



User Manual

Procyon Integrated Reader

First Edition (May 2014)

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Table of Contents

1	Getting Acquainted.....	2
2	Package Content	3
3	Installing the Procyon	4
3.1	Installation pre-requirements.....	4
3.2	Mechanical installation.....	4
3.3	Connecting to the reader.....	5
3.4	Software installation.....	7
3.5	Starting up the reader	7
4	Using the Reader Control Tool.....	9
4.1	Reading Tags	10
4.2	Writing Tags	12
4.3	Set Password Dialogue.....	13
4.4	To set a password	13
4.5	To reset the password (to default).....	13
4.6	Set Power Dialogue.....	13
4.7	To set the power level.....	13
4.8	Menu.....	14
4.9	Main menu.....	14
4.10	Application short-cuts	15
5	Reader Management	16
5.1	NTP configuration	16
5.2	Firmware Upgrade	18
6	Digital Inputs and Outputs.....	20
6.1	Digital Inputs.....	20
6.2	Digital Outputs.....	20
6.3	Digital I/O Hardware Connection Example.....	21
7	Reader Maintenance	22
7.1	External grounding point	22
7.2	Electrostatic Discharge	22
7.3	Un-mounting the reader.....	22
7.4	Storage of the reader.....	23
7.5	Antenna Radome Maintenance.....	23
8	Specifications	24
8.1	RF Specifications	24
8.2	Physical Specifications	24
8.3	Power Specifications.....	24
8.4	Ethernet Specifications	24
8.5	Digital I/O Specifications.....	24
8.6	RS-232 Specifications.....	24
8.7	Antenna Specifications	25
9	Disclaimer	26
	Appendix A.....	27



Document History

Author	Version	
J.L.	Pre 0.1	Initial Version

1 Getting Acquainted

Congratulations on purchasing a Star Systems International Integrated RFID Reader. The reader operates in the 860 – 960 MHz frequency ranges (subject to regulatory region). The reader supports tag complying with following protocols: EPC Class1Gen2 / ISO18000-6C.

It has been verified to work with tags from:

- ◇ Alien
- ◇ Avery Dennison
- ◇ Impinj
- ◇ Mikoh
- ◇ RSI/Sirit
- ◇ Star RFID
- ◇ TI
- ◇ UPM Raflatac

This document is intended for professional installers setting up and installing the Procyon Integrated reader. Before attempting to install or operate this product, you are expected to be familiar with the following:

- Microsoft© Windows© based software installation and operation
- Device communication parameters using Ethernet network communications
- RFID reader configuration including antenna placement
- Basic digital input/output control

Use this guide for more information on setting up your RFID Reader and learning how it works.

2 Package Content

The reader package includes the following:

Reader x 1	Mounting bracket x 1	Cable side weatherproof shield x 1
		

Optional parts that can be purchased separately:

Parts		Part numbers
PoE Injector	56V	HMS07000
Digital input/output interface cable	6 meters	HCB09000
	12 meters	HCB09001

Please contact your account manager or a sale representative from SSI to acquire the optional parts.

3 Installing the Procyon

3.1 Installation pre-requirements

- ✦ PC with a minimum Pentium 4 class CPU
- ✦ Microsoft® Windows Vista, Windows 7 or Windows 8
- ✦ 100 MB available hard drive space
- ✦ Ethernet TCP/IP network connectivity
- ✦ PoE switches/injectors (IEEE 802.3at compatible)
- ✦ Full feature category 5e Ethernet cable (IEEE 802.3at compatible and within 90 meters long)

3.2 Mechanical installation

Using the mounting kit provided, the reader can be mounted onto a pole with diameter $\varnothing 40\sim\varnothing 60$ mm.

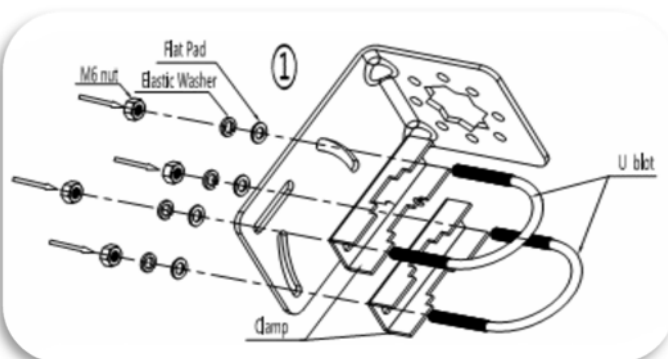
STEP 1

Put on the mounting bracket in the orientation needed and put on the bolts. Tighten the bolts using a wrench. (IMPORTANT: ONLY USE THE BOLTS PROVIDED)



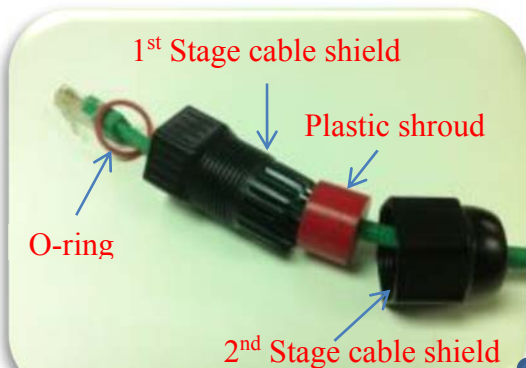
STEP 2

Assembly the mounting bracket according to the figure shown.



3.3 Connecting to the reader

Procedures for connecting the Ethernet cable on the reader's end:



Install waterproof cable shield components around the Cat5 cable



Connect the Cat5 cable to the reader's Ethernet connector. Ensure the rubber O-ring is placed properly as shown.



Lock the 2nd stage cable shield to the 1st stage cable shield by turning it clockwise



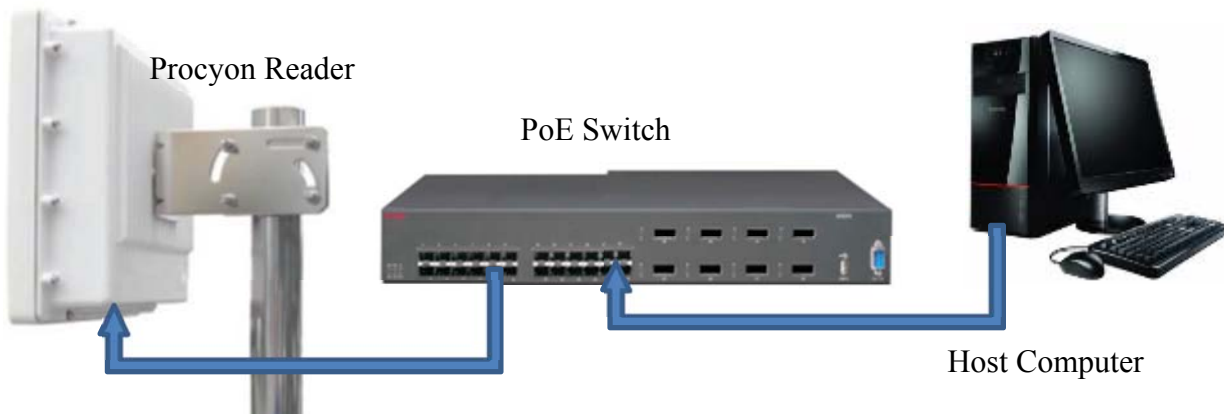
Lock the 1st stage cable shield to reader's connector by turning it clockwise along the thread

