

EDGE-55

User Guide

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What's new

Date	Description	Revision
April 2025	Initial release.	A.0

A complete list of revisions is available in Revision history.

Related documents

StormProtocol_v2.1.0.pdf

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1 Section – Introduction

1.1 Introduction

The EDGE-55 is a compact four-port long range RAIN RFID fixed reader, powered with HID – TSL RFID module integrating the Impinj E710 RFID chipset, can be compatible with various types of antennas, it offers PoE (Power over Ethernet), high-performance tag reading, easy installation, easy configuration, and robustness/reliability.

It comes with a range of features and functionalities that are ideal for various applications such RAIN RFID portal for logistics, RAIN RFID tunnels, laundry, cabinets, vending machines, production line and others:

- RAIN radio standard (GS1 UHF Gen2 and ISO/IEC 180000-63) compliant.
- HID-TSL module as RFID engine, powered by Impinj E710 chipset with the latest anti-collision recognition algorithms, high Rx sensitivity, fast read rate, multiple RF modes including High-Speed Tag Acquisition Mode, High Sensitivity Mode and Dense Reader Mode (DRM)
- PoE (Power over Ethernet) or external power supply or both for redundancy.
- Ethernet TCP/IP communication for seamless connectivity.
- Easily configurable through internal web interface (HTML pages and REST API via HTTP requests).
- Four RP-TNC Jack Male pin 50 Ohms connectors.
- Up to 31.5 dBm output power (30 dBm plus 1.5 dBm of power offset).
- Easy to use, has automatic tag reading (Inventory mode), fully configurable.
- Protected GPIO, one digital input, one digital output, one I2C (RFU).
- Optimum heat dissipation through the aluminum enclosure.
- Multiregional support.

1.2 Main features

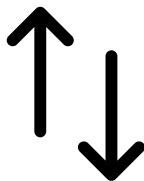
1.3 Operating modes

Inventory Mode



No API/SDK needed.

Automatic read tags
Results sent through a
TCP Socket connection.

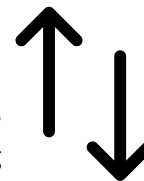


Transparent Mode



Storm Protocol.

Reader is idle and
controlled by the
Software using
the Storm Protocol.



1.3.1 Inventory Mode

- Automatic read tags (Inventory round) in a continuous user-controlled loop.
- Client - Server model is configurable, the reader can behave as Client or as a Server.
- Diagnostic services:
 - Debug port to receive internal reader messages in real time execution.
 - Syslog service.
- Fully configurable Inventory parameters:
 - Inventory duration.
 - Inventory trigger:
 - It can be via Socket Connection or via REST method or via Digital Input or Always on.
 - Antenna port selection:
 - Separated output power configuration per antenna port.
 - Antenna port search algorithms (port switching), Dynamic or Equal time.
 - Output power offset to all antenna ports to compensate RF cable loss.
 - RAIN RFID Gen2 parameters:
 - Select, Q value, Session, Target, Dual target, TagFocus, FastID, Filter by RSSI and RF modes.
 - Up to 3 fully configurable tag Select filters.
 - Up to 4 fully configurable tag read memory bank operations.
 - Can decode tags with GS1 SGTIN-96 and SGTIN-198 standards.
 - Pure Identity EPC URI, EPC URI and GS1 element string formats.
 - Can decode temperature sensor tags Magnus-S3 M3D.
- Flexible result output data format:
 - The output data consists of three strings (Data, Error and Heartbeat string) both can be configured with keywords that will contain real-time tag read data value or internal reader status values.
 - Data string:
 - Contains the tag read data values, such as EPC id, RSSI, memory bank read result, etc.
 - Its format can be configured as the user needs, such as JSON or CSV or any other custom format.
 - Error string:
 - Contains internal reader errors and warnings messages that can happen during Inventory tags execution.
 - Its format can be configured as the user needs, such as JSON or CSV or any other custom format.
 - Heartbeat string:
 - Used to check Ethernet connectivity, the reader keeps sending this string periodically.
- GPIO configuration:
 - Digital input debounce value and invert logic.
 - Digital output triggers via REST method or Tag Reading or Digital Input or Data Socket Connection.

1.3.2 Transparent Mode

- The reader remains on standby, and the user can have full control of it.
- The STORM RFID protocol must be used, a sophisticated, parameterized set of commands that carry out multiple actions locally within the RFID reader.
- A demo Software (Storm Protocol Explorer) is available for free. It can be used to test all the Storm protocol commands.

1.4 Products covered by this document

Model	Code
EDGE-55 TCP/IP-POE	Please consult

1.5 Approval notes

1.5.1 Anatel (Brazil)

EDGE-55 was tested and approved under the Regulation for Certification and Homologation of telecommunications Products, approved by Anatel Resolution No. 242 of November 30, 2000.

Types: Radio Frequency Identification Systems - Category II.

Service/Application: Restricted Radiation Radiocommunication.

1.5.2 FCC (US)

Federal Communication Commission Interference Statement (FCC)

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.

NOTE: This equipment has been tested and found to comply 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 radiofrequency 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.

FCC Caution:	Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
--------------	---

MPE Warning:	Radiation Exposure Statement - This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.
--------------	---

Power

When paired with an antenna, the reader may radiate no more than 36dBm EIRP per FCC Part 15.247 regulations. The reader output power can be increased to provide the maximum allowable EIRP subject to a maximum conducted power allowance of 30 dBm at the antenna connector. The maximum allowable output power of the reader can be set to satisfy both the conductor and radiated maximum criteria. The expression for the maximum reader power setting is:

Maximum power setting (in dBm) = the Smaller of: (36 - Composite Antenna Gain (in dBm)), or (30 + Cable Loss (in dBm))

Where the composite antenna gain comprises, the maximum linear antenna gain in dBi minus any cable loss between the reader and antenna in dB. Approved antenna vendors, model numbers, and associated gain are listed in the next section.

NOTE: The composite antenna gain comprises the maximum linear antenna gain in dBi minus any cable loss between the reader and antenna in dB.

The reader may be operated on with any antenna which has been certified for FCC compliance in conjunction with the reader. Alternatively, an antenna may be used in lieu of a certified antenna if it is of the same type with equal or lower gain. The reader may not be operated on with any antenna that is neither certified nor of the same type/gain as that of a certified antenna. Certified antennas, including vendor, model number, and associated gain are listed below.

1.5.3 Authorized antenna

Vendor	MTI Wireless Edge
Model	MT-262006/TRH/A/K
Frequency Range (MHz)	902-928 MHz
Circular Gain	10 dBiC
Connector Type	RP-TNC
Polarization	Circular (RHCP)
Type	Patch

Vendor	MTI Wireless Edge
Model	MT-263006/N
Frequency Range (MHz)	902-928 MHz
Linear Gain	12,5 dBi
Connector Type	N-type Female
Polarization	Linear
Type	Patch

Vendor	MTI Wireless Edge
Model	MT009S08LH
Frequency Range (MHz)	902-928 MHz
Circular Gain	8.5 dBiC
Connector Type	SMA female
Polarization	Circular (RHCP)
Type	Patch

Vendor	Keonn
Model	P22
Frequency Range (MHz)	902-928 MHz
Gain	7.7 dBiC
Connector Type	SMA female
Polarization	Circular (RHCP)
Type	Patch

Vendor	Keonn
Model	P16
Frequency Range (MHz)	902-928 MHz
Gain	9.4 dBiC
Connector Type	SMA female
Polarization	Circular (RHCP)
Type	Patch

