

HR-2 Reader User's Manual



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1 Introduction

1.1 HR-2 Reader

The HR-2 handheld RFID reader provides fully mobile read/write capability for TagMaster's 2.45 GHz ID-tags. The device is designed for use in a wide range of demanding environments where ID-tags need to be verified and recorded. The combination of this portable RFID device and its touch screen user interface with TagMaster's powerful Linux operating system provides integrators with the flexibility to customise or enhance the functionality of the HR-2.

The HR-2 is used for verifying the stored data and status of an ID-tag or for programming TagMaster ScriptTags. ID-tag information is stored in Flash memory and is easily transferred via Ethernet using the built-in web interface. The HR-2 reader provides a 2 meter standard read-range which can easily be adjusted using the configuration menu. Frequency hopping (FHSS) is the default frequency setting which ensures error free operation in close proximity with permanent reader installations. The HR-2 is a robust portable handheld reader powered by lithium-ion batteries. By utilising a default stand-by mode, the HR-2 can be operated for a full 10 hour work shift. The Reader becomes fully operational as soon as a reading is initiated via the touch screen. The HR-2 is based on the versatile and proven LR-series hardware platform which includes, Ethernet TCP/IP and RS232 connections, USB and SD memory data storage. The Software Development Kit (SDK) can be used for proprietary application development and the open-source HR-2 software can be customised, including the touch-screen interface word-list language.

1.2 TagMaster's RFID System

TagMaster's RFID system consists of readers and ID-tags. Readers can work standalone or be connected to a host computer using a serial or Ethernet connection.

1.2.1 Reader

The reader is a device for reading ID-tags using 2.45 GHz radio frequencies. In addition to reading, some readers have the capability to write information to ScriptTags. Some readers are also capable of detecting the speed and direction of moving objects without ID-tags, so called movement detection.

The reader has built-in antennas for communication with ID-tags as well as various interfaces for communication with a host computer and other external devices.

To reduce the risk of interference, several readers in close proximity to each other should use frequency hopping or be set to different frequency channels.

1.2.2 ID-tags

An ID-tag carries information that can be read at a long distance using radio frequency. There are two general types of TagMaster ID-tags called MarkTag and ScriptTag. MarkTag are read-only while ScriptTag are both readable and writable. Both types of ID-tags contain a unique and permanent identification number called the ID-tag mark. A ScriptTag contains an additional writable data field called the ID-tag userdata.

The data in an ID-tag is protected by a 32-bit checksum (16-bit for Open48) for maximum system security. A lithium battery is used in the ID-tag to preserve stored data and get a high communication speed.

TagMaster has a wide range of ID-tags with different properties. Technical data for the different ID-tags are presented in the respective ID-tag's data sheet.

2 Safety Instructions

Read this manual carefully before installation work is performed and take notice of warnings in order to prevent injury and product damage.

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.

The relevant manual (including this safety information) must be followed in any work performed on the TagMaster products or systems.

The use of TagMaster's genuine spare parts is recommended. TagMaster will not assume responsibility for any malfunction due to use of spare parts produced by a third party.

2.1 Warnings

Warnings are used throughout this manual to alert the reader to special instructions concerning a particular task or operation that may be hazardous if performed incorrectly or carelessly. The warnings are preceded by the common hazard symbol.



Figure 1 Hazard Symbol

The following two levels of warnings are used:

Warning!

Warning means that an accident may occur if the safety precautions are neglected. This type of accident may cause injury. It may also damage the product.

Caution!

Caution means that an accident may occur if the safety precautions are neglected. This type of accident may damage the product.

3 Overview

3.1 General Information

The HR-2 reader is designed for stand alone operation, reading and writing to ID-tags. After a working shift, information in the handheld can be uploaded into a system using serial or Ethernet interface.

A typical application for a HR-2 reader is reading ID-tags during a scheduled service (see Figure 2). This could be in order to identify the object being equipped with the ID-tag or to confirm the correct function of the tag itself.

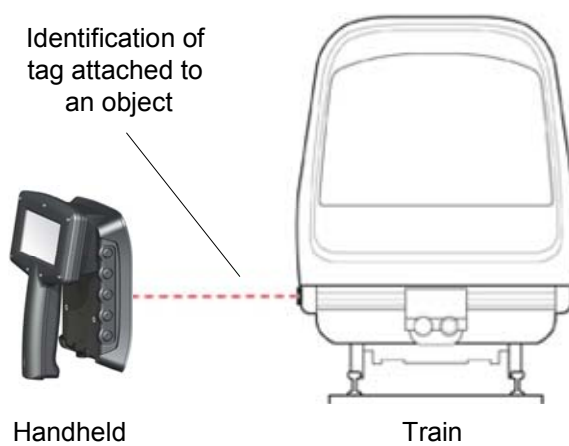


Figure 2 A typical application using a HR-2 reader.

