Brady FR22

UHF RFID READER

User Manual

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Safety and Environment

Please read and understand this manual before using the FR22 RFID reader for the first time. This manual describes all of the main functions of the FR22 RFID reader.

Precautions

Before using the Brady FR22 RFID reader, please note the following precautions:

- Read all instructions carefully before operating the RFID reader and prior to performing any procedure.
- Do not install the unit on an unstable surface or stand.
- Do not place anything on top of the unit.
- Only use the power source indicated on the rating label.
- This equipment is not intended for use by children.

CAUTION!

To avoid unnecessary exposure to RF radiation:

- Always maintain a 20 mm distance between the antenna and users and/or bystanders.

After extended use, the Brady FR22 chassis can be hot. When switching the unit off, allow the device to cool for 30 minutes before handling it.

Technical Support and Registration

Contact Information

Visit the Brady Knowledge Base at support.bradyid.com/s/.

For repair or technical assistance, locate your regional Brady Technical Support office by going to:

- **United States:** bradyid.com/techsupport
- **Canada:** bradycanada.ca/contact-us
- **Mexico:** bradyid.com.mx/es-mx/contacto
- **Latin America:** bradylatinamerica.com/es-mx/soporte-técnico
- **Europe**: bradyeurope.com/services
- **Australia:** bradyid.com.au/technical-support
- **Asia Pacific**: brady.co.uk/landing-pages/global-landing-page

Repair and Return

If for any reason you need to return the product for repair, please contact Brady Technical Support for repair and replacement information.

As a manufacturer, Brady stands responsible for providing repair services for its devices during and after the warranty period. Together with partners Brady serves customers globally. When your Brady device needs repair, always use only Brady Service or our authorized service partners. We want to make sure that your Brady product serves you the best possible way, and by using our preferred service partners the quality of the service is trustworthy and the spare parts are original. This way the existing product warranty remains, and you receive a 3-month service warranty for the repaired devices.

Brady works together with full support and primary support partners. Full support partners can handle both warranty and non-warranty repairs on behalf of Brady in their own regions. In addition, Brady has a network of smaller repair centers, primary support partners, who offer the first line of support to their customers locally.

Document Conventions

When using this document, it is important that you understand the conventions used throughout the manual.

- All user actions are indicated by **Bold** text.
- References to menus, windows, buttons and screens are indicated by *Italicized* text.

Contents

1 Getting Started

The Brady FR22 is the core device of a new approach for RFID fixed systems with a modular design. It enables a variety of use cases for different segments depending on which modules or accessories are attached to it.

The Brady FR22 is an IoT Edge Gateway providing USB, Ethernet, WLAN, 4G, GPS, BLE and RFID connectivity.

It also has an embedded computer with Linux OS and connection to HDMI display, what enables installation and operation of 3rd party applications and makes the system much more scalable and manageable than conventional RFID readers.

- Fast and reliable edge computing with support for custom embedded applications
- Wide communication options that enable flexibility in system designing and no need for external connectivity hardware
- UHF RFID engine based on the very latest technology, NUR3-1W
- Develop embedded web apps with user interface. Eliminating the need for external PC/tablet
- Brady extension connector for plug and play accessories, such as a 16 port RF multiplexer
- Connect external devices, sensors, triggers, lights and buzzers
- Full-featured API for controlling the reader

Device Variants

The Brady FR22 is available in multiple variants.

ORDER REFERENCE	DESCRIPTION
B-FR22-RFID-RDR-EU	Brady FR22 Fixed RFID Reader EU
B-FR22-RFID-RDR-US	Brady FR22 Fixed RFID Reader US
B-FR22-RDR-LTE-EU	Brady FR22 Fixed RFID Reader LTE EU

Figure 1-1. Brady FR22 device

Antennas and Accessories

The Brady FR22 needs external RFID antennas to operate. It can work with any standard UHF RFID antenna, but we recommend Brady RAIN RFID antennas.

The Brady antenna portfolio includes two exclusive antennas for the Brady FR22:

- Brady GA30, a general-purpose antenna with high gain and IP rating behind which the Brady FR22 can be mounted to create an integrated RFID reader and antenna solution.
- Brady BFA, a beam-forming antenna for special applications that require reading tags in large areas or detection of movement and direction. This antenna is connected to the BRADY Extension Port in BRADY FR22 instead of SMA ports.

The model and quantity (up to 4 without multiplexer or up to 16 with multiplexer) of antennas you need depend on the use case.

ORDER REFERENCE	DESCRIPTION
B-GA30-ANT	Brady GA30 antenna
B-BFA-ANT-868	Brady BFA antenna 868
B-BFA-ANT-915	Brady BFA antenna 915
GPS-Antenna	Active GPS antenna
B-FR22-Multiplex	Brady MUX 16 port multiplexer
B-IO-EXT-BOX	Brady IO Connection Box

ORDER REFERENCE	DESCRIPTION
FR22-ANT-Cable-1m	FR22 antenna cable 1 m SMA-male - RP-SMA
FR22-ANT-Cable-3m	FR22 antenna cable 3 m SMA-male 90° to RP-SMA
FR22-ANT-Cable-5m	FR22 antenna cable 5 m SMA-male 90° to RP-SMA
FR22-ANT-Cable-10m	FR22 antenna cable 10 m SMA-male 90° to RP-SMA
FR22-ANT-GA30-8cm	Antenna cable for FR22 mounted on GA30 8cm
FR22-PSU-cord-EU	Power Supply FR22 EU
FR22-PSU-cord-UK	Power Supply FR22 UK
FR22-PSU-cord-US	Power Supply FR22 US

Figure 1-2. MUX 16-port multiplexer

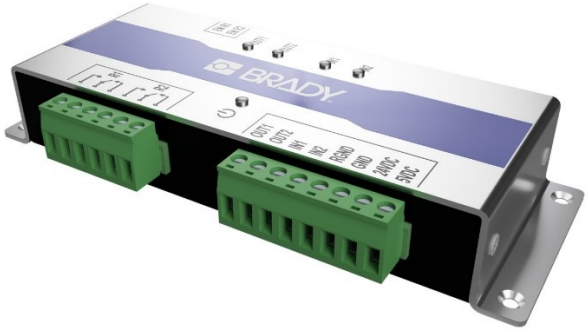

Figure 1-3. IO Connection Box

Figure 1-4. BFA antenna

Figure 1-5. GA30 antenna

Preassembled Kits

For convenience, the Brady FR22 can be delivered preassembled with extension modules.

ORDER REFERENCE	DESCRIPTION
B-FR22-RDR-BFA-EU	Brady FR22 + BFA 868 kit EU
B-FR22-RDR-BFA-US	Brady FR22 + BFA 915 kit US
B-FR22-RDLTE-BFA-EU	Brady FR22 LTE + BFA 868 kit EU

ORDER REFERENCE	DESCRIPTION
B-FR22-Mux16-EU	Brady FR22 + MUX 16 ports kit EU
B-FR22-Mux16-US	Brady FR22 + MUX 16 ports kit US
B-FR22LTE-Mux16-EU	Brady FR22 LTE + MUX 16 ports kit EU
B-FR22-RDR-GA30-EU	Brady FR22 + GA30 Antenna kit EU
B-FR22-RDR-GA30-US	Brady FR22 + GA30 Antenna kit US
B-FR22LTE-GA30-EU	Brady FR22 LTE + GA30 Antenna kit EU

Figure 1-6. Brady FR22 + Mux 16 ports kit

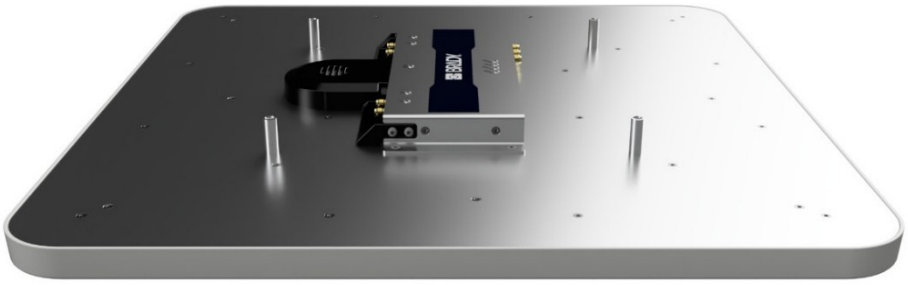

Figure 1-7. Brady FR22 + BFA antenna kit

Figure 1-8. Brady FR22 + GA30 Antenna kit

In-Box Content

The Brady FR22 box contains the following items:

- Brady FR22 device
- WLAN/Bluetooth antenna
- WWAN antenna (LTE variant only)
- Safety and regulations card
- Product information label (retain this label for reference)

Note: Power supplies and GPS antennas are sold separately.

Features

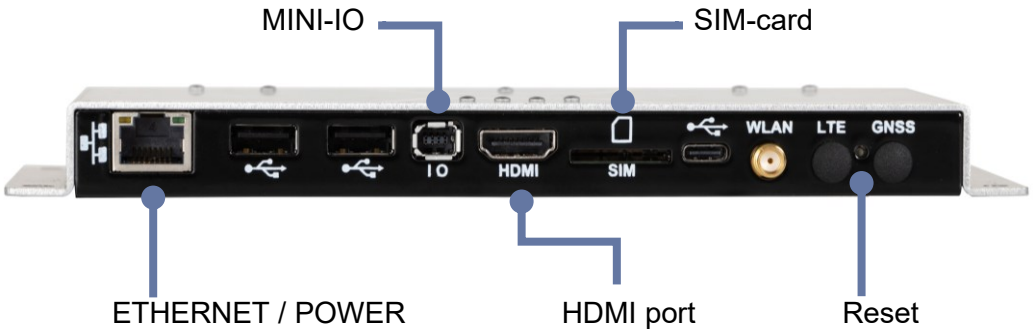

Figure 1-9. Brady FR22 rear panel (operation)

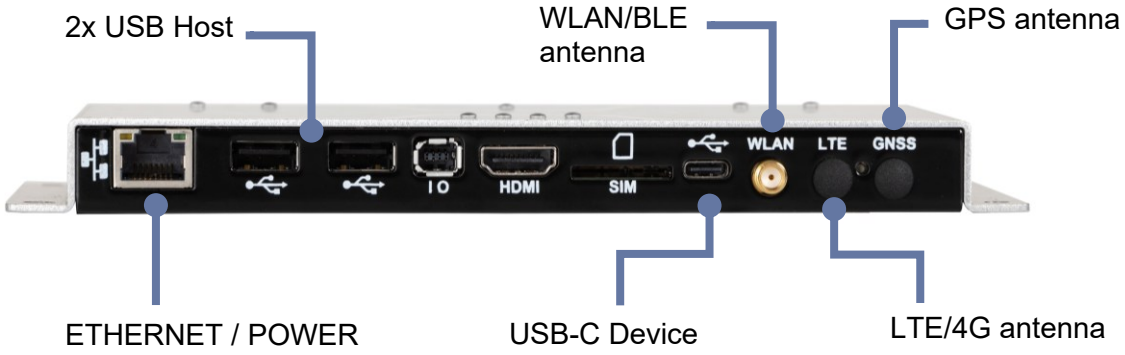

Figure 1-10. Brady FR22 rear panel (communication)

