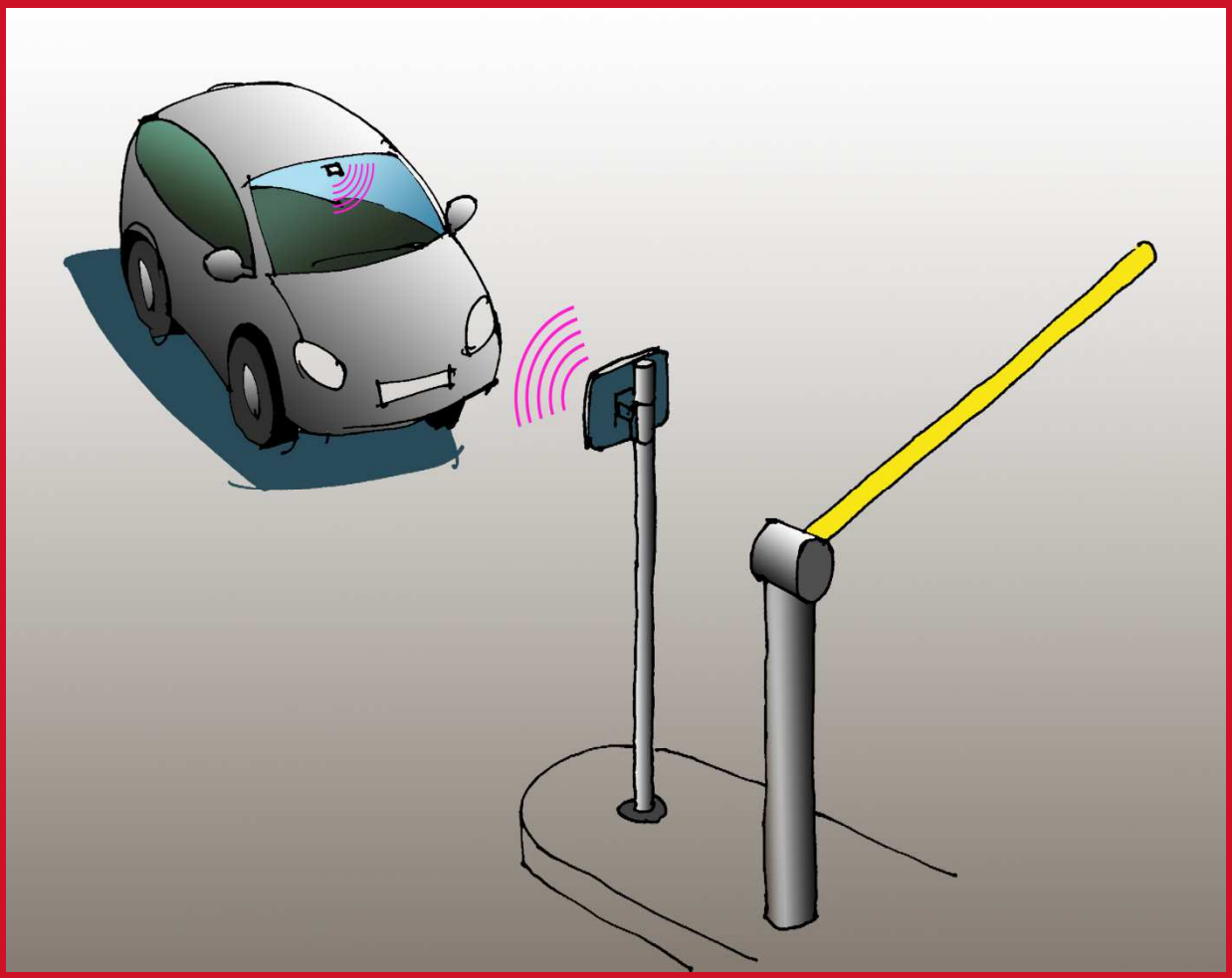
TagMaster

XT-1

Installation Manual



Note: This equipment has FCCID: M39XTXX. It complies with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Caution: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Caution: To comply with Council Recommendation 1999/519/EC and FCC regulations, this reader must be installed to provide a separation distance of at least 25 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

Table of Contents

1 Introduction

1.1 Overview

The XT-1 is an UHF RFID reader compliant with EPC Gen 2 (ISO 18000-6C). The reader is specifically tailored for Automatic Vehicle Identification (AVI) applications such as Parking, Gated Communities and Condominiums. It has been designed to provide absolutely premium performance for read-range and environmental specifications while also giving a large number of interface options and having an innovative implementation for TCP/IP connectivity and monitoring.

1.2 Tags

XT-1 supports any UHF tag compliant with the EPC Gen 2 standard. XT-1 also supports the SecureMarkID® format developed by TagMaster to ensure that each tag has a truly unique identity that is difficult to duplicate.

1.3 Security and SecureMarkID®

The EPC Gen 2 standard was initially developed for low cost item management and has for that reason no built-in support for encryption like DES or AES. This differentiates the system from for instance many proximity identification systems. To address this, TagMaster has developed the SecureMarkID® format using an encryption algorithm and non-writeable parts of the tag to create a truly unique identity that is difficult to duplicate. It is recommend to use SecureMarkID® tags only together with XT-1, but also to consider these limitations in any application requiring high security.

As the development of a cryptographic framework for EPC Gen2 proceeds, TagMaster will offer future new products to continue to make the most of available technology in an effort to offer the highest possible security.

2 Installation

2.1 Safety Instructions

The following safety instruction should be observed during installation, normal use and service.

- The installation and service should only be done by qualified personnel.
- Shields of cables should be connected to safety ground.
- The XT-1 must be disconnected from all voltage sources before any installation or service work. Capacitors inside the XT-1 can hold their charge even if the equipment has been disconnected from all voltage sources.
- Do not modify any part of the product. Repair is to be performed by TagMaster only.
- Where local regulations exist, these are to be followed. The safety information in this manual is a supplement to local regulations. It is the responsibility of the local project manager to make certain that local regulations are known and followed.

2.2 Mounting Instruction

2.2.1 General

Mount the reader in a horizontal position with the cable glands on the bottom side. Direct the reader so that the reading lobe covers the positions of the tags. For optimal performance, tilt and rotate the reader into a position so that the front side of the reader is parallel with the front side of the tag to be read. Align the reader so that the actual reading range is 60–70% of the specified maximum.

Figure 1 shows a typical reader installation.

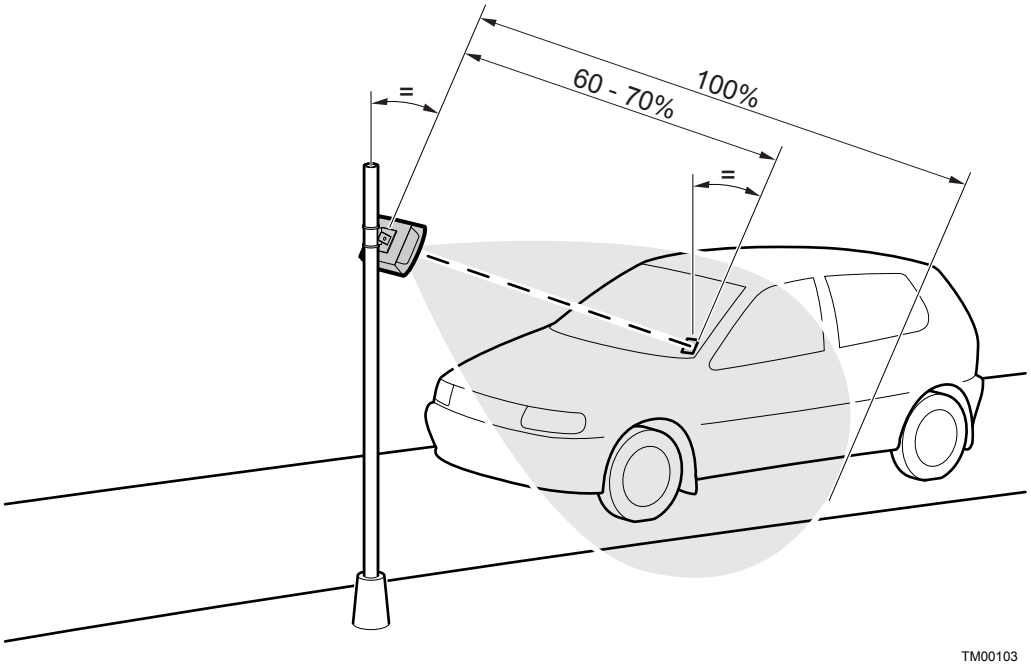


Figure 1 Reading lobe

The UMK (Universal Mounting Kit, Part No. 193600), see Figure 2, from TagMaster enables the reader to be mounted in a wide variety of positions and angles. The kit contains all parts needed for mounting the reader on a wall or on a pole. The UMK is designed and suitable for outdoor use. See separate data sheet for more details on installation [1].

