

XC-RF300 Reader User's Guide

Welcome to become a user of Invengo RFID products!

We are very glad that you choose the XC-RF300 Reader.

We hope that our equipment can bring convenience to your work.



Foreword

This manual is applicable to the following products:

XC-RF300 Reader.

 or  **Invengo** logo are owned by Invengo Company.

The introduction and description of product characteristics and functions and other information in this manual are the latest valid information at that time, and all information is accurate at the time of printing. Invengo reserves the right to correct or change the information and instructions in this manual without prior notice and assumes no responsibility for it.

Safety Instructions



Warning sign

Improper operation may do harm to your health.

Improper operation may cause damage to the equipment.



Caution sign

If it is ignored, your operation may not be conducted smoothly.

If it is ignored, it may bring you undesirable results.

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01 For Your Safety

XC-RF300 READER



1.1 General Use

The XC-RF300 reader is designed to be reliable and to provide continuous, trouble-free service.

Please observe the following general tips:

1. Take care not to scratch the device. Keep the device clean. When working with the device, use only INVENGGO-approved accessories.
2. This device is not waterproof and should not be exposed to rain or moisture. Under extreme conditions, water may enter the circuitry.
3. 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.
4. Do not store or use the device in any location that is extremely dusty, damp, or wet.
5. XC-RF300 shall be supplied by LPS (limited power source) power supply in accordance to clause 2.5 of UL/IEC 60950-1 Edition 2 with following ratings 24Vdc, 1.6A min suitable for a minimum 40°C (104°F). Only use the recommended Power Supply Unit A2-50S18R-V manufactured by VP ELECTRONIQUE or VEH40US24 manufactured by XP Power.

1.2 Care and Maintenance

This device should be handled with care. The suggestions below will increase the lifetime of this device.

1. Keep the device and all parts and accessories out of the reach of small children.
2. Keep the device dry. Precipitation, humidity and liquids contain minerals that will corrode electronic circuits.
3. Do not use or store the device in dusty, dirty areas. Its moving parts can be damaged.
4. Do not store in hot areas. High temperatures can shorten the life of electronic devices, damage batteries and warp or melt certain plastics.
5. 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.
6. Do not attempt to open the device. Non-professional handling of the device may damage it and will void the INVENGO warranty.
7. Handle the device with care. Shock and vibration may break internal circuit boards.
8. 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.
9. 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.
10. If the device or any accessory are not working properly, take it to your nearest qualified INVENGO representative.

⚠ CAUTION: Risk of explosion if battery is replaced by an incorrect type. Dispose of used batteries according to the instructions. Please see section 2.3.2 WEEE (Waste Electrical and Electronic Equipment) for more details.

1.3 Important Safety Information

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.



2.1 Occupational Health and Safety Notices

INVENGO 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 INVENGO Partner to install the XC-RF300 as described in INVENGO Documentation and with the appropriate antennas.

Modification of any INVENGO System is prohibited without the written consent of INVENGO.

Unauthorized modifications may void the conformity of the equipment to safety standards and will void the INVENGO warranty.

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

2.2 Regulatory Notices

An RFID system typically composed of an RF emission device such as the XC-RF300 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 μ A/m in Europe and 38 dB μ A/m in US.

The XC-RF300 meets these limits.



It is the responsibility of the INVENGO Partner to install the XC-RF300 as described in this User's Guide or in INVENGO Documentation.

2.2.1 In Europe (CE and RED Directives)

The XC-RF300 complies (CE Declaration of Conformity granted) with the European EMC directive.

It is the responsibility of the INVENGO Reseller to install the XC-RF300 as described in this Reference guide or INVENGO Documentation.

Any modification of the XC-RF300 is prohibited without the written consent of INVENGO.

Unauthorized modifications may void the conformity of the equipment to CE and RED Directives and will void the INVENGO warranty.

2.2.2 In USA (FCC Directive)

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference received, including interference that may cause undesired operation.

Furthermore typical configurations listed section 2.2.2 FCC ID Cross Reference Table have been successfully tested with Part 15 of the FCC rules.



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 INVENGO. Unauthorized modification may void the equipment authorization from the FCC and will void the INVENGO 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. Nonprofessional installation or installation of the equipment with an improper antenna may void the equipment authorization from the FCC and will void the INVENGO warranty.