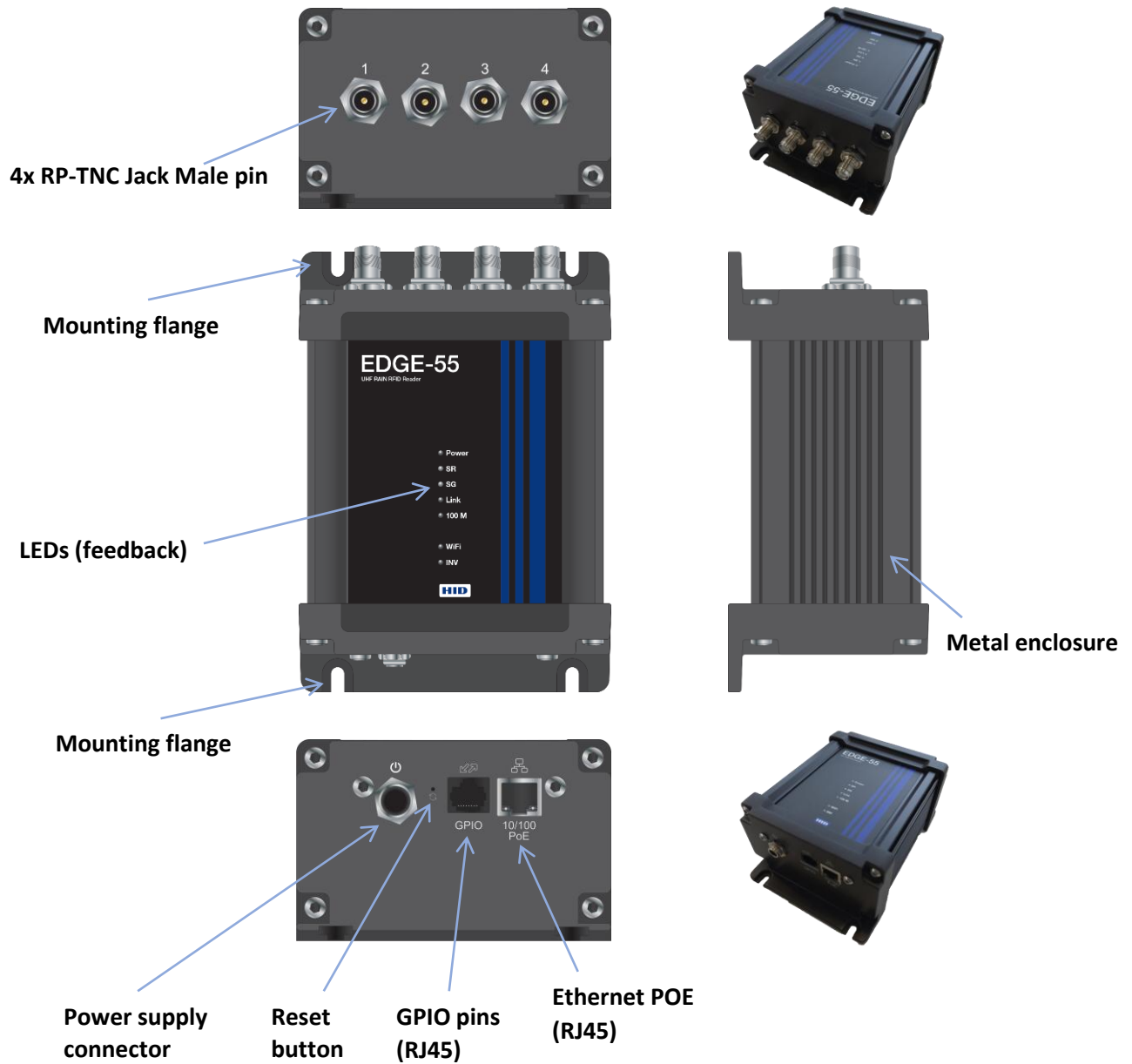
Vendor	Keonn
Model	P11
Frequency Range (MHz)	902-928 MHz
Gain	3.4 dBiC
Connector Type	SMA female
Polarization	Circular (RHCP)
Type	Patch

Vendor	RFIDKNOW
Model	FlexAntenna Industrial Portal
Frequency Range (MHz)	902-928 MHz
Gain	8 dBi
Connector Type	RP-TNC
Polarization	Multi-Linear
Type	Portal

Vendor	RFIDKNOW
Model	FlexAntenna Slim Portal
Frequency Range (MHz)	902-928 MHz
Gain	8 dBi
Connector Type	RP-TNC
Polarization	Multi-Linear
Type	Portal