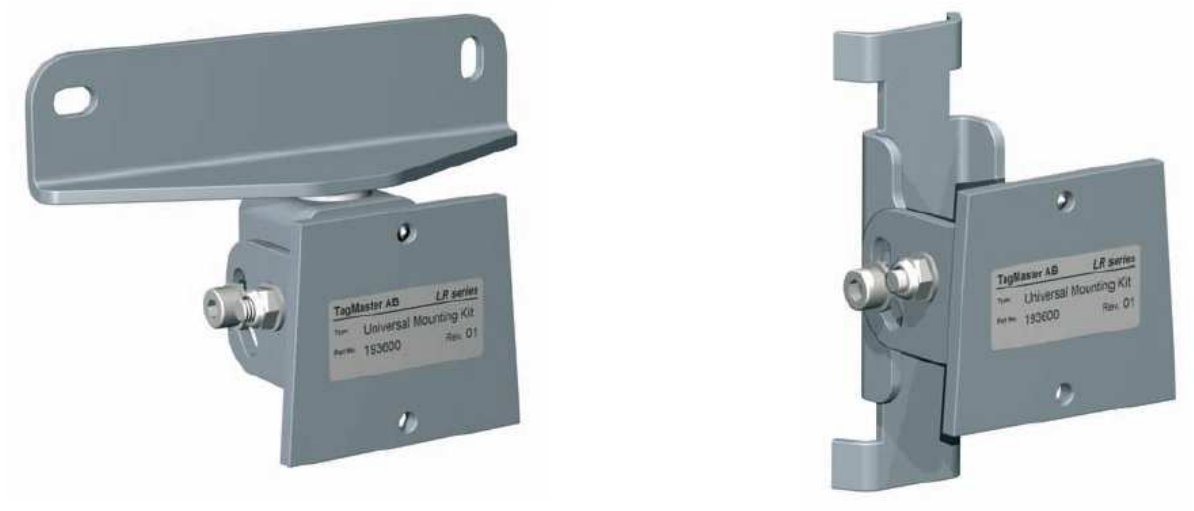


Figure 2 UMK for wall and pole mounting of XT-1

2.2.2 Dimensions

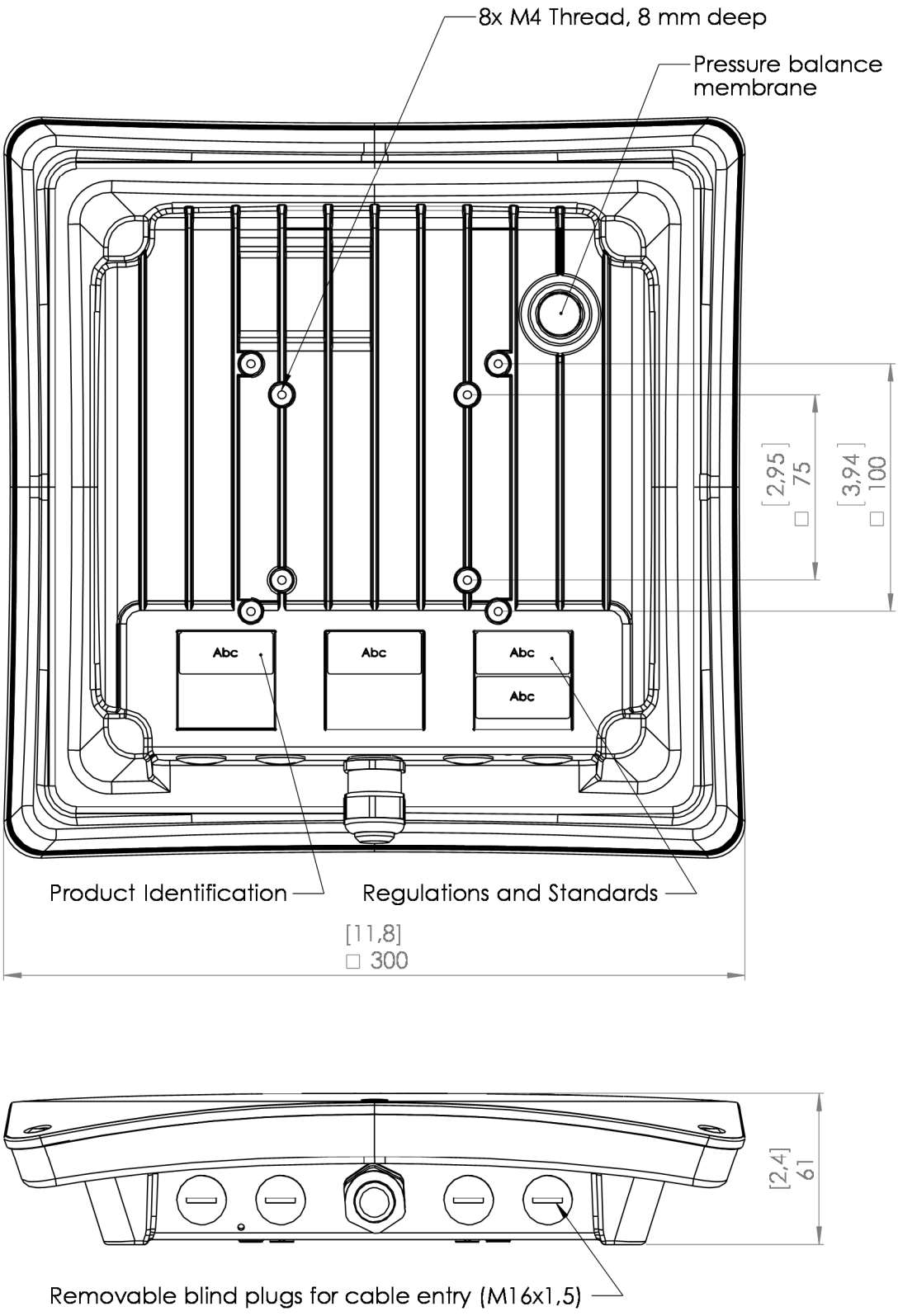


Figure 3 XT-1 Dimensions

3 Interfaces

3.1 Cables

Connections to the XT-1 is primarily done using the central M20 cable gland (Figure 4, Pos 1), and secondarily by replacing any of the 4 pcs of M16 blind plugs with cable glands (Figure 4, Pos 2). Shielded cables should be used for all connections. Select cables suitable for the installation environment, considering indoor or outdoor environment and use flexible cables with stranded wire. The reader chassis should be grounded.

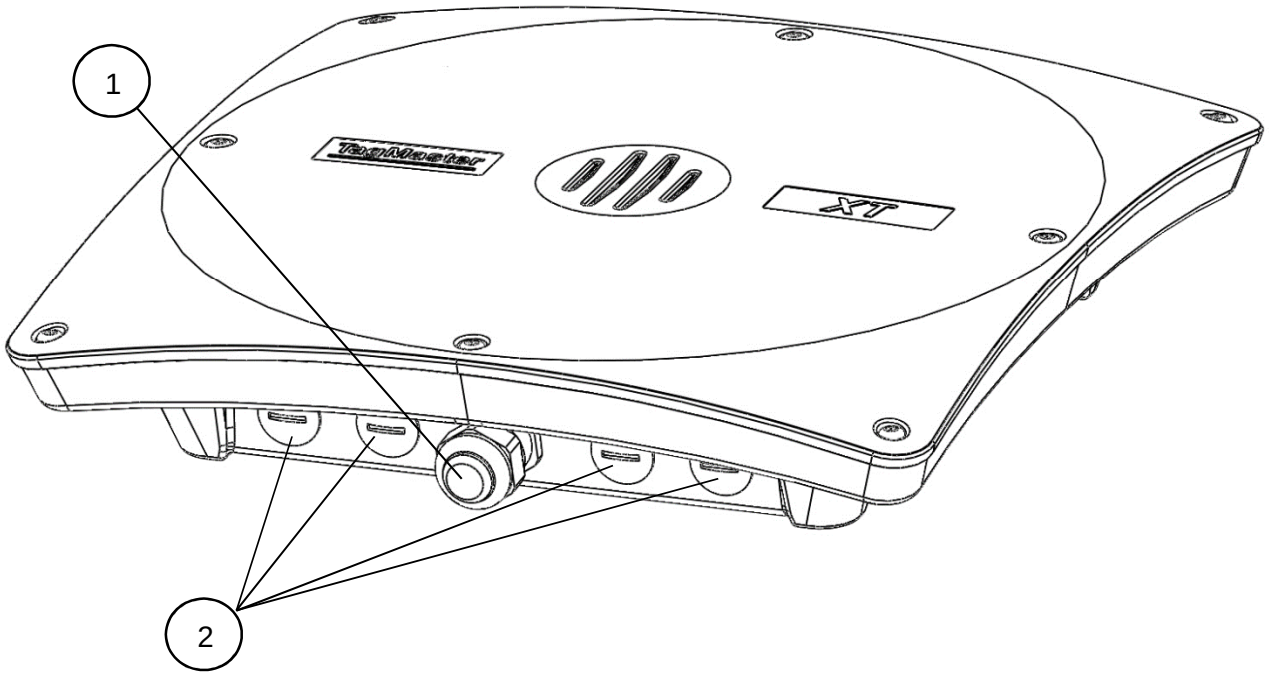


Figure 4 Cable connections for XT-1 (Pos. 1 is M20 cable gland, Pos. 2 is M16 blind plugs)

Instructions:

1. Select and use the M20 cable gland insert corresponding to the number of cables required. The cable gland can be used with one cable (6-12 mm) or by using the supplied insert with two cables (2-6 mm), see Figure 5.
2. Open XT-1 lid by loosening the 8 screws on the front, and slide the lid open (see Figure 6 for reader with lid in open position).
3. Feed the cable (or two cables) through the cable gland and through the chassis. All parts of the cable gland except the nut shall be on the outside of the XT-1.
4. Connect the wires to relevant terminals and connections depending on interfaces being used. If using RJ45 connectors for Ethernet these must be crimped inside the reader.
5. Connect the shielding of the power cable to the chassis grounding point using the grounding screw (Figure 6, Pos. 1).
6. Screw the cable gland to tighten and ensure proper water and dust sealing.