2.3 RoHS and WEEE Directives

2.3.1 RoHS

INVENGO certifies that this product is compliant with the European 2011/65/EU & EU 2015/863 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



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 2011/65/EU & EU 2015/863 in order to be recycled or dismantled to minimize its impact on the environment.

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

03 Overview

XC-RF300 READER



The XC-RF300 is a long-range 13.56MHz RFID reader intended for RFID applications requiring a high performance, long range RFID infrastructure.

The XC-RF300 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 XC-RF300 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 XC-RF300 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 XC-RF300 is a industry's self-correcting intelligent RFID reader. The XC-RF300 can be remotely managed and administered to ensure you get the highest levels of performance from your RFID infrastructure.

3.1 Key Features

Table 3.1: XC-RF300 Key Features

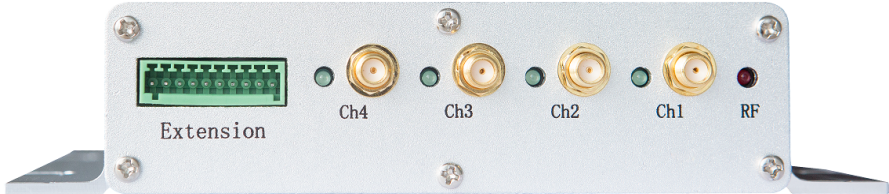
Description	XC-RF300
Operating Frequency	13.56MHz
Chip Compatibility	ISO15693 ISO18000-3M1 I-Code SLI series
Number of channels	4
RF Output Power	500mW to 5W
RF Output Tolerance	+/- 5% at 5W
Communication Interfaces	10/100M Ethernet RS485
Communication Protocols	StxNG
I/O Ports (GPIO)	2 Inputs/Outputs
Remote Monitoring	Many health indicators are remotely accessible, such as : • System uptime, • Read/Write count (per channel), • RF power amplifiers consumption, • RF power amplifiers operating temperature, • Antennas tuning status, • Real-time Raw signal capture, ...
Firmware	Remotely upgradeable

3.2 Physical Description

3.2.1 Front Panel

The front panel is dedicated to the RF connectors.

Figure 3.1 Front Panel



- RF connectors and status LEDs :

The XC-RF300 can handle up to 4 antennas. The connectors provided are SMA. RF output power is software selectable from 500mW to 5W in 250mW increments. One red LED indicates current RF power status.

Four green LED indicate current RF channel selected.

- Extension connectors :

For Invnogo Internal use only.

3.2.2 Rear Panel

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

Figure 3.2 Rear Panel



- 10/ 100 Ethernet Connector:

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

- RS-485 Connector:

For INVENGO Internal use only.

- GPIO connector:

A Male connector on the reader's rear panel implements 2 digital inputs/outputs (N-Channel OpenDrain). Please see section 6.3 GPIO Connector for more details.

- 24VDC Connector:

A power supply connector. Please see section 4.2 Cabling Requirements for more details.

- Synchronization Connector:

For INVENGO Internal use only.

- Reset Button:

This button allows restoring the reader to its factory settings. Please see section 4.4 Restoring Factory Configuration for more details.

04 Installation

XC-RF300 READER



This section describes how to install the XC-RF300 reader.

4.1 Mechanical Aspects

The XC-RF300 is delivered six slots allowing easily fastening off the reader on your system. Please see section 8.1 Mechanical Data for more details.

4.2 Cabling Requirements

2-ways Male connector mounted on board can accept these references of 2-ways female connectors (2 ways, 3.81mm):

- Phoenix Contact references:
 - 1851041
 - 1850660
 - 1803578
- Wurth Electronic Reference:
 - 691361300002 (Serie 361 WR-TBL)

Please refer to section 3.3.1 Front Panel to identify the power supply connector.



- a) Connect your power supply to the provided 2-ways connector respecting the wiring described above.
- b) Connect the reader to the host system using Ethernet.
- c) Connect one or several antennas to reader channels.
- d) Connect the power supply to the mains supply.