Warning!

To comply with FCC RF exposure limits and Council Recommendation 1999/519/EC, it is recommended that the reader is handled so that a separation distance of at least 20 cm (8 in) from all persons is provided.

4 Operating the Unit

4.1 Starting the Unit

To start the HR-2 reader, press the power switch button (see Figure 3). When the unit is powered on, this will be indicated with a red LED indication in the middle of the power switch button.

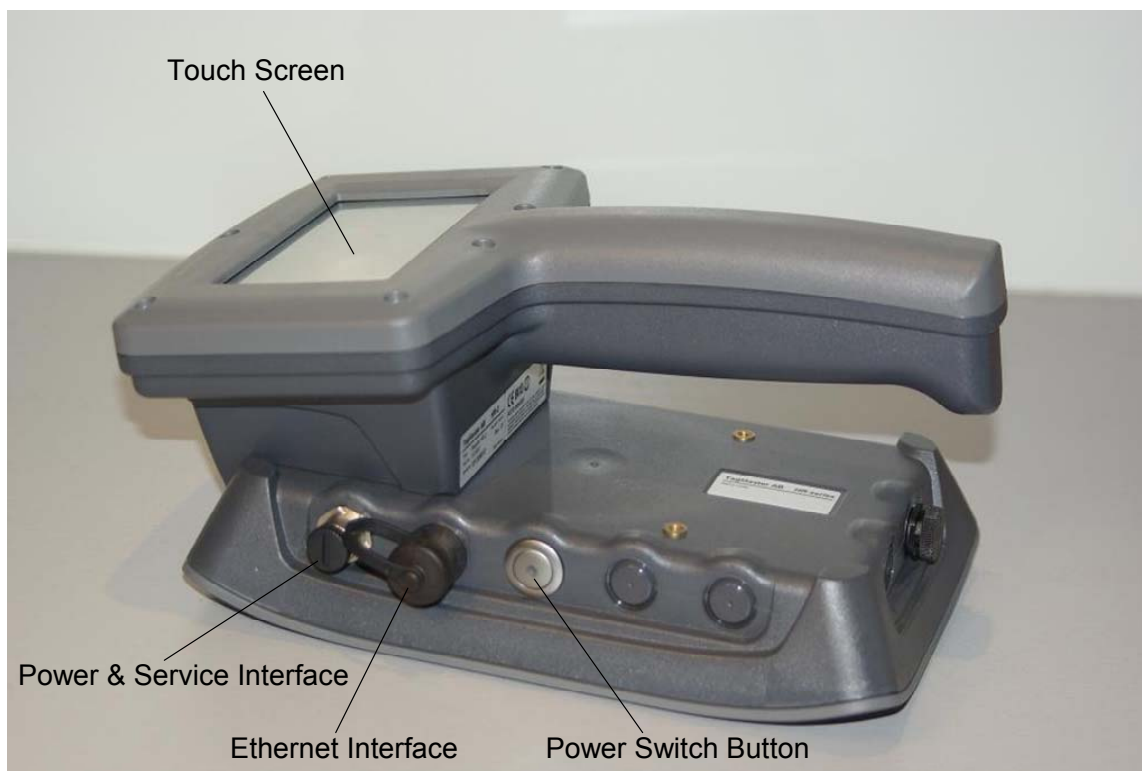


Figure 3 HR-2 reader overview.

⚠ Warning!

Never power-on the HR-2 if any signs of the unit being damaged can be observed. As the unit contains a lithium-ion battery, this could result in an accident and potential injury. Please contact TagMaster for advice on how to proceed if the unit is damaged.

⚠ Caution!

Never exceed the environmental and electrical limits as specified in paragraph 7. Exceeding the limits can result in permanent damage to the reader.

As soon as the power switch button has been pressed the boot procedure of the HR-2 will start. During this stage a boot screen will be displayed (see Figure 4). The boot

duration is approximately 15 seconds, but will be depending on software version and possible specific software additions.