As an alternative for grounding, a metallic cable gland (not included) can be used to connect the reader chassis to ground using the power cable shielding.

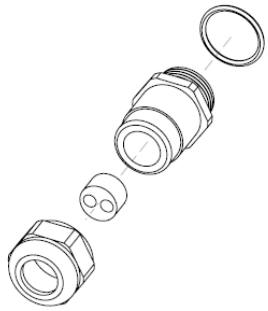


Figure 5 The XT-1 M20 cable gland with insert for 2 cables

Never remove or use the ventilating membrane (Figure 6, Pos. 2) on the back of the XT-1 for cable connections.

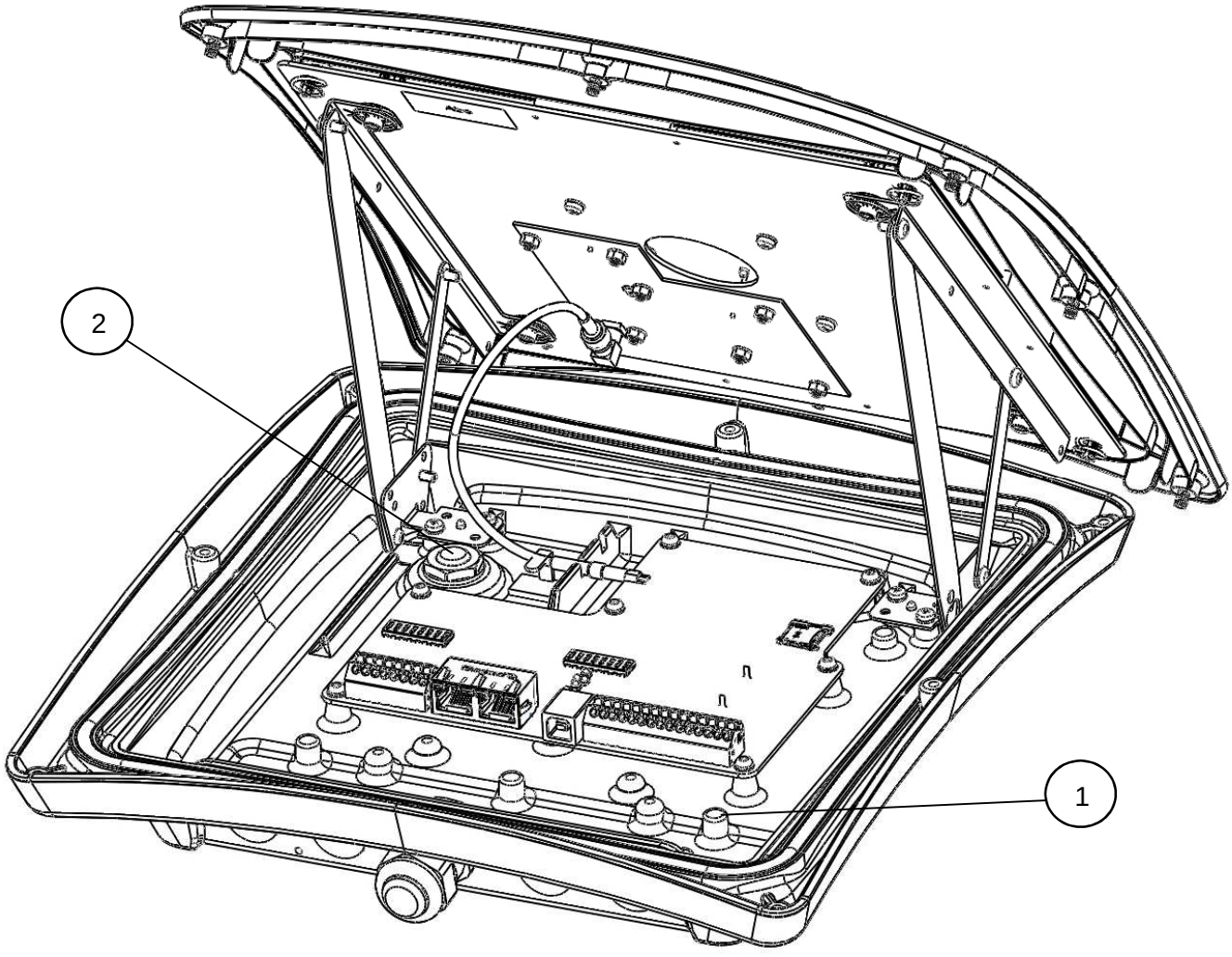


Figure 6 XT-1 overview (Pos. 1 is ground screw connection, Pos.2 is ventilating membrane)

3.2 Wires

3.2.1 Terminal Connections

Wire connections (with the exception of Ethernet and USB, see §3.2.2) are added as single wires to spring cage terminal connectors, see Figure 7. These are easy-to-use terminals for single solid or stranded wires.

Instructions:

1. Strip wire lead approximately 9 mm.
2. Push screwdriver down to release spring cage.
3. Insert wire into terminal.
4. Remove screwdriver to clamp wire.
5. Gently pull installed wire to make sure connection is reliable.

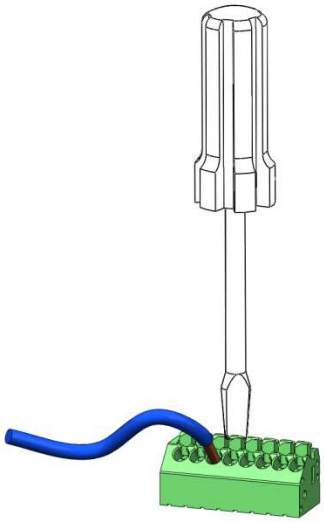


Figure 7 Connection with easy-to-use spring cage terminal

Wire size	0.5 mm^2 - 1.5 mm^2 (AWG 20 - AWG 16)

Table 1 Wire connection overview

3.2.2 Ethernet and USB

Ethernet is connected using RJ45 connectors. To be able to fit this connector given the limited diameter of the M20 cable gland and the hole in the chassis, such RJ45 must be crimped to the wires inside the reader. This is done with corresponding standard tool and RJ45. Pass the Ethernet cable through the cable gland before crimping the connector on the cable.

USB is intended for service and maintenance and is therefore connected only when lid is open. Connection is done using a standard USB type B cable.

3.3 Power Supply

The XT-1 shall be powered by an isolated power supply suitable for outdoor use. The required voltage is 12 VDC to 24 VDC. It is recommended to use a power supply of 24 VDC, 0.5 A minimum.

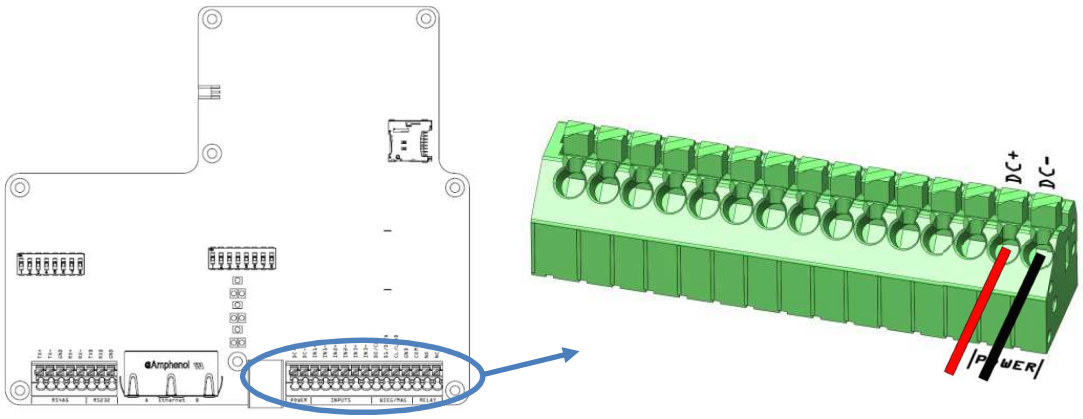


Figure 8 Power supply connection, overview and detail

The power input has built-in protection for an accidental connection of reversed polarity.

Connections	DC+ High supply potential (See Figure 8 for details) DC- Low supply potential
Supply voltage	12 VDC to 24 VDC (Absolute minimum rating 10 VDC, absolute maximum rating 30 VDC)
Recommended / Max length	10 m / 100 m
Wire size	Recommended 1.5 mm^2 (AWG 16)

Table 2 Power connection overview

3.4 Wiegand/Magstripe

The XT-1 has a software configurable Wiegand/Magstripe interface. The interface has 1500 VDC isolation and overvoltage protection. The software functionality is described in §4.2.3.3.2.

Using DIP switch S301:6-8 it is possible to activate 1 kΩ pull-up resistors on D0/CLK, D1/DATA and CL/LOAD. Details are shown in Figure 10. The DIP switches are also described in §3.11.

