RMMS V4

Installation and User Manual

REMOTE MAGNET MONITORING SYSTEM for GE MAGNETS ONLY

Designed and Manufactured by Echo Magnet Services BV.
www.echomagnetservices.com

Echo Magnet Services BV. Middendijk 5a, 5705 CC

Helmond - The Netherlands +31 20 210 34 90

Revision History

Rev.	Description	Revised by	Date
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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 built-in local serial terminal interface for precise system calibration, network setup, and advanced hardware diagnostics

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	220-240V Vac (Standard Type C / Type F Schuko plug)
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.

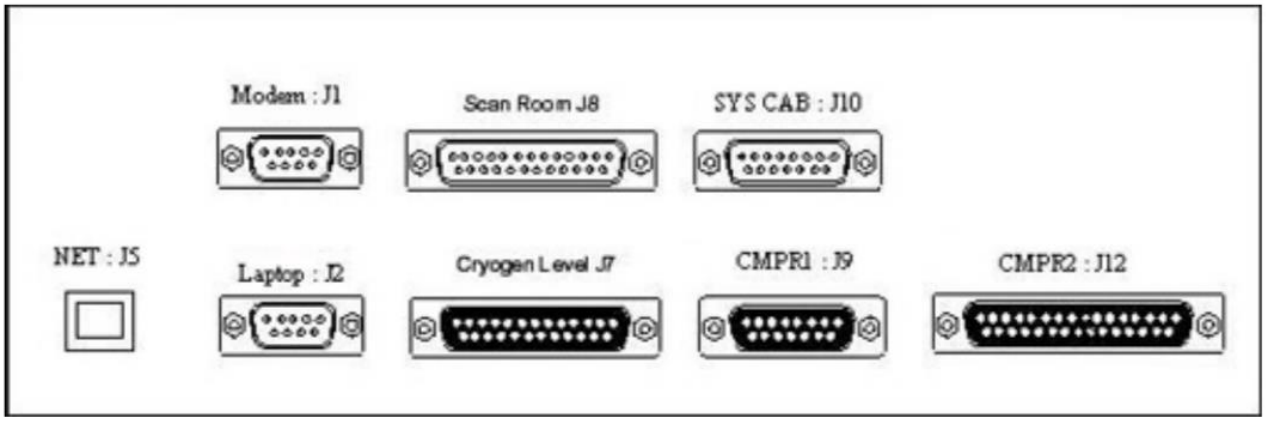

Illustration 3.1 Magnet Monitor right panel connector locations.