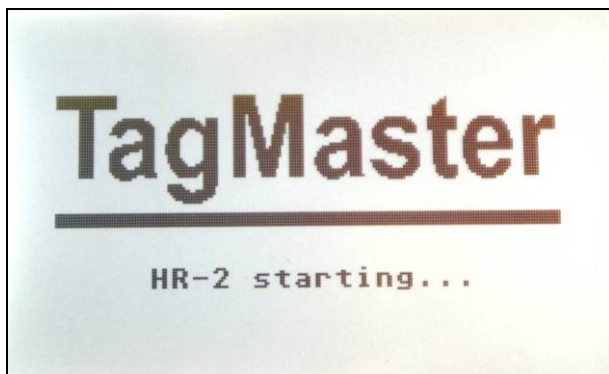


Figure 4 Start-up screen.

4.2 Main Menu

The main menu (see Figure 5) of the HR-2 will display a number of icons. These include 'ReadTag', 'WriteTag', 'Settings' and 'Info'. Additional Icons might be present if optional software has been ordered from TagMaster or developed by the user.

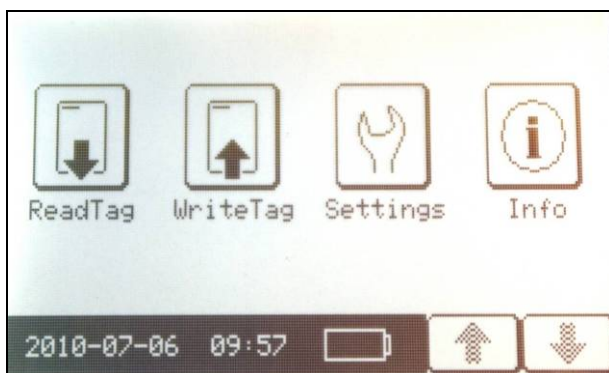


Figure 5 Main menu screen.

The bottom of the main menu screen also displays date, time and remaining battery capacity.

A number of general ways to interact with the HR-2 are listed below:

- The vertical arrows (↑↓) at the bottom of the screen can be used to navigate (if not all info can be displayed at once). If all info is present on the screen, these arrows will be shaded.
- The horizontal arrow (←) is being used to go back to the next higher level of the menu hierarchy.
- By touching the screen (using the tip of a finger is recommended but a stylus can also be used) a specific alternative is activated.

Caution!

Never use a sharp or metal object when touching the screen. This will lead to permanent scratches on the screen. Always use a finger (or a plastic stylus) when interacting with the touch screen.

The HR-2 touch screen includes a function for backlight. In general, the screen backlight will be on for a few seconds after the last user interaction. To save power, the backlight will then fade away. To activate the backlight again touch the screen. This single action of touching the screen to activate the backlight will not be used as input to any of the HR-2 menus.

4.3 ReadTag Menu

To read an ID-tag, touch the 'ReadTag' icon to enter the 'ReadTag' menu (see Figure 6).

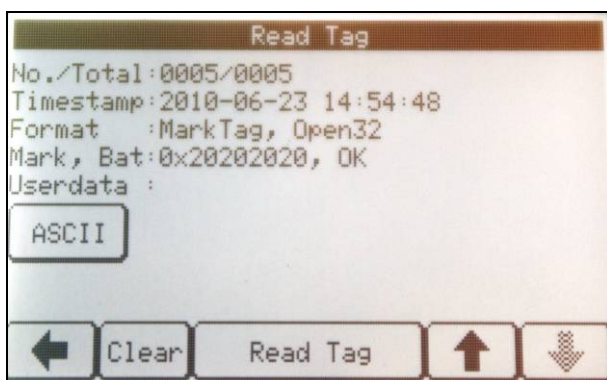


Figure 6 'ReadTag' screen.

Hold the HR-2 reader over the tag to be read. By touching 'Read Tag', the reader starts searching for a tag. It will continue to search until a tag is found or an abort is issued by the user. If a tag is found, corresponding info will be presented on the screen.

A log of all read tags will be present, and this log can be navigated using the vertical arrows. This log can be cleared by touching 'Clear'.

The info on 'Read Tag' screen is explained below:

- No./Total:** The record number of the displayed tag reading / the total number of stored tag readings.
- Timestamp:** Timestamp of displayed tag reading.
- Format:** Tag type and formatting of displayed tag reading.
- Mark, Bat:** Info on mark and battery status of displayed tag reading.
- Userdata:** Info on userdata (ScriptTag only) of displayed tag reading.

The user data formatting can be changed by touching the area just below the word Userdata.