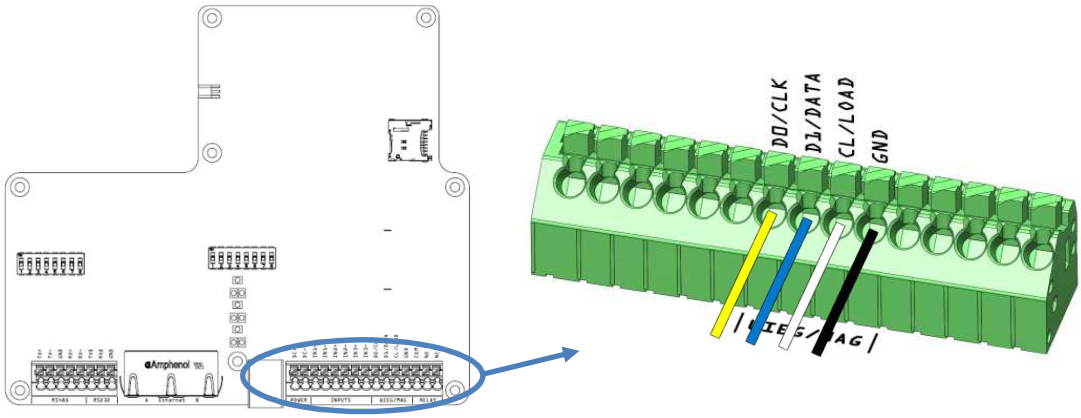


Figure 9 Wiegand connection, overview and detail

Connections (Wiegand)	D0 Wiegand 0 (See Figure 9 for details) D1 Wiegand 1 CL Card load GND Signal ground #1
Connections (Magstripe)	CLK Magstripe clock (See Figure 9 for details) DATA Magstripe data LOAD Card load GND Ground
Recommended / Max length	10 m / 100 m (depending on properties of receiving system)
Wire size	0.5 mm^2 (AWG 20), 1.5 mm^2 (AWG 16) above 10 m of length.
Voltage	30 V (Max)
Sink current	500 mA (Max)
Isolation	1500 VDC (Min)

Table 3 Wiegand connection overview

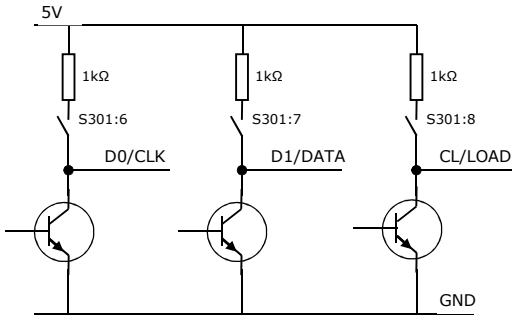


Figure 10 Wiegand/Magstripe DIP switch configuration

3.4.1 Wiegand Timing

The following values apply when all outputs are pulled up to 5 V with 1 kΩ resistors.

Symbol	Parameter	Min	Typ	Max	Unit
t_{SU}	CL to D# setup time		1520		µs
t_F	Fall time (all signals)		125		ns
t_R	Rise time (all signals)		5		µs
t_{PI}	Pulse interval		2		ms
t_{PW}	Pulse width		80		µs
t_H	CL hold time after last D# change		1840		µs

Table 4 Wiegand interface timing

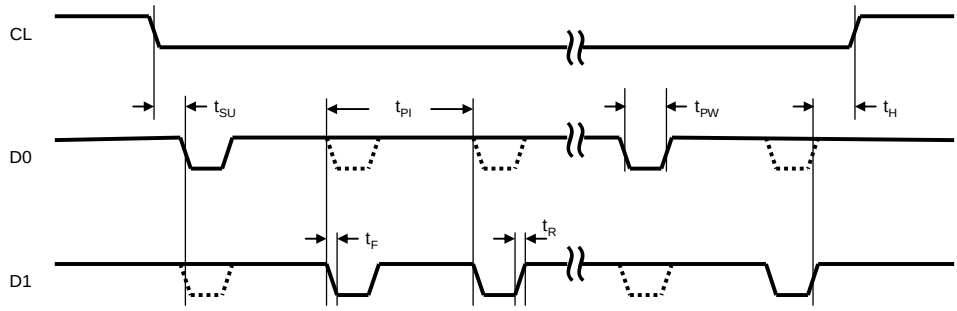


Figure 11 Wiegand timing diagram

3.4.2 Magstripe Timing

The following values apply when all outputs are pulled up to 5 V with 1 kΩ resistors.

Symbol	Parameter	Min	Typ	Max	Unit
t_{SU}	LOAD to CLK setup time		1520		µs
t_F	Fall time (all signals)		125		ns
t_R	Rise time (all signals)		5		µs
t_{CL}	Clock low		480		µs
t_{CH}	Clock high		960		µs
t_H	LOAD hold time after last CLK change		1520		µs
t_{DH}	Data hold time		880		µs

Table 5 Magstripe interface timing

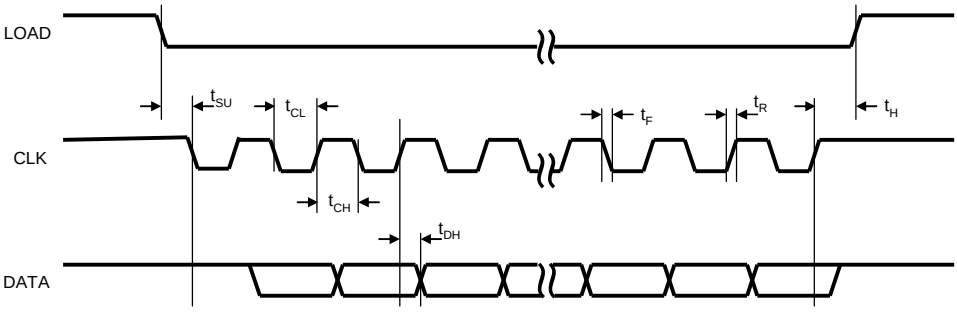


Figure 12 Magstripe timing diagram

3.5 Ethernet

The XT-1 has a built in 10 Mbps/100 Mbps Ethernet switch and dual ports. This makes it possible to connect a number of readers in a system without the need for additional network equipment. The two ports A and B are using RJ45 connectors and are fully equivalent.

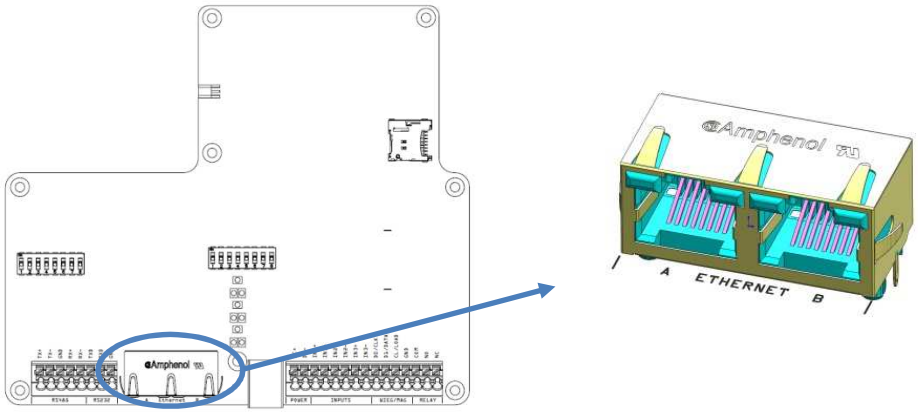


Figure 13 Ethernet connection, overview and detail

The XT-1 supports auto crossover (Auto-MDIX) so that installation can be done using both patch and crossover cables. The connectors have eight pins and the wire scheme is based on the T568A standard. The interfaces have separate isolation of 1500 VDC.

The default IP address of the device is unique among XT-1 readers and can be found on the label on the back of the XT-1. This makes it possible to create a stand-alone network without changing any reader network settings. Detailed network settings are configured in firmware, see §4.2.3.3.1. Each port has two LED indicators for Link/Activity (Yellow/Flashing Yellow) and 10 Mbps/100 Mbps speed (Off/Green).

Connections	A B	Port A (See Figure 13 for details) Port B
Recommended / Max length	- / 100 m	
Wire size	CAT5e cable or better is required for the Ethernet connection	

Table 6 Ethernet connection overview

Ethernet communication is normally done using TagMaster protocol TAGP available at port 9999, see [2] for details.

3.6 RS232

The RS232 interface is used for host communication and supports ASCII output and TAGP. Detailed settings are configured in firmware see §4.2.3.3.3. The interface has 1500 VDC isolation and overvoltage protection.

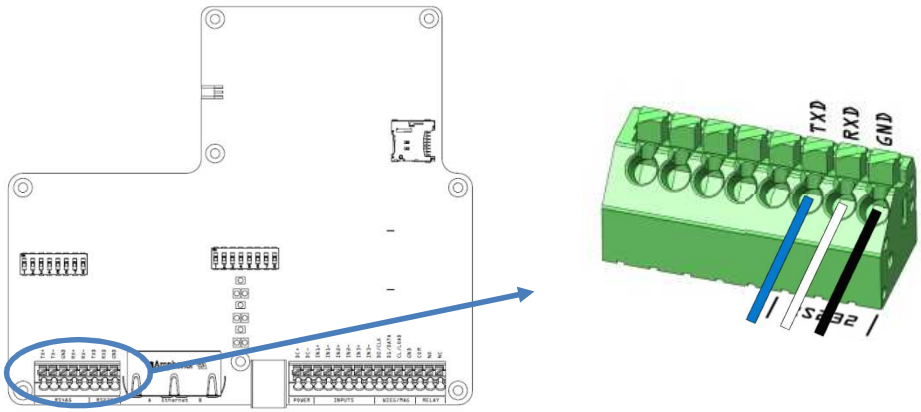


Figure 14 RS232 connection, overview and detail

Connections	TXD RXD GND	Transmitted data to host (See Figure 14 for details) Received data from host Signal ground #2
Recommended / Max length	- / 10 m	
Wire size	Specification according to EIA RS232C. Belden 9184 or Belden 9502 are recommended.	
Max Baud Rate	115.2 kb/s (default)	

Table 7 RS232 connection overview

The default output of the RS232 interface is tag data in ASCII format. If SecureMarkID® tags from TagMaster are being used (recommended) the numeric identity is sent out. If other EPC tags are being used the default output is the EPC data. The data is followed by CR+LF ('\r''\n').