4.3 Using 10/100 Ethernet Interface

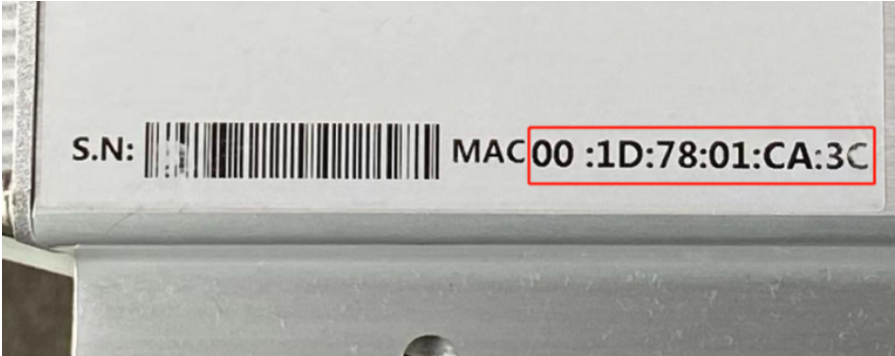
10/100 Ethernet interface does not require specific drivers installation. Default TCP/IP configuration is the following:

Table 4.1: Default TCP/IP configuration

Parameter	Value
DHCP	Active (The reader will try to automatically configure using DHCP. If it fails, the reader will use the following fallback configuration)
Fallback IP Address	192.168.9.23
Fallback Netmask	255.255.255.0
Fallback Gateway	192.168.9.1
Hostname	XC-RF300-XX-XX-XX (where XX-XX-XX is the last 3 hex couples of the reader MAC address)

The MAC address of each reader is written on a sticker positioned at the bottom right corner of the reader.

Figure 4.1 The MAC address



The green Ethernet Activity LED acts as well as the Ethernet Link LED.

Green LED constantly ON signals that the reader is connected to an Ethernet network. Green LED starts blinking to signal activity on the Ethernet with the XC-RF300 reader.

Orange LED is only used to provide feedback on the reader being powered up or not.

Beware to plug your Ethernet interface on the correct RJ45 connector (i.e. Ethernet)

Either straight or crossed Ethernet cable can be used, as the reader auto-detect the cable type.

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. INVENGO antenna products are delivered with good performance shielded coaxial cables with 6 ferrite beads already mounted to increase shielding effectiveness at low frequencies.

4.4 Restoring Factory Configuration

To restore factory configuration, please follow these steps:

- 1) Turn reader off.
- 2) Press and hold the “Reset” button.
- 3) Turn reader on.
- 4) After 3 seconds, release the “Reset” button.

4.5 Running Web UI for the First Time

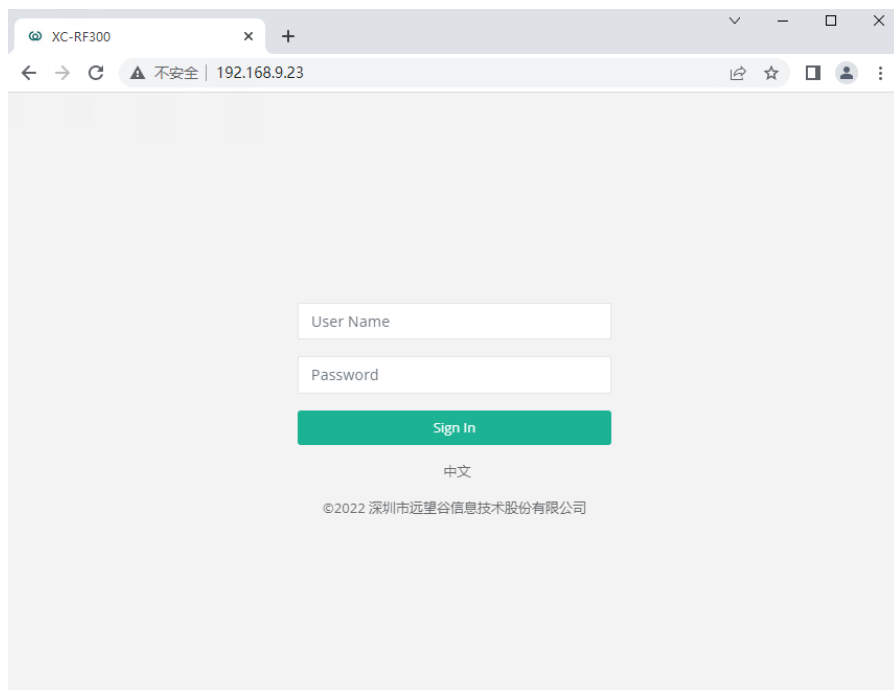
The web UI can be accessed via the web browser and is useful for quick setup or troubleshooting. Web browsers we support are Chrome 96.x, Firefox 95.x, and Safari 15.x.