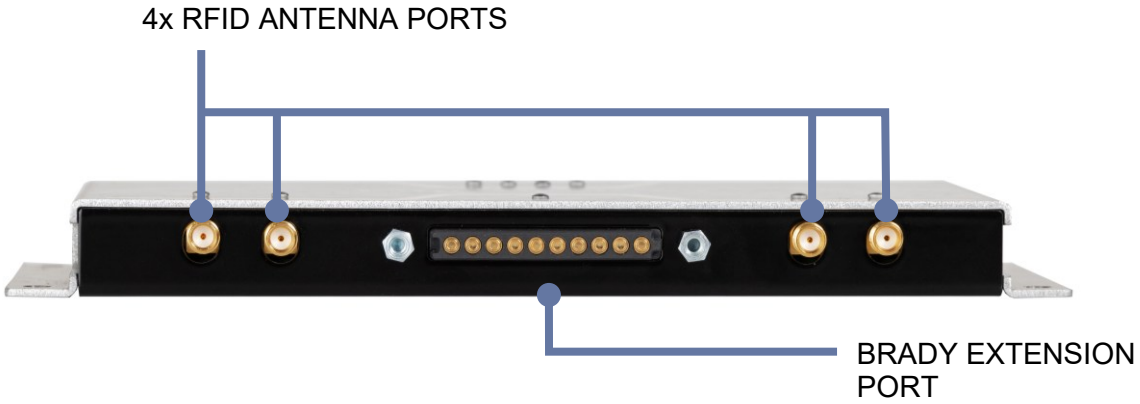

Figure 1-11. Brady FR22 front panel

Physical Connectors

The Brady FR22 has the following physical connectors.

- Ethernet 10/100Mbps with PoE 802.3at support.
- 2 USB 2.0 host Type A connectors
- USB 2.0 device Type C connector (USB HID profile supported)
- Mini-IO connector (supports 4 IOs)
- HDMI connector (video only)
- Slot for mini-SIM card (LTE variant only)
- SMA antenna connector for dual band WLAN and Bluetooth connectivity
- SMA antenna connector for WWAN cellular connectivity (LTE variant only)
- SMA antenna connector for GNSS (LTE variant only)
- 4 RP-SMA antenna connectors for connecting external RFID antennas to the reader
- Brady Extension Port

Note: The external WLAN/BLE antenna and LTE (WWAN) antenna (if applicable) must be fastened to the FR22 device before using it.

Ethernet and Power

The Brady FR22 includes a standard RJ-45 Ethernet connector supporting 10/100 Mbps speed class and 802.3at PoE.

The device is powered over Ethernet regardless whether the Ethernet communication interface is in use. It does not support an external DC power supply.

USB 2.0 Host with Type A Connector

The Brady FR22 includes two USB 2.0 host Type A connectors for connecting peripheral USB devices, such as barcode scanners, memory sticks, keyboards, and sensors to the device. The maximum current out from the USB 2.0 host Type A connectors is 500mA.

USB 2.0 Device with Type C Connector

The Brady FR22 has one USB 2.0 device Type C connector for connecting it to a host device.

Note: The web management UI cannot be accessed via USB connection. It is only accessible via a network connection (Ethernet, WLAN, or WWAN).

GPIO Connector

The Brady FR22 has an Industrial Mini-IO type I connector supporting the following functionalities:

- I2C bus (with internal pull-up resistors)
- 4 x inputs / outputs (TTL 1.8VDC)
- 5VDC supply (output)
- GND level

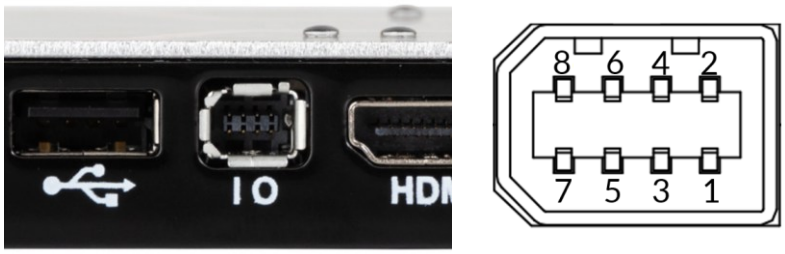

Figure 1-12. Pin-out diagram for the mini-IO connector

The following table describes the pin out and signals for the mini-IO connector.

PIN	SIGNAL	DESCRIPTION	DEFAULT STATE
1	VCC_5V	Power 5V output	N/A
2	GND	Ground	N/A
3	GPIO3	general purpose IO	output, low
4	GPIO4	general purpose IO	output, low
5	GPIO1	general purpose IO	input, low
6	GPIO2	general purpose IO	input, low
7	I2C_CLK	I2C master bus clock	N/A
8	I2C_DATA	I2C master bus data	N/A

The following table details the electrical signal specifications.

SIGNAL	VOLTAGE MIN (V)	VOLTAGE NOMINAL (V)	VOLTAGE MAX (V)	CONDITIONS
VCC_5V		5		< 500mA
GPIO 1-4 inputs, low	-0.3	0	0.6	
GPIO 1-4 inputs, high	1.3	1.8	2.1	
GPIO 1-4 outputs, low		0	0.45	<2mA
GPIO 1-4 outputs, high	1.4	1.8		<2mA
I2C_CLK		1.8		
I2C_DATA		1.8		

When building a custom cable for the Brady FR22 mini-IO port, mind the positions of the pins/wires on the cable plug.

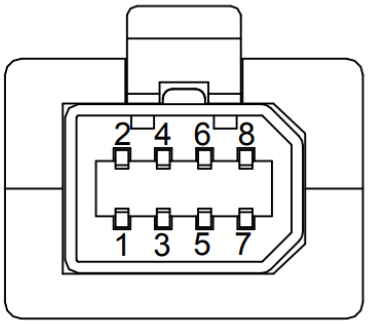

Figure 1-13. Mini-IO cable plug front view

IMPORTANT! These GPIO are not opto-isolated. They are digital inputs/outputs. If you need opto-isolated pins, a Brady IO Connection Box (B-IO-EXT-BOX) can be connected to the mini-IO port.
Incorrect or excessive voltages can damage the Brady FR22 unit.

HDMI Output

The Brady FR22 includes a standard HDMI port for connecting a video display. The supported resolutions are 1280x720 and 640x480.

By default, the HDMI output shows only the Brady logo on the display. By installing the web browser plugin via the administrator web UI, the HDMI output automatically shows the web browser. The web browser plugin also includes features such as full-screen kiosk mode and configuring the default page shown on the web browser.

Mini-SIM (LTE Variant)

The LTE variant of the Brady FR22 supports a Mini-SIM card. Insert the Mini-SIM card with the orientation shown in the following figure.

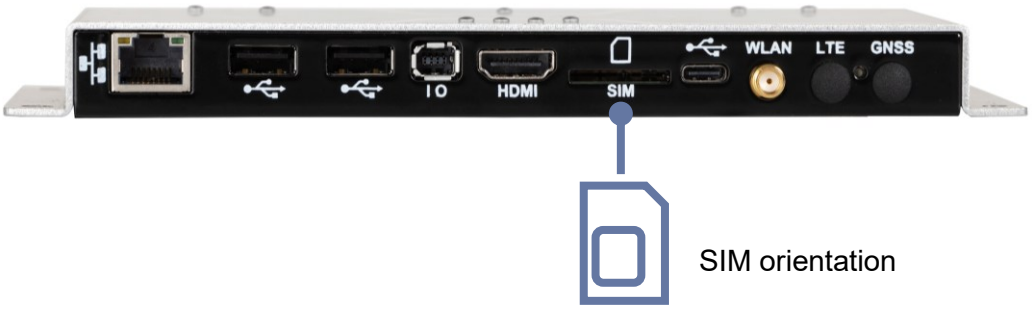

Figure 1-14. Mini SIM card orientation

Dual-band WLAN and Bluetooth

All the variants of Brady FR22 support dual band WLAN (supporting 2.4GHz and 5.0GHz frequency bands) and Bluetooth 4.2.

For WLAN and Bluetooth to function as specified, the included external dual band antenna must be attached to the device.

Supported Bluetooth standards: BT 2.1 + EDR/3.0/4.1 LE /BT4.2

Supported Bluetooth profiles:

- SPP Profile (classic Bluetooth)
- HID Profile (classic Bluetooth)
- HID Over GATT Profile (HOGP) (BLE)

WWAN Cellular Connectivity (LTE Variant)

The LTE variant of the Brady FR22 supports WWAN connectivity over 2G, 3G and 4G cellular networks.

Supported bands:

- GSM/EDGE Quad-band 850/900/1800/1900 MHz
- LTE-FDD B1/B3/B5/B7/B8/B20
- LTE-TDD B38/B40/B41
- WCDMA B1/B5/B8

For cellular connectivity to function, a SIM card must be installed and the included external WWAN antenna must be attached to the device.

GNSS (optional)

The LTE variant of the Brady FR22 supports is equipped with a GNSS receiver for global positioning information using GPS, BeiDou or GLONASS.

To use this feature, you must connect an external GNSS antenna (GPS-Antenna, sold separately) to the device.

RFID Antenna Ports

The Brady FR22 has four RP-SMA female antenna connectors for connecting external RFID antennas to the device. Impedance of antenna ports is 50Ω and maximum conducted output power is 32dBm (30dBm in FCC region).

The antenna ports can be configured independently via the NUR API.

If more than 4 antenna ports are needed, the Brady MUX multiplexer (sold separately or as a kit preassembled with the FR22) can be connected to the Extension Port for a total of 16 RF ports.

Brady Extension Port

The Brady FR22 is the first device to include the exclusive Brady Extension Port that enables the device to be connected to exclusive Brady FR22 accessories, such as an RFID multiplexer or advanced antennas.

The extension port enhances the capabilities of the computing units of the Brady FR22, transforming the device into a complete system solution for specific use cases and applications.

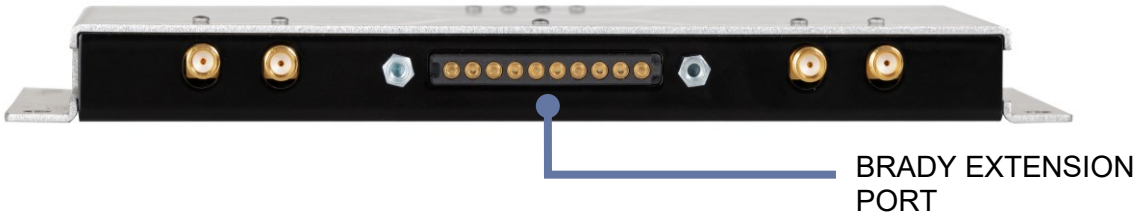

Figure 1-15. Brady Extension Port location

Thermal Management

The Brady FR22 reader implements sophisticated thermal management features that can prevent device overheating when used in warm environments. The reader monitors temperatures of the onboard computer and UHF RFID module and adjusts their operation points based on the temperature information.