A TAGP connection can be initiated by sending the HELOTAGP message to the reader. The TAGP connection is terminated with the QUIT message.

3.7 RS485

The RS485 interface is used for host communication and supports ASCII output and TAGP. It generally supports longer transmission distances than RS232. Detailed settings are configured in firmware, see §4.2.3.3.3. The interface has 1500 VDC isolation and overvoltage protection.

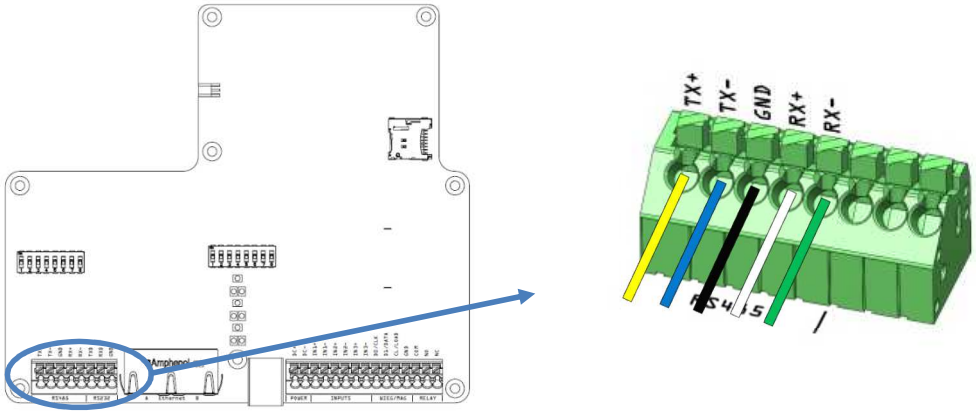


Figure 15 RS485 connection, overview and detail

The hardware supports 2-wire (DIP S301:1-2 ON) and 4-wire communication, half duplex and full duplex as well as multi-drop. When using RS485 communication, correct termination of the interface should be considered in order to handle transmission-line effects. The XT-1 has a built-in option (DIP S301:3 ON) of 120 Ω termination on the receive side (to be used at each end of the RS485 chain), and an option (DIP S301:4-5 ON) of 620 Ω bias on the receive side (to be used at one node in the RS485 chain). The options using DIP switches are detailed in Figure 16 and also described in §3.11.

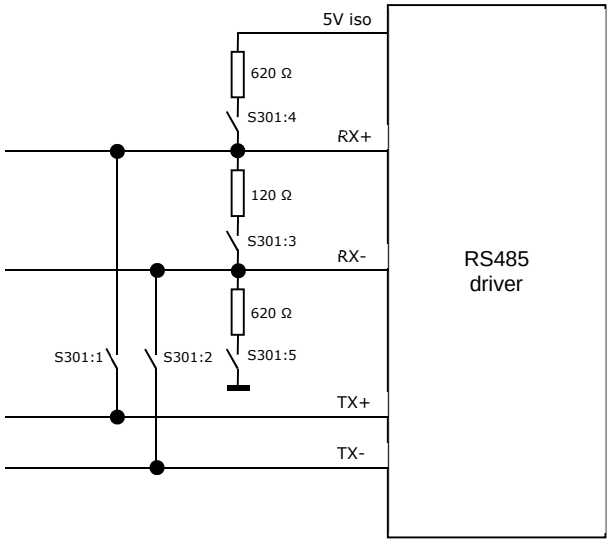


Figure 16 RS485 DIP switch configuration

Connections	TX+ TX- GND RX+ RX -	Transmitted data to host (See Figure 15 for details) Transmitted data to host Signal ground #3 Received data from host Received data from host
Recommended / Max length	- / 1000 m	
Wire size	The cable for the RS485 interface must be a twisted pair cable and conform to the EIA RS485 standard.	
Max Baud Rate	115.2 kb/s (default)	

Table 8 RS485 connection overview

The default output of the RS485 interface is tag data in ASCII format. If SecureMarkID® tags from TagMaster are being used (recommended) the numeric identity is sent out. If other EPC tags are being used the default output is the EPC data. The data is followed by CR+LF ('\r''\n').

A TAGP connection can be initiated by sending the HELOTAGP message to the reader. The TAGP connection is terminated with the QUIT message.

3.8 Inputs

The XT-1 has 3 software configurable inputs. The inputs are opto-coupled, have 1500 VDC isolation and reverse polarity protection. The inputs are activated by a current flow and the input impedance is 1 kΩ. A schematic view of an input is shown in Figure 18. The software functionality is described in §4.2.3.3.4.

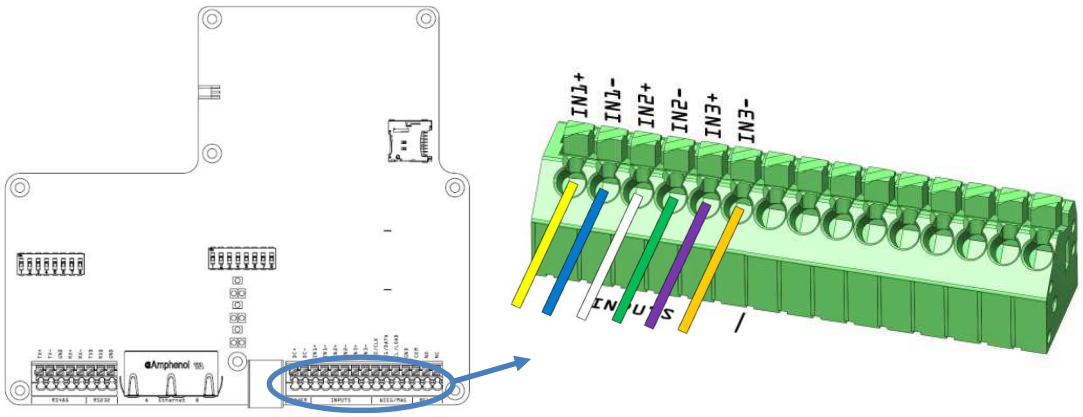


Figure 17 Input connections, overview and detail

Connections	IN1+ IN1- IN2+ IN2- IN3+ IN3-	Input 1 positive terminal Input 1 negative terminal Input 2 positive terminal Input 2 negative terminal Input 2 positive terminal Input 3 negative terminal
High Voltage (active)	Min 3.0 V / Max 30 V	
Low Voltage (inactive)	Min 0.0 V / Max 0.2 V	
Input impedance	1 kΩ	
Recommended / Max length	10 m / 100 m	
Wire size	0.5 mm^2 (AWG 20)	

Table 9 Input connection overview

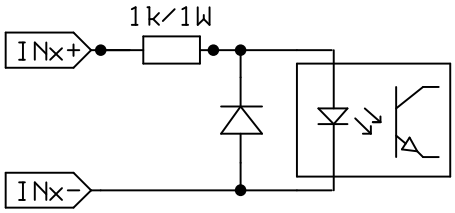


Figure 18 Input schematic

3.9 Relay

The XT-1 has a non-latching relay available. It is typically connected to the logic controlling a barrier, gate or other object when the reader is in stand-alone operation.

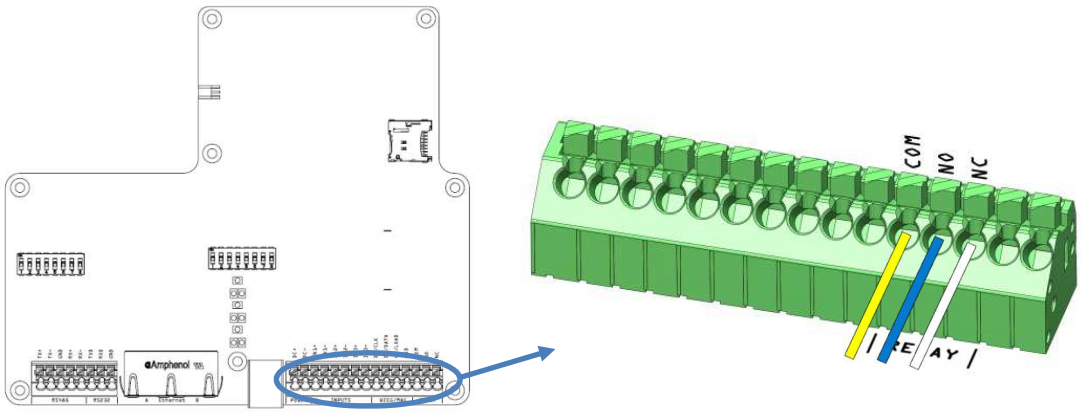


Figure 19 Relay connections, overview and detail

Connections	COM Common (See Figure 19 for details) NO Normally Open NC Normally Closed
Switching current	Max 2 A
Switch voltage	Max. 60 VDC / 30 VAC
Switching capacity:	Max. 60 W / 62,5 VA
Recommended / Max length	10 m / 100 m
Wire size	0.5 mm^2 (AWG 20)

Table 10 Output connection overview

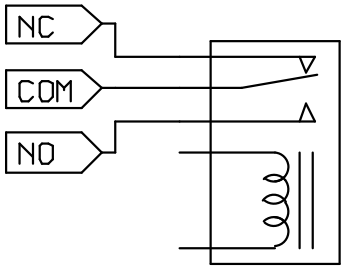


Figure 20 Inactive relay (COM connected to NC)

3.10 USB

The XT-1 has one USB type B connector, and acts like a USB 2.0 Full-Speed (12 Mbps) device. This interface is only intended for service and maintenance. The interface is connected using a standard cable to a USB port of a PC.