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

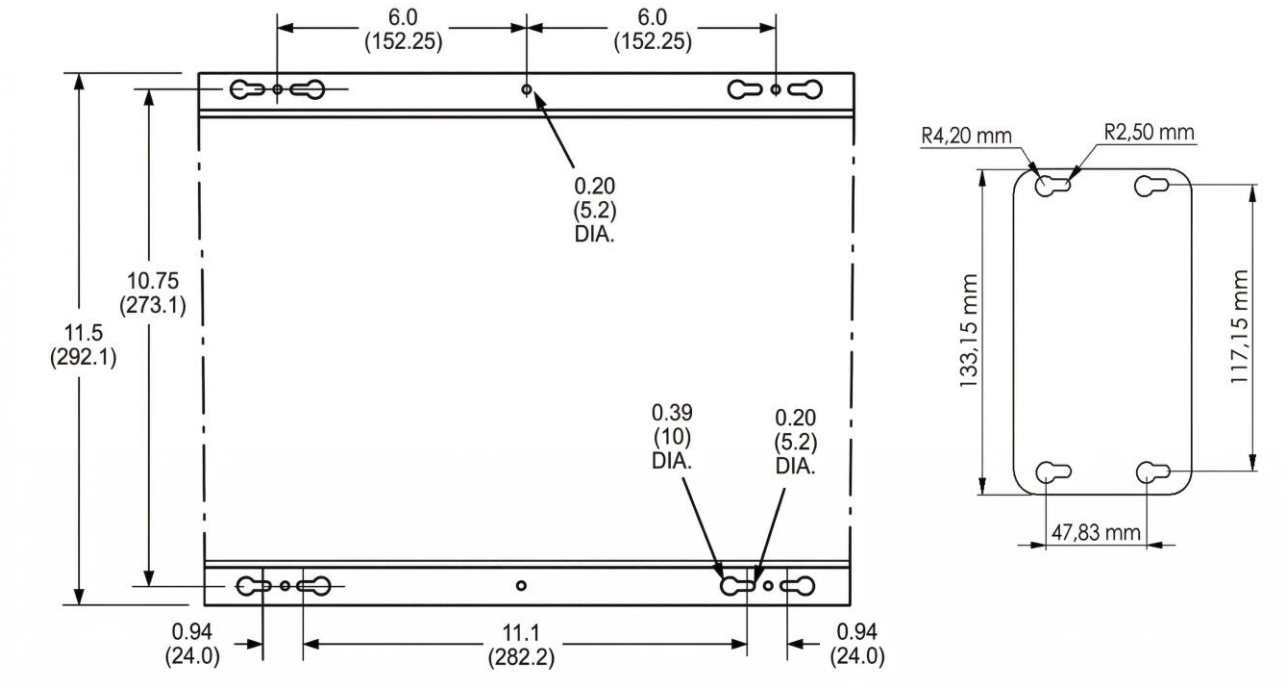

Illustration 3.2 Magnet Monitor and RMMS V4 Dimensions. MagMon dimensions in this diagram are in inches and bracketed () dimensions are in millimeters.

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).

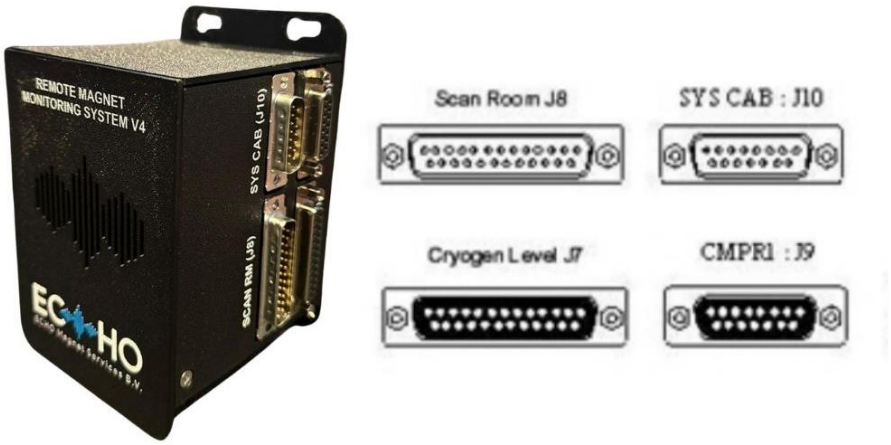

Illustration 3.4 RMMS V4 right panel.

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.

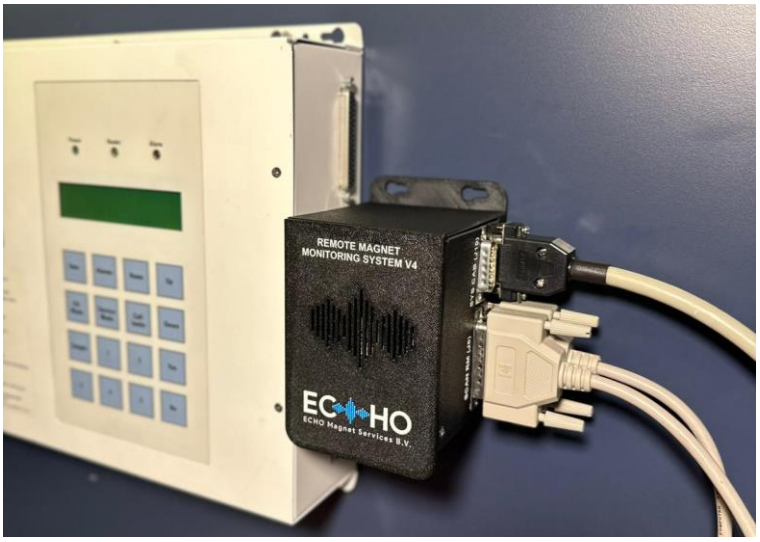

Illustration 3.5 Example photograph showing the finalized mechanical assembly, with the RMMS V4 securely mounted and interconnected with the Magnet Monitor.