The onboard computer starts its mitigation scheme (for example, decreasing the CPU clock frequencies) when the temperature of the onboard computer reaches 85°C.

The thermal mitigation scheme of the UHF RFID module starts when it reaches 80°C. UHF RFID reading operations are suspended for 100ms and suspend time is increased 20ms for each °C temperature increase. The thermal mitigation scheme is turned off once the temperature drops below 80°C. The high temperature warning message (TEMP_HIGH) is sent via NUR API to host. The warning message contains the current temperature information.

2 Installing the Device

This chapter describes installation instructions for the Brady FR22.

Device Mounting

To attach the Brady FR22, use the holes shown in the following figure.

Figure 2-1. Mounting holes on the Brady FR22

You can use the 1:1 image on the following page as a template to drill holes for mounting the device.

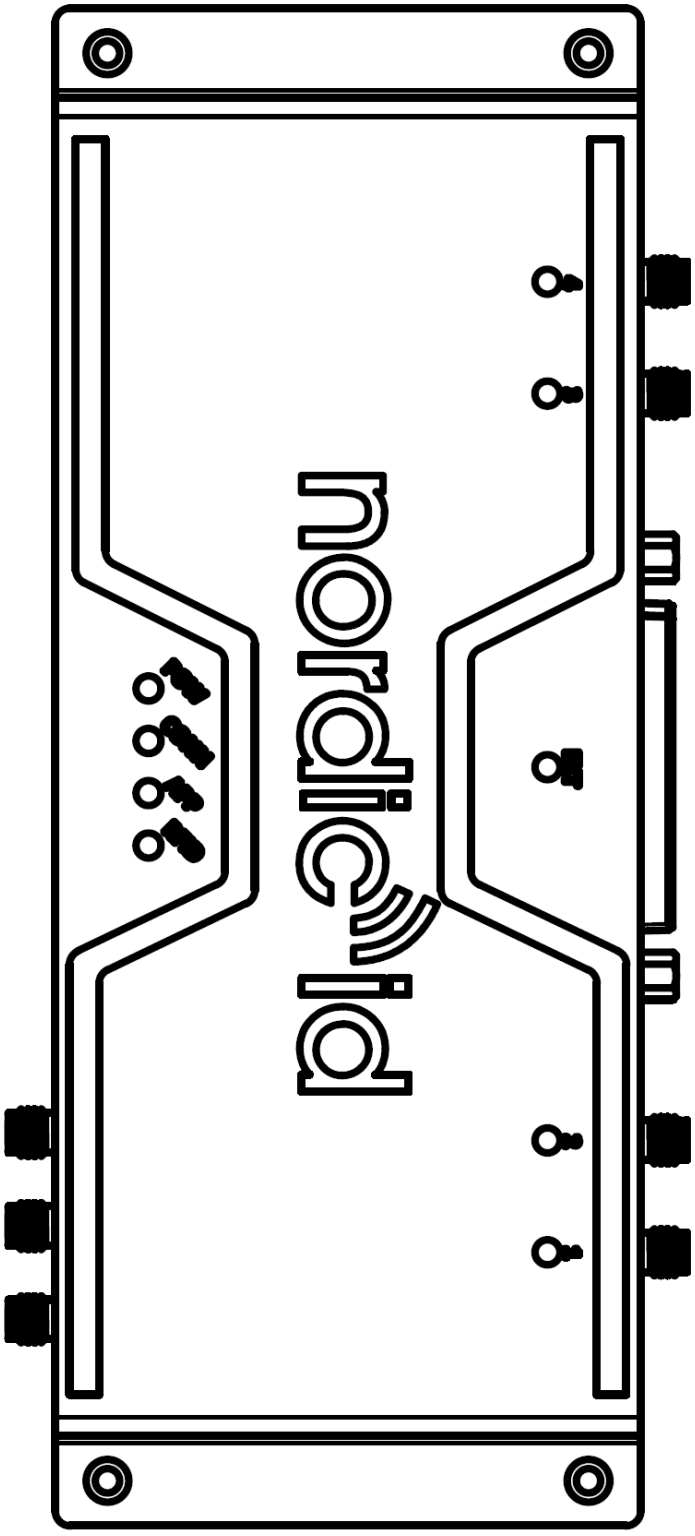

Figure 2-2. Drilling template

Device Power

The Brady FR22 can be powered via DC ethernet port, if the network supports power over Ethernet (PoE), or using a PoE+ power supply (sold separately). The way that the device is powered does not affect the available connectivity methods that the device supports, including USB, Bluetooth, Ethernet, WLAN, and WWAN.

The device powers on automatically when connected to the PoE power supply or network.

The rated maximum power consumption for the Brady FR22 reader is:

- 25.5W with maximum RFID transmission level and all radios (WLAN, Bluetooth and LTE) enabled.
- 18W with maximum RFID transmission level and all radios disabled (communication via Ethernet or USB).
- 4W in idle state, with RFID and all radios disabled.

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3 Using the Device

This chapter describes the LED indicators, physical buttons, and RFID reader features on the BradyFR22.

LED Indicators

The Brady FR22 has various LED indicators, including the following:

- Four user indicators (Power, Connection, Application, RFID)
- Four antenna status indicators
- Brady Extension Port indicator

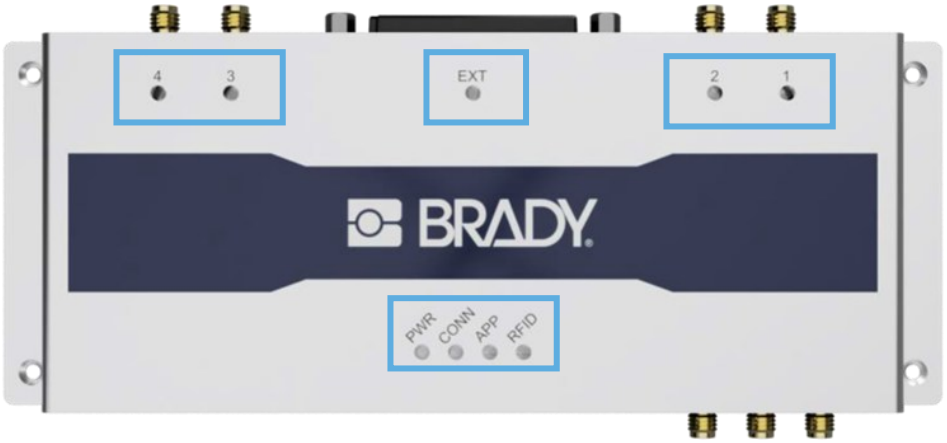


Figure 3-1. Device LEDs

Power LED

By default, the Power LED indicates whether power is supplied to the device.

Green indicates that the device is powered.

No light indicates that the PoE port is not powering the device.

The Power LED turns yellow during the upgrade procedure. DO NOT POWER THE DEVICE OFF DURING THIS PROCESS.

During the boot sequence after powering the device, the Application LED will also flash red and/or green.

Connection LED

Connection LED indicates whether the reader has established a network (TCP/IP) connection, i.e. Ethernet, WLAN or LTE connection.

- Off: All the communication interfaces are disabled.
- Stable green: At least one communication interface is connected and ready to communicate, i.e., the reader has an IP address.

Application LED

The Application LED indicates whether the RFID module is connected to an application (software) or not.

- Stable red: RFID module firmware (NUR service) not running.
- Slow blinking green: RFID module running, ready to be used.
- Stable green: An application is connected to the RFID module.
- Fast blinking green: An application is sending commands to the RFID module, it's in use.

Note: When the Brady FR22 is in "ready" status, the Power, Connection and Application LEDs are all green at the same time. The Application LED can be blinking green if the host application is not using the RFID module yet.

RFID LED

RFID LED indicates whether RFID reading is ON or OFF.

- Off: The RFID module is not transmitting.
- Fast blinking/stable green: The RFID module is transmitting RF commands (read, write, inventory, etc).

Antenna LEDs

Antenna LEDs are used to indicate the antenna ports configuration, i.e., whether an RFID antenna port is enabled or not, even if an antenna is not connected or it is not reading.

- Off: Antenna port disabled.
- Green: Antenna port enabled.

Extension LED

The Extension LED indicates whether the Brady Extension Port is being used.

Reset Button

To restore the factory default settings on the Brady FR22, press and hold the reset button while powering on the device. The Power LED illuminates, followed by the Connection LED. When the Application LED illuminates, release the Reset button. This process takes 10 to 15 seconds.

RF Profiles

The Brady FR22 includes the NUR3-1W UHF RFID module, which supports several RF profiles. Select an appropriate RF profile based on your use case and environment:

CODE	DESCRIPTION
Robust	• Link frequency: 160 kHz • Coding: Miller 8 • Read rate: Up to 50 tags/s Optimized for sensitivity through slower data speed. Ideal for challenging environments where there can be interfering signals from other readers, signal sources, or reflections from the environment.
Nominal	• Link frequency: 250/300 kHz • Coding: Miller 4 • Read rate: Up to 250 tags/s The default profile for the Brady FR22. This profile is recommended for DRM use cases.
Fast	• Link frequency: 640 kHz • Coding: Miller 4 • Read rate: Up to 500 tags/s Provides a balance between speed and sensitivity.
High speed	• Link frequency: 640 kHz • Coding: FM0 • Read rate: Up to 900 tags/s Optimized for speed at the cost of high sensitivity. Good for environments where little interference is expected.
High speed 2	• Link frequency: 640 kHz • Coding: FM0 • Read rate: Up to 1000 tags/s or more The High speed 2 profile further optimizes for speed by reducing the Tari value for the pulse interval encoded (PIE) data.

Note: The actual read rate depends on factors such as the operating environment, reader settings, tag population, and tag type.

4 Software

Brady provides several tools for testing and configuring the Brady FR22 device. The tools run primarily on Microsoft Windows and can be downloaded from the Brady Downloads.

Brady RFID Demo

The Brady RFID Demo (available for Windows and Android) is a full-featured application that allows you to test the capabilities of compatible Brady. By adjusting the RFID parameters on the fly in the application, you can get statistics on and understand how RFID settings affect tag reading performance.

Note: Device settings changed with the Brady RFID Demo applications are reverted on device power cycle. To save settings to the device, use the Web Management Interface.