2 Section – Overview and Installation

2.1.1 Hardware - EDGE-55 Overview

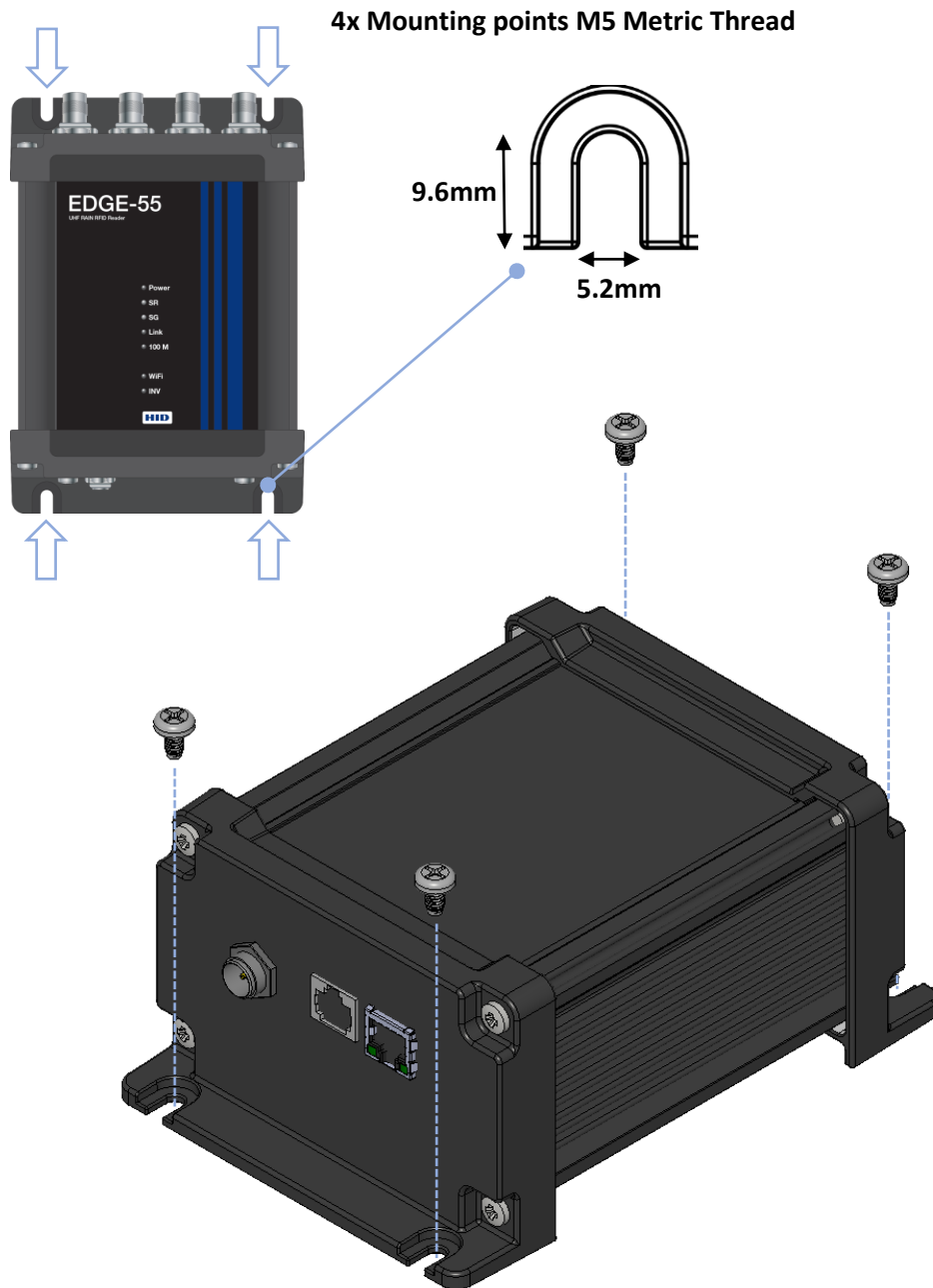


2.1.2 Specification

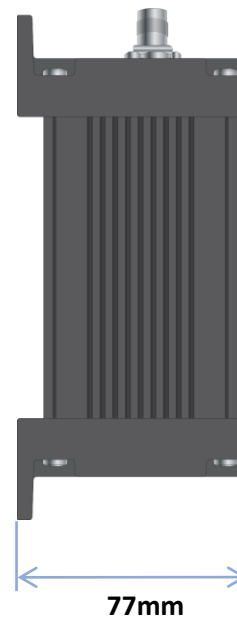
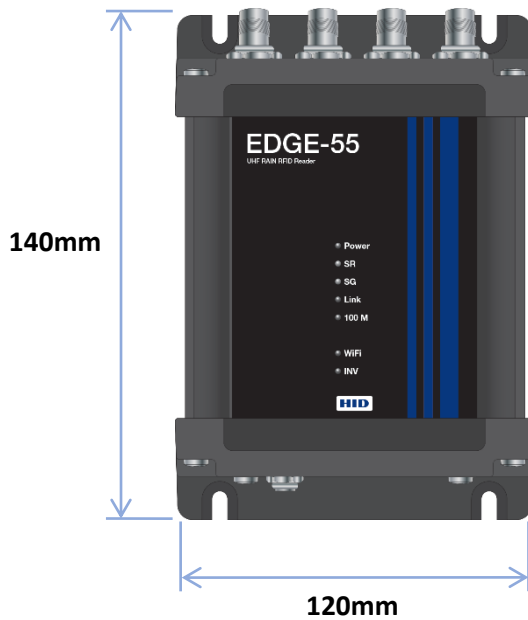
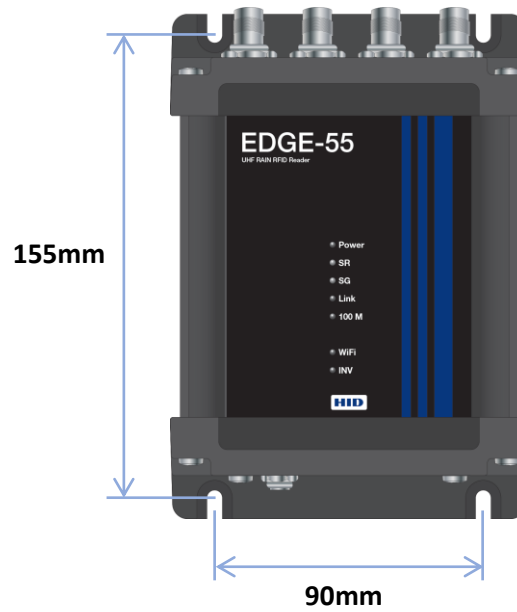
Transponder Protocol	
Protocol	RAIN RFID (EPC Class 1 Gen 2, ISO 18000-63)
Interface RF	
RF Output power	From 5 to 30 dBm (+1.5dBm of power offset)
Regulation	ANATEL (BR) 902 – 907MHz and 915 – 928MHz FCC (USA) 902 – 928MHz
Mode	Frequency Hopping
Modulation/RF Coding	PR-ASK, DSB-ASK / M4, M8, M1, M4
Backscatter Link Frequency (BLF)	160KHz, 250KHz, 320KHz, 640KHz
RFID performance	
Measured Rx Sensitivity	-76.8 dBm (high power and with return loss)
Read rate	≥ 1200 tags/s
Data/Control Interface	
	RJ45 Ethernet PoE connector: • Ethernet 10/100Mbps (1.5KV RMS insulation) • PoE (IEEE 802.3af standard) • PoE modes supported: ○ Mode A (mixed DC & data) ○ Mode B (DC on spares)
	RJ45 GPIO connector: • 1x OVP Digital Input: ○ Supports Dry Contact, with configurable Debounce time. ○ Can be used to trigger Inventory or digital output. • 1x OVP Digital Output: ○ Triggered by tag reading or REST method or digital input. ○ High Level (3.3 VDC), Low Level (0 VDC) • 1x I2C interface (RFU)
Programming	Using Inventory mode does not require API/SDK, with a simple socket connection, the tag reading results can be processed by receiving the Data string. Using Transparent mode , the STORM RFID protocol is used (a sophisticated, parameterized set of commands that carry out multiple actions locally within the RFID reader).

Energy	
	PoE (Power over Ethernet): IEEE 802.3af Powered Device (PD) PD Power Class: Class 3, 12.95W Operating PoE Voltage: 37Vdc to 57Vdc PoE Injector or Switch with PoE port can be used.
	External Power Supply: +24Vdc +/- 1% Max ripple: 200 mVpp @ 20 MHz Connector features Cable Clamp, Thread Lock. Mating cable connector: Switchcraft 761KS12 Connector center pin is +Vdc.
Consumption	Max. 10W, with RF transmit power +31.5 dBm and high duty cycle. Min. 2.6W, with RF transmit idle.
Physical characteristics	
IP rating	Internal use only.
Dimensions	120x140x77mm (WxLxH)
Weight	0.975Kg (2.15lbs)
Operation temperature	0°C to 65°C (14°F to 149°F)
Storage temperature	0°C to 70°C (14°F to 158°F)
Humidity	95%
Mounting type	Metal flanges 90x155mm (WxH), 4x M5 metric thread

2.2 Mechanical installation

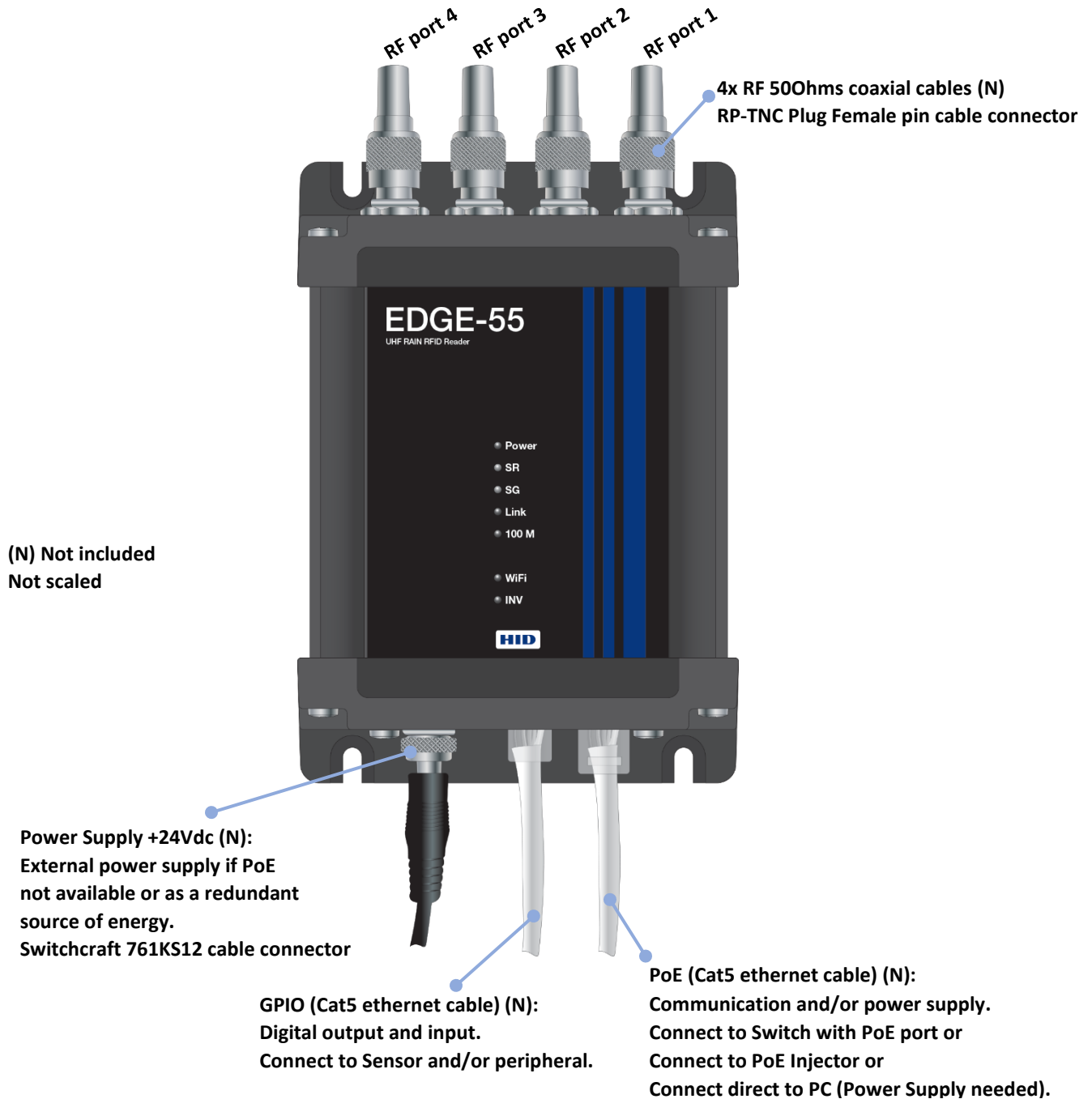


2.3 Dimensions



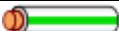
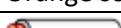
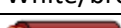
2.4 Electrical installation