- 1) Determine the reader hostname to connect to a network with DHCP server.
- 2) In a new browser tab, connect to the XC-RF300 reader using the URL `http://<Hostname or Static IP>`.

3) Sign into the reader using the default credentials:

- user name : admin
- password: admin

Figure 4.2 Sign In Web Page



4) The Web UI can configure ISO15693 parameters, including Uplink、Downlink(Tag to Device)、Memory Mapping(Vicc)、Application Family Identifier(AFI)、Default Read and Advanced Options.

Figure 4.3 ISO15693 Parameters

ISO15693✕

Parameters

Information and State

Memory

Custom

Uplink

Command modulation depth:10%(ASK)

EOF modulation depth:10%(ASK)

Data coding mode:1 of 4

Downlink(Tag to Device)

Number of subcarriers:1 subcarriers

Data rate:Fast

Memory Mapping(Vicc)

Block length:4

Number of blocks:28

Application Family Identifier(AFI)

☐ Use AFI

AFI value:

Default Read

Fields to read:UID only

Number of time slots:1

☐ Quiet tags once read

Signal level threshold:

Advanced

☐ Set write option flag

☐ Set protocol extension flag

5) After the configuration is completed, Place the tag in the radio field of antenna and the 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 4.4 Web UI reading ISO15693 Tags

Tag In

Tag Read

Data	Type	Ch.1	Ch.2	Ch.3	Ch.4	All Ch.	RSSI	Last Time
E00401080198658F	ISO15693	537	56	0	0	593	67	2022/08/13 17:40:02
E00401080198658B	ISO15693	246	0	317	0	593	8	2022/08/13 15:45:01
E0040150C8285569	ISO15693	0	0	91	0	91	31	2022/08/13 15:39:02
E004010801986597	ISO15693	0	0	80	0	80	13	2022/08/13 15:39:01
E004010801986583	ISO15693	0	0	0	431	431	85	2022/08/13 15:15:58
E004015070A404ED	ISO15693	0	154	0	0	154	80	2022/08/13 15:11:43
E0040108018AA06E	ISO15693	0	100	0	0	100	49	2022/08/13 15:11:40
E004015070A405E9	ISO15693	148	3	0	0	151	71	2022/08/13 14:01:04



5.1 Reader to Host Protocols

5.1.1 StxNG

StxNG is the protocol used by the XC-RF300 reader to communicate with the host system. Upon start up, the XC-RF300 reader starts listening for incoming frames over 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>	This field is ignored by XC-RF300.
<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 XC-RF300 Designer's guide.

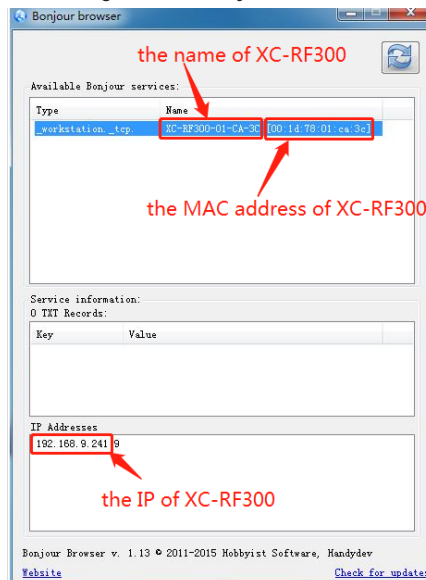
5.1.2 Bonjour

XC-RF300 reader supports Bonjour, also known as zero-configuration networking, enables automatic discovery of devices and services on a local network using industry standard IP protocols.

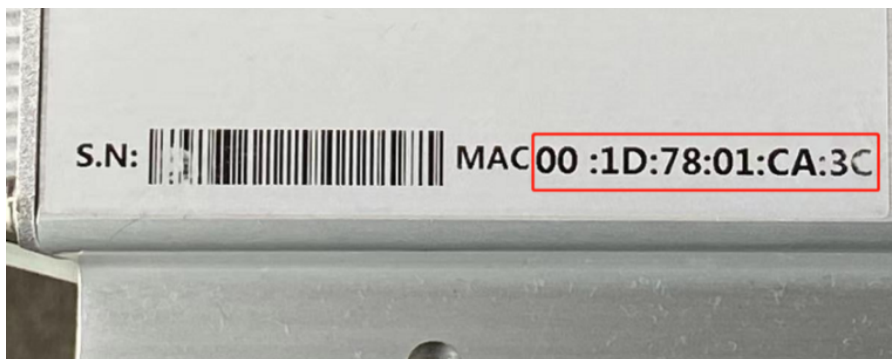
To obtain the IP of the XC-RF300, please take the following steps:

- 1) Prepare a computer with Windows operating system installed, install Bonjour and Bonjour browser software.
- 2) Directly connect the XC-RF300 to the above computer through a network cable, and power off and restart the XC-RF300.
- 3) After waiting for a minute, open the Bonjour browser software on the computer to query the IP of XC-RF300.
- 4) Under normal circumstances, you can find the IP of XC-RF300, as shown in the figure below.

Figure 5.1: Bonjour browser



5) In the image above, the bonjour browser shows the scanned reader model, MAC and IP. Among them, the “Name” column “XC-RF300-01-CA-3C” indicates that the model of the reader is XC-RF300, and the “01-CA-3C ” indicates the last 3 segments of the MAC address of the reader. You can check the MAC on the silk screen on the bottom of the reader case and compare it with the MAC queried by bonjour browser to confirm whether it is the same reader.



6) If you cannot get the reader IP through the bonjour browser, please restart the computer and the reader and try again.

5.2 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 reception 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 cannot 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 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 #2 to signal reading activity. GPIO Output #2 is activated when the reader “sees” tags in the RF field.

The time an output remains active after the corresponding event has occurred is software configurable.

- “Single”: If this mode is active, the reader will only scan once the current RF configuration.

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

5.4 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”

06 Technical Specifications

XC-RF300 READER



6.1 Technical Data

Table 6.1: XC-RF300 Technical Specifications

Description	XC-RF300
Size (L x W x H)	223 x 166 x 36 mm (8.8 x 6.5 x 1.4 in.)
Weight	0.8 kg (1.8 lbs.)
DC power	24 VDC +/- 10% Typical
Power consumption	Up to 50 W
Operating temperature	Reader : 0°C to +55°C (32°F to 131°F) GS40A24-P1J : 0°C to +50°C (32°F to 122°F) A2-50S18R-V : 0°C to +40°C (32°F to 104°F) FRA045E-S24-4 : -10°C to +70°C (14°F to 158°F)
Storage temperature	-20° to +70°C (-4°F to 158°F)
Mechanical fixation	screw cutting hole for vertical installation
Certification	ETSI EN 302 291-1 & -2, ETS 301-489, FCC Part 15 (for typical configurations), CE and RED Directives
Antenna Compatibility	50-Ohms antenna
Operating Frequency	13.56 MHz
Chip Compatibility	ISO15693 ISO18000-3 Mode 1 I-Code SLI series
Number of channels	4
RF Output Power	500mW to 5W

Communication Interfaces	10/100 Ethernet
Communication Protocols	StxNG
I/O Ports (GPIO)	2 Inputs/Outputs
Remote Monitoring	System uptime // Current number of connections per interface // Date of last connection per interface // Total number of connections per interface since powerup // Total amount of bytes sent/received per interface since power-up // 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 GPIO Connector

Connector reference mounted on board is: Phoenix Contact (Manufacturer P/N: 1881503).

It does mate with this female connector: Phoenix Contact (Manufacturer P/N: 1881383).

6.2.1 Pin Assignment

Figure 6.1 GPIO Connector (8-pin)

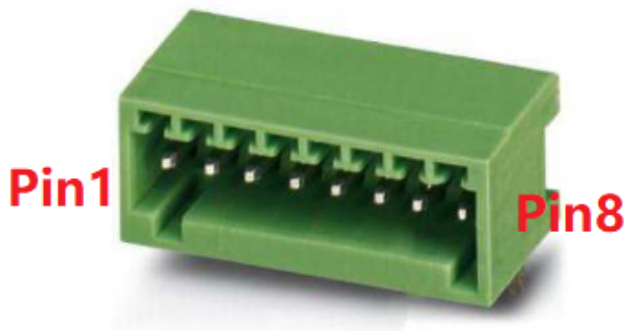


Table 6.2: GPIO Connector – Pin Assignment

Pin	Description	Pin	Description
1	RFU (INVENGO Internal use only)	5	IO #1
2	RFU (INVENGO Internal use only)	6	GND
3	RFU (INVENGO Internal use only)	7	IO #2
4	RFU (INVENGO Internal use only)	8	GND

6.2.2 Electrical Characteristics

Table 6.3: 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

6.2.3 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 6.3 below demonstrates how to connect an external sensor (a simple switch or a totem pole output sensor) to an input.