There are two methods for setting up a connection between the host computer and the reader:

Connecting via a PoE switch

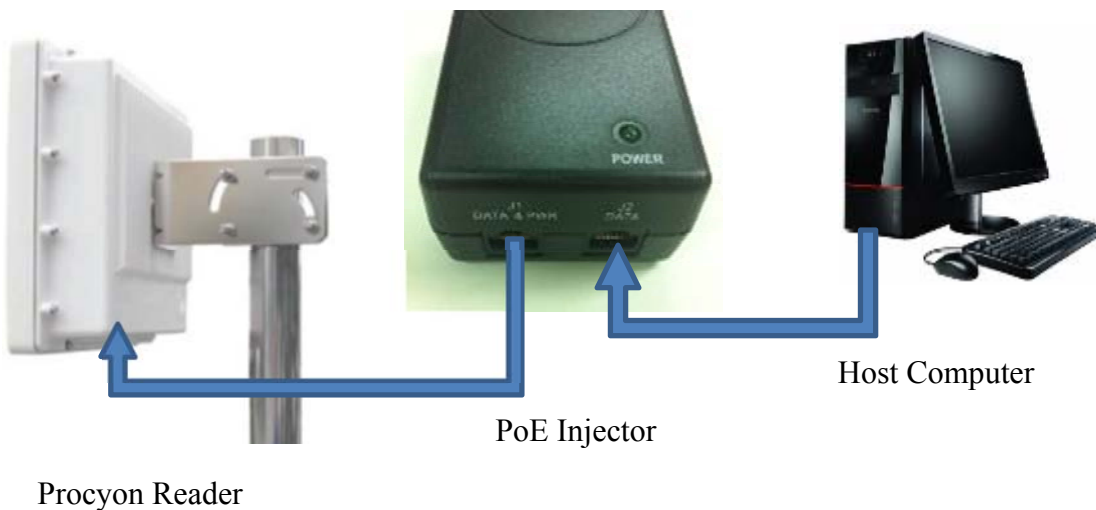
Connect the reader to a PoE switches with a full feature category 5e Ethernet cable.

Connect the host computer to the PoE switch via an Ethernet cable.

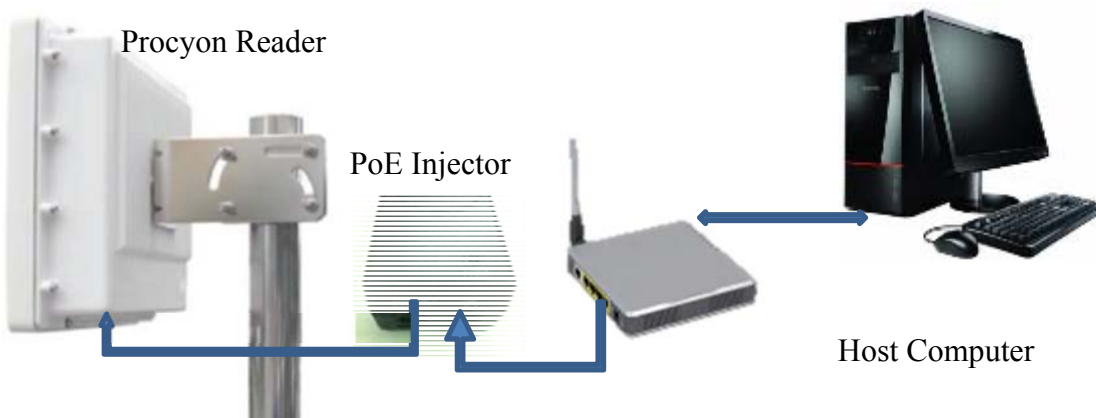


Connecting directly to a host computer

Unless your host computer Ethernet port support PoE, otherwise a PoE injector is required. Connect the reader to the PoE injector with a full feature category 5 Ethernet cable, and then connect the PoE injector to the host computer.



The Procyon reader can also be connected to access points or switches that do not have PoE support by using a PoE injector as shown below.

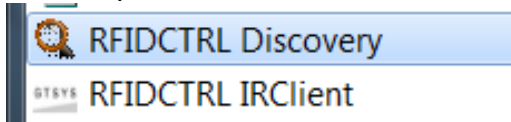


3.4 Software installation

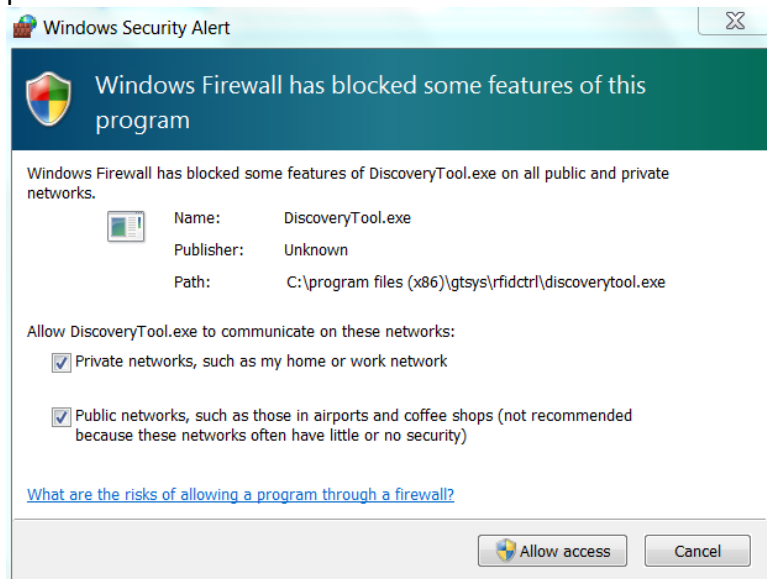
1. Insert the accompanying CD into the CD tray of your computer or download the software from www.star-int.net.
2. Start the **RFIDCTRL-v1.3.msi** (the version you obtain maybe newer than the version stated here) program from the CD and follow the instructions in the installation wizard.
3. After you have installed the accompanying software on your computer and established a network connection with the reader, you are ready to run the reader.

