

RMMS V4

Installation and User

Manual

REMOTE MAGNET MONITORING SYSTEM for
GE MAGNETS ONLY



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1.INTRODUCTION

1.1 Purpose of the Manual:

1.1.1 This manual provides comprehensive instructions for the hardware installation, network configuration, and daily operation of the Remote Magnet Monitoring System V4 (RMMS V4). It is intended for field service engineers, IT administrators, and facility managers responsible for maintaining MRI equipment.

1.2 Product Overview:

1.2.1 Designed and manufactured by ECHO Magnet Services B.V., the RMMS V4 is an advanced, standalone telemetry device built specifically for GE Magnets. The unit seamlessly interfaces with the existing GE Magnet Monitor (MagMon) by safely intercepting the OEM sensor cables connected to the J7, J8, J9, and J10 ports. This plug-and-play architecture allows for continuous remote tracking of critical magnet health metrics without interfering with the original equipment's standard operation.

1.3 Key Features:

1.3.1 The RMMS V4 ensures maximum uptime and safety for your MRI system through the following capabilities:

1.3.2 Comprehensive real-time monitoring of Helium Level, Magnet Pressure, Water Flow, Water Temperature, and Compressor Status.

1.3.3 Flexible network connectivity, supporting both wired Ethernet and wireless Wi-Fi configurations.

1.3.4 Cloud-based monitoring via the Blynk IoT platform, offering secure access to live dashboards and historical trend graphs from any web browser or mobile device.

1.3.5 An automated alerting system that instantly dispatches detailed email alerts and mobile push notifications during critical events, such as pressure fluctuations or compressor failures.

1.3.6 Proactive offline tracking that notifies the user if the device loses power or internet connectivity.

1.3.7 Automated routine status reports sent every 24 hours during normal operation, or every 1 hour if the compressor remains OFF.

1.3.8 A dedicated RMMS V4 User Interface for automatic device connection, initial system configuration, sensor calibration and live data access.

2.SPECIFICATIONS

2.1 Mechanical and Electrical Specifications:

Parameter	Specification
Dimensions	Height: 133.15 mm Width: 96.9 mm Depth: 91 mm
Mounting	4-slot keyhole wall-mount; mounts next to the GE Magnet Monitor.
Power Supply Adapter Input	100-240VAC, 50/60Hz, Universal
Operating Voltage	5V DC
Power Connection	Dedicated 5V DC barrel jack located on the bottom panel.
Indicators & Controls	Two red LEDs (Data/Network, Power) and a physical reset button.

2.2 Communication and Compatibility:

Parameter	Specification
Compatibility	Designed exclusively for GE Magnet Monitors via J7, J8, J9, and J10 ports.
Network Connectivity	Standard RJ45 Ethernet and built-in Wi-Fi module.
Diagnostic Port	Type C Host port (Baud Rate: 9600, Data bits: 8, Parity: None, Stop bit: 1).
Cloud Platform	Blynk IoT Server (Firmware updates supported via OTA).

2.3 Monitored Parameters

2.3.1 The RMMS V4 continuously reads, calculates, and reports the following system metrics:

- Helium Level (%)
- Magnet Pressure (psi)
- Compressor Status (ON/OFF)
- Water Flow (L/min)
- Water Temperature (C)
- Room Temperature (C)
- Room Humidity (%RH)

3.HARDWARE INSTALLATION

3.1 Cable Disconnection:

3.1.1 Locate the OEM cables connected to ports J7, J8, J9, and J10 on the right side of the GE Magnet Monitor (MagMon).

3.1.2 Carefully note the original position and labeling of each cable for reference.

3.1.3 Gently disconnect the cables from their respective ports on the Magnet Monitor.

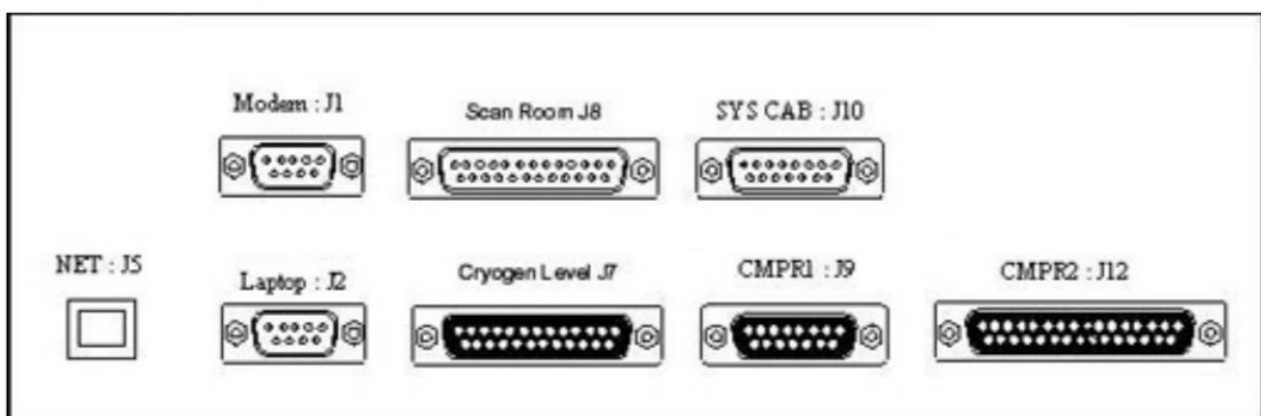


Illustration 3.1 Magnet Monitor right panel connector locations.

