Allowed on Power Pin	600 mA
Input Voltage Range on RS232 Receiver pin	±25 V
Input/Output Voltage	+25 V
ESD Protection on RS232 pins	±2 kV

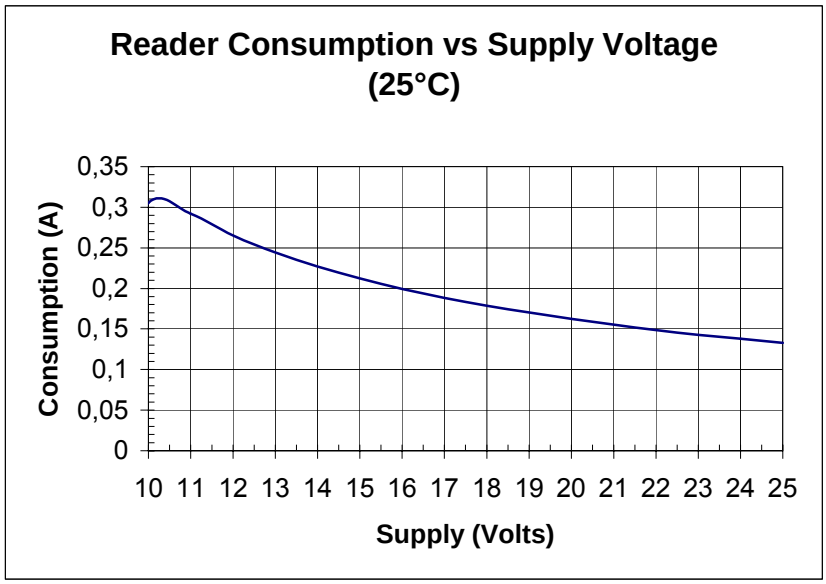
10.2 Standards Compliance

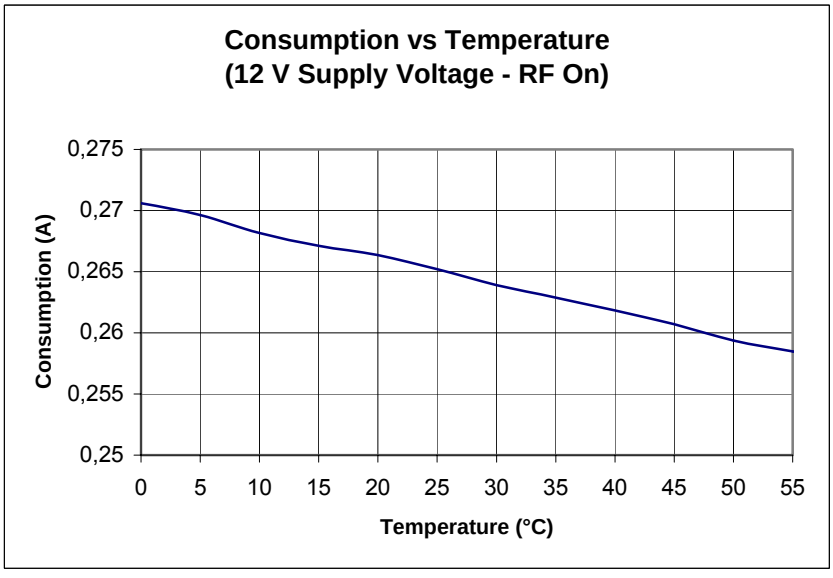
The Medio P013 coupler is compliant with the following standards:

- CE
- FCC part 15 regulations.

10.3 Power Supply DC Characteristics

Parameters	Conditions	Min.	Typ.	Max.	Unit	Comments
Power Input Voltage		10		24	V	
Power On Input Peak Current			600		mA	(Input voltage = 10V)
Power On Input Peak Current Recovery Time				10	ms	
Power Input Current	Input Voltage = 12V		260		mA	RF On
	Input Voltage = 12V		25		mA	RF Off





10.4 Communication Link DC Characteristics and timings

Absolute Maximum Ratings:

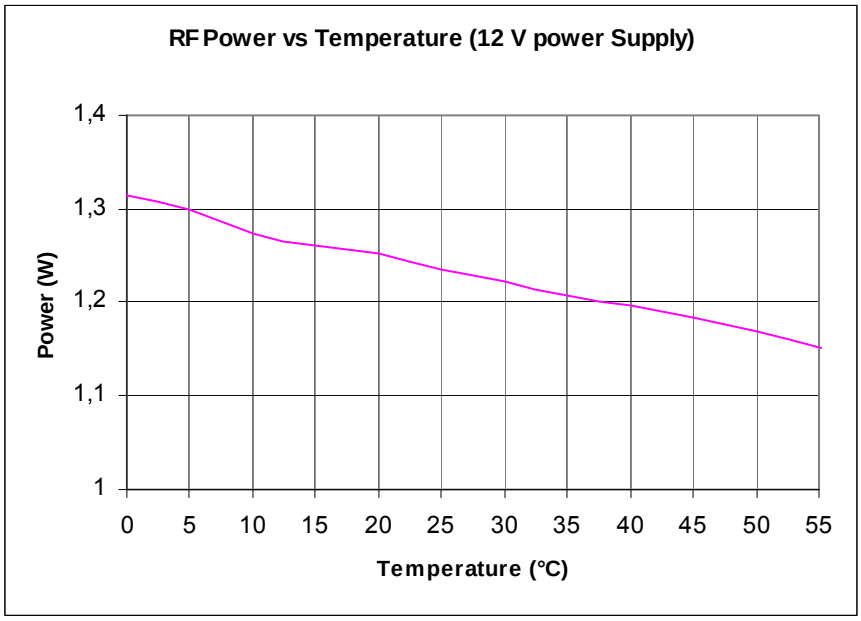
- Input Voltages: A, B to GND: ±25 V
- Output Voltages: Y, Z to GND: ±18 V

Parameters	Conditions	Min.	Typ.	Max.	Unit
RS232 Input Voltage Range		-25		+25	V
RS232 Input Voltage Low	25°C			0.8	V
RS232 Input Voltage High	25°C	2			V
RS232 Input Hysteresis			0.6		V
RS232 Input Resistance		3	5	7	kΩ
RS232 Output Voltage Swing	Loaded with 3 kΩ	±5	±6.5		V
RS232 Output Short-circuit current			±60		mA
RS-422, RS-485 Receiver Input Resistance	-7V < V_{CM} < +12V	12	24		kΩ
RS-422, RS-485 Receiver Input Current	V_{CM} = +12V			1	mA
	V_{CM} = -7V	-0.8			
RS-422, RS-485 Receiver Input Differential Threshold		-200		200	mV
RS-422, RS-485 Receiver Input Hysteresis			40		mV
RS-422, RS-485 Transceiver Differential Output Voltage	RS-422	2		6	V
	RS-485	1.5		6	
RS-422, RS-485 Change In Magnitude of Transceiver Differential Output Voltage for Complementary Output States		-0.2		+0.2	V
RS-422 / RS-485 Transceiver Output Short-circuit Current			±250		mA
RS-422 / RS-485 Output Leakage Current			±5	500	µA
ESD Protection on both pins	IEC 1000-4-2 Air-Gap Discharge		±4		kV
	IEC 1000-4-2 Contact Discharge		±2		kV
RX - TX error on baud rate	4800 Bps		+0.16		%
	9600 Bps		-1.36		%
	19200 Bps		+1.73		%
	38400 Bps		+1.73		%
TX Inter-character time				10	ms

10.5 Antenna Electrical and Timing Characteristics

Parameters	Conditions	Min.	Typ.	Max.	Unit	Comments
RF output power			1.2		W	
RF output impedance			(50, 0)		(Ω, °)	At 13.56 MHz

Figure 10 : Output Power vs. Temperature



10.6 I/O Electrical Characteristics

Parameters	Conditions	Min.	Typ.	Max.	Unit	Comments
Input voltage low		0		1.5	V	
Input voltage high		3		25	V	
Input current		1			µA	
Output current				1.5	A	

11 Warranty Conditions

11.1 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.

11.2 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.

11.2.1 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.

11.2.2 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 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@tagsys.net

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 4-9127-5701

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 4-91-27-5736