Figure 6.2 Connecting a simple switch to input #1 or #2

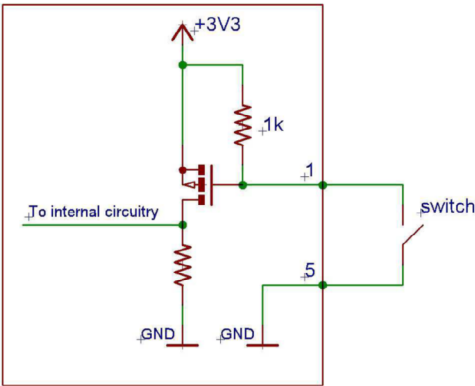
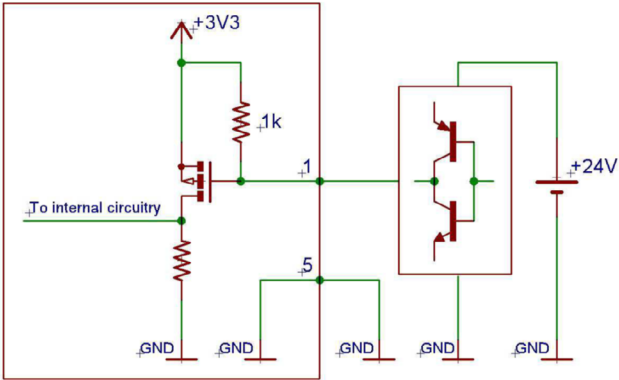


Figure 6.3 Connecting a totem-pole output sensor to input #1 or #2



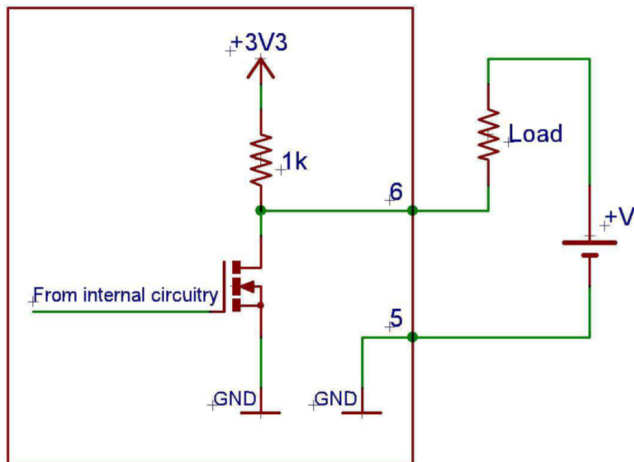
⚠ External devices must be connected to GPIOs in compliance with Table 8 and SELV requirements.

6.2.4 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 overheat. Applying negative voltage to outputs (polarity inversion) may destroy them.

Figure 6.4 below demonstrates how to connect an external load to an output.

Figure 6.4 Connecting a totem-pole output sensor to input #1 or #2



⚠ External devices must be connected to GPIOs in compliance with Table 8 and SELV requirements.

07 Electrical Characteristics

XC-RF300 READER



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

7.1 Absolute Maximum Ratings

Consumptions and temperatures	
Ambient Operating Temperature	0°C to +55°C
Storage Temperature	-20°C to +70°C
Supply Voltage	30 V
Supply Current	2.5 A
Input Power	50 W
Power Dissipation (Casing)	20 W
IO Ports, Synchro port	
Maximum Input Voltage	36 V
Minimum input Voltage	-0.3 V
Continuous Input Voltage	28 V
ESD Voltage (Human Body)	4 kV
ESD Voltage (Machine Model)	0.5 kV
Maximum inductance drive	30 uH
Maximum frequency switch	10 kHz

Note :

- a) Reverse power on RF connector is not allowed
- b) Avoid shortcuts and open connections on RF ports
- c) Use the product in a dust free and dry environment