2.4.1 Connections diagram



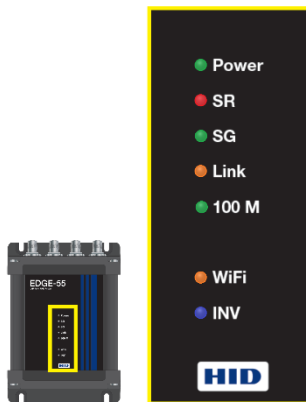
2.4.2 Ports pinout

Ethernet PoE port	Pins	T568A color	T568B color	10/100 mode B, DC on spares		10/100 mode A, mixed DC & data	
	Pin 1	 White/green stripe	 White/orange stripe	RX+		RX+	DC+
	Pin 2	 Green solid	 Orange solid	RX-		RX-	DC+
	Pin 3	 White/orange stripe	 White/green stripe	TX+		TX+	DC-
	Pin 4	 Blue solid	 Blue solid		DC+	Unused	
	Pin 5	 White/blue stripe	 White/blue stripe		DC+	Unused	
	Pin 6	 Orange solid	 Green solid	TX-		TX-	DC-
	Pin 7	 White/brown stripe	 White/brown stripe		DC-	Unused	
	Pin 8	 Brown solid	 Brown solid		DC-	Unused	
All pins are electrically isolated. Users can choose between T568A and T568B standards.							

GPIO port	Pins	T568A color	T568B color	Input	Output	I2C
	Pin 1	 White/green stripe	 White/orange stripe			SCL
	Pin 2	 Green solid	 Orange solid			SDA
	Pin 3	 White/orange stripe	 White/green stripe	Input 1		
	Pin 4	 Blue solid	 Blue solid	+5Vdc (max. 100mA)		
	Pin 5	 White/blue stripe	 White/blue stripe			
	Pin 6	 Orange solid	 Green solid		Output 1	
	Pin 7	 White/brown stripe	 White/brown stripe	Gnd		
	Pin 8	 Brown solid	 Brown solid			
All pins are electrically OVP. Users can choose between T568A and T568B standards. Input1 and Outpu1 are available only when using Inventory mode.						

2.4.3 Visual feedback

The reader has an operating status LEDs located as follows:



Power: Indicates that internal circuitry has energy.

SR: Signal Red indicates warnings or errors.

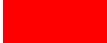
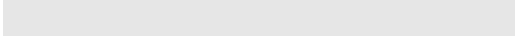
SG: Signal Green shows the reader operations status.

Link: Ethernet link.

100M: Ethernet speed.

WiFi: WiFi connectivity indicator (*optional hardware*).

INV: Inventory running indicator (*only for Inventory mode*).

	SR  SG  It indicates that there is no antenna port selected.
	SR  Led always on indicates some internal error during Inventory execution.
	SG      Led blinking fast indicates the reader is in Inventory mode.
	SG         Led blinking very fast indicates the reader is in Inventory mode and reading tag(s).
	SG   Led blinking slowly indicates the reader is in Transparent mode.
	SG  Led solid indicates that the reader is in Transparent mode and the Data socket connection is established.
	INV  Led off indicates that the Inventory is not running (<i>only in Inventory mode</i>).
	INV  Led solid indicates that Inventory is running (<i>only in Inventory mode</i>).

3 Section – Operation

Connecting to the reader

3.1.1 Reader IP address

By default, the IP address is automatically generated using the Link Local Address standard IPV4LL 169.254.0.0/16.

The following logic is used to generate the default IP address:

IP = 169.254.**xx.xx** where **xx.xx** are the last two decimal digits of the MAC address, e.g. MAC = 0.36.119.82.**5.38** the IP address will be 169.254.**5.38**.

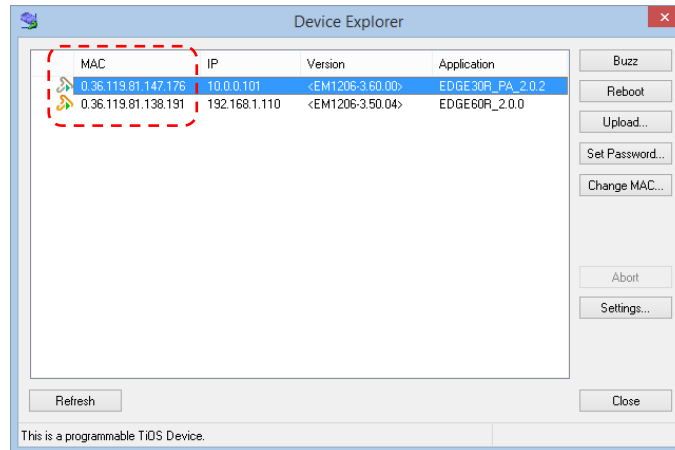
3.1.2 Where is the MAC address?

1. External label on the flange of the reader.



2. Software tool Device Explorer (Windows)

[Download Device Explorer...](#)



Note: UDP port 65535 must be enabled in the OS Firewall rules.
After setting a static IP by the user, the reader no longer generates IPV4LL, only if a factory reset is performed.

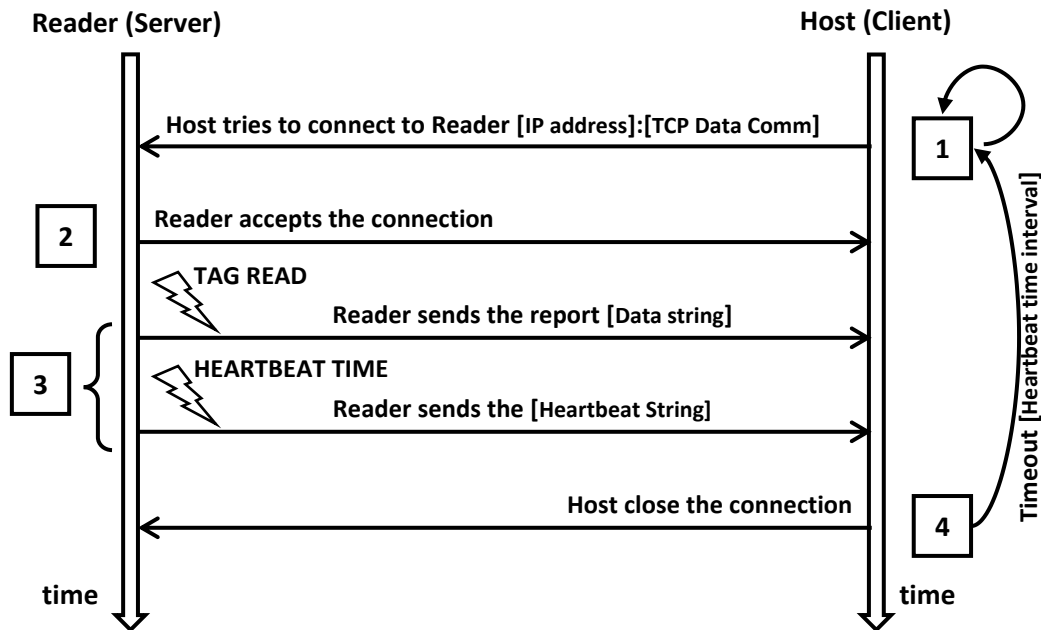
3.2 Ethernet Server-Client model

When using Inventory mode, the user can choose how the reader will behave, as a Server or as a Client [Network model], this choice must depend on how the external Software/Controller/System will interact with the reader. Both Network models are explained in the next sections.