3.2 Mounting Position and Wall Preparation:

3.2.1 RMMS V4 uses a 4-slot keyhole wall-mount design to secure the unit and prevent mechanical stress on the connector pins.

3.2.2 Align the RMMS V4 next to the GE Magnet Monitor to determine the exact mounting position.

3.2.3 Mark and install the 4 mounting screws on the wall. Leave the screw heads slightly protruding so the module's mounting slots can slide over them to lock

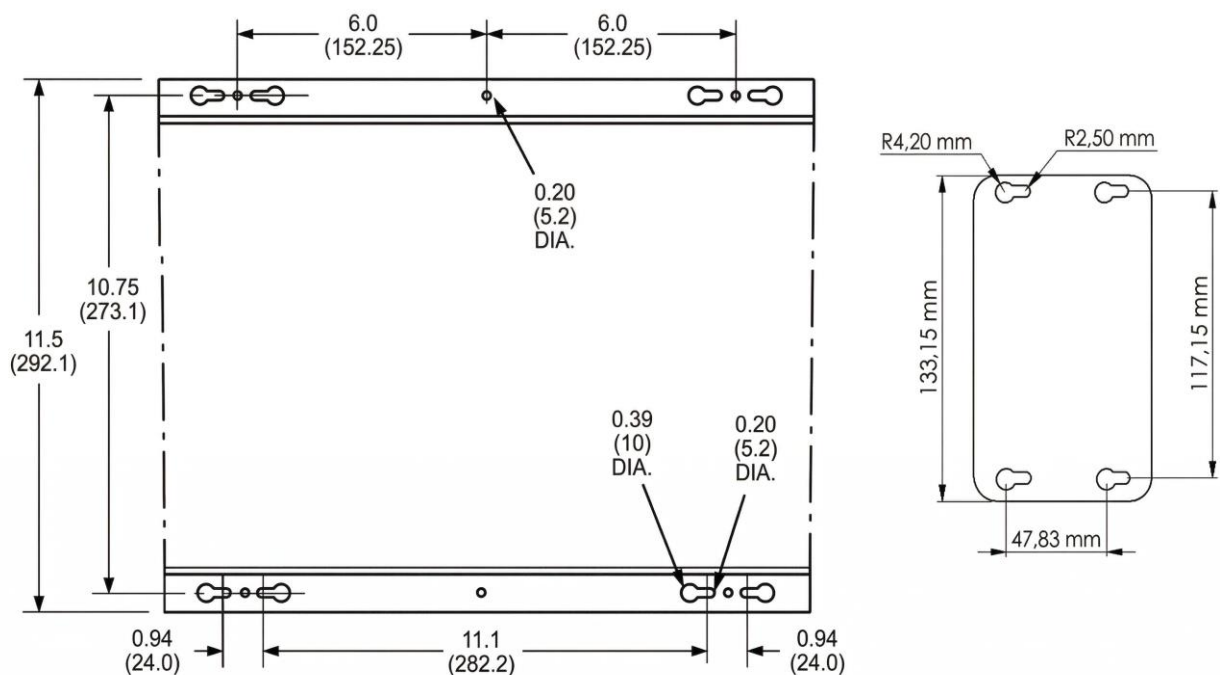


Illustration 3.2 Magnet Monitor and RMMS V4 Dimensions. MagMon dimensions in this diagram are in inches and bracketed () dimensions are in millimeters.

3.3 Unit Installation and Connector Alignment:

3.3.1 Ensure the RMMS V4 is oriented with the front panel lettering facing you.

3.3.2 Align the D-Sub connectors on the left face of the RMMS V4 with the corresponding **J7, J8, J9, and J10** ports on the Magnet Monitor.



Illustration 3.3 Side-by-side view of the Magnet Monitor (right side) and the RMMS V4 (left side)

3.3.3 Position the wide section of the RMMS keyhole slots over the pre-installed wall screws.

3.3.4 Push the RMMS V4 toward the Magnet Monitor while simultaneously sliding it onto the screws. Ensure that the ports seat firmly and completely into their connectors as the unit slides into its locked position on the wall screws.

3. 4 Power Up and Cable Connections:

3. 4.1 The left panel of the RMMS V4 features the same port layout and naming conventions as the GE Magnet Monitor (MagMon).



Illustration 3.4 RMMS V4 right panel.

3.4.2 Reconnect the OEM cables—previously disconnected from the MagMon—to the corresponding ports on the left panel of the RMMS V4, maintaining the original sequence.



Illustration 3.5 Example photograph showing the finalized mechanical assembly, with the RMMS V4 securely mounted and interconnected with the Magnet Monitor.

Note for Illustration 3.5: The J10 SYS CAB cable is not depicted. If this connection was present in the original OEM configuration, reconnecting it to the RMMS V4 is mandatory.