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.

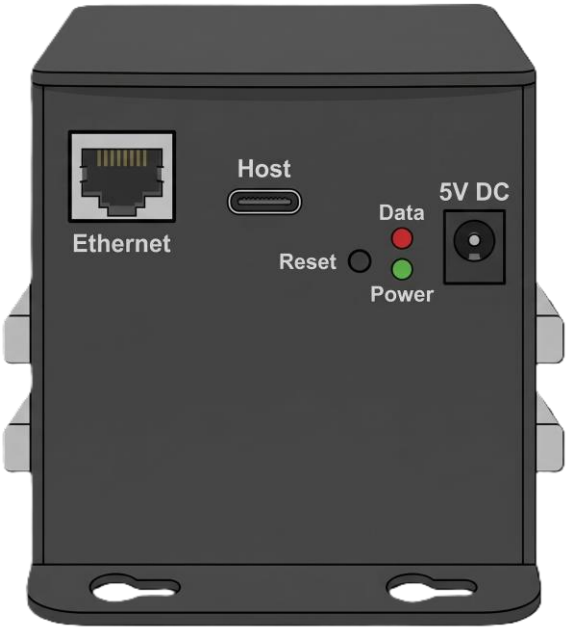

Illustration 3.6 Bottom Panel of the RMMS V4

3.4.3 Ensure a standard power outlet (220-240V, Type C / Type F "Schuko") 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.

4. SYSTEM & NETWORK SETUP

4.1 Terminal Connection Preparation:

4.1.1 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.

4.1.2 Open a serial terminal emulator program on your computer. (Termite is the recommended terminal emulator. To download: https://www.compuphase.com/software_termite.htm#)

4.1.3 Configure the serial port settings to a Baud Rate of 9600, 8 data bits, no parity, and 1 stop bit.

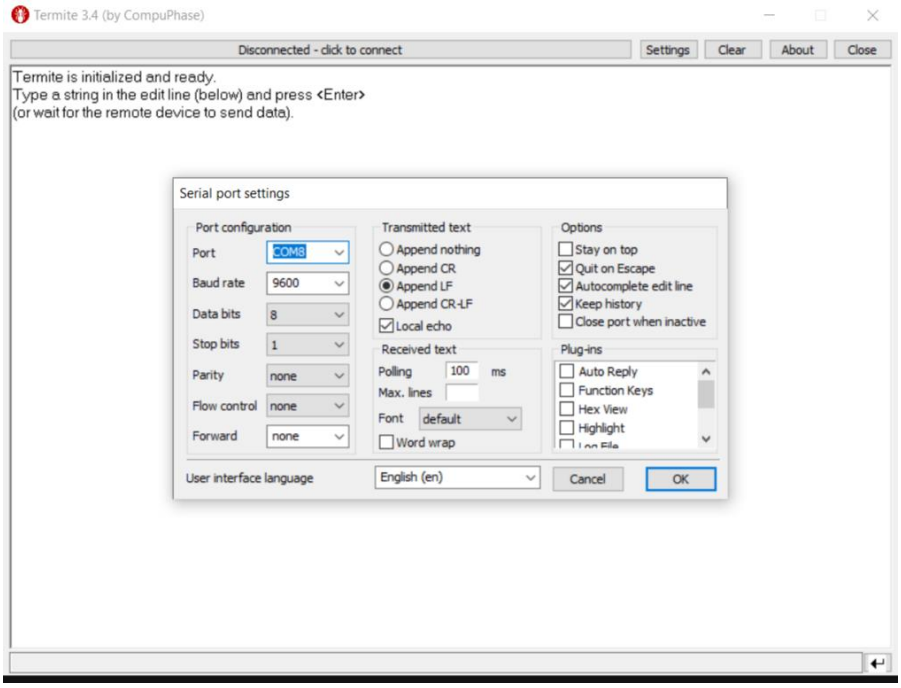

Illustration 4.1 Example configuration in a serial terminal emulator, showing the correct Baud Rate and port settings.