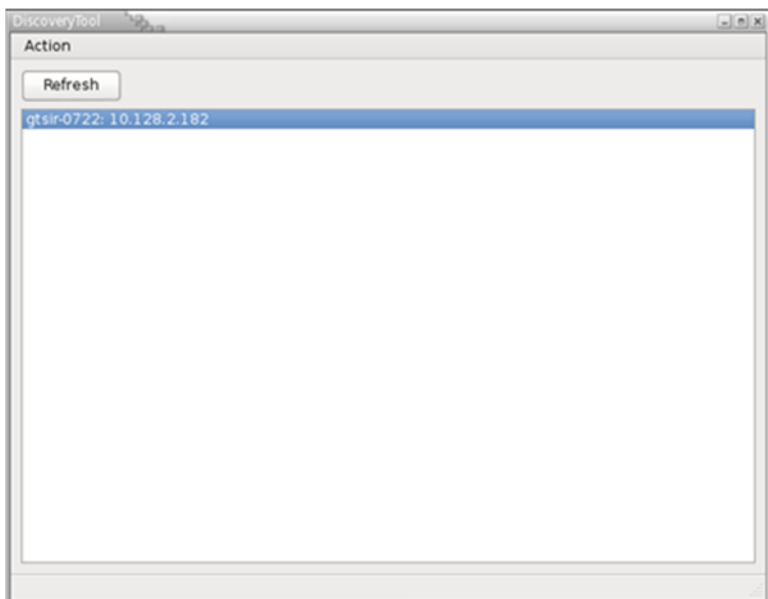
3.5 Starting up the reader

After established the PoE connection to the reader, it takes approximately 35 seconds for the reader to complete booting sequence; the LED will show a static green in combination with a heart-beat blue. At this stage the reader should have retrieved an IP address from the DHCP server, run the reader auto discovery tool from the Windows Start Menu:



Windows may prompt you for firewall access of the discovery tool, allow access on both private and public networks:



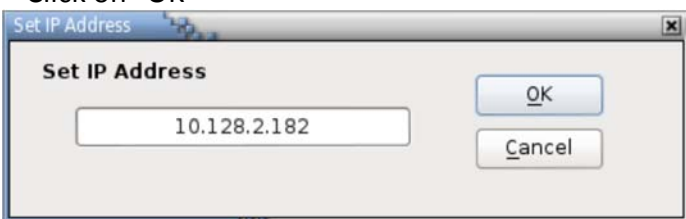


Click the “Refresh” button on the discovery tool and launch the **Reader Control Tool** by double clicking on the found reader.

If the auto reader discovery tool failed to find the reader, check the leases information from the DHCP server to find the readers IP. The MAC address is written on a label next to the RJ45 Ethernet port. Connect to the reader manually using the Settings menu tab and select "Set IP Address" in the Reader Control Tool.

To set the reader IP-Address

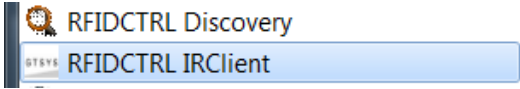
- Select “Settings->Set IP-Address” from the top menu bar
- Type a IPv4 dotted decimal address to the input field
- Click on “OK”



4 Using the Reader Control Tool

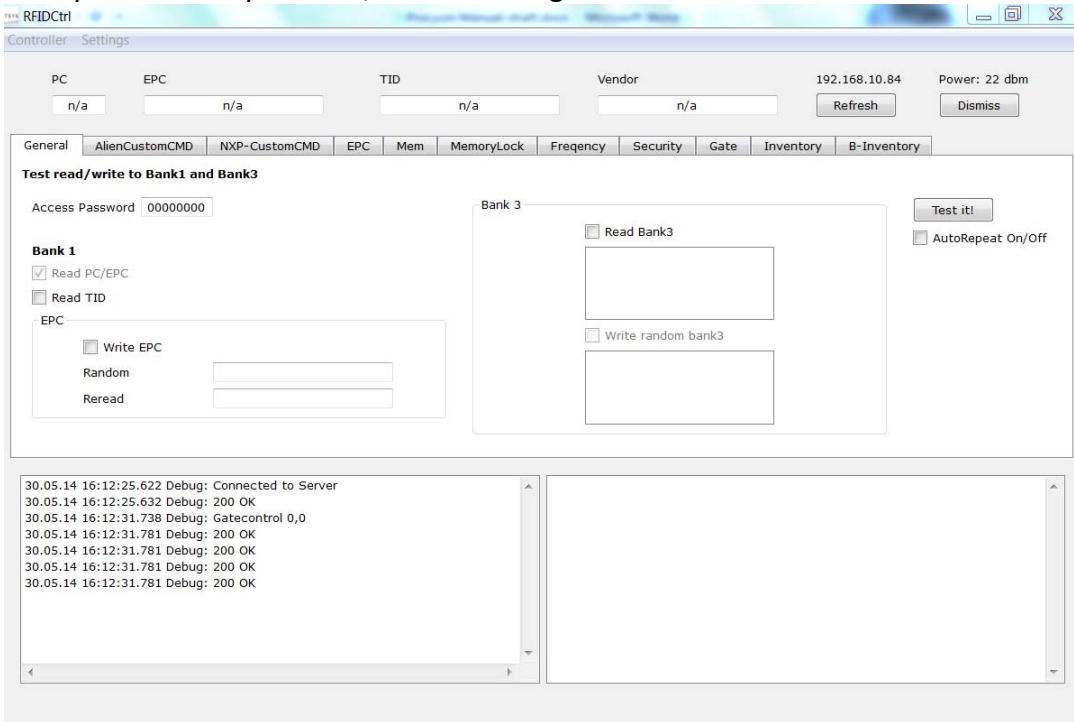
Star Systems International provides a test tool: *Reader Control Tool*. It is available from the Start menu after the installation process has successfully finished. The path to the program is: **Start -> Program ->**

RFIDCTRL IRClient



*If you start the Reader Control Tool client without using the discovery tool, you will have to manually enter the IP address

The system is ready to Read/Write RFID tags.

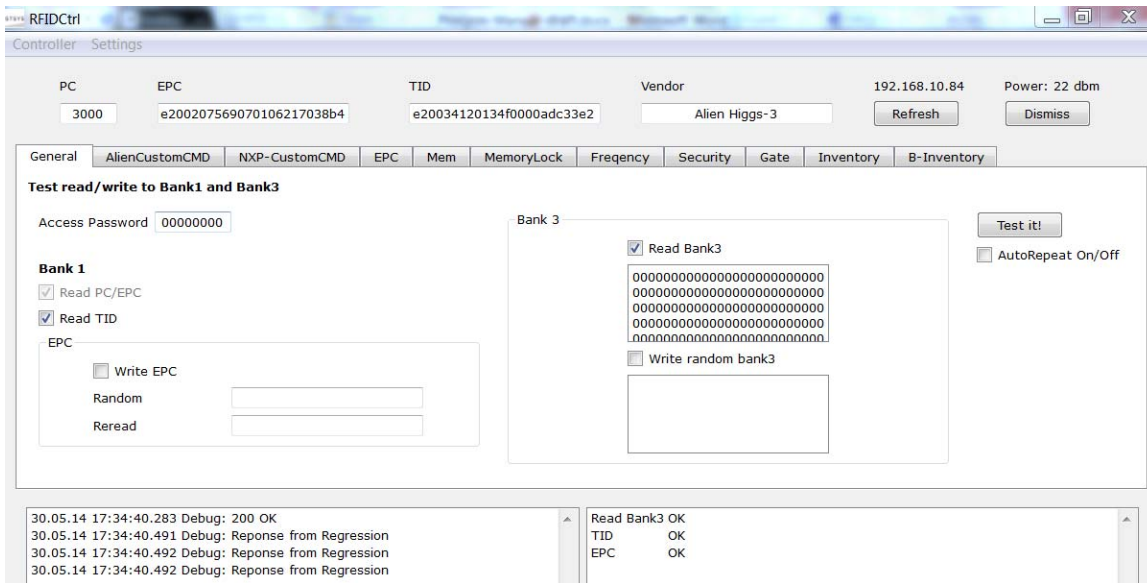


4.1 Reading Tags

The Reader Control Tool allows you to read information from a ISO18000 – 6C RFID tag.