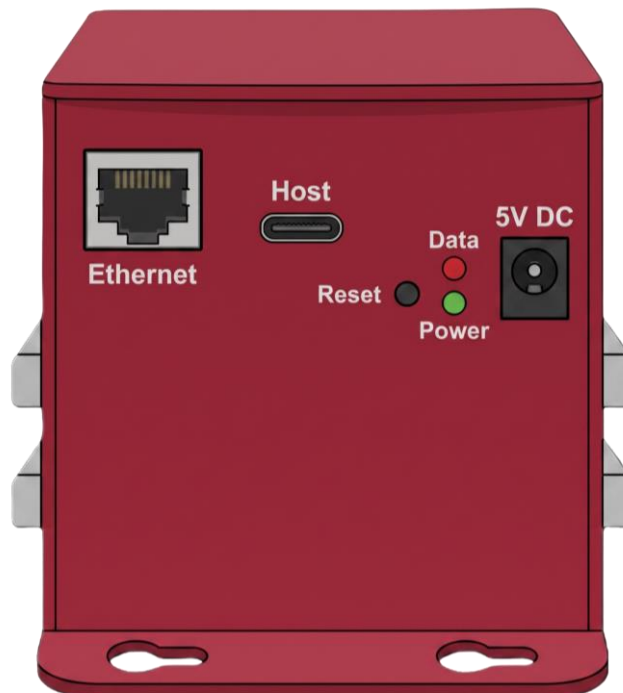


Illustration 3.6 Bottom Panel of the RMMS V4

3.4.3 Ensure a power outlet is available near the Magnet Monitor.

3.4.4 Plug the 5V power adapter (included with the RMMS) into the power outlet.

3.4.5 Connect the adapter's jack to the port labeled "5V DC" located on the bottom panel of the RMMS to power up the unit.

3.4.6 If providing internet connectivity via Ethernet, plug the RJ45 network cable into the "Ethernet" port, also located on the bottom panel.

3.4.7 If providing internet connectivity via Wi-Fi, locate the port with the Wi-Fi symbol on the right panel and fasten the antenna securely by rotating it clockwise.

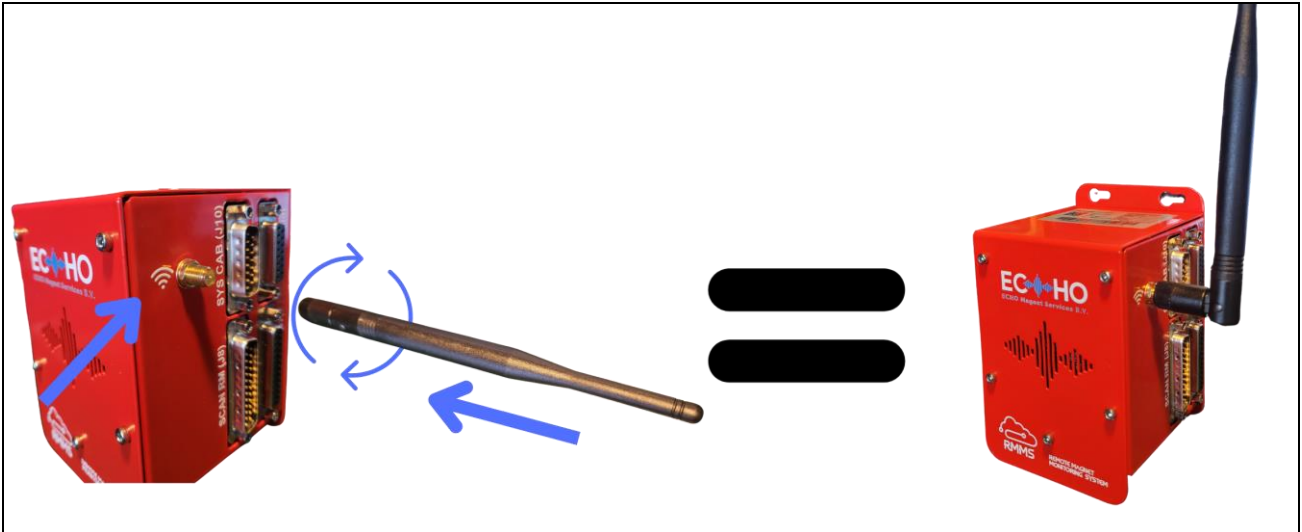


Illustration 3.7 RMMS External Antenna Installation

4. SYSTEM & NETWORK SETUP

4.1 RMMS V4 User Interface:

4.1.1 Run the program named "RMMSV4UI.exe".

4.1.2 Connect your computer with a Type C cable to the Type C port named "Host" on the bottom panel of the RMMS V4 shown in Illustration 3.6.

4.1.3 The software automatically detects and identifies the RMMS V4 and establishes the communication connection. Manual COM-port selection or serial communication configuration is not required during normal installation.