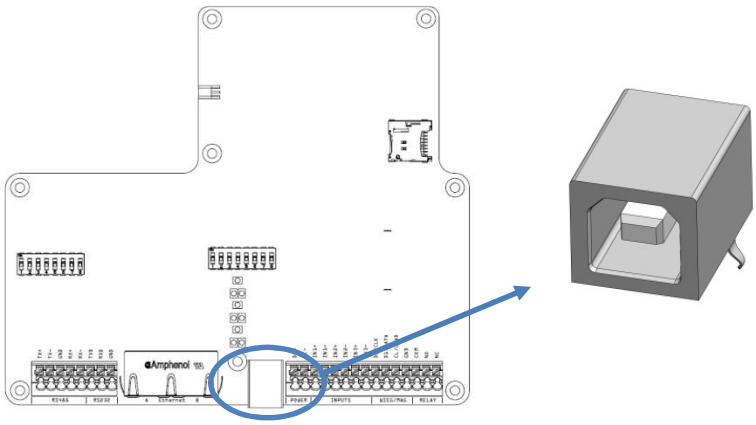


Figure 21 USB connection, overview and detail

3.11 DIP Switches

Two 8-position DIP switches are available for interface and software configuration. All switches are OFF by default.

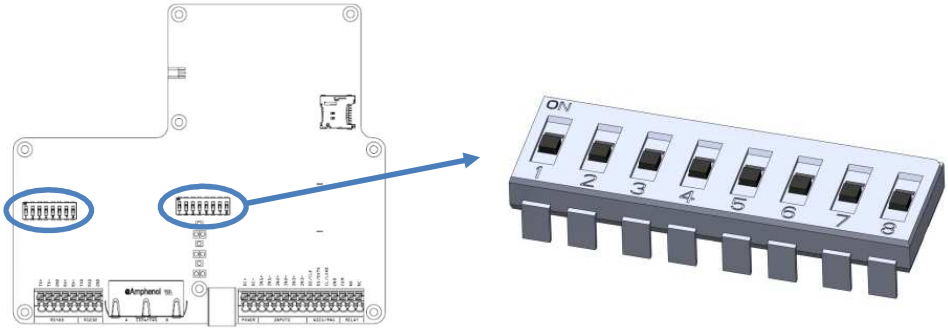


Figure 22 DIP switches S301 (left) and S101 (right)

3.11.1 Interface Configuration DIP Switch (S301)

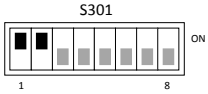
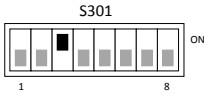
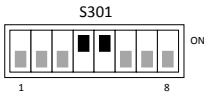
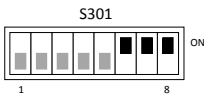
Position(s)	Description
1-2 	**RS485 2-wire mode** S301:1 ON = TX+ connected to RX+ S301:2 ON = TX– connected to RX–
3 	**RS485 termination** S301:3 ON = 120 Ω termination between RX+ and RX- Termination should be activated at each end of an RS485 chain.
4-5 	**RS485 bias** S301:4 ON = 620 Ω pull-up from RX+ to 5 V S301:5 ON = 620 Ω pull-down from RX- to 0 V Bias should be activated at one node in an RS485 chain.
6-8 	**Wiegand/Magstripe pull-ups** S301:6 ON = 1 kΩ pull-up from D0/CLK to 5 V S301:7 ON = 1 kΩ pull-up from D1/DATA to 5 V S301:8 ON = 1 kΩ pull-up from CL/LOAD to 5 V Pull-ups should be activated when the reader is connected to an access control system without built-in pull-ups.

Table 11 Interface Configuration DIP Switch (S301)

3.11.2 Software Configuration DIP Switch (S101)

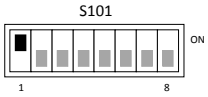
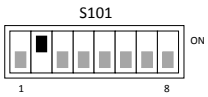
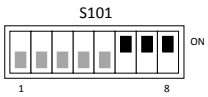
Position(s)	Description
1 	**Firmware upgrade mode** S101:1 is used for firmware upgrade. See §4.3 for more information.
2 	**Factory defaults** S101:2 is used to restore the reader to factory default settings. See §4.4 for more information.
6-8 	**Easy configuration** S101:6-8 are used for easy configuration of Wiegand/Magstripe and other settings when using XT-1 with an access control system. See §4.1 for more information.

Table 12 Software Configuration DIP Switch (S101)

3.12 Light and Sound

The XT-1 is equipped with bright LEDs for external signalling (see Figure 23). These can indicate red/green/yellow based on firmware settings. A buzzer is also available and the default setting is off.

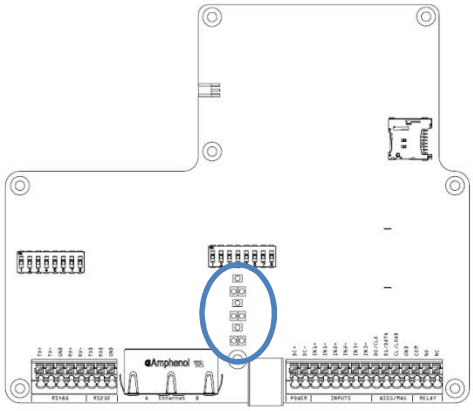


Figure 23 LED, overview

3.13 MicroSD Memory Card Slot

The XT-1 is equipped with a microSD memory card slot for additional storage (see Figure 24).

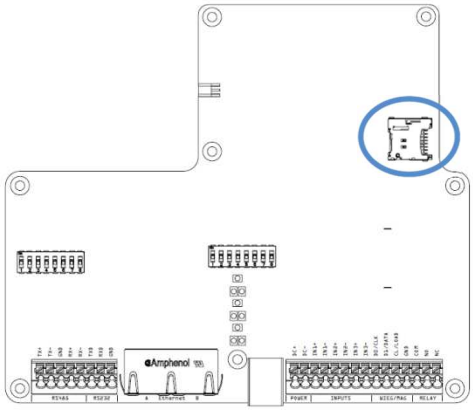


Figure 24 microSD, overview

4 Configuration

4.1 Easy Configuration

XT-1 can be configured to work with common access control systems using DIP switches S101:6-8. When any of these switches are in the ON position, the reader is configured to report tags once, accept SecureMarkID tags only, and use the specified Wiegand/Magstripe format.

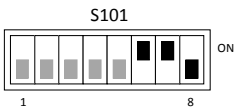
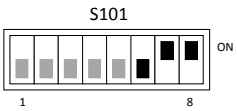
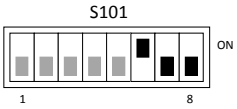
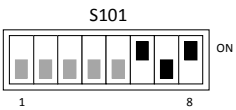
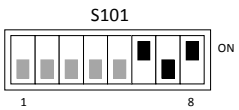
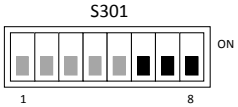
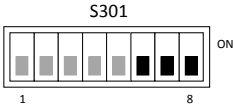
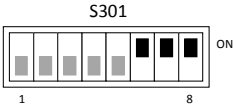
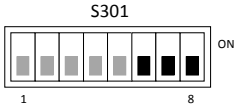
Cable Connections				
XT-1	**Assa ARX/RX WEB (with 500RW22)**	**Bewator Entro**	**Bewator 2010 Omnis (with EV2)**	**Paxton Net2 plus**
GND	0V	0V	[Conn.G] -	0V
CL/LOAD	N/C	N/C	[Conn.E] A	N/C
D0/CLK	D0	D0/CLOCK	[Conn.E] B	Clock/D1
D1/DATA	D1	D1/DATA	[Conn.E] C	Data/D0
IN1+	12V	N/C	[Conn.G] +12V	12V
IN1-	LED_GREEN	N/C	[Conn.E] G	Green LED
IN2+	12V	N/C	[Conn.G] +12V	12V
IN2-	LED_RED	N/C	[Conn.E] R	Red LED
Access System Configuration				
Settings	Configure the ARX/RX WEB system to use card type Wiegand.	Configure the Bewator Entro system to use H10302 format.	XT-1 behaves like a RB500 reader in Clock&Data mode.	Configure the Paxton system to use reader type "Clock & Data".
Tested version	RX WEB PR300233 build-8418 version-17.2.0.5	Bewator Entro 6.55.011	Bewator 2010 Omnis 6.0.107	Net2 Lite version 4.28.8417
Built-in pull-ups	2.2 kΩ to 5 V	3.3 kΩ to 5 V	XT-1 pull-ups required (S301).	1 kΩ to 3.3 V
XT-1 DIP Settings				
S101		Bewator Entro ≥ 6.5:  Older versions: 		
S301				

Table 13 Easy Configuration (part 1 of 2)

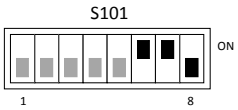
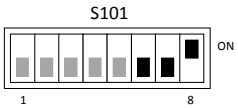
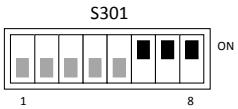
Cable Connections				
XT-1	**RCO R-CARD M5 (with DB-50W)**			
GND	DC-			
CL/LOAD	N/C			
D0/CLK	DATA0			
D1/DATA	DATA1			
IN1+	N/C			
IN1-	N/C			
IN2+	N/C			
IN2-	N/C			
Access System Configuration				
Settings	The RCO system automatically detects the Wiegand format.			
Tested version	-			
Built-in pull-ups	No pull-ups			
XT-1 DIP Settings				
S101	Strap at P14*:  No strap at P14: 			
S301				

Table 14 Easy Configuration (part 2 of 2)

* To get all digits from the SecureMarkID tag, it is necessary to solder a strap at P14 on the RCO DB-50W board. Without this strap it is only possible to get the last four digits from the tag.