3.2.1 Reader as Server

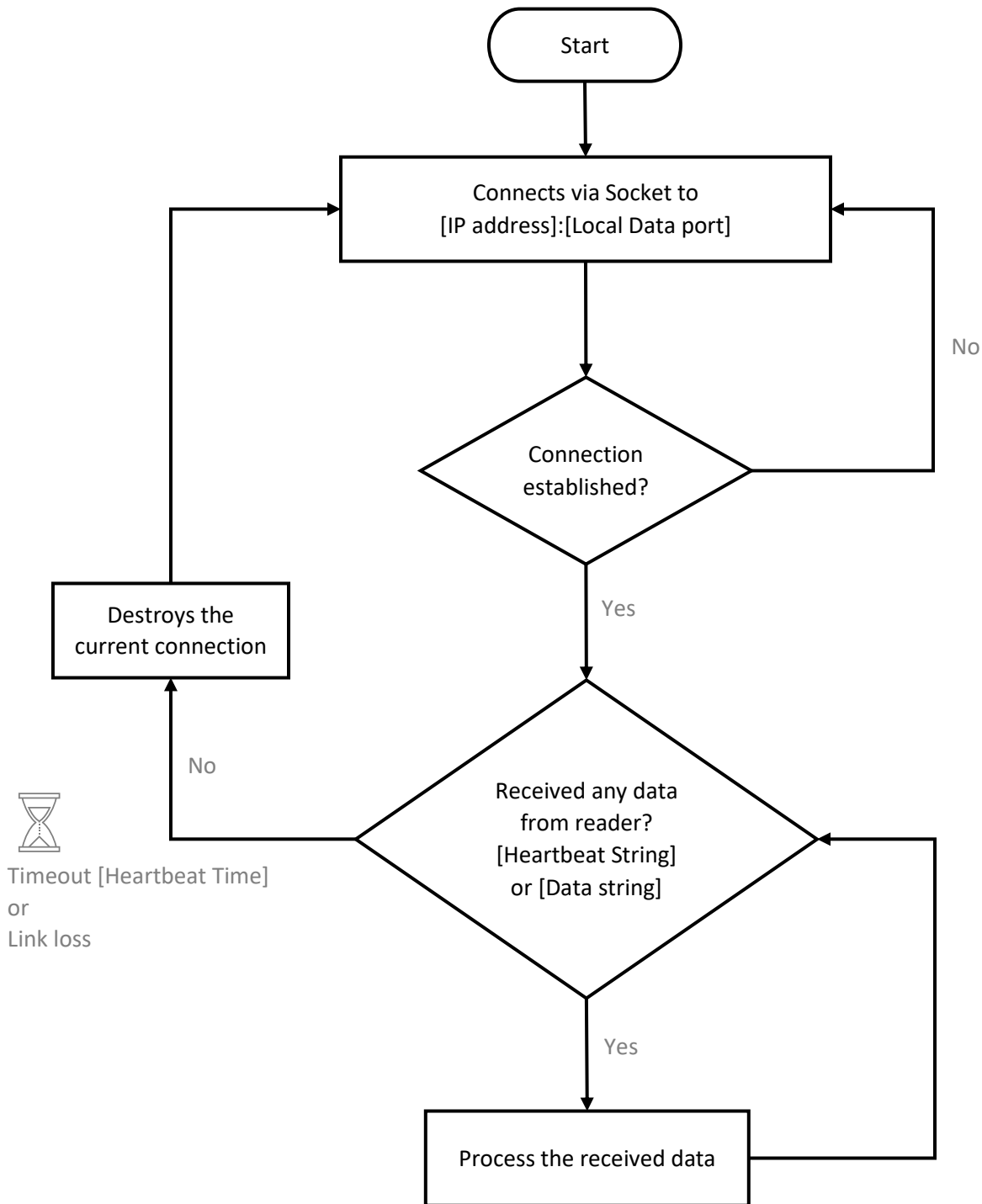
This model is the default configuration of the Network model, in this case, the reader will have the following behavior:

- Listen to and accept one external connection on [IP address]:[Local Data port], to send the tag readings results formatted through the [Data String].
- Listen to and accept one external connection on [IP address]:[Local Config port], to receive and execute the REST API.
- The reader has no responsibility for the reconnection scheme, the Client side is responsible for it.
- The reader will never execute an active disconnection or reset in the current established Ethernet connection.



Note: Connection management is responsibility of the Client side, in this case, the external Software or Controller or any System that has being interacting with the reader.

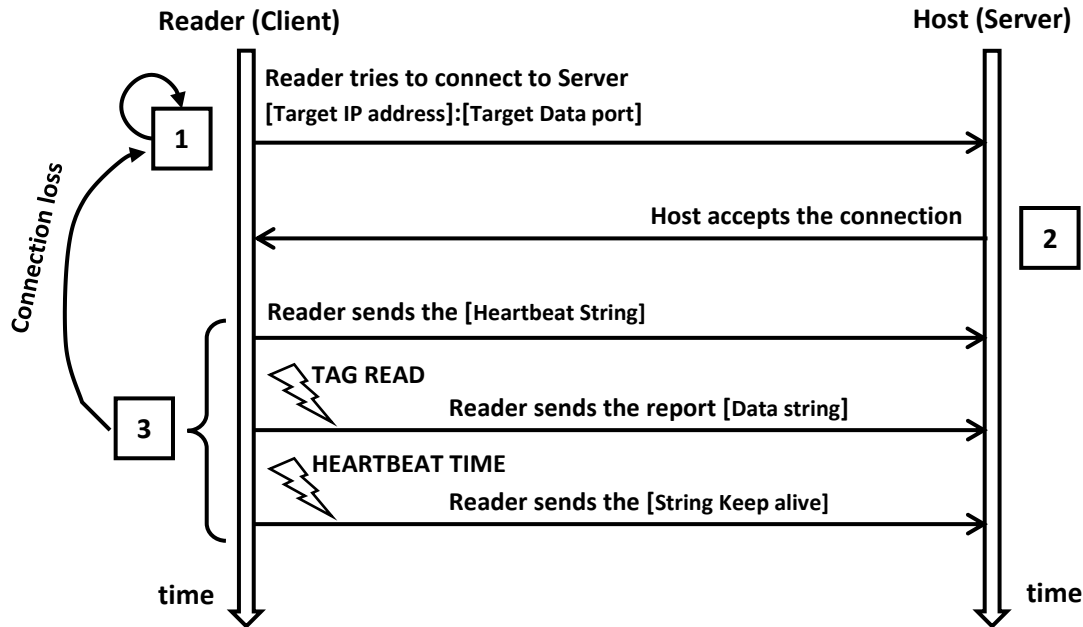
3.2.1.1 Host (Client) logic for receiving data from the reader



3.2.2 Reader as Client

In this Network model, the reader will run as Client and will have the following behavior:

- After initialization, the reader keeps trying to connect to [Target IP address]:[Target Data port].
- The reader handles the reconnection to the server, in case of connection loss.
- The heartbeat logic is the same as in the Server model.
- The reader will never execute an active disconnection or reset in the established current connection.



Note: Connection management is the responsibility of the Reader, in this case. The Server should be always listening to and accepting connections on [Target IP address]:[Target Data port].

4 Section – Configuration

4.1 Configuring the reader

The reader settings can be modified through the internal web server in two ways:

- Using HTML pages, any web browser can be used to access the pages.
- Using REST API, via HTTP requests with GET and PUT methods, this requires Digest Authentication, popular data transferring tool “curl” can be used to send data to the reader or a simple Python code programming (code examples available).

4.2 Configuring using Web Browser

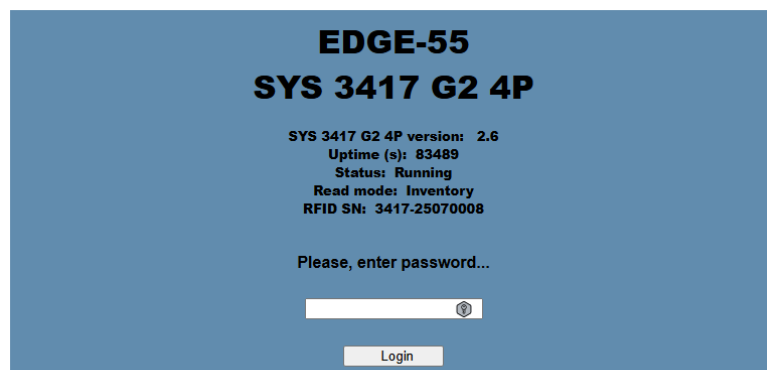
The reader settings can be modified through the readers Configuration Page, including:

- View all reader information/status.
- Change network parameters.
- Configure reading parameters.
- Change date and time settings.
- Configure communication interface settings.

Note: Make sure your computer is on the same LAN or WLAN as the reader.

1. Launch a web browser, enter the IP address of the reader in the address bar, and press **Enter**. The **Login** page is displayed.
2. The factory default **login** password is **acura@rfid**.
Enter the **password** and click **Login**. The **Status** page will be displayed.

Note: The user may choose their own login password in the Security settings section.