To proceed with reading:

- ✦ Put a RFID tag within the read-zone of the reader.
- ✦ In Reader Control Tool select the "General" tab.
- ✦ Set the read options (see below)
- ✦ Click the "Test it!" button to read at tag.

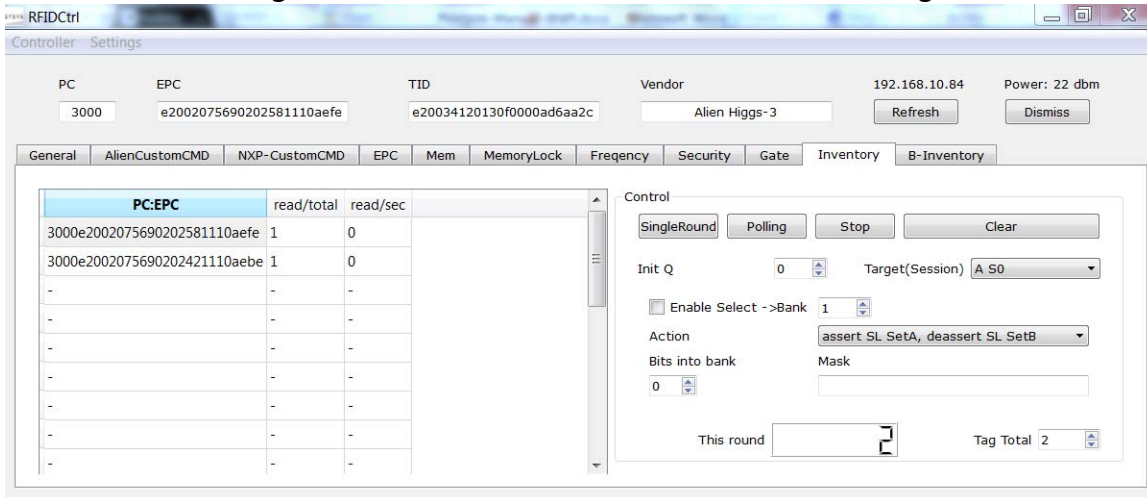


Read options:

- Read TID
- Read Bank3 (user data)
- AutoRepeat

Reading multiple tags (Inventory mode)

- ✦ In Reader Control Tool select the "Inventory" tab.
- ✦ Click the "SingleRound" button to read once or Click the "Polling" button to read continuously.

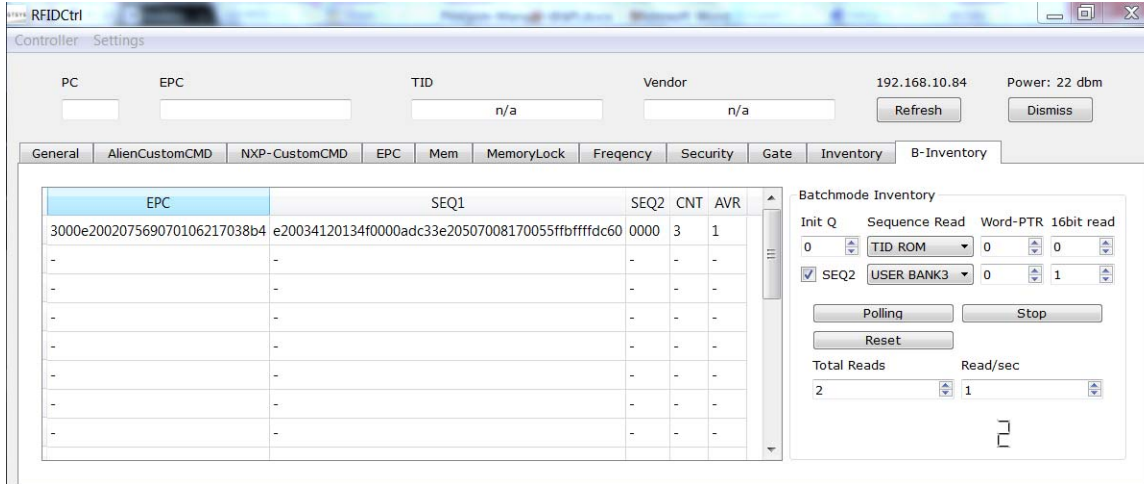


Select and double click on a tag record will read the TID of the selected tag and the information will be displayed on the top.

Read options:

- ⤴ Init Q (default: 0)
- ⤴ Target Session
- ⤴ Enable ISOC Select command (optional)

“B-Inventory” tab allows user to read tags with the option to read additional memory banks.



Read options:

- ⤴ Init Q (default: 0)
- ⤴ Sequential reads
- ⤴ Word pointer and 16bit read length (default: 0)

Adjusting the Q value:

Depending on the number of tags that are expected to be presence in the reader’s read zone, the user may want to optimize the Q value accordingly.

The table below provide a reference for Q values and the expected tag population:

Number of tags	Q values	Application
1 – 2	0	Free flow traffic tracking
3 - 10	3	Conveyer belt
11 - 60	4 - 6	Inventory management

For details about how Q values work, please refer to the EPC C1G2 protocol definition document.

Problem cannot read TID or Bank3

- ⤴ The RFID tag may be password protected.
Please refer to page 13 –
- ⤴ RFID tag may be out of read range – reposition the tag.

4.2 Writing Tags

The Reader Control Tool allows you to write information to the Bank3 user memory of a RFID tag.