4.2 Web Interface

XT-1 has a web interface for configuration and maintenance. The web interface is designed and tested to work with Google Chrome 34, Microsoft Internet Explorer 10, and Mozilla Firefox 28.

Before it is possible to connect to the web interface, the PC's IP address and subnet mask must be changed. In Windows 7, this is done using "Network and Sharing Center" in "Control Panel". Click on "Local Area Connection", "Properties", "TCP/IPv4", and "Properties". Select "Use the following IP address" and fill in "IP address" 10.0.0.10 and "Subnet mask" 255.0.0.0 as shown in Figure 25. Click "OK".

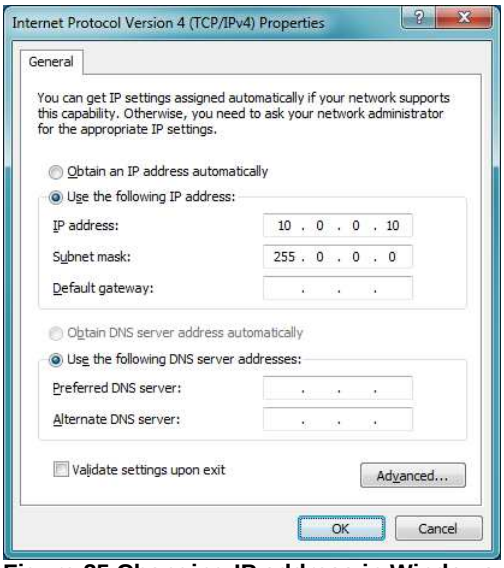


Figure 25 Changing IP address in Windows

Connect to the reader by entering the reader's IP address in the web browser's address bar. The reader's IP address can be found on a label on the backside of the reader. Figure 26 shows the web interface with all menu alternatives expanded. Note that the web interface may look slightly different depending on the version of the firmware in the reader. Up-to-date documentation is always available by selecting "Documentation" in the web interface menu.

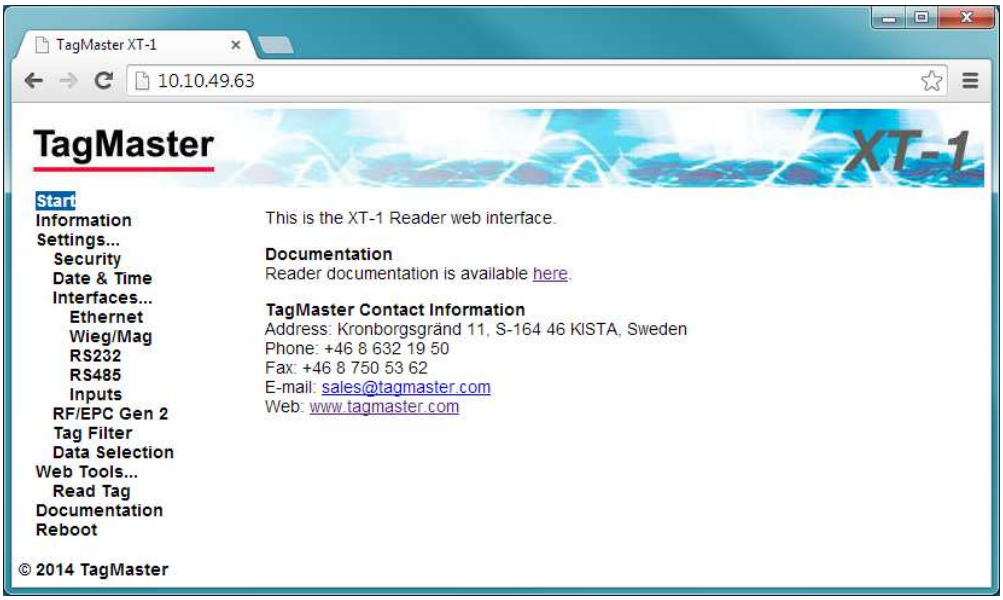


Figure 26 Web interface with expanded menu

4.2.1 Start

The "Start" page provides TagMaster contact information.

4.2.2 Information

The "Information" page provides information about the system.

4.2.3 Settings

All configuration of the reader can be done on the "Settings…" pages. For all settings, it is possible to get help by clicking on the question mark (?). Click the "Save Settings" button to activate changed settings. Click the "Factory Defaults" button to restore all settings on a page to factory defaults.

4.2.3.1 Security

The Security page makes it possible to change the TAGP password that is used to authenticate TAGP clients. Make sure to set this password if the reader is connected on a public network!

4.2.3.2 Date & Time

The reader has a battery backed real time clock that can be set on the Date & Time page.

4.2.3.3 Interfaces…

4.2.3.3.1 Ethernet

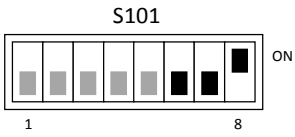
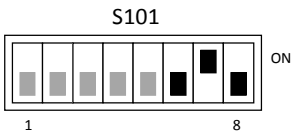
The Ethernet page shows the current Ethernet settings and makes it possible to set IP address, netmask and gateway.

4.2.3.3.2 Wieg/Mag

The Wiegand/Magstripe page contains all settings related to Wiegand/Magstripe. It is possible to select a predefined format or to define a custom format. A description of all predefined formats and how to define a custom format is available on the Documentation page.

The most common predefined formats can also be selected by setting DIP switches S101:6-8 as shown in the table below. When any of these switches are in the ON position, the reader is also configured to report tags once and only accept SecureMarkID tags (see §4.1 for more information).

D = Data from tag (bit for Wiegand/digit for Magstripe)
S = Value of Site code
E = Even parity bit, O = Odd parity bit, X = Bit included in parity calculation
B = Magstripe start character, F = Magstripe stop character, L = Magstripe LRC

Output Format	Description
Disabled	Wiegand/Magstripe output is disabled
W26S/H10301  	26-bit Wiegand (8-bit site code, 16-bit data): ESSSSSSSSDDDDDDDDDDDDDDDO XXXXXXXXXXXXX---------- ----------XXXXXXXXXXXXX
W26N/H10301  	26-bit Wiegand (24-bit data, no site code): EDDDDDDDDDDDDDDDDDDDDDDDO XXXXXXXXXXXXX---------- ----------XXXXXXXXXXXXX

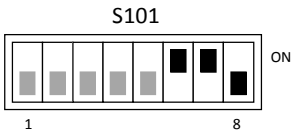
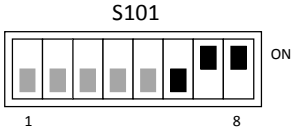
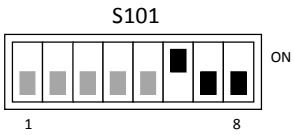
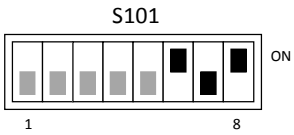
W34N 	34-bit Wiegand (32-bit data, no site code): EDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDO XXXXXXXXXXXXXXXX---------------- ----------------XXXXXXXXXXXXXXXX
W37N/H10302 	37-bit Wiegand (35-bit data, no site code): EDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDO XXXXXXXXXXXXXXXXXX---------------- ----------------XXXXXXXXXXXXXXXXXX
W37R/H10302 	37-bit Wiegand (37-bit data, no site code, no parity): DDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD
M8N/H10320 	8-digit Magstripe: [25 zeroes]BDDDDDDDDFL[165 zeroes]

Table 15 Wiegand/Magstripe formats

4.2.3.3.3 RS232/RS485

The RS232 and RS485 pages makes it possible to set Baud rate and output format for the RS232 and RS485 interfaces. It is possible to select a predefined output format or define a custom format. All details are described on the Documentation page.

4.2.3.3.4 Inputs

The reader has three inputs. The first two inputs can be used to control the green and red LED from an external access control system to indicate if access has been granted or denied. Note that by default read blink is disabled when the LED is externally controlled. The third input can be used as a read enable/disable input. This input can be connected to an external presence detector such as an inductive loop to make sure that the reader only reads tags when a vehicle is present.

All inputs have a debounce filter that is enabled by default. When the debounce filter is enabled, short pulses on the inputs are ignored. Pulses must be at least 20 ms to guarantee that they are detected. The polarity of the inputs can be inverted to cope with signals that are active high or active low.

The read enable/disable input can be configured to work in different modes. "Read time" is used to specify how long time reading should be enabled after it has been activated by the input. If read time is zero, reading is enabled as long as the input is active. The "Abort after read" setting can be used to abort reading after a single tag has been read (read time must be non-zero for this setting to have any effect). The "Indicator" setting is used to specify the colour of the LED when reading is enabled.