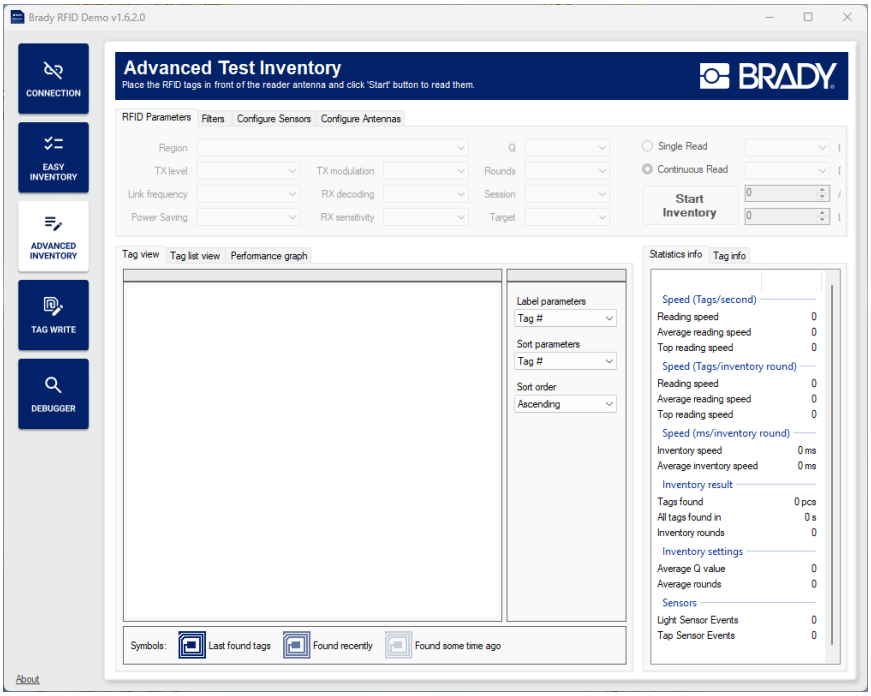


Figure 4-1. Brady RFID Demo for Windows

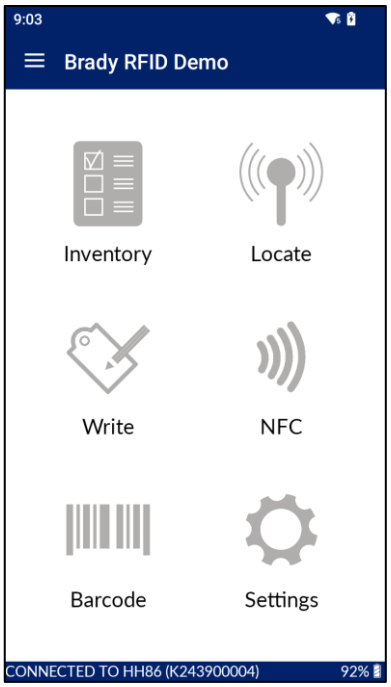


Figure 4-2. Brady RFID Demo for Android

Brady Smart Device Control

The Smart Device Control software allows you to conveniently discover and access the Web Management Interface for RFID readers connected to your network.

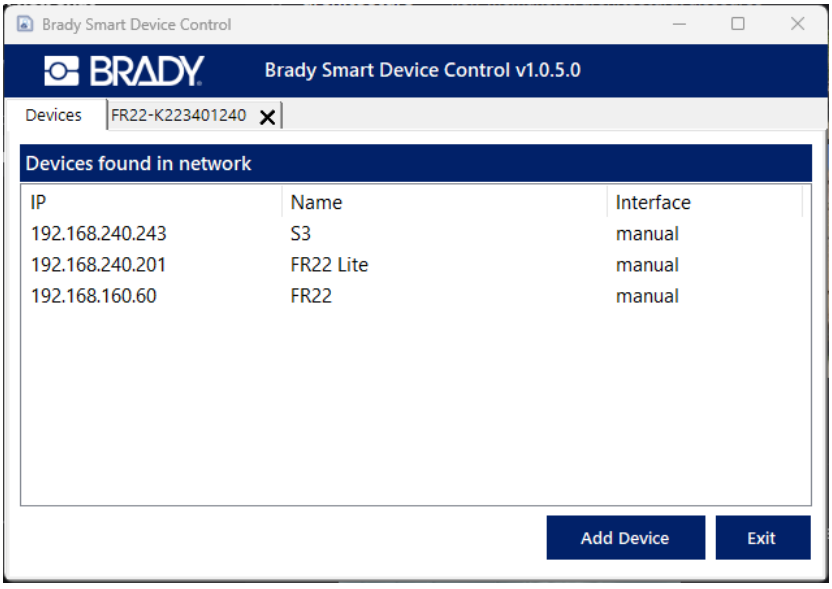


Figure 4-3. Brady Smart Device Control

Nordic ID FR Application Signing Tool

To provide more security for the software platform, ZIP-files for applications that run directly on the Brady FR22 need to be signed with the FR Application Signing Tool. The tool can be used to sign pre-built ZIP-files, or to create and sign new ZIP files. The public key generated for the ZIP-file will be then verified against the list of files when installing the ZIP-file on the reader. This makes sure that only valid content from the file can be installed.

The Nordic ID FR Application Signing Tool can be downloaded from GitHub.

Keyboard Wedge

The Keyboard Wedge software enables you to read tags and feed the tag data into an active input field, emulating keyboard input. This allows you to integrate the Brady FR22 with third-party applications that support manual input or barcode scanners, such as word processors, spreadsheets, web forms or even an existing ERP.

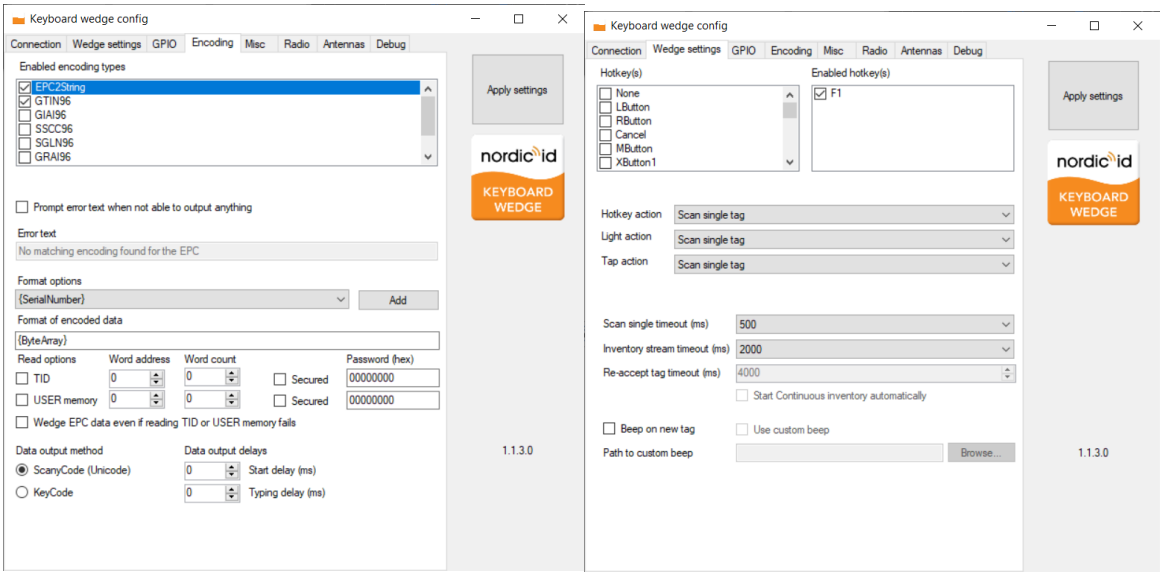


Figure 4-4. Keyboard Wedge

5 Web Management Interface

The Brady FR22 comes with a web management interface which can be accessed with a web browser. The web user interface has a responsive design, which makes it fully usable from web browsers in computers, tablets, and smartphones.

The Brady FR22 web management interface is used for:

- Applications and plugins management
- System health monitoring
- System logs
- Hardware settings
- RFID configuration
- Network configuration
- Firmware update
- Access management
- Application management
- Configure public web user interface (application, admin, web page, display...)
- Factory reset

Logging In

Although the Brady FR22 can be connected via USB, the built-in administrator web interface can only be accessed via network connections, i.e., Ethernet, WLAN or LTE.

Therefore, it is important to make sure that the network interfaces are configured to be used as expected. By default, all the network interfaces are set to DHCP mode, and the MAC address of each interface is indicated on the printed product label. This will help to find the Brady FR22 in the DHCP table of the network router or modem.

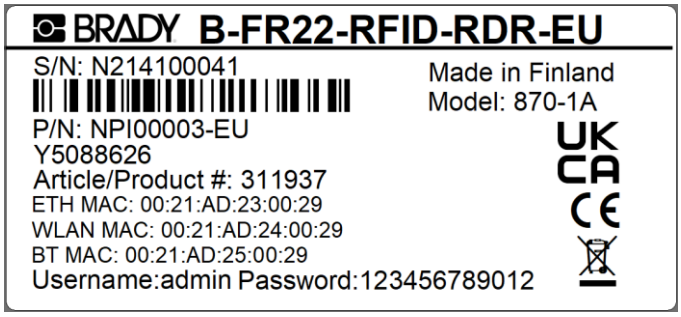


Figure 5-1. Brady FR22 product label

The Brady Smart Device Control software can also discover Brady RFID devices on your network and show their IP address.

Once the IP address of the Brady FR22 is known, typing it in the address bar of a web browser will open the log in screen of the web UI

If the network and host device support it, the connection can also be established typing the Brady FR22's hostname in the address bar of a web browser. The default hostname for FR22 is:

fr22-*serialnumber*

For example, the device in Figure 5-1. Brady FR22 can be accessed via the url https://fr22-n214100041/

Note: A security alert will pop up on the browser the first time that you connect to the device, as the connection is forced to be secure. This alert will disappear as soon as you install a certificate on your device (see Network Settings).

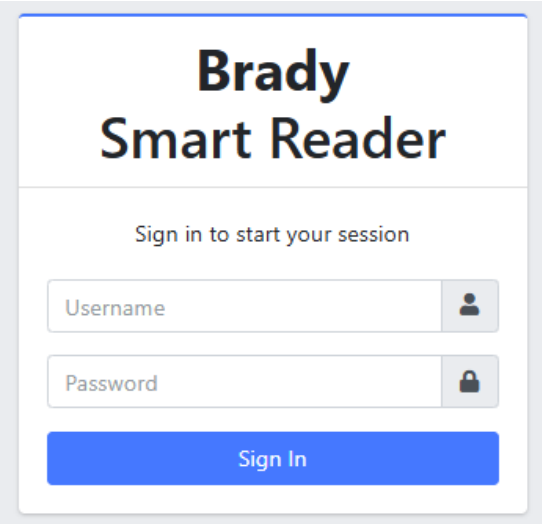


Figure 5-2. Web UI log in

The default username ("admin") and password are printed on the product label attached to the back side of the device. An extra copy of the product label is included inside the box for your device, so you can keep this important information visible in case the Brady FR22 is mounted in a way that covers the label.