To proceed with writing onto the tag's EPC memory bank:

- ✦ Put a RFID tag close to the reader
- ✦ Read the tag (see)
- ✦ Select the "EPC" tab and write information in the input line
- ✦ Click the "Save Changes" button

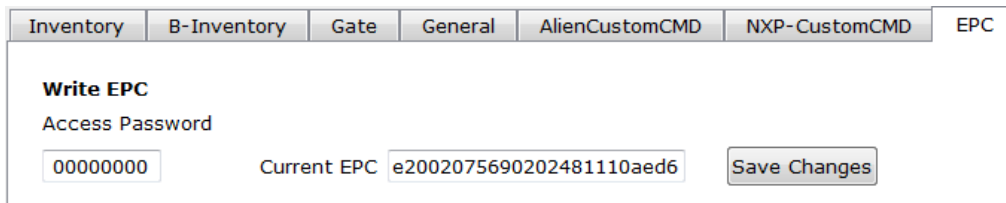
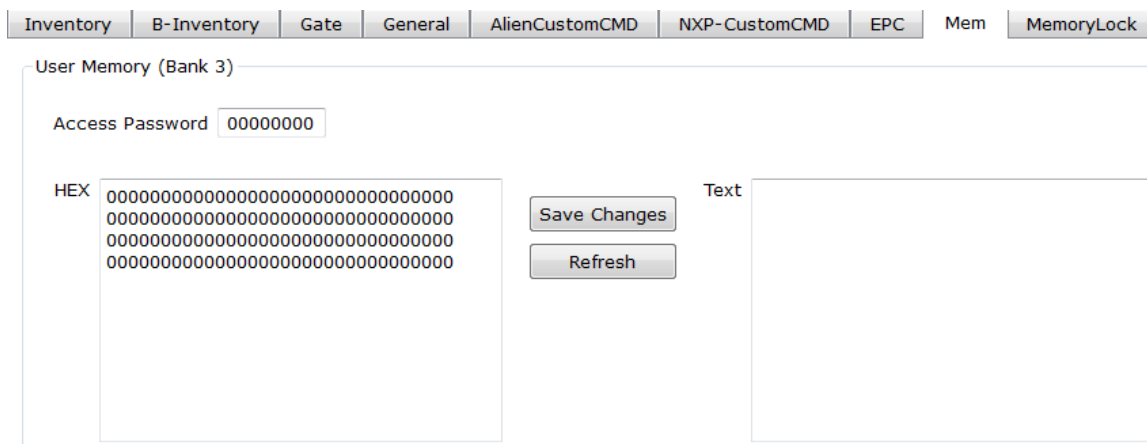


Illustration 1: RFID Write Tab

To proceed with writing onto the tag's User Data memory bank:

- ✦ Put a RFID tag close to the reader
- ✦ Read the tag (see)
- ✦ Select the "Mem" tab and write information in the input line
- ✦ Click the "Save Changes" button

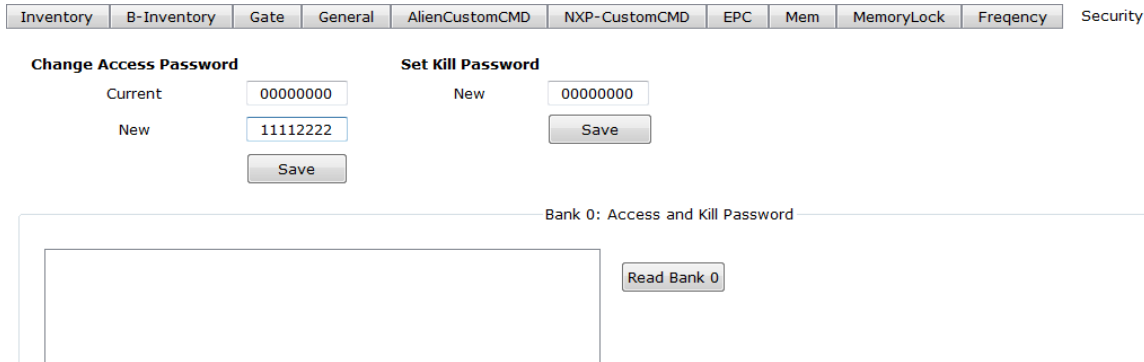


Problem write failed troubleshooting:

- ✦ Reason: Power setting may be too low.
Please refer to page 13 – to adjust the power settings.
- ✦ Reason: Tag may be password protected.
Please refer to page 13 –

4.3 Set Password Dialogue

The EPC/Gen2 RFID tags have a feature to protect information with a password. The “Security” tab allows you set a password while reading or writing onto a RFID tag.



Password input in hexadecimal characters (0-9,a-f) with a length of 8, the default value is 00000000

To set a password

- Select “Security” tab
- Type a 8 character hexadecimal password in the “New” password field.
- Click on “Save”

To reset the password (to default)

- Select “Security” tab
- Type “00000000” into the input line
- Click on “Save”

4.4 Set Power Dialogue

Depending on the environment and the RFID tag in use, you need to adjust the power setting of the reader's amplifier to read and write successfully.

To set the power level

Notice: High power values may not necessary give a positive effect to the read/write results – it is recommend to start from low (min) to high (max) power values in small steps to find the optimal setting.

- ⤴ Select “Settings->Set Power” from the top menu bar
- ⤴ Use the slide bar to set the power level
- ⤴ Click on “OK”

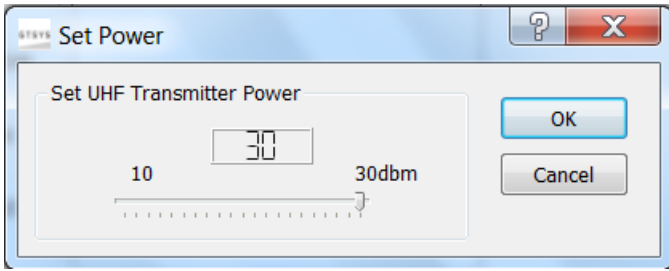


Illustration 2: Set Power Dialogue

Output power range:

- Min = 10 dbm
- Max = 30 dbm
- Stepping = 1 dbm

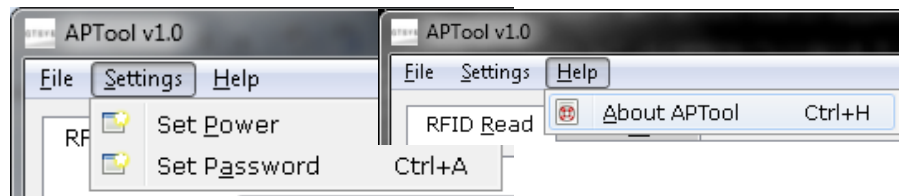
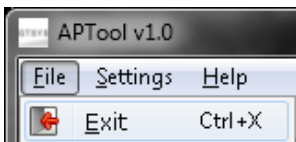
4.5 Menu

Reader Control Tool menu and shortcuts.