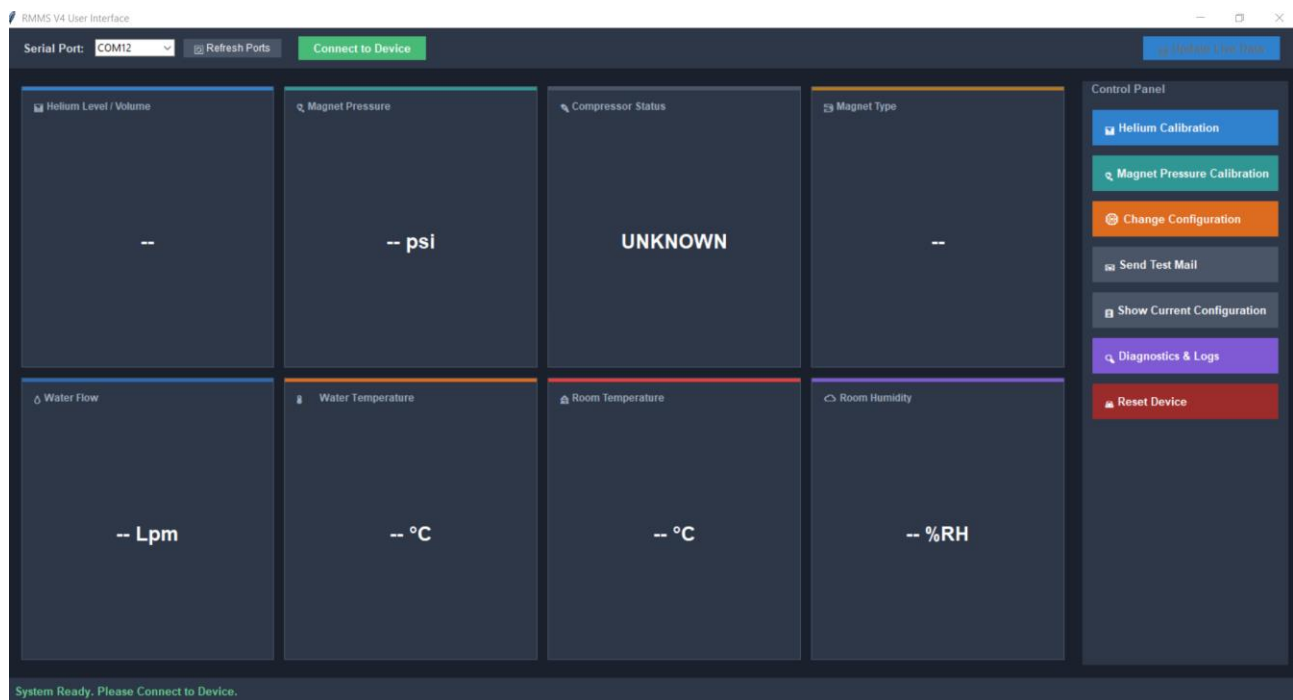


Illustration 4.1 RMMS V4 User Interface waiting for the RMMS connection.

4.2 Initial Configuration Steps:

4.2.1 When the RMMS V4 is connected for the first time without a stored configuration, the RMMS Hardware Provisioning Form will automatically open in the RMMS V4 User Interface.

4.2.2 Select your preferred connection method by selecting "W (wifi)" for Wi-Fi or "E (Ethernet)" for a wired Ethernet connection. If Wi-Fi is selected, enter the SSID and

password of the wireless network. For Ethernet option, the SSID and password fields are automatically hidden.

4.2.3 Select the Magnet Type as "1: PM Series", "2: AR Series", or "3: Other".

4.2.4 Enter the e-mail address where you wish to receive alarm notifications and routine status reports. Enter the desired High Pressure Alarm Level and Low Pressure Alarm Level. Enter a Site Name to identify the physical location of this specific RMMS V4 unit.

4.2.5 By default, DHCP Mode is enabled and the network parameters will be assigned automatically. If a Static IP configuration is required, disable DHCP Mode and enter the IP Address, Subnet Mask, Gateway IP, and DNS Server IP in the corresponding fields.

4.2.6 After all required parameters have been entered, click "UPLOAD CONFIGURATION TO DEVICE". The RMMS V4 User Interface will automatically transfer the entered configuration to the device.

The image displays two side-by-side screenshots of the RMMS V4 User Interface, specifically the 'RMMS HARDWARE PROVISIONING FORM'. Both screenshots show the 'Change Configuration' window with the 'W (wifi)' connection mode selected. The left screenshot shows the 'E (Ethernet)' mode selected, and the right screenshot shows the 'W (wifi)' mode selected. The form includes fields for connection mode, SSID, Password, Magnet Type (1: PM Series, 2: AR Series, 3: Other), e-mail address, Hi pressure alarm level (4.1), Low pressure alarm level (3.9), site name, Network Protocol (DHCP Mode checked), IP, Subnet Mask, Gateway IP, and DNS Server IP. A green button at the bottom of each form reads 'UPLOAD CONFIGURATION TO DEVICE'. The status bar at the bottom of both windows indicates 'Hardware provisioning form active...'.

Illustration 4.2 The RMMS Hardware Provisioning Form displaying Wi-Fi and Ethernet configuration modes.

4.3 Connection Verification:

4.3.1 After the configuration is uploaded, the RMMS V4 will initialize the selected network connection and attempt to connect to the Blynk cloud server..

4.3.2 The status bar at the bottom of the RMMS V4 User Interface displays the current connection status. Once the connection is successfully established, the interface will indicate that the RMMS V4 is connected to the Blynk Cloud Server.

4.4 User Account Creation and Mobile Dashboard Access:

4.4.1 After the physical installation and network configuration are complete, your organization administrator from ECHO Magnet Services will create your user profile and assign your specific RMMS V4 device to your account on the cloud server.