4.2 Initial Configuration Steps:

4.2.1 Upon connecting the power, the Power LED on the bottom panel (shown in illustration 3.6) will illuminate immediately. The terminal will then display the ECHO Magnet Services boot banner and output the message "No config found. Starting setup..." to initiate the configuration sequence.

4.2.2 The system will prompt "Enter connection mode as one letter W(wifi) or E(Ethernet):". Type W for a Wi-Fi connection or E for a wired Ethernet connection and press Enter.

4.2.3 If W is selected, the system will sequentially prompt for "Enter SSID:" and "Enter Password:". Provide your wireless network credentials.

4.2.4 At the "Enter the e-mail address which the data will be send to:" prompt, enter the recipient email address for system alerts and periodic status reports.

4.2.5 The system requires upper and lower magnet pressure thresholds. Input the values in psi when prompted with "Enter Hi pressure alarm set level:" and "Enter Low pressure alarm set level:".

4.2.6 At the "Enter site name:" prompt, input the facility or hospital name where the magnet is located to identify the source of the emails.

4.2.7 The system will sequentially ask for IP, Subnet Mask, Gateway IP, and DNS Server IP. To use DHCP (automatic IP assignment), simply leave the fields empty and press Enter for each prompt. To assign a Static IP, enter the properly formatted IPv4 addresses. Entering an invalid IP format will force the system to fall back to DHCP automatically.