Side Menu

The Brady FR22 web UI displays a side navigation menu to access all the different available options to manage the device. The menu pane can also be hidden if wanted.

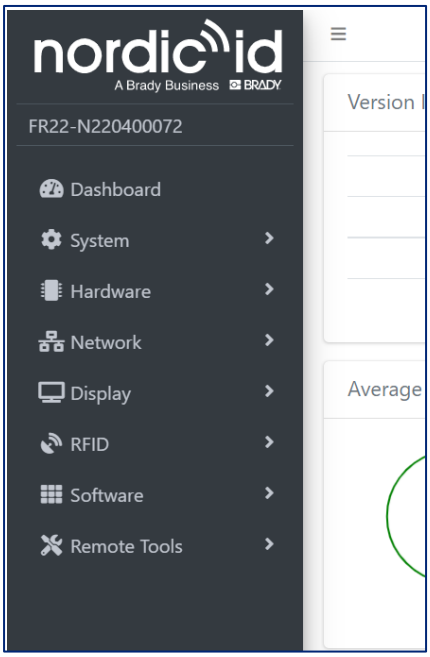


Figure 5-3. Web UI side menu

There are also six icons always accessible on the top right corner of the screen, to:

- Download debug logs
- View notification messages
- Open the current frame in a new window
- Reboot the device
- Toggle full screen mode
- Logout

Figure 5-4. Icons in the Web UI

Dashboard

The default landing page is the dashboard, where you can see the system status and health monitor in real time. Visually, green metrics indicate that the device is behaving as expected. Red metrics would require immediate action on the physical device, environment, or software applications to solve the issues.

This page is shown every time you connect to the device web UI, but you can configure any other page or application to be shown by default instead of the dashboard, as described in System Menu.

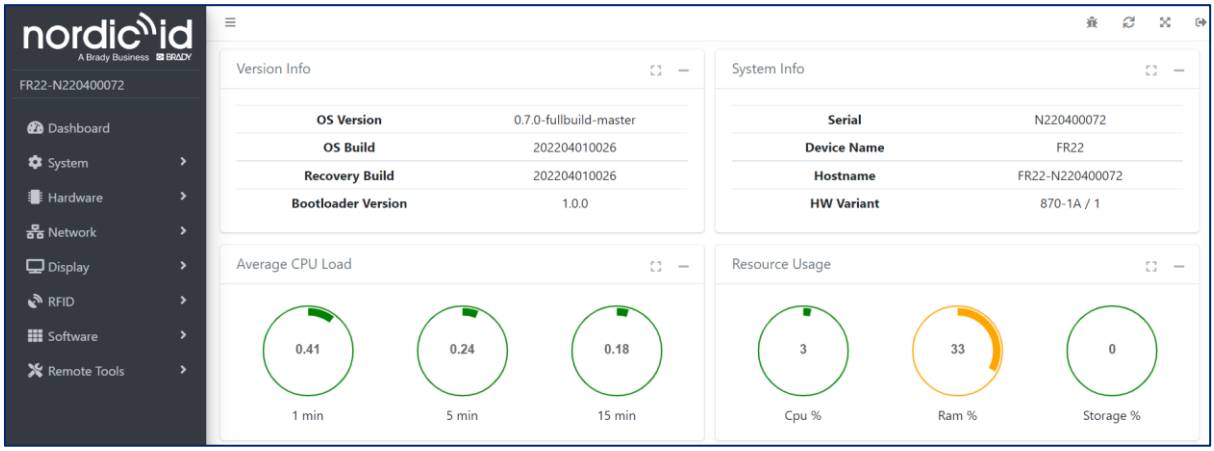


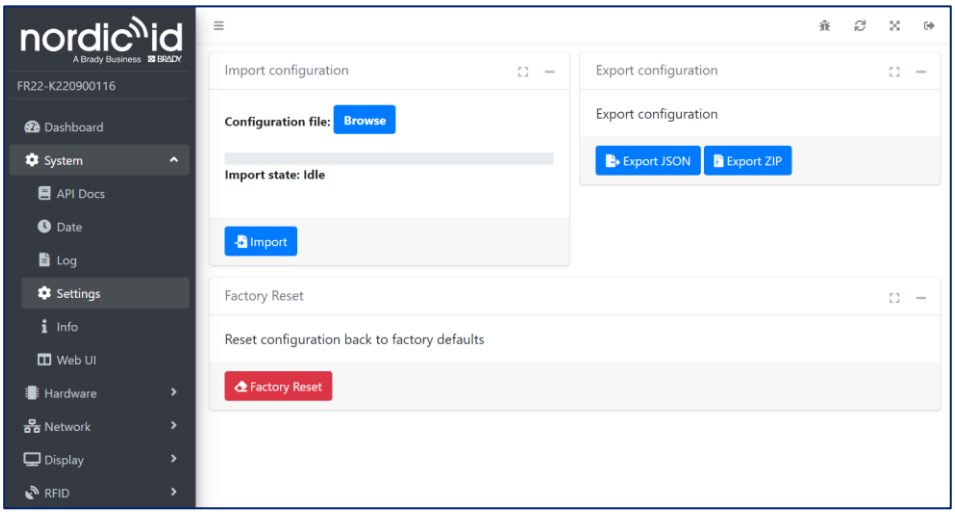
Figure 5-5. Web UI dashboard

System Menu

The system menu has six sections, mostly intended for developers.

- **API docs**
  - Describes the functions of the system APIs to control the reader.
- **Date**
  - Shows the current system time and allows adjusting the date and time settings.
  - Date and time can be adjusted manually or automatically using NTP servers.
  - Time zone must be set manually.
- **Log**
  - Shows the logged events and allow to download them for debug purposes.
  - Events can be filtered by severity and application/service (started by user, Nordic ID or system) that created the event.

- **Settings**
  - The settings in the Brady FR22 can be exported to a file, which can later be imported in the same or another Brady FR22 unit to apply the same settings. This enables an easy mass configuration and roll out of Brady FR22 devices.
  - Allows you to factory reset the device.

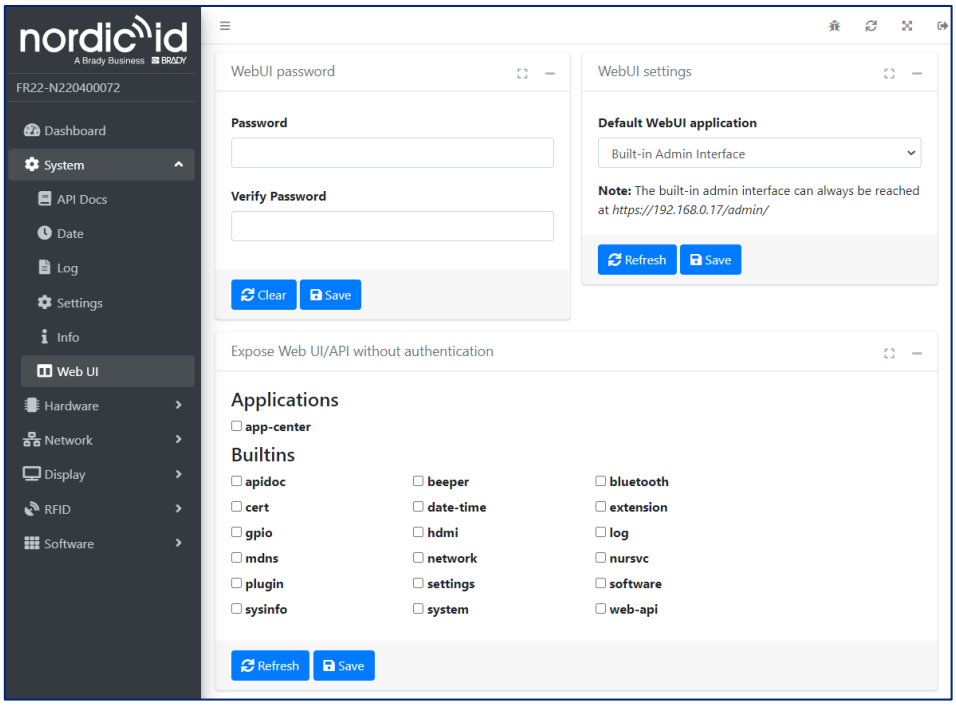


- **Info**
  - Contains more detailed information about the data shown in the dashboard page: hardware versions, software versions and performance metrics.
  - Shows persistent hardware parameters such as device variant, serial number or MAC addresses.
- **Web UI**
  - Allows you to set a password for accessing the administrator web UI. The default password is printed in the product label on the device and on its package, and the administrator username is always “admin”.
  - You can set the default landing page (when accessing *https://{device_IP}*) for the web UI. By default, the landing page of the web UI is the dashboard of the administrator interface, but it can be any installed application, plugin page, or settings page.

    The built-in administrator interface can always be reached at *https://{device_IP}/admin/*, even after changing the default landing page.
  - The administrator web UI always prompts for username and password. If you want to bypass authentication when accessing the landing page, you can select the applications, plugins or pages that are exposed without requiring authentication.

CAUTION!

Exposing administrator pages can result in users making unwanted changes to your device settings.



Hardware Settings

This section includes all the configuration parameters related to the Brady FR22 device.

- Beeper
  - Internal (and external, if available) beeper can be enabled / disabled.
  - It's possible to test the beeper with a certain frequency and duration, and also to test all frequencies.
- Bluetooth
  - Bluetooth can be enabled/disabled and Bluetooth device name can be set.
  - This screen also shows the list of detected Bluetooth devices nearby and allows pairing with them.
  - Supported Bluetooth profiles:
    - Classic – SPP and HID
    - BLE – HID
  - When pairing is made with a device that exposes a serial port profile service, the Brady FR22 will automatically bind the port into **/dev/rfcomm***. From there it can be accessed / used by the third-party applications. The lowest free rfcomm number is taken and reserved for the paired device (until pairing is removed).

- Extension
  - The Brady FR22 has an exclusive Extension Port, that can be enabled to connect external modules or accessories such as the 16 port multiplexer or a beamforming antenna.
  - This page enables managing the connected accessory: update firmware and check the module version and status.
- GNSS (only in LTE variant)
  - Here you can configure the GNSS (Global Navigation Satellite System).
  - This page also shows information about positioning and visible satellites.
- GPIO
  - There are 4 GPIOs in the mini-IO port in Brady FR22.
  - The mini-IO port can be enabled and disabled, and also each GPIO can be configured as input or output (with default state high or low)
  - If a connected external module has GPIOs, they can also be configured in this screen.
  - This screen also shows the current state of each GPIO and allows changing it.
- USB
  - There are 3 USB ports on the Brady FR22:
  - 2 USB-A host ports that can be enabled or disabled.
  - 1 USB-C port to connect the Brady FR22 to a host. The available modes are:
    - “NUR serial”, to communicate with the device using the Nordic ID NUR API. Default baud rate 1Mbps
    - “Serial console”, to access the console interface for e.g., debug purposes. Default baud rate 115200bps.