4.4.2 You will receive an official invitation email from the Blynk IoT platform at the e-mail address you provided.

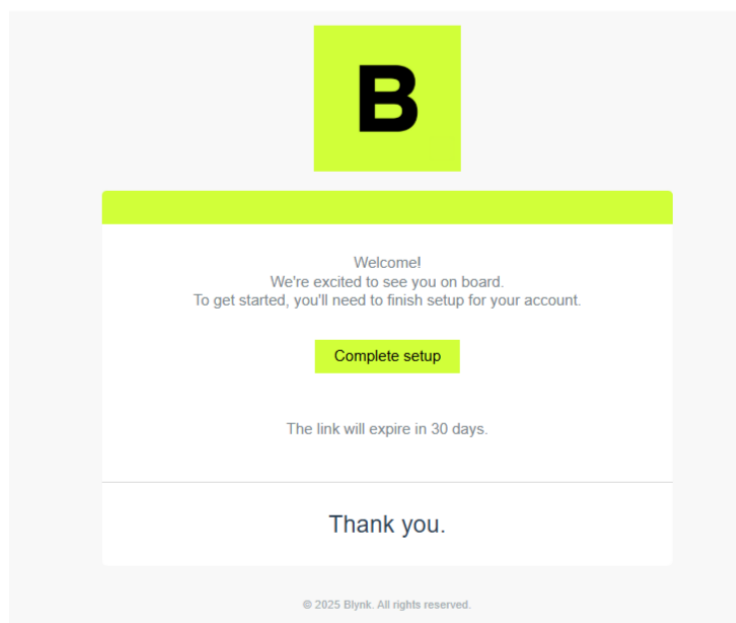


Illustration 4.3 Example of the official Blynk IoT invitation email

4.4.3 Open the email on your computer and click the provided invitation link to create your secure account password. This step activates your user profile.

4.4.4 For your initial login, it is highly recommended to use a computer. Open a web browser, navigate to blynk.cloud, and log in using your registered email address and the password you just created.

4.4.5 Upon successful login on the web console, you will see your pre-configured RMMS V4 device assigned to your account. The dashboard interface, widgets, and layout are entirely pre-set by ECHO Magnet Services, so no further configuration is required on your part.

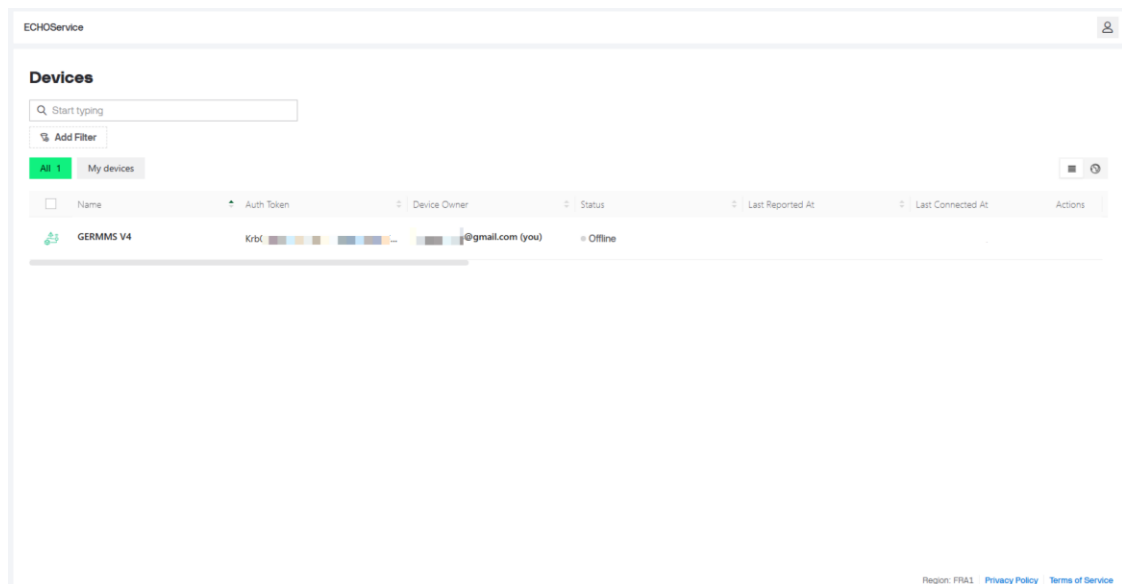


Illustration 4.4 The Blynk web console device list, displaying the pre-configured RMMS V4 unit assigned to your account.

4.4.6 Click on your device name to access the live web dashboard. Here, you can immediately monitor real-time values, check alarm statuses, and view historical graphs for Helium Level, Magnet Pressure, Compressor Status, and other crucial system metrics.

4.4.7 For mobile access, open the Apple App Store (for iOS devices) or Google Play Store (for Android devices) on your smartphone or tablet. Search for the "Blynk IoT" application, download, and install it.

4.4.8 Open the Blynk IoT mobile app, log in with the same email and password, and tap your device name to access the mobile-optimized dashboard on the go.

5.USAGE & OPERATION

5.1 Accessing the Main Terminal Interface:

5.1.1 During normal operation, the RMMS V4 User Interface displays the current Helium Level / Volume, Magnet Pressure, Compressor Status, Magnet Type, Water Flow, Water Temperature, Room Temperature, and Room Humidity.

5.1.2 To obtain the latest sensor values, click "Update Live Data". The displayed values will be automatically updated when the sensor reading process is completed.