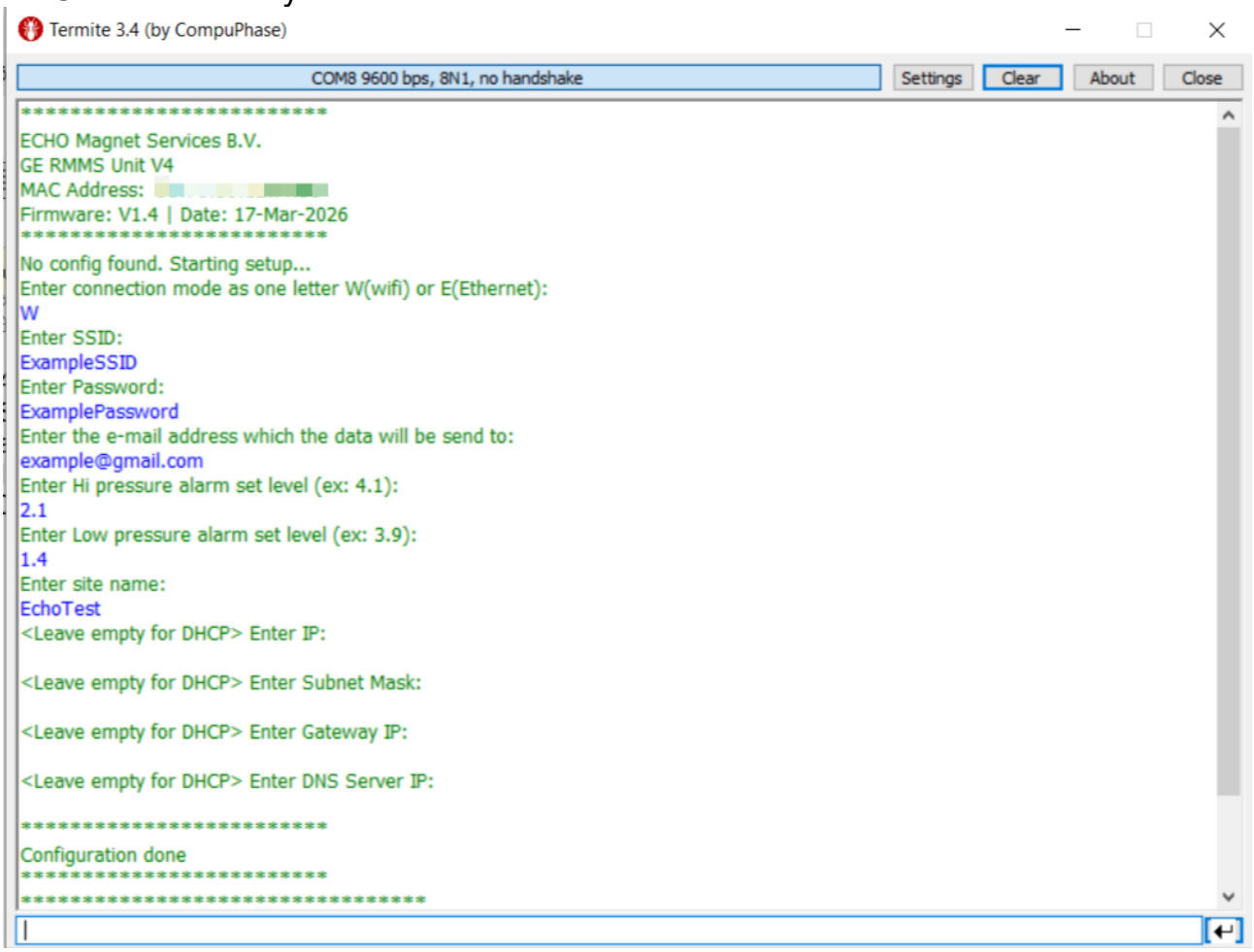

Illustration 4.2 Terminal interface displaying the initial configuration sequence and network parameter prompts.

4.3 Connection Verification:

4.3.1 Once all parameters are entered, the system will display "Configuration done" and attempt to connect to the local network and the cloud server.

4.3.2 The network setup is successfully completed when the terminal displays the assigned Local IP address and indicates "Blynk connected.". At this point, the Data LED on the bottom panel (shown in illustration 3.6) will blink several times to indicate that an IP has been obtained and the system is ready. The terminal will then present the "GE RMMS Terminal Interface Ready" message followed by the Main Menu.

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.

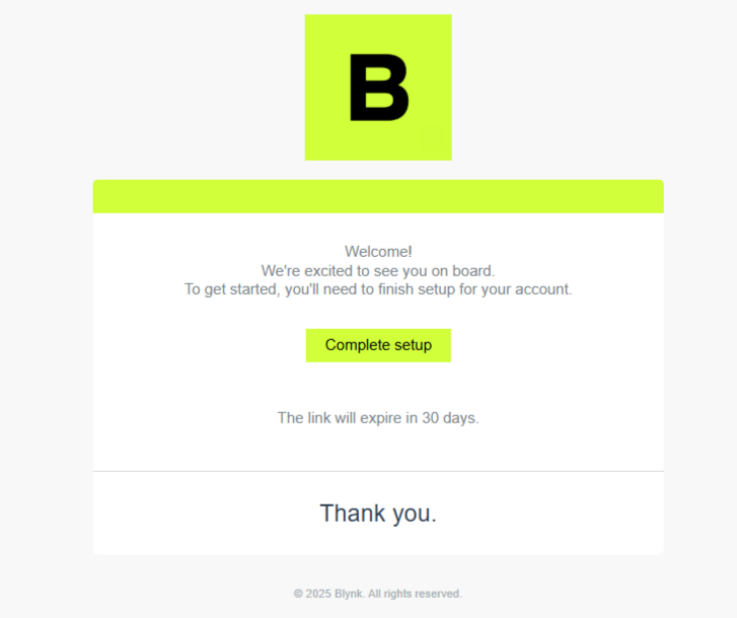

Illustration 4.3 Example of the official Blynk IoT invitation email

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.