4.2.3.4 RF/EPC Gen 2

The RF/EPC Gen 2 page contains many advanced settings related to the EPC Gen 2 standard. The following settings are the most important:

Setting	Description
Carrier	Enables or disabled reading of tags
Read level	Sets the read range in percent

EPC channel mask	Sets which frequencies that shall be used in EU readers (not applicable in US readers).
EPC memory bank	Specifies which parts of the EPC tag to read. The default setting (EPC/SecureMarkID) makes it possible to read both EPC tags and SecureMarkID tags.
EPC custom format	Used to specify in detail which parts of the EPC tag to read. All details are available on the Documentation page.

Table 16 RF/EPC Gen 2 settings

4.2.3.5 Tag Filter

The reader has a tag filter that controls how often tags are reported. The filter can be set to work in one of the following modes:

Mode	Description
Off	Tags are reported every time they are read.
Periodic	Tags are reported periodically every "Filter timeout" milliseconds.
Once	Tags are reported once and have to be away for at least "Filter timeout" milliseconds before they are reported again.
Report	Similar to once except that a TAGP GONE event is generated when the tag has been away for "Filter timeout" milliseconds.

Table 17 Tag filter settings

It is possible to activate read beep and read blink to get an indication every time a tag is reported.

4.2.3.6 Data Selection

The data selection settings make it possible to specify which part of the data from the tag that shall be used and how it shall be interpreted. All details are available on the Documentation page.

4.2.4 Web Tools

4.2.4.1 Read Tag

The "Read Tag" page makes it easy to read tags and display tag contents.

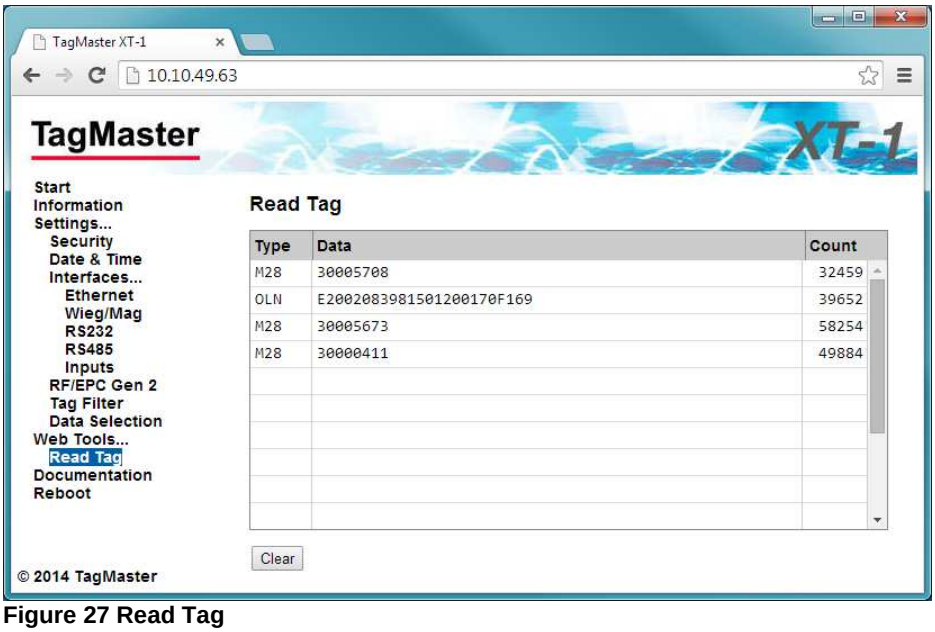


Figure 27 Read Tag

4.2.5 Documentation

The Documentation page provides up-to-date reader documentation.

4.2.6 Reboot

The Reboot page makes it easy to reboot the reader.

- Press the "Reboot" button to initiate a reboot.

- Wait for the reboot to complete.

4.3 Firmware Upgrade

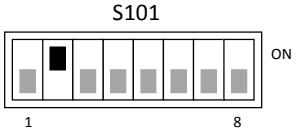
The latest version of the reader firmware can be downloaded from ftp://partner:245ghz@ftp.tagmaster.com/Vigilant/Firmware.

Follow the instructions in the README document that is available in the same directory to install the required tools and upgrade the reader firmware.

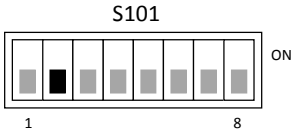
4.4 Factory Defaults

Use the following procedure to restore the reader to factory default settings:

1. Set DIP switch S101:2 to ON



2. Power cycle the reader
3. Set DIP switch S101:2 back to OFF



5 TAGP Communication Protocol

TagMaster Readers can be controlled and monitored using a protocol called TAGP. The TAGP protocol is human readable and can be used over TCP/IP, RS232 and RS485. A terminal emulation program such as PuTTY is all that is required to interact with TAGP.

The "TAGP Protocol Specification" [2] can be downloaded from www.tagmaster.com.
Use login name "partner" and password "245ghz".

PuTTY TagMaster Edition can be downloaded from ftp://partner:245ghz@ftp.tagmaster.com.

All TAGP messages start with a 4-character message identifier and ends with a new line character. To initiate communication with the TAGP server in the reader, a client has to send a HELO message specifying the required TAGP version. The TAGP server replies with a RPLY message:

```
HELOTAGP/2
RPLYHELO00
```

The client can then send commands to the reader. The most important commands are SET, SETS, GET, and GETS. SET and GET sets and gets the current value of a variable. SETS and GETS sets and gets the stored value of a variable. The stored value is used to initialize the variable at startup. The following example shows how to set the LED to green:

```
SET LED=GREEN
RPLYSET 00
```

The reader sends events to the client when something happens. The following example shows a TAG event that is sent when a tag has been read:

```
EVNTTAG 20140416151015810%00%07'%14l%00%00%00%00%00%00%00
```

6 Troubleshooting

To facilitate troubleshooting, consider the following:

- Make sure that the XT-1 has correct supply voltage and sufficient current. Check the small green LED on the right side of the controller board inside the reader. When the LED is flashing (once per second) the reader is powered and the firmware is running. If the LED is on, but not flashing, the reader is powered but the firmware is not running. If the LED is off, the reader is not powered.

- If using Ethernet communication, make sure that the network connection is ok. There are small LEDs on the RJ45 socket, only visible when the lid of the reader is open. A yellow light indicates 'Link' and a flashing yellow light indicates 'Activity'.

- If the IP address has been forgotten or firmware settings have been corrupted the reader can be restored to factory default settings as described in §4.4.

- Make sure that working and correctly formatted EPC Gen 2 tags are being used.

7 Definitions and Abbreviations

AES	Advanced encryption standard
ASCII	American standard code for information interchange
AWG	American wire gauge
CR	Carriage return
DES	Data encryption standard
DIP	Dual in-line package
EPC	Electronic product code
FCC	Federal communications commission
LED	Light emitting diode
LF	Line feed
OEM	Original equipment manufacturer
RFID	Radio-frequency identification
PC	Personal computer
SecureMarkID®	A TagMaster implementation for improved Security using EPC tags
TAGP	A TagMaster protocol for RFID reader communication
TCP/IP	An Internet protocol suite
UMK	Universal mounting kit
USB	Universal serial bus
XT-1	A TagMaster RFID reader

8 References

[1] 06-147 UMK 193600 DATA SHEET
[2] 05-172 TAGP PROTOCOL SPECIFICATION

Manuals and documentation can be downloaded from www.tagmaster.com.

9 Technical Specification

Operating frequencies	XT-1 eu: 865.6-867.6 MHz Europe, XT-1 us: 902-928 MHz US, Americas
Read range	Up to 8 meters (26ft) with TagMaster UHF tags with SecureMarkID®; Windshield ID-tag and ISO-Card ID-tag
Dimensions	300x300x60 mm (11.8x11.8x2.4 in)
Weight	2.3 kg (5.1 lbs)
Ingress protection	IP 66
Operating temperature	-40°C to +60°C (-40°F to +140° F) EN 60068-2-1 Ad, En 60068-2-2 Bd, EN 60068-2-14 Nb
Storage temperature	-40°C to +85°C (-40°F to +185°F)
Housing	Aluminium housing UL94 certified XENOY™ cover
Power supply	12-24 VDC supply
Power consumption	10W (max 12W)
Output power	XT-1 eu 2W (e.r.p.), XT-1 us 4W (e.i.r.p.)
Input	3 isolated inputs
Output	3 isolated outputs shared with Wiegand/Magstripe
Relay	1 relay output 60VDC, 2A
Interfaces	RS232, RS485, Wiegand/Magstripe, 2 pcs Ethernet and USB service Interface
Certificates	CE Certificate according to R&TTE-directive 1999/5/EC and FCC RoHS Directive 2002/95/EC and 2011/65/EU WEEE 2002/96/EC
Standards	EPC Gen 2 (ISO 18000-6C)
LED indicator	Red/Green/Yellow
Communications protocols	TAGP and various OEM protocols
Encrypted air interface	According to EPC Gen 2 (ISO 18000-6C)
EMC	EN 301489-1, EN 301489-3
Radio	EN 302 208-1, EN 302 208-2 FCC: CFR 47, Part 15 subpart C, FCC ID: M39XTXX
Safety & health	EN 60950-1, EN 60950-22 & 1999/519/EC
Mechanical	EN 60068-2-27 Ea, EN 60068-2-64 Fh
Manuals and documentation	XT-1 Installation Manual, 13-111 TAGP Manual, 05-172
Part No.	XT-1 eu: 152500, XT-1 us: 152600
Accessories	Universal Mounting Kit: 193600 ISOcard ID-tag: 225000 WindShield ID-tag: 221000

Technical Support

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