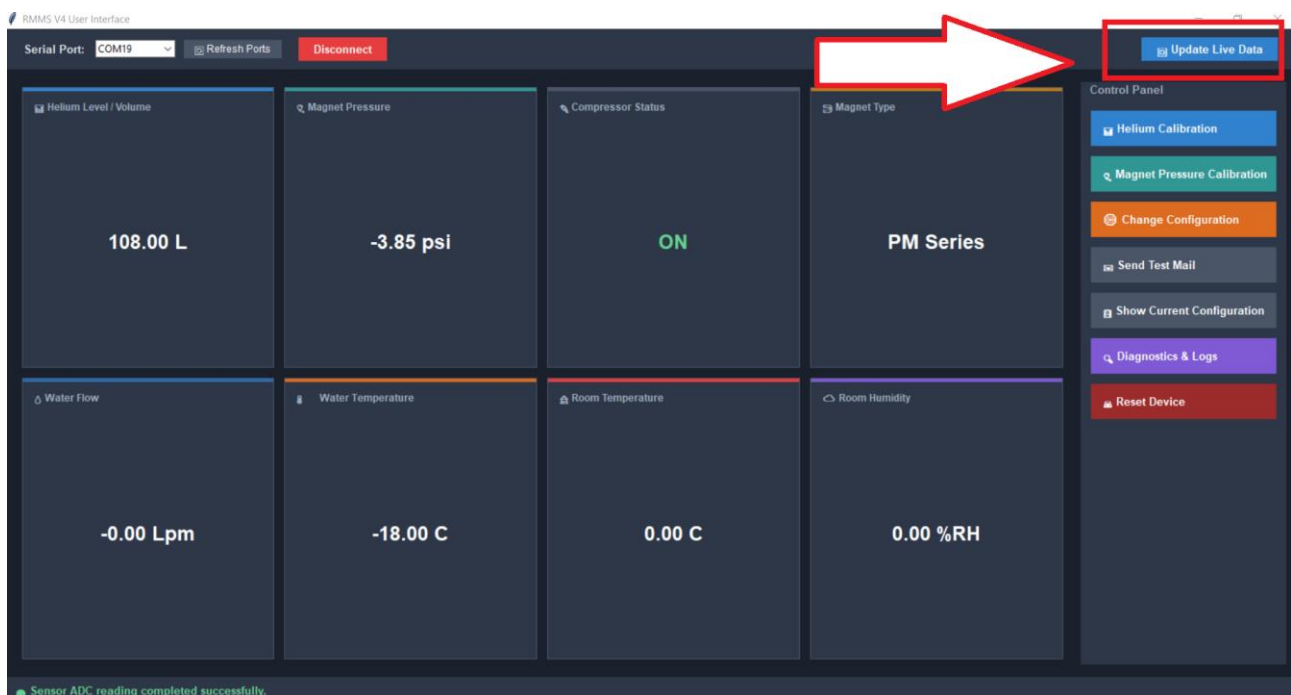


Illustration 5.1 The RMMS V4 User Interface displaying live system data and operational controls.

5.1.3 The Control Panel on the right side of the interface provides access to calibration, configuration, test e-mail, current configuration, diagnostics, and device reset functions.

5.2 System Calibration:

5.2.1 Helium Level Calibration: Click "Helium Calibration" from the Control Panel. When prompted, enter the helium value currently displayed on the physical GE Magnet Monitor and click "Calibrate & Save". The system will automatically calculate and save the new Level Calibration Factor.

5.2.2 Click "Magnet Pressure Calibration" from the Control Panel. When prompted, enter the pressure value currently displayed on the physical GE Magnet Monitor and

click "Calibrate & Save". The system will automatically calculate and save the new Pressure Calibration Factor.

5.3 Configuration and Diagnostics:

5.3.1 Change Configuration: Click "Change Configuration" to erase the current preferences and restart the configuration process described in Section 4.2.

5.3.2 Send Test Mail: Click "Send Test Mail" to manually trigger a test e-mail. This is useful for verifying SMTP connectivity and e-mail delivery.

5.3.3 Show Current Configuration: Click "Show Current Configuration" to display all currently stored network settings, alarm limits, site information, magnet type, and calibration factors.

5.3.4 Diagnostics & Logs: Click "Diagnostics & Logs" to display Device Uptime, Last Alarm, Alarm Type, Last Email Sent, Total Emails Sent, Compressor Hours, Total Resets, and Firmware Version. The diagnostic logs can also be cleared from this window.