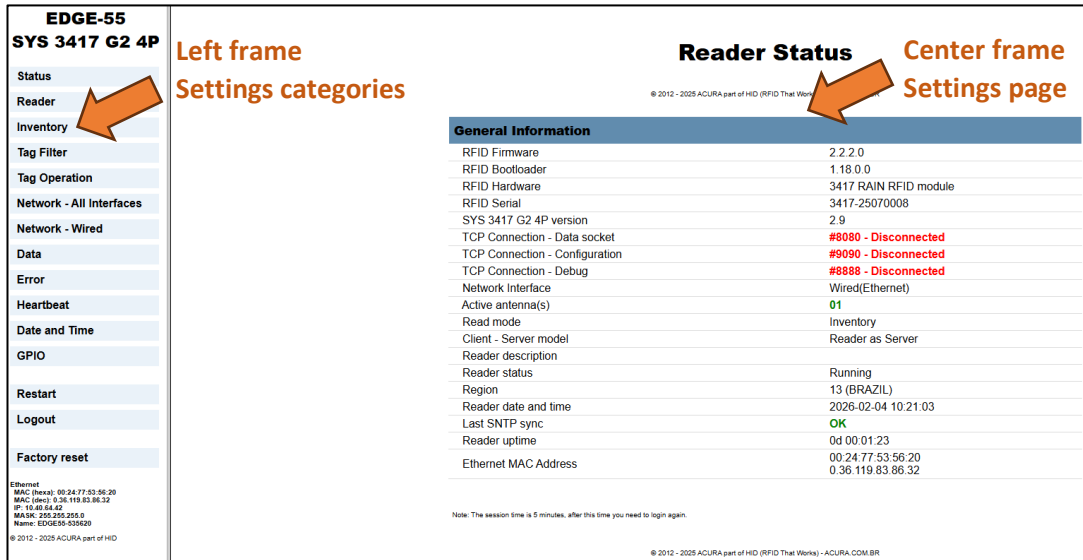


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Important: To ensure any applied changes are saved, it is important to:

1. Make the required changes.
2. Click Apply.
3. If the Restart message appears, click Restart.

After login, the configuration pages will be loaded organized in categories.



EDGE-55
SYS 3417 G2 4P

Left frame
Settings categories

- Status
- Reader
- Inventory
- Tag Filter
- Tag Operation
- Network - All Interfaces
- Network - Wired
- Data
- Error
- Heartbeat
- Date and Time
- GPIO
- Restart
- Logout
- Factory reset

Reader Status

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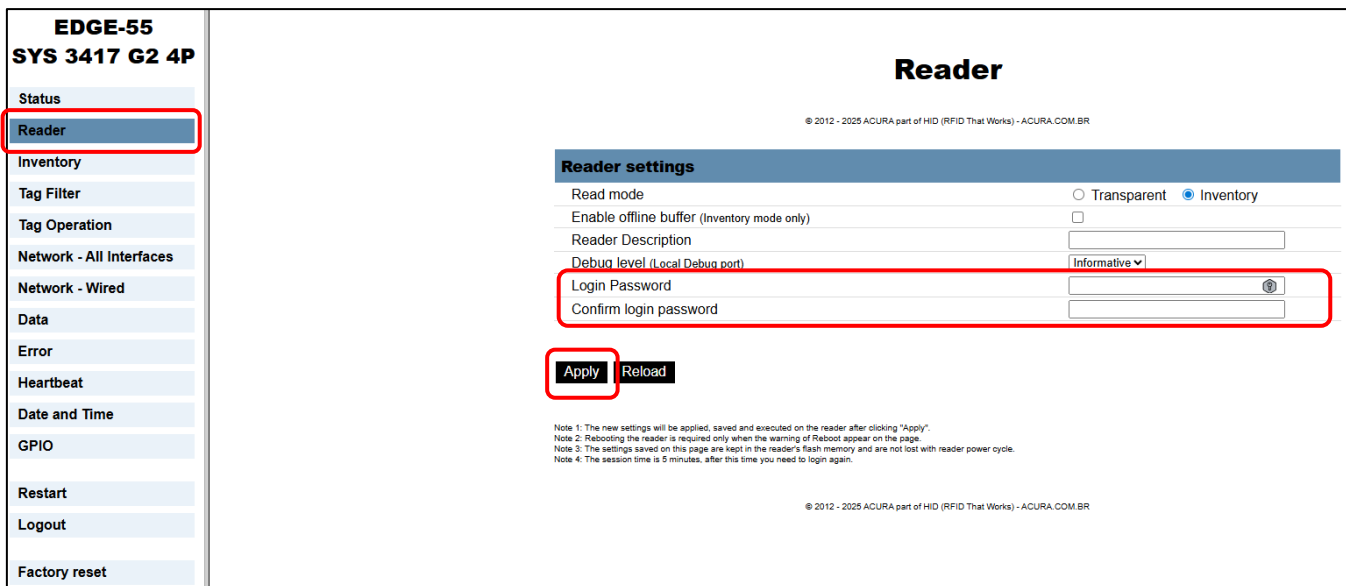
General Information	
RFID Firmware	2.2.2.0
RFID Bootloader	1.18.0.0
RFID Hardware	3417 RAIN RFID module
RFID Serial	3417-25070008
SYS 3417 G2 4P version	2.9
TCP Connection - Data socket	#8080 - Disconnected
TCP Connection - Configuration	#9090 - Disconnected
TCP Connection - Debug	#8888 - Disconnected
Network Interface	Wired(Ethernet)
Active antenna(s)	01
Read mode	Inventory
Client - Server model	Reader as Server
Reader description	
Reader status	Running
Region	13 (BRAZIL)
Reader date and time	2026-02-04 10:21:03
Last SNTP sync	OK
Reader uptime	0d 00:01:23
Ethernet MAC Address	00:24:77:53:56:20 0:36:119:83:86:32

Note: The session time is 5 minutes, after this time you need to login again.

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4.3 Setting a user password

1. Launch a web browser, enter the IP address of the reader in the address bar, and press Enter. The Login page is displayed.
2. The factory default **login** password is **acura@rfid**.
3. Enter the **password** and click Login. The **Status** page will be displayed.
4. In the left menu click on **Reader**.
5. Enter the new password in **Login Password**.
6. Reenter the new password in **Confirm login password**.
7. Click Apply.



EDGE-55
SYS 3417 G2 4P

Reader

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Reader settings

Read mode ☐ Transparent ☒ Inventory

Enable offline buffer (Inventory mode only) ☐

Reader Description

Debug level (Local Debug port)

Login Password

Confirm login password

Apply **Reload**

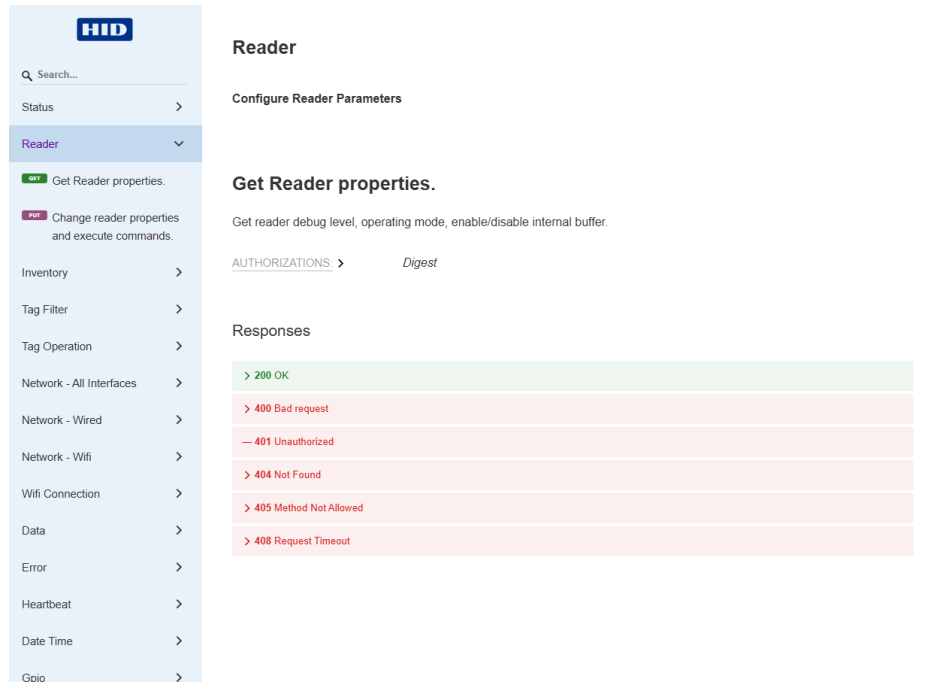
Note 1: The new settings will be applied, saved and executed on the reader after clicking "Apply".
 Note 2: Rebooting the reader is required only when the warning of Reboot appear on the page.
 Note 3: The settings saved on this page are kept in the reader's flash memory and are not lost with reader power cycle.
 Note 4: The session time is 5 minutes, after this time you need to login again.