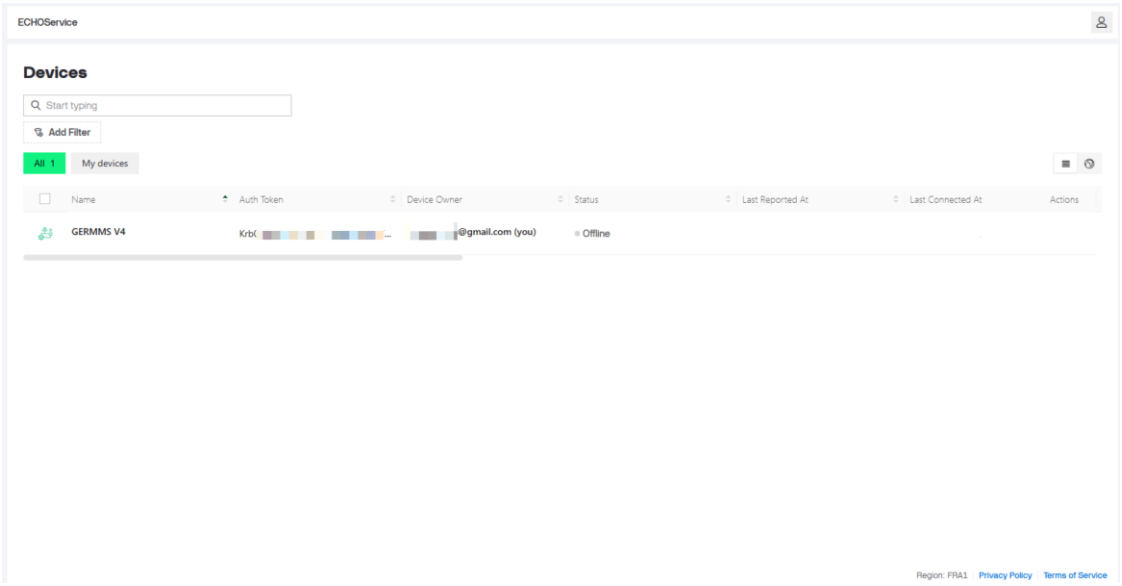

Illustration 4.4 The Blynk web console device list, displaying the pre-configured RMMS V4 unit assigned to your account.

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 To interact with the device menus for calibration and diagnostics, ensure your computer is connected to the Data Type C port on the bottom panel and your serial terminal emulator is running at 9600 baud.

5.1.2 The terminal will display the GE RMMS MAIN MENU presenting 8 operational choices. Type the corresponding number (1-8) and press Enter to select a function.

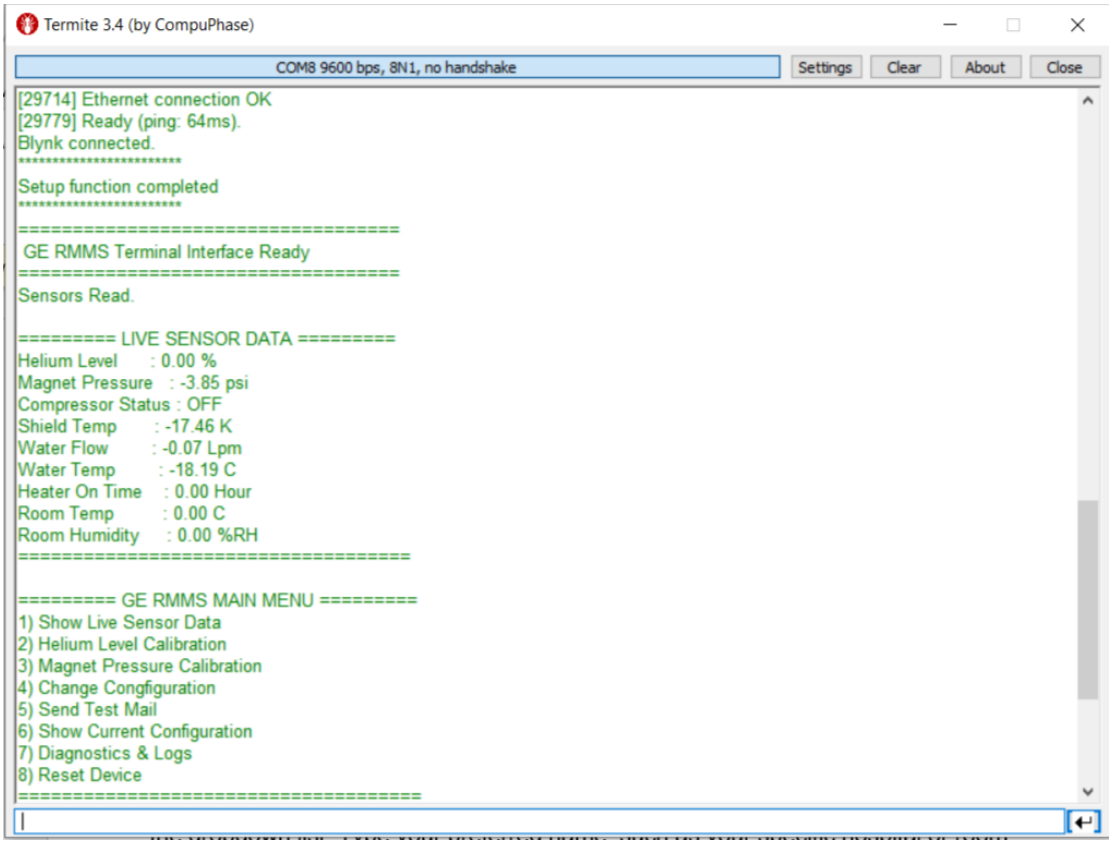

Illustration 5.1 The GE RMMS Main Menu displayed in the terminal interface.