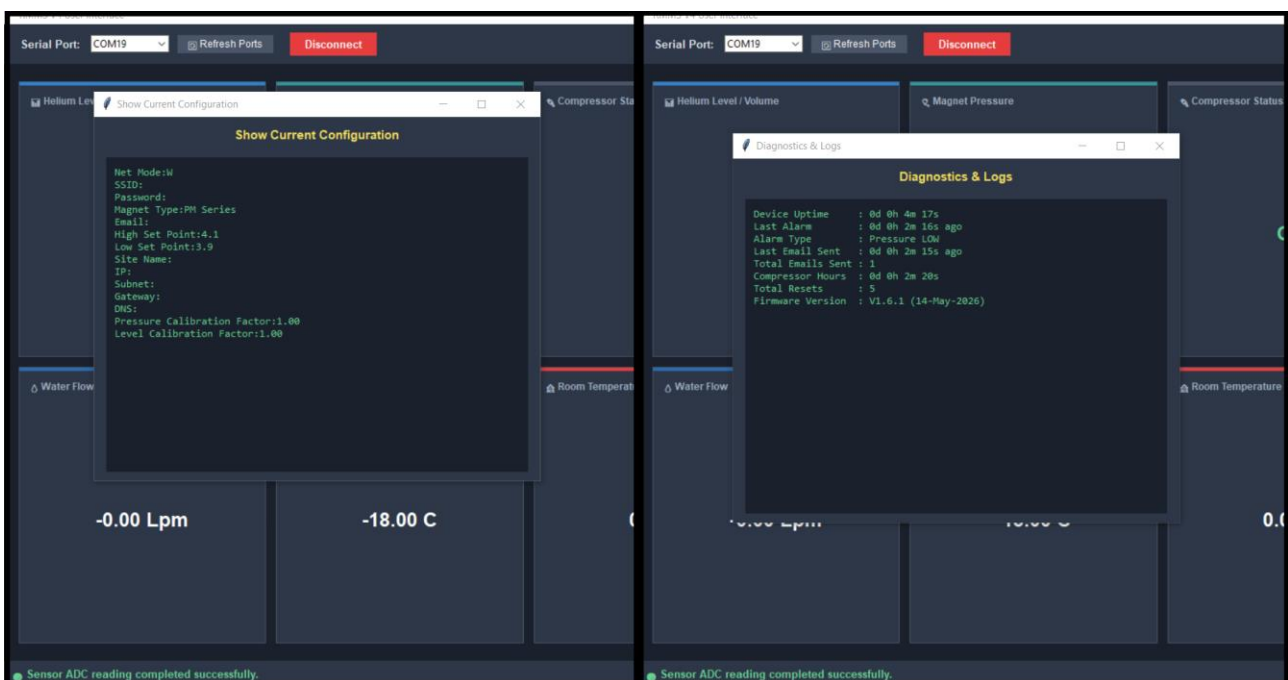


Illustration 5.2 Current Configuration (left) and Diagnostics & Logs (right) dialog windows

5.4 Blynk Web and Mobile Dashboard:

5.4.1 Once logged into the Blynk web console or mobile app, you will see the main dashboard for your RMMS V4 unit.

5.4.2 The top section of the dashboard clearly displays your defined Hospital Name and the current system alarm status (e.g., No Alarm Detected).

5.4.3 The interface features real-time, color-coded widgets displaying numerical values for HeLevel (%), MagnetPressure (psi), Water Temperature (C), WaterFlow (l/min), Room Temperature (C), and Room Humidity (%).

5.4.4 The Compressor Status is indicated by a clear visual indicator, such as a green dot when the compressor is running.

5.4.5 The lower section features interactive historical charts, including a combined Helium and Pressure trend data graph and a continuous Compressor Power Trend graph for long-term monitoring.

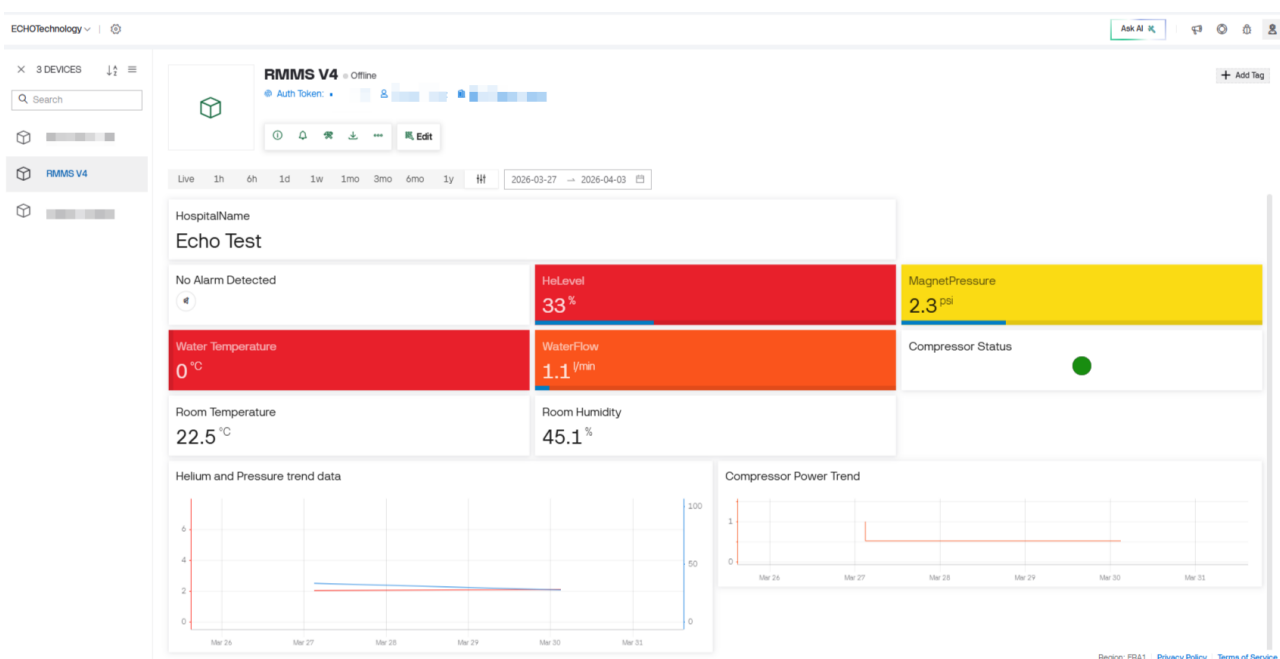


Illustration 5.3 The Blynk dashboard displaying real-time sensor widgets, alarm status, and historical trend graphs.

5.4.6 You can customize the display name of your RMMS V4 unit to make it easily recognizable. On the Blynk web console, navigate to the Devices list. Click the three-dot menu (...) in the Actions column next to your device and select "Rename" from the dropdown list. Type your preferred name, such as your specific hospital or room name, and save the changes. This custom name will immediately update on your dashboard.