Network Settings

Because the administrator Web UI is accessible only by network connection, you must configure the network settings before using the Brady FR22.

There are three network **interfaces** in the Brady FR22: LAN (Ethernet), WLAN (Wi-Fi) and LTE (Modem). These can be enabled and disabled in this screen, as well as their network parameters: DHCP mode, IP address, gateway, and DNS.

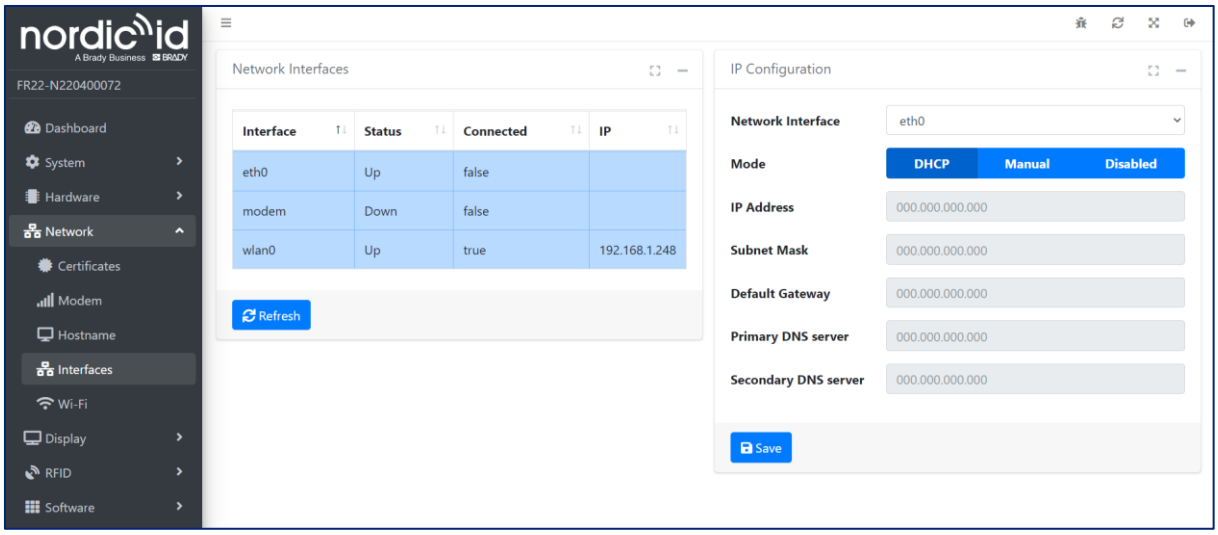


Figure 5-6. Network settings screen

There is a section to scan for WLAN networks and add the network to be used to the list of saved networks entering its SSID and password.

To increase the security of the network connection with the Brady FR22 and avoid security warnings, you can install your own web server certificates in this section.

Figure 5-7. Security warning

The web server certificates and SSH public keys can also be exported from this screen.

The network settings also allow you to change the hostname of the Brady FR22 device, so that you can conveniently access it using its hostname instead of its IP address.

VPN

If you have installed the OpenVPN plugin from the App Center, its settings are in the Network Settings menu.

OpenVPN is a robust and highly flexible tunneling application to enable the configuration of a virtual private network on the Brady FR22. The VPN extends a private network across a public network and enables users to send and receive data across shared or public networks (e.g. Internet) as if their computing devices were directly connected to the private network (e.g., the local company LAN).

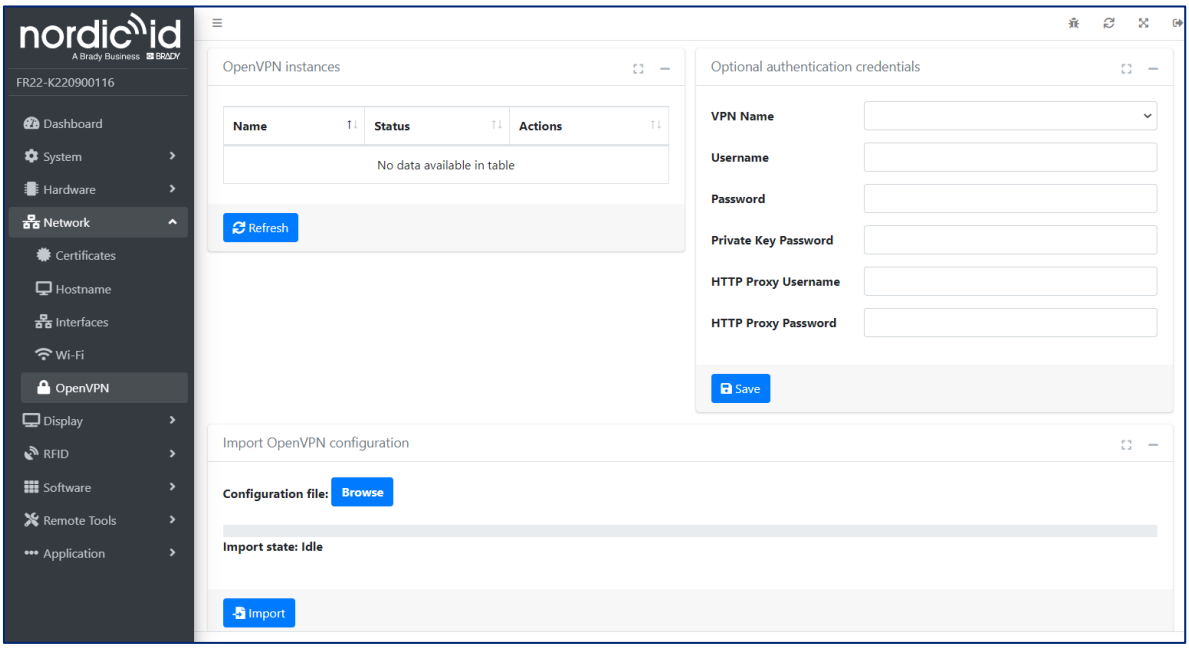


Figure 5-8. OpenVPN configuration

Display Settings

The Brady FR22 also includes an HDMI connector with video output to connect a display.

Here you can enable/disable the HDMI port and configure the resolution and rotation (if any) of the display.

The supported resolutions are 1280x720 and 640x480.

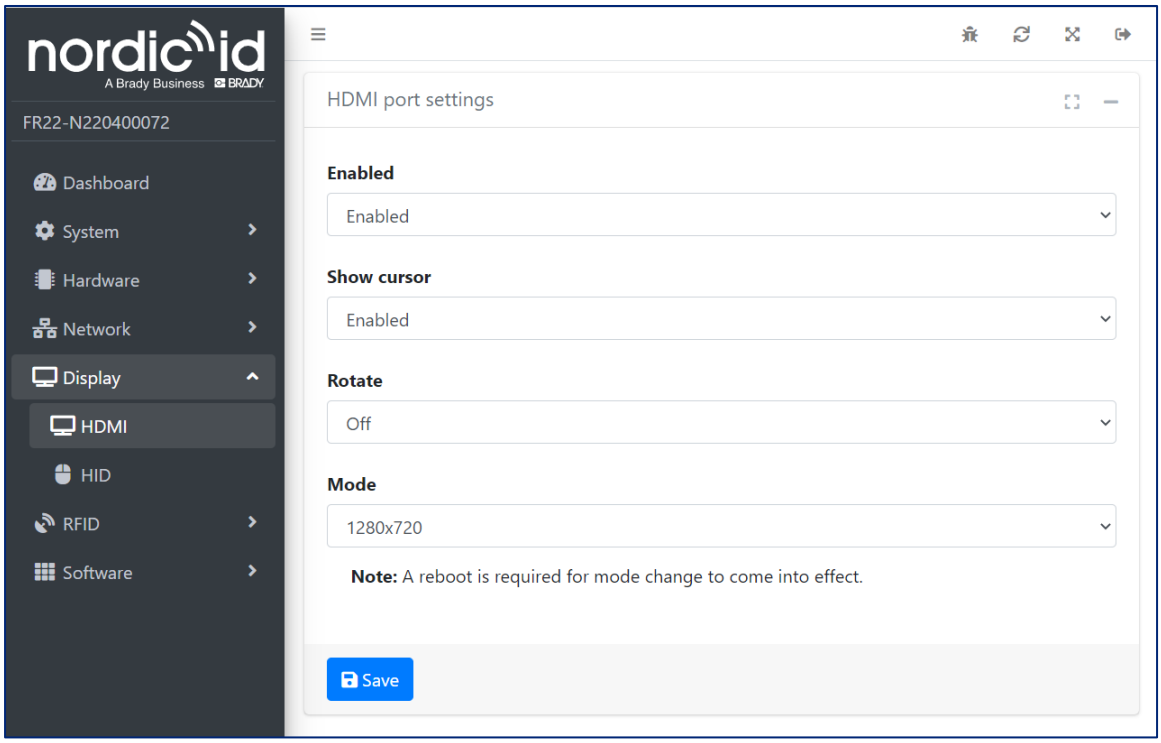


Figure 5-9. HDMI port settings

HID devices such as a keyboard, a mouse or the touch function of a touchscreen can be connected to the Brady FR22 via USB or Bluetooth.

Here you can configure the touch input settings, the keyboard layout and show or hide the cursor.

Web Browser

If you have installed the Chromium web browser from the App Center, its settings are in the Display Settings menu.

You can set the web browser as the landing page on the device and have it display a local web page or any URL on the Internet, e.g., a floor map, statistics and reports, a video, product information, a form, or your own custom web page.

You can also select whether users interact through the browser interface or kiosk mode (where the user can only interact with a selected page, without access to the browser interface).