5.1.3 Live Sensor Data (Option 1): Displays a real-time terminal snapshot of all calculated sensor values, including Helium Level, Pressure, and Temperatures.

5.2 System Calibration via Terminal:

5.2.1 Helium Level Calibration (Option 2): Enter 2 to calibrate the Helium sensor. The terminal will prompt "Enter He level on Magmon:". Type the exact numerical value shown on the physical GE Magnet Monitor screen into your terminal and press Enter. The system will save a new Level Calibration Factor.

5.2.2 Magnet Pressure Calibration (Option 3): Enter 3 to calibrate the pressure sensor. When prompted, type the current pressure reading displayed on the GE Magnet Monitor and press Enter to save the new Pressure Calibration Factor.

5.3 Configuration and Diagnostics via Terminal:

5.3.1 Change Configuration (Option 4): Wipes the current preferences and restarts the initial setup sequence for network and alarm settings.

5.3.2 Send Test Mail (Option 5): Manually triggers a status email from the device to verify SMTP network access.

5.3.3 Show Current Configuration (Option 6): Prints out the saved network settings, site name, alarm limits, and calibration factors.

5.3.4 Diagnostics & Logs (Option 7): Displays long-term metrics such as Device Uptime, Last Alarm details, Total Emails Sent, Compressor Hours, and Resets. You can also clear these logs from a sub-menu here.

5.3.5 Reset Device (Option 8): Executes a software reboot. For a hardware reset, press the physical Reset button located near the LEDs on the bottom panel.

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.