4.6 Main menu

Reader Control Tool comes with 3 menu items:

- ^ File
 - * Exit application
- ^ Settings
 - * Set Power
 - * Set Password
- ^ Help
 - * About



4.7 Application short-cuts

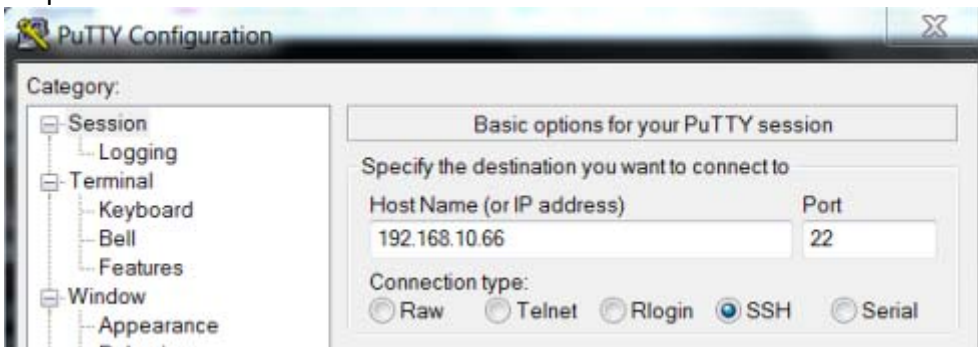
Reader Control Tool Software	Functions
Alt-F	File Menu
Alt-S	Settings Menu
Alt-H	Help / About
Alt-R	Activate Read Tab
Alt-W	Activate Write Tab
Alt-T	Set/unset TID read
Alt-S	Set/unset Bank3 read
Ctrl-X	Exit program
Ctrl-H	About
Ctrl-P	Power Dialogue
Ctrl-A	Password Dialogue

5 Reader Management

5.1 NTP configuration

The reader will try to synchronize its system time with the pre-set NTP servers when the reader boots up. Users can configure the set of NTP servers that the reader is referencing. The following steps demonstrate how to configure the NTP servers:

Step1:



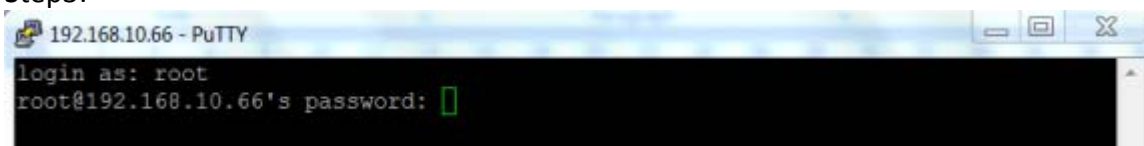
Login to the server root's access via SSH using any terminal software. In this example, Putty was used.

Step2:

The terminal software may prompt you for not cached key found message, click "Yes" to continue.



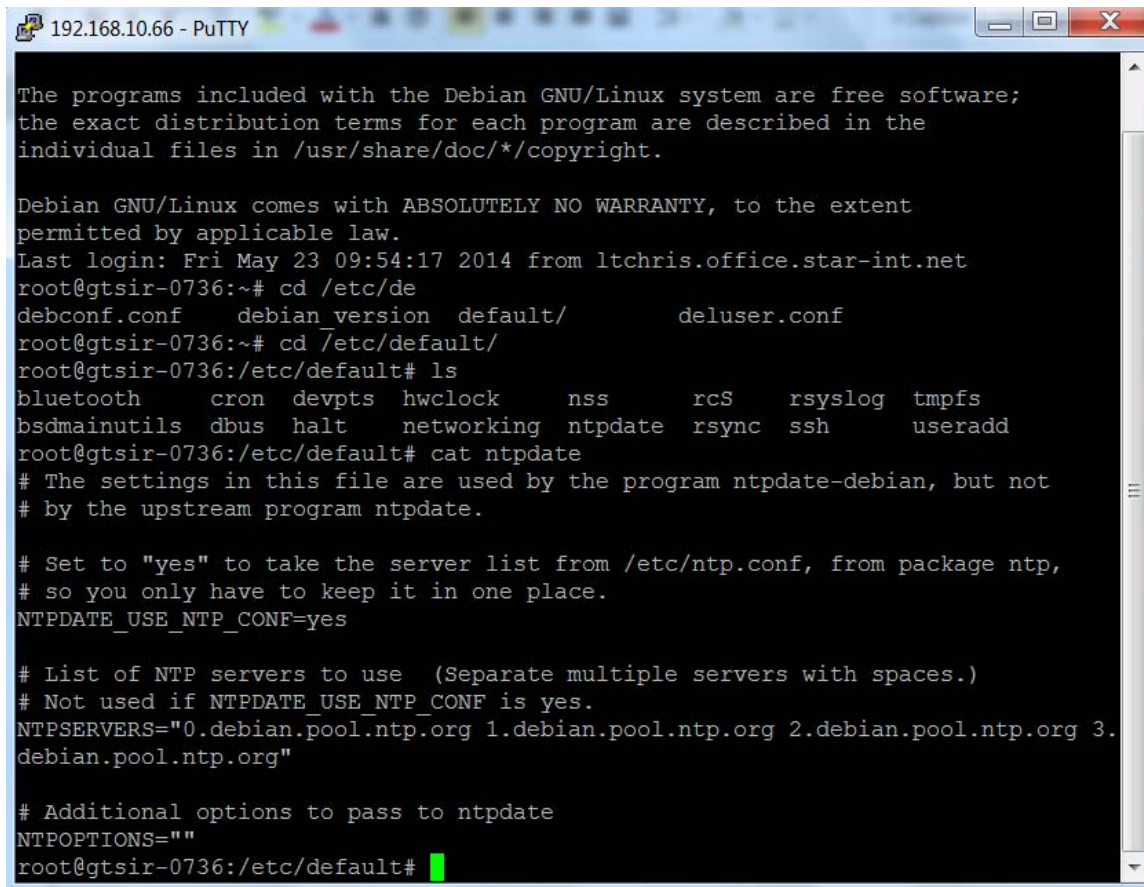
Step3:



Login to the reader's console using username: "root" and default password "webus4u".

Step4:

Go to "/etc/default" directory by input the following commands "cd /etc/default/"



```
192.168.10.66 - PuTTY
The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Fri May 23 09:54:17 2014 from ltchris.office.star-int.net
root@gtsir-0736:~# cd /etc/de
debconf.conf  debian_version  default/      deluser.conf
root@gtsir-0736:~# cd /etc/default/
root@gtsir-0736:/etc/default# ls
bluetooth      cron  devpts  hwclock      nss      rcS      rsyslog  tmpfs
bsdmainutils  dbus  halt     networking  ntpdate  rsync   ssh      useradd
root@gtsir-0736:/etc/default# cat ntpdate
# The settings in this file are used by the program ntpdate-debian, but not
# by the upstream program ntpdate.

# Set to "yes" to take the server list from /etc/ntp.conf, from package ntp,
# so you only have to keep it in one place.
NTPDATE_USE_NTP_CONF=yes

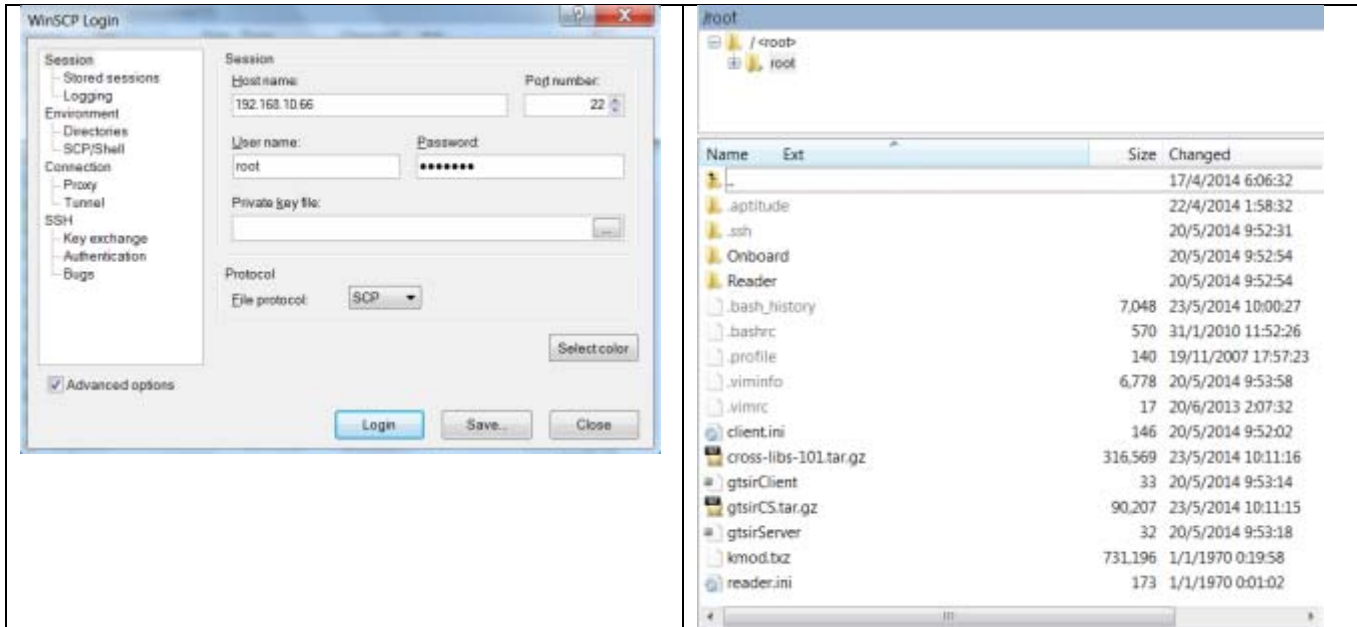
# List of NTP servers to use (Separate multiple servers with spaces.)
# Not used if NTPDATE_USE_NTP_CONF is yes.
NTPSERVERS="0.debian.pool.ntp.org 1.debian.pool.ntp.org 2.debian.pool.ntp.org 3.
debian.pool.ntp.org"

# Additional options to pass to ntpdate
NTPOPTIONS=""
root@gtsir-0736:/etc/default#
```

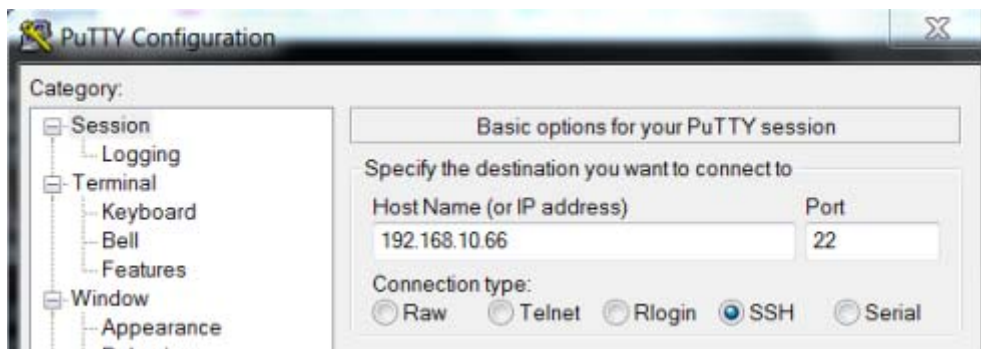
5.2 Firmware Upgrade

Step 1:

Upload firmware upgrade package to the root directory of the reader file's system via SCP protocol.



Step 2:



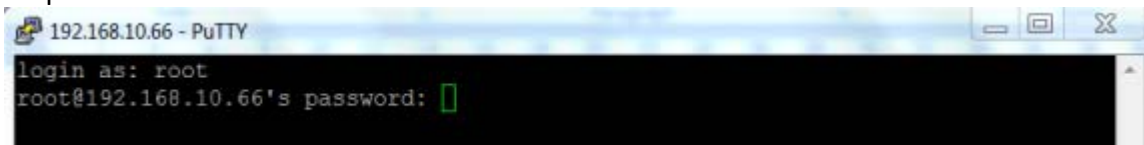
Login to the server root's access via SSH using any terminal software. In this example, Putty was used.

Step 3:

The terminal software may prompt you for not cached key found message, click “Yes” to continue.



Step 4:



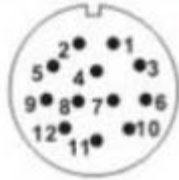
Login to the reader’s console using username: “root” and default password “webus4u”.

Step 5:

Execute the firmware upgrade package.

6 Digital Inputs and Outputs

Digital input and output signals are provided via the bulkhead connectors. Refer to the following diagram specifications for the connector pin out:



D I/O connector Male Contact Face View

Pin	Cable Color	Pin Name	Function
1	Grey	GPIO1 -1	GPIO IN
2	Purple	GPIO1 - 2	GPIO IN
3	Light Green	GPIO2 - 1	GPIO IN
4	Blue	GPIO2 - 2	GPIO IN
5	Pink	GPIO3 - 1	GPIO Out
6	White	GPIO3 - 2	GPIO Out
7	Green	GPIO4 - 1	GPIO Out
8	Brown	GPIO4 - 2	GPIO Out
9	Red	RS232 - 1	+5V
10	Yellow	RS232 - 2	RS232 pin 3
11	Orange	RS232 - 3	RS 232 pin 2
12	Black	R S 2 3 2 - 4	GND

6.1 Digital Inputs

There are 4 isolated digital inputs channels can be used as general purpose inputs or to trigger the reader for tag reading. By default, the digital inputs are in open state. To activate the input connect the reader's digital input to a relay. When they relay is closed, the connected digital input will be closed. No voltage higher than +5 Vdc or lower than 0 Vdc should ever be connected to the input channels with maximum current at 500mA.

6.2 Digital Outputs

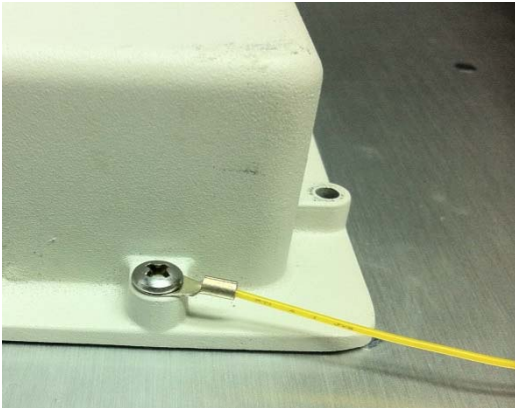
There 4 isolated digital outputs channels can be used as general purpose outputs, to indicate tag reading activity, or to indicate the reader is transmitting (RF On). Digital outputs can be pulled high and close the internal relay. Any external circuits that connected to the digital output shall not be higher than 120VAC with maximum current at 0.5A or 24VDC with maximum 1A.