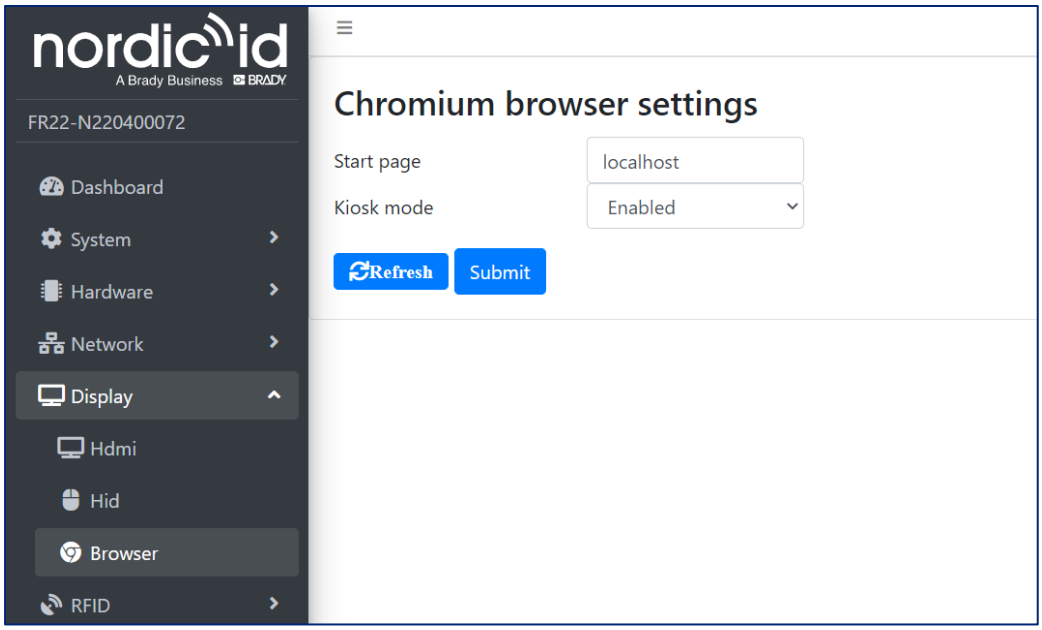


Figure 5-10. Chromium browser settings

RFID Settings

The RFID section on the web UI allows changing connection settings to the internal RFID NUR module and all the RFID parameters of the reader:

- Q: auto, 1, 2 ... 15
- Rounds: auto, 1, 2 10
- Session: 0, 1, 2, 3
- Target: A, B, dual
- Tx level: 1dBm / 1mW - 30dBm / 1000mW (30 steps of 1dBm)
- RX Sensitivity: nominal, low, high
- RF Profile: nominal, robust, high speed, high speed 2, fast (see RF Profiles)
- Power saving mode: off, 100ms, 500ms, 1000ms
- Active antennas
- Selected antenna: auto or specific antenna
- RSSI filters: min / max for read / write / inventory
- Timeouts for different commands (read, write, kill, lock)
- Channel hopping event: enabled or disabled
- Report Zero Count Inventory: enabled or disabled

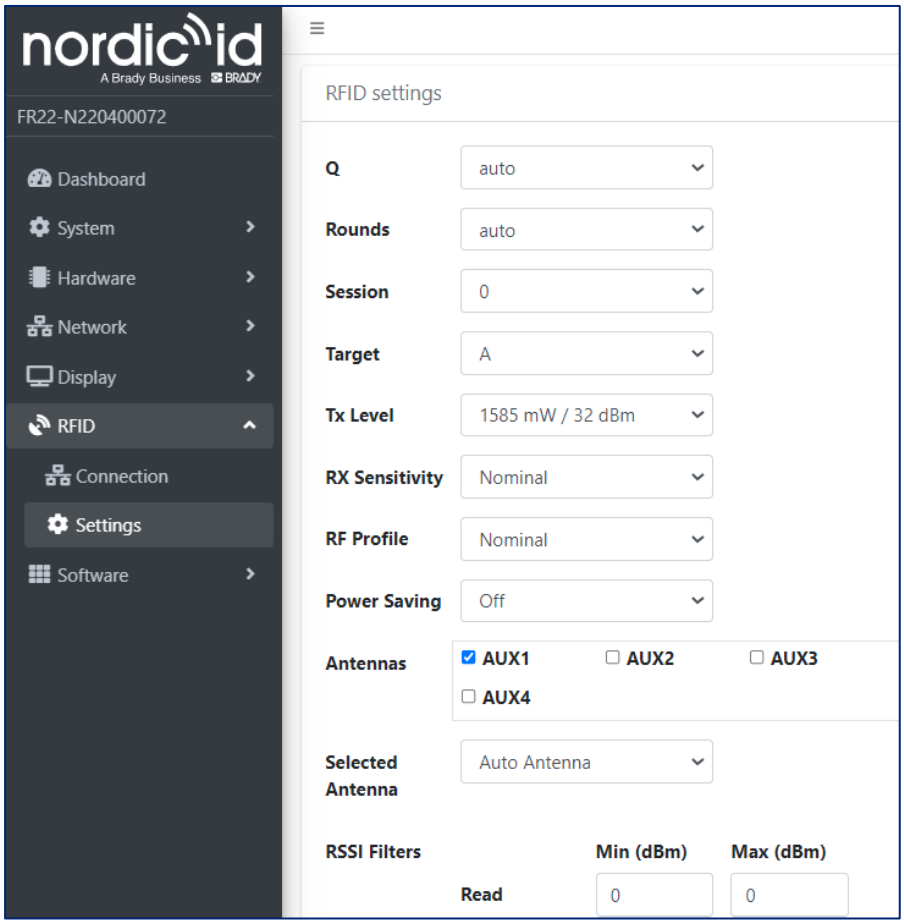


Figure 5-11. RFID settings screen

To test the RFID functionality of the Brady FR22 without an external host, you can run and install the RFID Sample application available from the App Center on the device.

Software Settings

The features in the Software menu include updating the system software on the device and managing applications and plugins.

Plugins

On the Brady FR22, a plugin is a service that runs internally on the device to enable specific additional features.

For example, the RFID functionality is a system plugin (named “nur3”) that is installed by default, and it cannot be removed. Other available plugins are a media player (API for playing video files) and C# runtime engine (Mono).

You can manually install other plugins (or other versions of installed plugins) and uninstall the installed plugins using this interface.

Note: The RFID module is considered a plugin, so RFID firmware updates are treated as plugin updates.

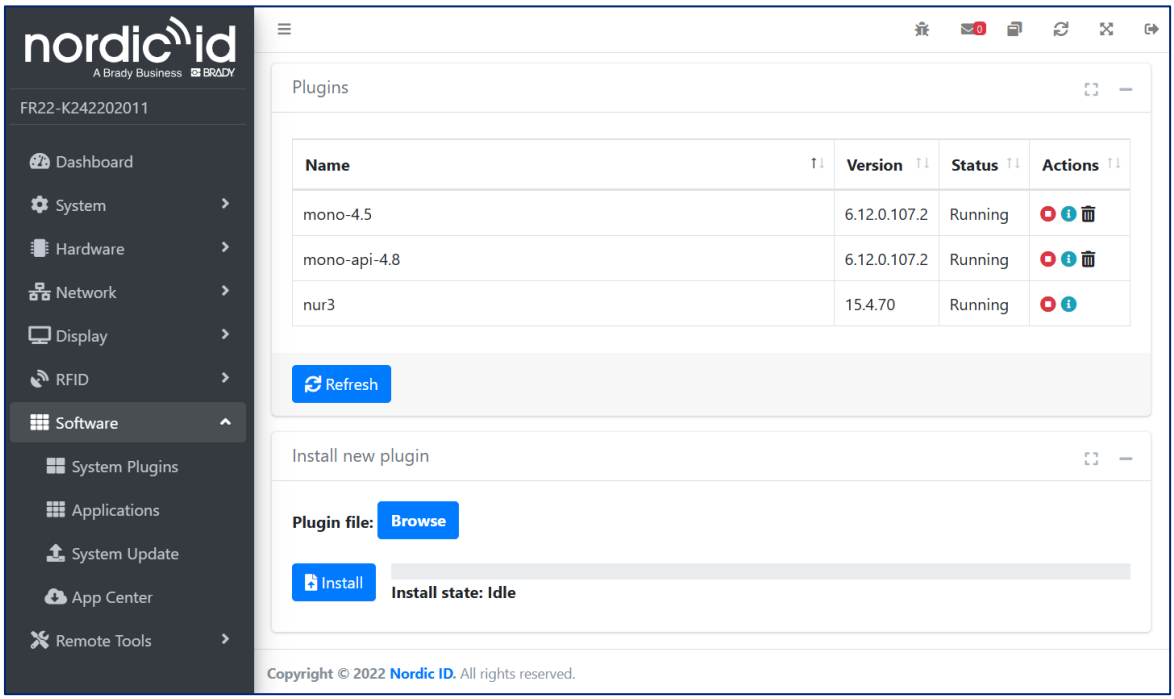


Figure 5-12. System Plugins screen

Apps

An application in Brady FR22 can be any application that you develop for your customers, or applications provided by Nordic ID to help during your development and implementation process.

Not all the applications have a user interface. For example, an application can just read the data from RFID tags, consolidate it, add additional information such as location or timestamp, and send it to a server in the cloud.

Other applications do have an interface. For example, the Web Browser, SSH terminal, or remote desktop app. For more information, see Web Browser and Remote Tools.

For information about developing your own apps for the Brady FR22, see Application Development.

App Center

The App Center provides a curated repository of apps and plugins for the Brady FR22. It allows you to easily install and update them.

Administrators have full control of the available repositories and can add new ones to extend the number of available apps.

Advanced users and developers can also create their own app repository and upload their own apps, to make them accessible and distribute updates. Firmware updates can be included in this repository as plugins, in case you require specific versions instead of the latest version.

Note: Although the App Center provides updated versions of installed apps or firmware, you must install them manually. If you want to implement automatic updates or installations, you must use a third-party MDM/EMM (Mobile Device Management / Enterprise Mobility Management) platform. For more information, see Remote Tools.

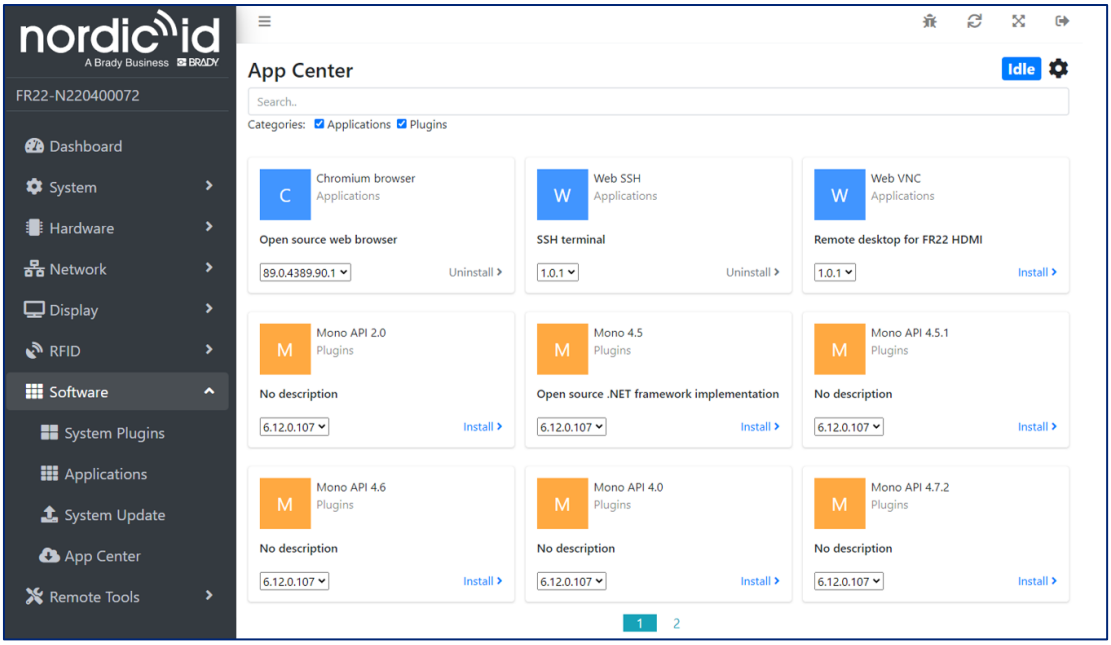
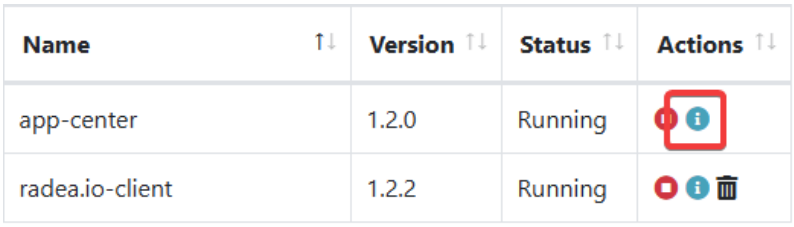