4.4 WriteTag Menu

To write an ID-tag, touch the 'WriteTag' icon to enter the 'WriteTag' menu (see Figure 7).

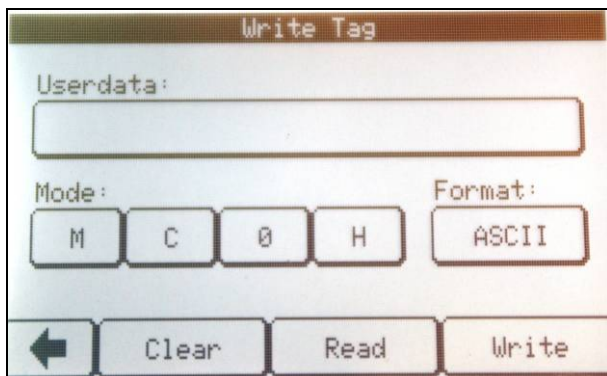


Figure 7 'WriteTag' screen.

Alternatives for selecting different ScriptTag modes (see corresponding Data Sheet for more info) and formatting can be made. By using 'Clear', 'Read' and 'Write' the corresponding actions can be carried out.

By selecting the 'Userdata' area, a submenu can be accessed (see Figure 8) which can be used for entering userdata.

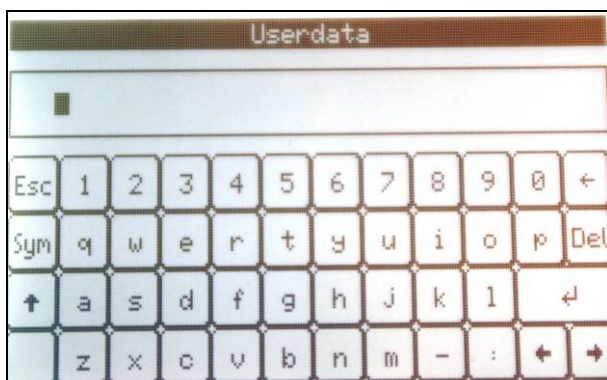


Figure 8 Userdata entry screen.

4.5 Settings Menu

The settings menu (see Figure 9) allows the user to change a number of reader parameters.

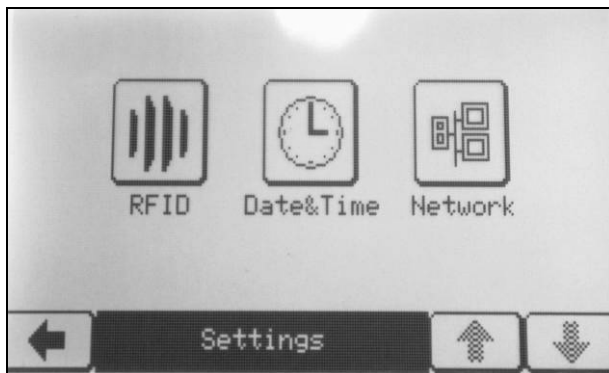


Figure 9 Settings screen.

Settings that can be adjusted include:

RFID:

- FHSS
- Frequency
- Read level
- Bit rate

Date & Time:

- Time zone
- NTP
- Date
- Time

Network:

- DHCP
- Bonjour
- Host name
- IP address
- Netmask
- Gateway
- Primary DNS
- Secondary DNS

4.6 Info Menu

To get info on the HR-2 software and network settings, touch the 'Info' icon to enter the 'Info' menu (see Figure 10).

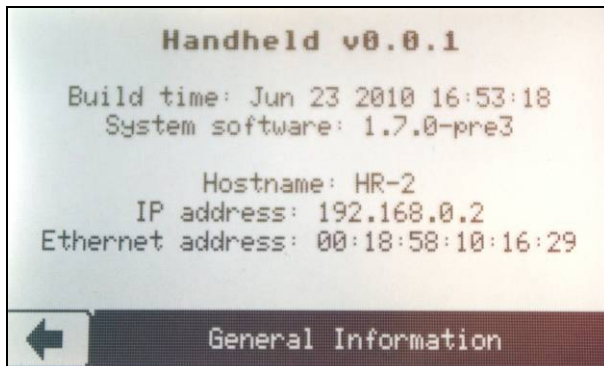


Figure 10 'Info' screen.

5 External Interfaces

5.1 Ethernet Interface

The HR-2 reader is equipped with an Ethernet Interface accessible using a M12 Ethernet connector (see Figure 2). For convenience a short cable converting the M12 Ethernet to RJ45 is included with the HR-2.