6.3 *Digital I/O Hardware Connection Example*

7 Reader Maintenance

7.1 External grounding point

The Procyon UHF integrated reader has an external grounding point on the enclosure. For installations that require external grounding, user can connect grounding wire to the enclosure as shown below:



7.2 Electrostatic Discharge

Use proper Electrostatic Discharge (ESD) precautions to avoid static discharge when handling or making connections to the Procyon's communication ports. Equipment failure can result if the communication ports are subjected to ESD.

7.3 Un-mounting the reader

When un-mounting the reader, user should first disconnect the PoE Ethernet connector; follow the instructions as shown below:

Step 1



Unlock the 2nd stage cable shield from the 1st stage cable shield by turning it anti-clockwise

Step 2



Unlock the 1st stage cable shield from reader's connector by turning it anti-clockwise along the thread



7.4 Storage of the reader

The storage temperature ranges of the reader are -40°C to 85°C. The reader is tested to work under IP67 requirement; user should ensure the connectors' caps are being applied and tighten when storing the reader away.



7.5 Antenna Radome Maintenance

The Procyon UHF RFID reader is a low maintenance device.

However, the user must ensure that any reader antenna radomes are kept clean. Any build-up of foreign substances, water, or snow may degrade the performance of the unit

8 Specifications

8.1 RF Specifications

Frequency Range	FCC: 902 - 928 MHz India: 865-867 MHz
RF Output Power	10 - 30 dBm

8.2 Physical Specifications

Operating Temperature	-20°C to 70°C
Storage Temperature	-40°C to 85°C
Dimension	(8 dBi) 220 x 220 x 120 mm (12 dBi) 450 x 450 x 140 mm
Weight	(8 dBi antenna option) 1.7 kg (12 dBi antenna option) 2.3 kg
IP Rating	67

8.3 Power Specifications

Power Supply	5V, max 1.5A through PoE IEEE 802.3af
--------------	---------------------------------------

8.4 Ethernet Specifications

Ethernet	10/100 BaseT
Supported cable	Category 5e

8.5 Digital I/O Specifications

Input	5 Vdc, 500 mA
Output	Maximum 400V, 1A

8.6 RS-232 Specifications

Baud rate	9600
Parity	None
Data bits	8
Stop bits	1

8.7 Antenna Specifications

8 dBi	Antenna Option	12 dBi
RHCP	Polarization	Linear or RHCP
865 - 868 MHz 902 - 928 MHz	Frequency options	865 - 868 MHz 902 - 928 MHz
90°	H Beam Width	40°
90°	V Beam Width	40°
216 x 216 x 25 mm	Dimension	450 x 450 x 42.5 mm
1.2 kg	Weight	1.8 kg
UV Protected ABS	Material	UV Protected ABS
216 km/h	Rated Wind Velocity	216 km/h
Ø40~Ø60 mm	Mounting Ø	Ø40~Ø60 mm

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GPL software used in this product includes:

- Linux Kernel 3.13+
- Debian v.7.4

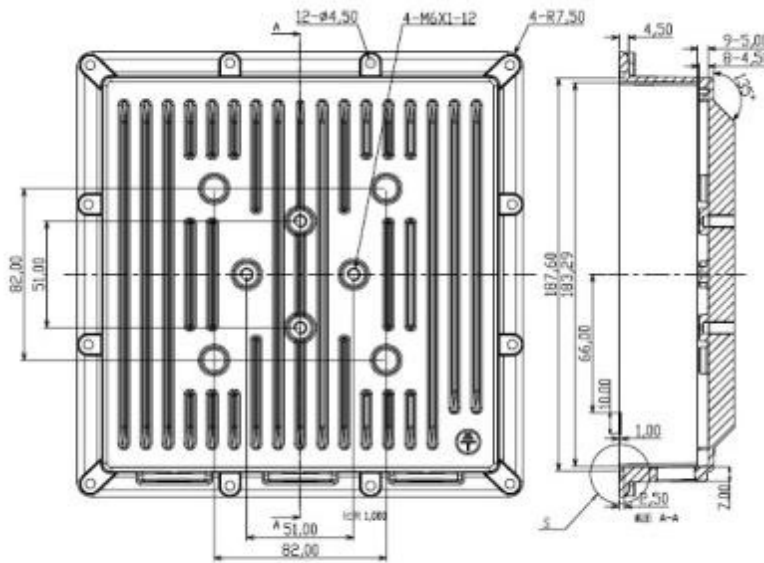
Appendix A

● Mechanical Dimension

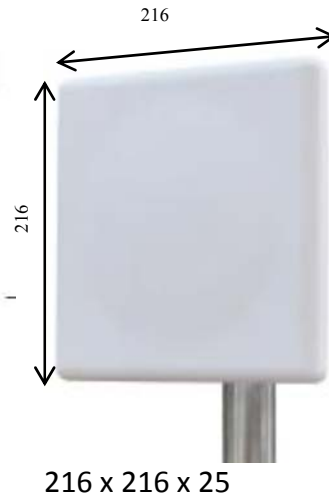
**All figures are measured in mm

8dBi Antenna

Enclosure dimension

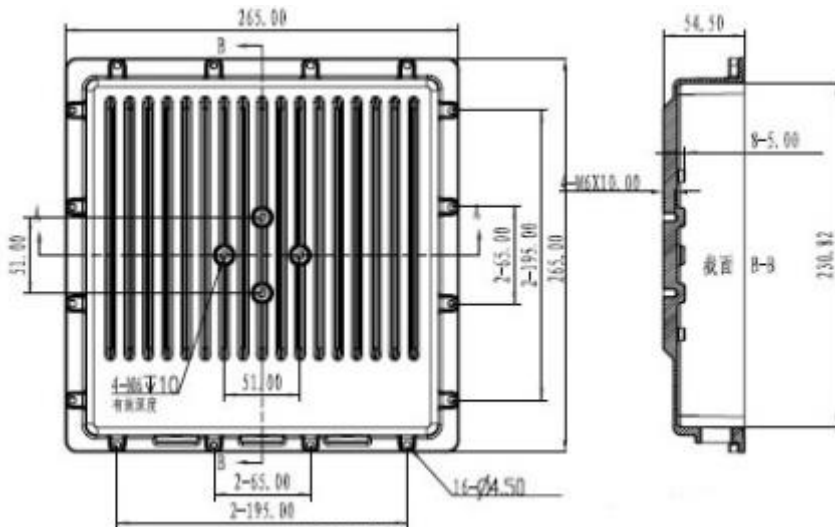


Antenna dimension



12 dBi Antenna

Enclosure dimension



Antenna dimension