7.2 Antenna Electrical Characteristics

Table 7.1: Antenna Electrical Characteristics

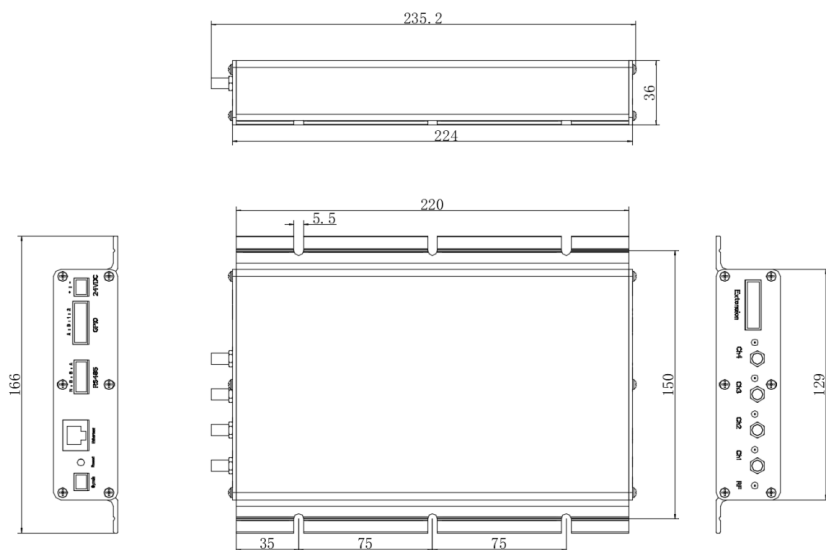
Parameters	Conditions	Min.	Typ.	Max.	Unit
RF ASK modulation ratio		19	22	24	%
RF output SWR	1W		1.29		
	2W		1.19		
	3W		1.09		
	4W		1.07		
	5W		1.09		
RF frequency			13.56		MHz
RF Frequency tolerance	Overall temperature range		100		ppm

7.3 Input / Output Electrical Characteristics

Table 7.2: I/O Electrical Characteristics

Parameters	Conditions	Min.	Typ.	Max.	Unit
I/O voltage		0		28	V
Input voltage Threshold		0.9		1.5	V
Active output resistance				0.45	Ohm
Output switch time (on or off)				20	μs
Active Output – Over Current protection threshold		1.9	2.8	3.8	A
Input – Over Voltage Protection		34	37		V

Figure 8.1 XC-RF300 – Mechanical dimensions



Values in Figure 8.1 have a tolerance of 0.5 mm.

The XC-RF300 reader is delivered with six screw-cutting holes for mounting the unit in various positions. Figure 8.1 gives details about the screw cutting holes positioning.

Use M5 screws to fix your XC-RF300 reader to your system.

⚠ For a proper integration of this product in your design, do not forget to leave some space for connections on the front and rear faces.

09 Warranty Conditions

XC-RF300 READER



9.1 Warranty

INVENGO 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.

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

- a) any product in which the Product is incorporated;
- b) any equipment not supplied by INVENGO which is attached to or used in connection with the Product; or
- c) 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 INVENGO' readers, by applying INVENGO installation guidelines and by having your installation reviewed by a INVENGO' technical consultant.

INVEGNO 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 INVENGO and returned according to the return procedure defined below; in such case, INVENGO will, at INVENGO' option, either replace every defective Product by one new Product or refund the purchase price paid by Buyer to INVENGO for the defective Product.

9.2 Warranty Exclusions

- a) Defects or damages resulting from storage of the Product under conditions which do not comply with INVENGO specifications or normal usage
- b) 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.
- c) Defects or damages from misuse, accident or neglect.
- d) Defects from improper testing, operation, maintenance or installation.
- e) 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 INVENGO.
- f) Any action on Product that prevents INVENGO from performing an inspection and test of the Product in case of a warranty claim.
- g) Tampering with or abuse of the Product.
- h) Any use or incorporation by the Buyer or a third party of INVENGO' Product into lifesaving or life support devices or systems, or any related products; INVENGO expressly excludes any liability for such use.

9.3 General Provisions

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

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

The remedy provided above is in lieu and to the exclusion of all other remedies, obligations or liabilities on the part of INVENGO 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.

INVENGO 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.

10 Product End of Life Management

XC-RF300 READER



INVENGO aims at minimizing the environmental impacts of its products throughout their entire life cycle. Therefore INVENGO is committed to support and help its customers to reuse, recycle or safely dispose of our products.

Please do contact INVENGO Sales Support or Quality Team to get the latest End of Life Management Documentation.

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 2011/65/EU & EU 2015/863 in order to be recycled or dismantled to minimize its impact on the environment.

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



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V1.0

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