The Ethernet interface can be used for uploading log files and adjusting the settings of the HR-2. All settings available using the touch screen can also be adjusted using the web server of the reader.

5.2 Service Interface

The HR-2 reader is equipped with a combined Power & Service Interface (see Figure 3). The service interface is providing a text-based way to configure the reader. A PC with terminal emulation software is used to access the administration interface.

Perform the configuration as follows:

1. Connect the Service Interface of the reader to the serial port of a PC with a RS232.
2. Configure the terminal emulator with the following communication settings:
 - Baud rate: 115200
 - Data bits: 8
 - Parity: None
 - Stop bits: 1
 - Flow control: None
 - Emulation: VT100
3. Open a connection from the terminal emulator to the reader and press ENTER. The login prompt will be displayed.
4. Login as user `admin`. The default password is `qwerty`.
5. The main menu will be displayed with the following menu items:
 - Start TagMaster contact information
 - Information Detailed system information (HW/SW versions, etc.)
 - Settings Settings menu
 - Reboot Reboots the reader
 - Exit Exits the administration interface

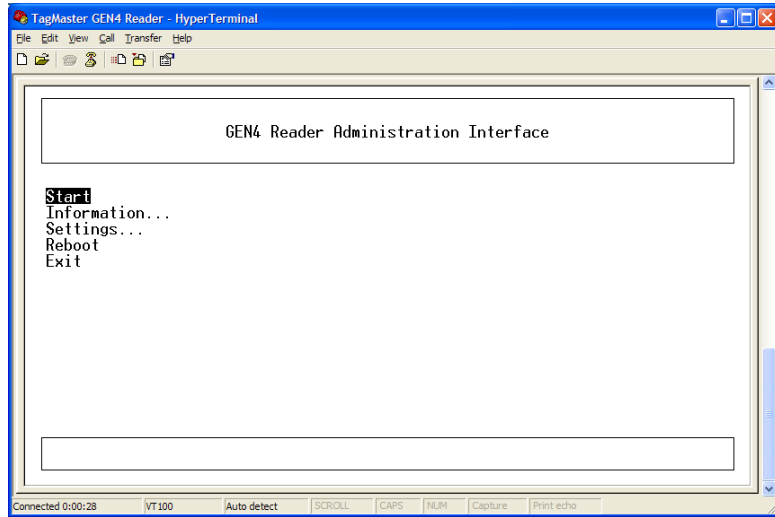


Figure 11 Service interface main menu.

6 Charging the Unit

The HR-2 is equipped with an internal lithium-ion battery. When the HR-2 is running low on power, this will be indicated by the battery status icon on the main menu (see Figure 5). To start recharging, connect the HR-2 charger (included with the unit) to the Power and Service Interface M12 connector (see Figure 3). Only the original HR-2 charger may be used together with the unit, and the specific M12 connector is chosen to make a mix-up highly unlikely. If the HR-2 charger is lost or broken, contact TagMaster for a replacement charger.

A full recharge takes 5 hours to complete (given that the HR-2 is powered off during this time).

The HR-2 battery and charging electronics has been designed and reviewed to fulfil relevant safety requirements. For this reason the battery may not be replaced or the HR-2 unit modified in any way. If a change of battery is need, return the unit to TagMaster for service.

Warning!

The HR-2 may only be charged in the temperature interval of 0°C to 50°C. Charging the HR-2 outside this specified temperature interval may cause injury.

Warning!

Incinerate, disassemble, short circuit, dispose of in fire, or heat above 60°C/140°F may cause burst or burn. Use designated charger only.

7 Technical Data

7.1 Reader Overview

Figure 12 shows an overview of the internals of HR-2 reader.