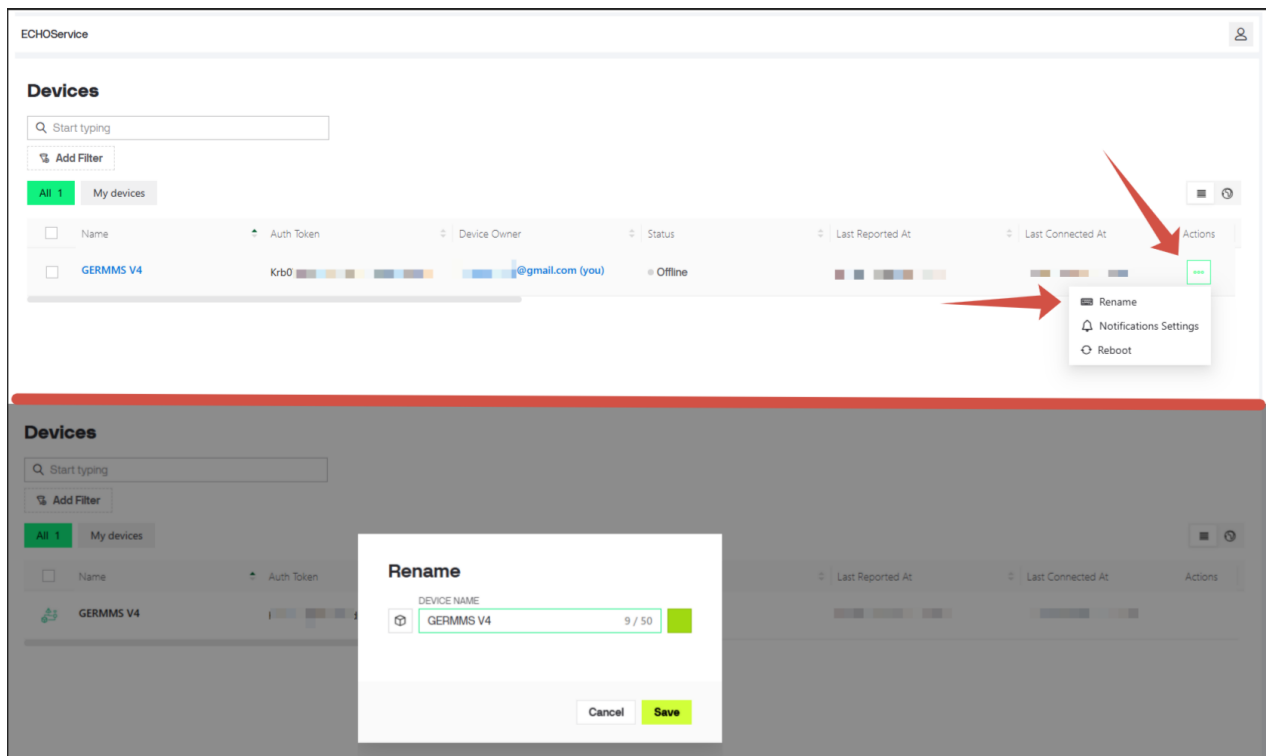


Illustration 5.4 Example of the Devices list on the Blynk web console, demonstrating how to access the Rename option from the Actions menu.

5.5 Background Operations, Alarms, and Notifications:

5.5.1 The RMMS V4 continuously monitors system parameters. An ALARM condition is triggered if the pressure drops below the Low Set Point, rises above the High Set Point, or if the compressor turns OFF.

5.5.2 Email Alerts: Upon an alarm trigger, the RMMS V4 device immediately dispatches a detailed email alert to your configured address.

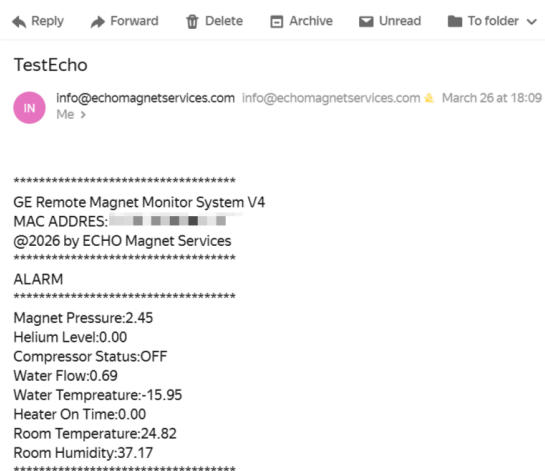


Illustration 5.5 Example of email alert indicating an active alarm condition.

5.5.3 Mobile App Alerts: Simultaneously with the email, the Blynk mobile application will display an immediate pop-up alert and send a push notification to your smartphone to ensure you are instantly aware of the issue.

5.5.4 Alarm Cleared: When system parameters return to normal bounds, the alarm condition is cleared, and a status update email is automatically sent.

5.5.5 Device Offline Alert: If the RMMS V4 module loses power or internet connectivity, the Blynk cloud server will automatically detect the disconnection and send a device offline notification email directly to you. This ensures you are notified even if the hardware cannot send an email itself.

5.5.6 Routine Reports: During normal operation without active alarms, the device automatically sends routine status report emails every 24 hours while the compressor is ON, and every 1 hour if the compressor remains OFF.