Figure 5-13. App Center

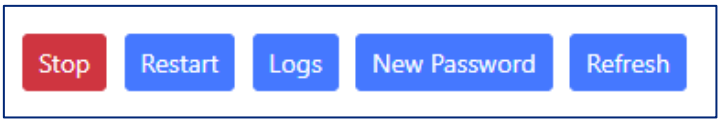
App and Plugin-Specific Credentials

Some applications or plugins need credentials to function properly. In this situation you can create an application specific password from the System Plugins or Applications screen.

1. Find the application or plugin that you need credentials for and click the “Show info” icon.



2. Click “New Password”.



A message appears with the username and the new password. In the following example, the username is the internal app or plugin name (e.g., *app-webssh*) and the password is generated randomly (e.g. *W9a4hPlmCsxbF*).

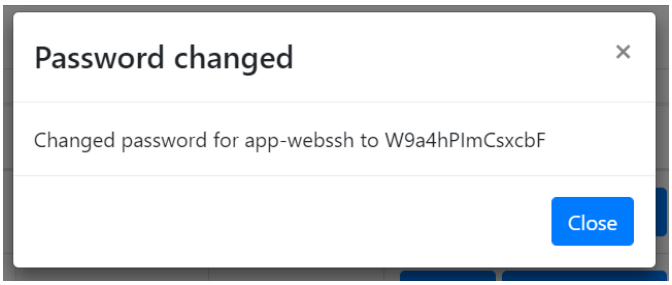


Figure 5-14. Generated application-specific password'

Remote Tools

Several developer tools (applications) available in the App Center can be installed on the Brady FR22 to facilitate debugging and remote management:

- **SSH** allows you to open a secure terminal connection with the local machine and access the command prompt without using telnet software via a PC on the network.
  You need an app-specific password to use the console. For more information, see App and Plugin-Specific Credentials.

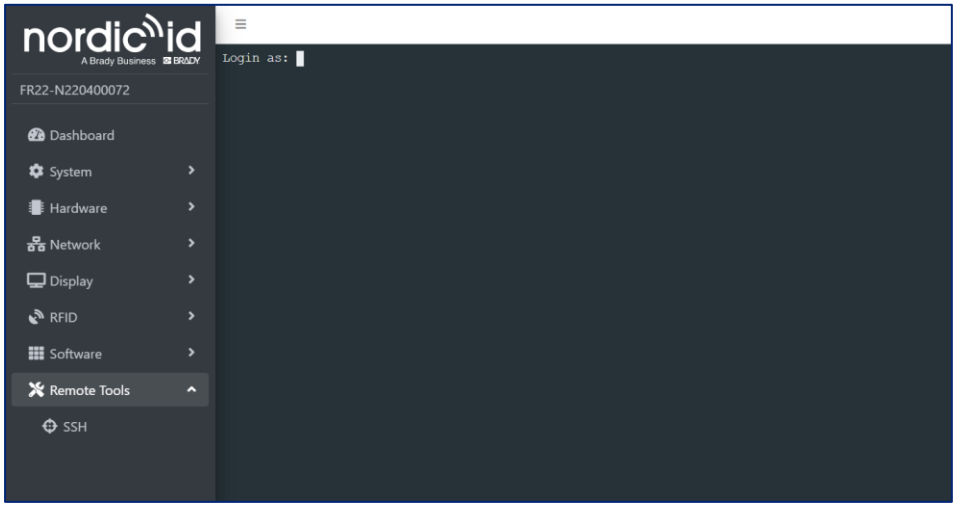


Figure 5-15. Terminal console

- **VNC** is a remote desktop application that allows you to see the output of the HDMI port. This means that, if a display is connected to the Brady FR22, you can remotely see exactly what the user is seeing on the display in real time.
- **SOTI MobiControl™** is an Enterprise Mobility Management (EMM) solution created by SOTI that gives you visibility and control over where the Brady FR22 devices are, what they are doing, how they are performing, and what security or compliance risks they are facing. Remote installation and update for applications and plugins can be performed using this tool.

  Note: A valid SOTI license is required for each FR22 device you want to manage with this tool.

6 Application Development

Nordic ID by Brady has developed the NUR API (Nordic ID Universal RFID Application Programming Interface) to facilitate communication between RFID readers and software applications that manage data collected from RFID tags. The API is designed to be flexible and easy to integrate.

Developers can make use of the NUR API Software Development Kit (SDK) and sample code on GitHub to develop their own applications that implement features supported by the Brady FR22.

NUR API Architecture

The NUR API architecture consists of the following layers: application, NUR API, transport, and hardware.

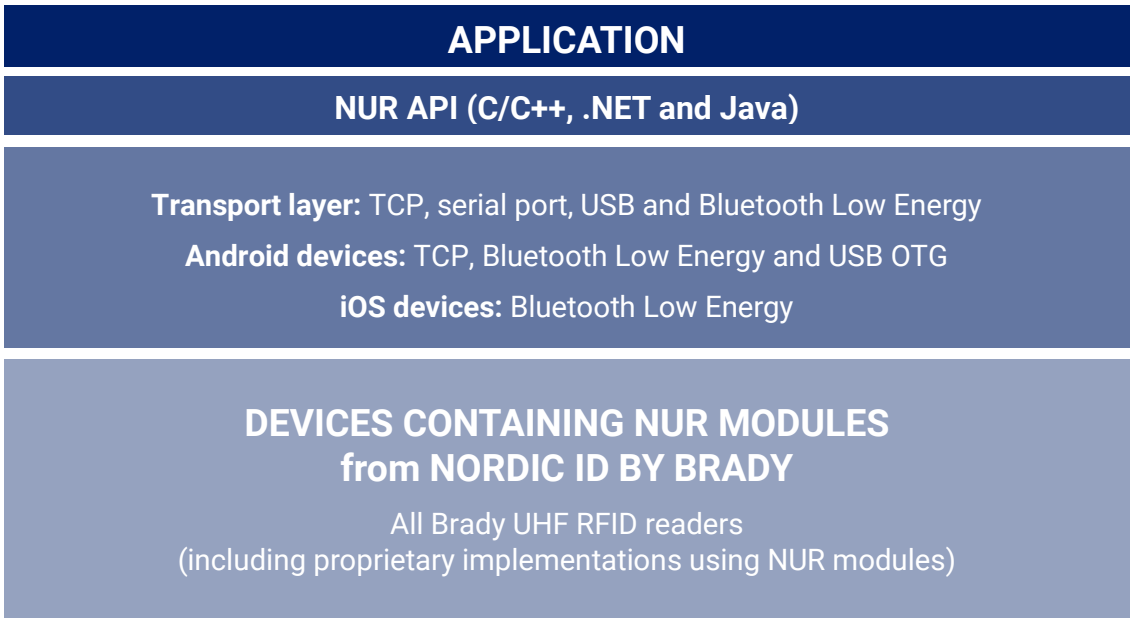


Figure 6-1. NUR API architecture layers

Developer Resources

Source code and sample projects related to the Brady FR22 can be found in the following GitHub repository:

https://github.com/NordicID/fr22_samples

A Regulatory Compliance

Regional Settings

Regional regulatory agencies such as ETSI and FCC have defined rules and requirements for UHF RFID readers, which specify the operating frequencies, output power, and other RF parameters that are permitted.

Brady UHF RFID readers support the operating frequency range 860 – 960 MHz. Some readers cover the full operating frequency band, while others support two sub bands: 868 ETSI band (865.6 - 867.6 MHz) and 915 FCC band (902 – 928 MHz).

To ensure that Brady products comply with local regulations throughout their lifespan, devices with UHF RFID functionality are locked to predefined regional settings based on the region to which it is sold. For example, if a device is sold to a customer in Europe, its settings are configured and locked to the ETSI requirements. Similarly, if the device is sold to a customer in Australia, it is locked to the settings required in Australia.

CE

Hereby, Nordic ID, a Brady Company, declares that this device is in compliance with the essential requirements and other relevant provisions of:

- RED: 2014/53/EU
- EMC: 2014/30/EU
- LVD: 2014/35/EU
- RoHS: 2011/65/EU

FCC/IC

The Brady FR22 device complies with Part 15 of the FCC Rules. Operation is subject to the following 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.

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

The Brady FR22 device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

(1) This device may not cause interference.

(2) This device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur/récepteur exempt de licence contenu dans le resent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

1) L'appareil ne doit pas produire de brouillage;

2) L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

RF Exposure

This equipment complies with EU, FCC and IC's RF radiation exposure limits set forth for an uncontrolled environment under the following conditions:

The Brady FR22 device should be installed and operated such that a minimum separation distance of 20mm is maintained between the antenna and user's/nearby person's body at all times.

Brady FR22 doit être installé et utilisé de manière à ce qu'une distance de séparation minimale de 20 mm soit maintenue à tout moment entre l'antenne et le corps de l'utilisateur / de la personne proche.

B Related Documents and Content

- Brady FR22 datasheet
- Safety and Regulations Guide
- GitHub organization for developers (https://github.com/NordicID)

C Document Version History

VERSION	DATE	CHANGES
0.1	21.06.2021	Initial draft
0.2	20.08.2021	Updated pictures and list of accessories
0.3	05.01.2022	New SMA-RP cables, added pictures of accessories, kits and compliance statements
0.4	18.03.2022	Web user interface explained, updated LED behaviour, reset button and added mounting template
1.0	01.04.2022	Updated screenshots, added GNSS in web UI.
1.1	25.07.2022	GPIO connector pin-out, new apps (VPN, SOTI™, RFID test), export settings functionality, updated screenshots
1.2	03.10.2025	Firmware v1.5. Additional RF profiles, new apps/plugins UI, Brady-branded graphics and document template.