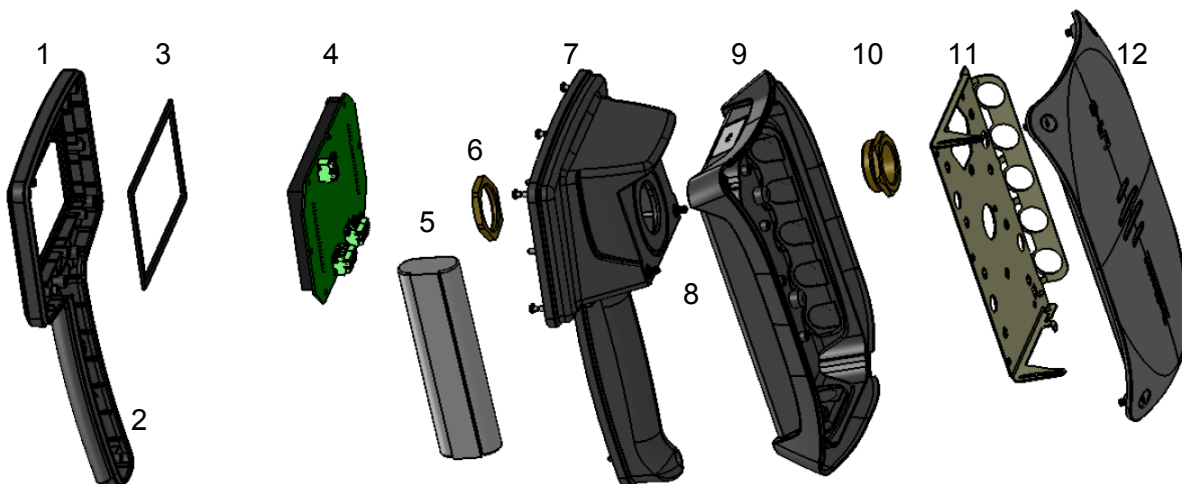


Figure 12 Overview of the HR-2 reader.

The following table describes the position of the components inside the unit.

No	Component	No	Component
1	Top	7	Bottom
2	Gasket	8	Gasket
3	LCD gasket and cover film	9	Enclosure Base
4	Screen module	10	Reduction Nipple
5	Li-Ion battery pack	11	Shield Plate
6	Barrier nut	12	Lid

Table 1 Components of the HR-2.

7.2 Performance Data

7.2.1 Communication range data

Parameter	Value	Unit
Read Range	Up to 3.5*	m
	Up to 11.5*	ft
Write Range	Up to 0.2	m
	Up to 0.6	ft

* Default setting is 2m/6.6 ft, which can be easily adjusted using the configuration menu

7.2.2 RFID communication speed

Parameter	Value	Unit
Data Speed	16	kb/s

7.3 Electrical Data

Data regards the temperature range -20°C to $+45^{\circ}\text{C}$ or -4 to $+113^{\circ}\text{F}$.

7.3.1 Radio

Parameter	Value	Unit
Radio Wave Polarisation	Circular	
Output Power	10	mW e.i.r.p
CW-mode: Radiation Frequency	2435–2465	MHz
CW-mode: Number of RF Channels	93	
CW-mode: Channel Separation	300	KHz
FHSS-mode*: Radiation Frequency	2400–2483.5	MHz
FHSS-mode*: Number of RF Channels	400	
FHSS-mode*: Channel Separation	200	KHz

* Not available in Japan, Korea and Taiwan.

7.3.2 Power supply

Parameter	Value	Unit
DC battery Charger*	24	VDC
DC Power Consumption Typical	4.5	W
Max DC Power Consumption	15	W
Internal battery voltage	14.4	VDC
Internal battery capacity	2200	mAh

* 100- 240 VAC powered battery charger (24V, Max 2A) included with reader

7.4 Mechanical Data

Parameter	Value	Unit
Weight	1.4	kg
	3.1	lbs
Dimensions	257×154×142	mm
	10.12 × 6.06 × 5.59	in

Enclosure Material	PC-PBT and PC (Xenoy)	
Chassis Material	Aluminium	
Sealing	Rubber Gaskets	
Colour: Enclosure base & bottom	Dark Grey RAL7024	
Colour: Lid & top	Light Grey RAL7001	
Power and Service Interface connector	M12 × 5 Poles	
Ethernet connector	M12 x 4 Poles	

7.5 Environmental Specification

7.5.1 Climate

Parameter	Value	Reference
Cold	-20°C or -4°F	-
Heat	+60°C or +140°F	-
Sealing	IP54	

Caution!

Do not remove the pressure balance membrane, or use the unit without protective caps on the Power & Service Interface or Ethernet Interface. This will compromise the IP classification.

7.5.2 RoHS

The HR-2 reader complies with RoHS Directive 2002/95/EC

7.5.3 Electrical

Parameter	Reference
Immunity	Acc. to CE: EN 301 489-3
Emission	Acc. To: CE: EN 300 440-2 (radio) and EN 301 489-3 (EMC). FCC part 15 subpart B and C. The Reader fulfils Class B digital equipment limits
Safety	EN 60 950-1

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 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

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

8 Contact

For any further inquiries, please contact TagMaster AB.

8.1 Technical Support

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