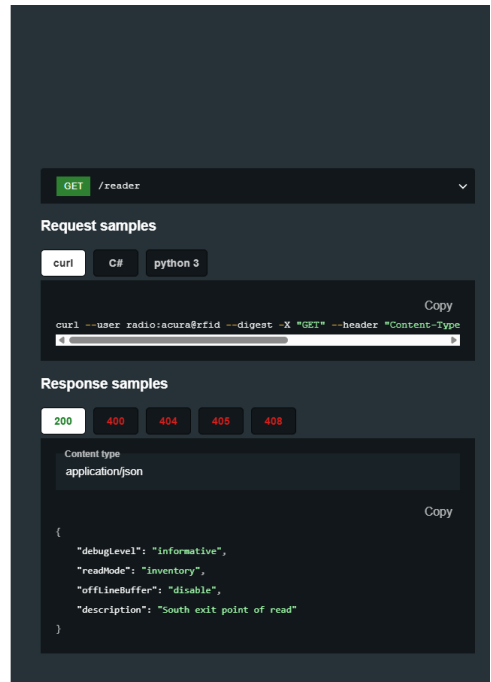
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4.4 Configuring using REST API through HTTP requests

The following link has detailed information about the methods and examples of how to use the REST api.

https://drive.google.com/drive/folders/1JOTRTQCP6atidnHYKbLbDkfsMCIBM2_J?usp=drive_link





5 Section - Inventory mode

5.1 Output data format

The output data consists of three strings (Data, Error and Heartbeat string) both can be configured with keywords that will contain real-time tag read data value or internal reader status values.

5.1.1 Data String

While using the Inventory mode, the output format of the tag reading results (Data String) can be customized by using keywords that will be replaced by real-time data.

Keywords are:

“.EPC”, “.TID”, “.SGTINURI”, “.SGTINTAGURI”, “.GS1ELSTR”, “.TAGOP1”, “.TAGOP2”, “.TAGOP3”, “.TAGOP4”, “.TAGTEMPC”, “.TAGTEMPF”, “.RSSI”, “.PORT”, “.CHANNEL”, “.PHASE”, “.TMSTP”, “.UTM”, “.CR”, “.LF”.

The Data String containing the keywords is sent through the Local Data port or Target Data port, depending on the Client - Server model configured, at each tag read event.

Keywords description:

.EPC will be replaced by the EPC id value of the tag in hexadecimal format.

.TID will be replaced by the TID value of the tag in hexadecimal format, result of the Fast ID special command.

.SGTINURI will be replaced by the decoded EPC value according to the GS1 SGTIN standard (Pure Identity EPC URI).

.SGTINTAGURI will be replaced by the decoded EPC value according to the GS1 SGTIN standard (EPC URI).

.GS1ELSTR will be replaced by the decoded EPC value according to the GS1 SGTIN standard (GS1 element string).

.TAGOP1 will be replaced by the value of Tag Read Operation 1, in hexadecimal format.

.TAGOP2 will be replaced by the value of Tag Read Operation 2, in hexadecimal format.

.TAGOP3 will be replaced by the value of Tag Read Operation 3, in hexadecimal format.

.TAGOP4 will be replaced by the value of Tag Read Operation 4, in hexadecimal format.

.TAGTEMPC will be replaced by the Tag temperature value in Celsius (Magnus-S3 M3D), reader setup needed.

.TAGTEMPF will be replaced by the Tag temperature value in Fahrenheit (Magnus-S3 M3D), reader setup needed.

.RSSI will be replaced by the tag signal strength value in dBm.

.PORT will be replaced by the antenna number that the tag was read.

.CHANNEL will be replaced by the tag read frequency in KHz.

.PHASE will be replaced by the phase of the field scattered by the tag in hexadecimal format.

.TMSTP will be replaced by the reader timestamp [yyyy/MM/dd hh:mm:ss].

.UTM will be replaced by the reader Unix timestamp in microseconds.

.CR will be replaced by Carriage Return (0x0D).

.LF will be replaced by Line Feed (0x0A).

Data String default value: **“0x.EPC.CR.LF”**

5.1.1.1 Data String examples

Plain text format

Configured Data String: "Timestamp: **.TMSTP** Id: **.EPC** Signal level: **.RSSI.CR.LF**"

Result:

Timestamp: **2025-06-04 10:51:56** Id: **E200420F6480601501972020** Signal level: **-6613**

Timestamp: **2025-06-04 10:51:56** Id: **E200631692AA33F1652EC0CF** Signal level: **-5711**

CSV format

Configured Data String: "Timestamp, **.TMSTP** Id, **.EPC** Signal level, **.RSSI.CR.LF**"

Result:

Timestamp, **2025-06-04 10:59:04**, Id, **E200631692AB56F1652EC55B**, Signal level, **-4319**

Timestamp, **2025-06-04 10:59:04**, Id, **E20042101C50601501972B9D**, Signal level, **-4968**

JSON format

Configured Data String: "{"Timestamp": "**.TMSTP**", "Id": "**.EPC**", "Signal level": "**.RSSI**"}.**CR.LF**"

Result:

{"Timestamp": "**2025-06-04 11:03:40**", "Id": "**E200631692ABBF31652EC6FC**", "Signal level": "**-4451**"}

{"Timestamp": "**2025-06-04 11:03:40**", "Id": "**E200631692ABCDF1652EC737**", "Signal level": "**-5175**"}

5.1.2 Error String

While using the Inventory mode, the format of the internal error messages can be customized by using keywords that will be replaced by real-time data.

Keywords are:

“.ERRCODE”, “.ERRMSG”, “.TMSTP”, “.CR”, “.LF”

The Error String containing the keywords is sent through the Local Data port or Target Data port, depending on the Client - Server model configured, at each internal error event.

Keywords description:

.ERRCODE will be replaced by the error code number.

.ERRMSG will be replaced by an error message.

.TMSTP will be replaced by the reader timestamp [yyyy/MM/dd hh:mm:ss].

.CR will be replaced by Carriage Return (0x0D).

.LF will be replaced by Line Feed (0x0A).

Error String default value: **“ERR:.ERRCODE:.ERRMSG.CR.LF”**

To disable the error message through the data port, just set an empty string to this parameter.

5.1.3 Heartbeat String

The Heartbeat String containing the keywords is sent through the Local Data port or Target Data port, depending on the Client - Server model configured, at each “Heartbeat Time” interval. This string can be used by the connected Host to check the reader connectivity throughout the time.

Keywords description:

.MAC will be replaced by the MAC address in hexadecimal.

.RD will be replaced by the configured Reader Description.

.ALIVE will be replaced by the reader uptime in seconds.

.CR will be replaced by Carriage Return (0x0D).

.LF will be replaced by Line Feed (0x0A).

Heartbeat String default value: **“.CR.LF”**

5.2 Inventory configuration

The reader has a very flexible Inventory configuration. It can be used in a variety of tag reading scenarios, such as Inventorying Stationary Tags, Tags moving through a portal, Multiple Reader Environments, etc.

Following are the Inventory parameters:

Duration

Inventory round duration in seconds with values **1** to **60**.

Default value: **4**.

Start trigger

How the Inventory round (tag reading) will start.

Always on: the Inventory round will always be activated, executed in an infinite loop (high RF duty cycle).

Starts with GPI1: the digital input 1 will control the start of the Inventory round. It can be used with a presence sensor or a manual switch to start tag reading.

Starts with TCP Data Socket connection: the Data Socket connection status will control the Inventory round start/stop, socket connection established will start the Inventory round and socket connection closed will stop the Inventory round.

Starts with command: the control of the Inventory round is via REST command on path /inventory.

Default value: **Always on**.

Antenna ports

Up to four antennas can be used to read tags, named **1, 2, 3, 4**. When no antennas are selected, the Inventory round is disabled.

Default value: **no antenna selected**.

Antenna ports search

Antenna ports switching algorithm when more than one antenna is selected.

Dynamic: the switching time to the next antenna will depend on the number of tags in the reading field, the dynamic algorithm will read each tag in the field four times before switching to the next antenna selected.

Equal Time: each antenna will radiate RF energy exactly (Inventory Duration / number of antennas) seconds e.g. Duration = 4s and 4 antennas were selected, each antenna will radiate 1s before switching to the next antenna.

Default value: **Dynamic**.

Read power Port 1 to 4

RF output read power, individual value for each antenna port in centidBm, 500 to 3000 (5 to 30dBm).

Default value: **2700**.

Power offset for all antenna ports

Extra power to compensate RF coaxial cable losses, fixed in +1.5dBm, disabled or enabled option.

Default value: **Enabled**.

Select

Select SL flag chooses which Tags respond to the Query.

Select ALL and **Select ALL2**: The Selected flag can be in any state.

Not Asserted: The selected flag must be de-asserted.

Asserted: The selected flag must be asserted.

Default value: **Select All**.

Q value

Sets the number of slots in the round.

0 to 15: fixed number of slots, user must know the tag population.

Dynamic: Automatically adjusted to the tag population being scanned.

Default value: **Dynamic**.

Session

Inventoried flag persistence.

S0: Energized (Indefinite), Not energized (None).

S1: Energized ($0.5s < t < 5s$), Not energized ($0.5s < t < 5s$).

S2 and **S3**: Energized (Indefinite), Not energized ($2s < t$).

Default value: **S1**.

Target

Selects whether Tags whose inventoried flag is A or B participate in the inventory round.

A: Tags with their session flag in state A will be inventoried.

B: Tags with their session flag in state B will be inventoried.

Default value: **A**.

Dual Target

Enabled: Reads 'A' tags moves them to 'B' then reads 'B' tags and moves them to 'A'. Repeats this until inventory stops.

Disabled: Reads 'A' tags moves them to 'B', tags stay in this state according to Session persistence. Repeats this until inventory stops.

Default value: **Enabled**.

TagFocus

Custom Impinj tag feature.

Enabled: Standard tag behavior applies.

Disabled: Provides the advantage of Sessions 2 or 3 tag will remain quiet once inventoried, while in the read field, along with the advantage of Session 1 in that it will revert almost immediately back to 'A' state upon leaving the read field.

Default value: **Disabled**.

Fast ID

Custom Impinj tag feature to get TID information.

Enabled: TID information will be retrieved from supported tags, other tag types will not be returned

Disabled: No TID information will be returned.

Default value: **Disabled**.

Note that the **Data String** must contain the keyword **.TID** to get the TID information result without setting a tag read memory operation.

Filter to strongest RSSI

Enabled: Only tags with strongest RSSI value will be returned every inventory cycle.

Disabled: All tags with any RSSI value will be returned.

Default value: **Disabled**.

RF Mode

Air communication settings, Data Encoding, Backscatter Link Frequency and Tari.

146 - M:4 Link:250KHz Tari:20us: used for dense reader (noise) environment.

185 - M:8 Link:160KHz Tari:20us: used for very low read rate but sensitivity reads.

103 - M:1 Link:640KHz Tari:6.25us: used for fast read rate.

104 - M:1 Link:320KHz Tari:6.25us: used for fast read rate.

120 - M:2 Link:640KHz Tari:6.25us: used for fast read rate.

Default value: **146 - M:4 Link:250KHz Tari:20us**.

5.3 Tag read operation

It is possible to setup up to four different tag read operation while using the reader in Inventory mode. Each one can have the following parameters:

Memory bank

The tag memory bank to read from, **Reserved**, **Epc**, **Tid**, **User**, **None**.

Default value: **None**.

Data length

Number of words in decimal to read from the specified Memory bank, 1 to 32 words.

Default value: **1**.

Data offset

The address of the first word in decimal to read from the specified Memory bank, 0 to 65535.

Default value: **0**.

Report only successful read operation

The reader will report only if the tag read operation was successful, disabled or enabled option.

Default value: **disabled**.

Using the four tag read operations, it is possible to read up to 2048 bits (2Kb) at once from the same memory bank, or read different tag memory bank contents.

5.3.1 Read operation examples

Read 2048 bits from tag USER memory bank and only report if all read data was successful:

Tag Read Operation 1

Memory bank: **USER**, Data length: **32**, Data offset: **0**, Report only successful read operation: **Enable**

Tag Read Operation 2

Memory bank: **USER**, Data length: **32**, Data offset: **32**, Report only successful read operation: **Enable**

Tag Read Operation 3

Memory bank: **USER**, Data length: **32**, Data offset: **64**, Report only successful read operation: **Enable**

Tag Read Operation 4

Memory bank: **USER**, Data length: **32**, Data offset: **96**, Report only successful read operation: **Enable**

Note that the **Data String** must contain the keywords **.TAGOP1**, **.TAGOP2**, **.TAGOP3**, **.TAGOP4** to get the tag read operations results.

Read TID memory bank Tag serial number region and first 6 words of the USER bank, report even nonsuccess reads:

Tag Read Operation 3

Memory bank: **TID**, Data length: **3**, Data offset: **3**, Report only successful read operation: **Disable**

Tag Read Operation 4

Memory bank: **USER**, Data length: **6**, Data offset: **0**, Report only successful read operation: **Disable**

Note that the **Data String** must contain the keywords **.TAGOP3**, **.TAGOP4** to get the tag read operations results.

6 Section - Transparent mode

6.1 STORM Protocol

The STORM Protocol allows a simple method of configuring the reader, whilst retaining high-performance and without the complexity of running low-level RFID transponder operations. Multiple RFID operations can be pre-configured in ten independent command banks which can then be executed at will.

The reader module has 10 (ten) independent commands banks. Each bank has its own set of **Inventory** round parameters and 10 (ten) command-slots which may be used for Gen2 **Select** or other access commands. The command-slots and the **Inventory** round parameters may be configured in any order. However, please note that whilst the **Inventory** round parameters may be set by multiple commands, the Gen2 access commands are atomic and will replace previous settings. The Bank command allows a complete reset of the specified bank as well as being used to execute the command configured in that bank. If no stop conditions are configured in a bank, then the RFID processing will continue until a socket disconnection or **ABORT** command is sent. Multi-bank support is available, meaning that a sequence of banks may be executed in a one-shot or continuous mode via a single command, with an overall set of stop conditions.

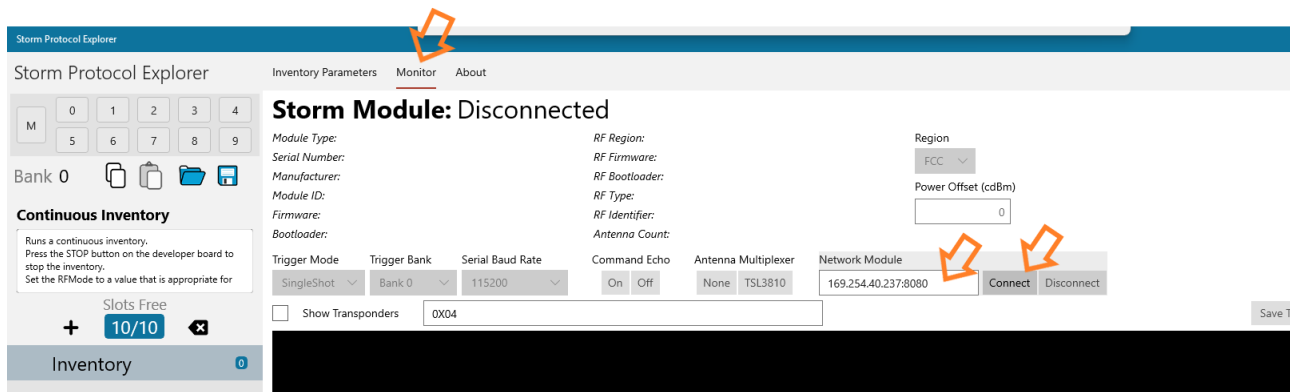
Link to protocol user guide:

https://drive.google.com/file/d/1Uzk9X91pBdjf6gQFQz7tXJD5RmWBy6-Z/view?usp=drive_link

6.2 STORM Protocol Explorer

This demo application controls the connected STORM reader module.

https://drive.google.com/file/d/14VCjt_848mcwK5UG6_T-KZE2a1ivV9is/view?usp=drive_link



7 Revision history

Date	Description	Revision
May 2025	Initial release.	A.0