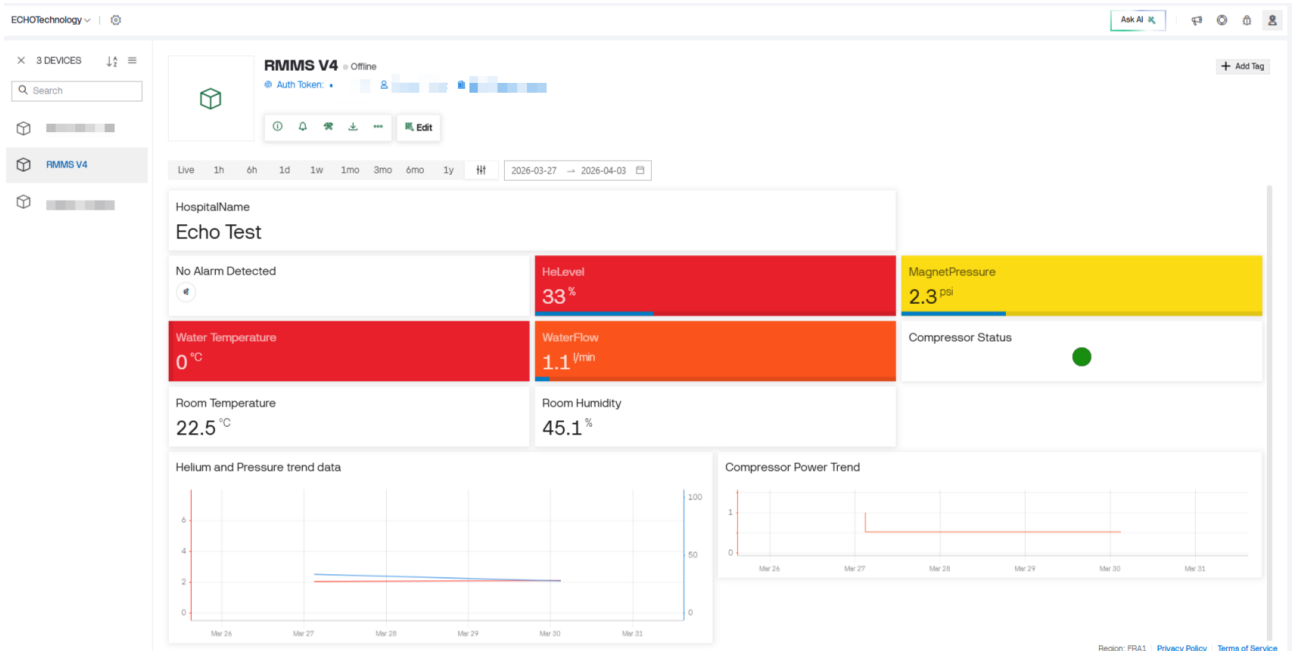

Illustration 5.2 The Blynk dashboard displaying real-time sensor widgets, alarm status, and historical trend graphs.

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.

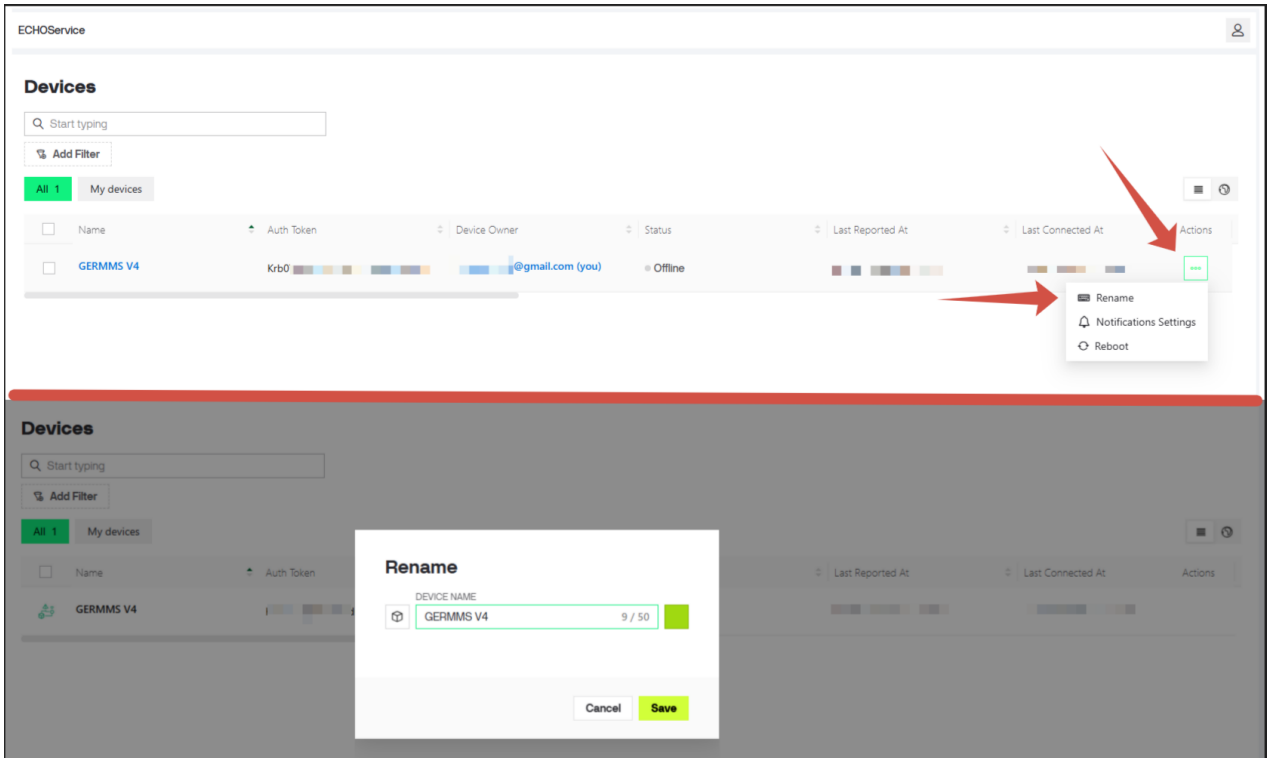

Illustration 5.3 Example of the Devices list on the Blynk web console, demonstrating how to access the Rename option from the Actions menu.

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.

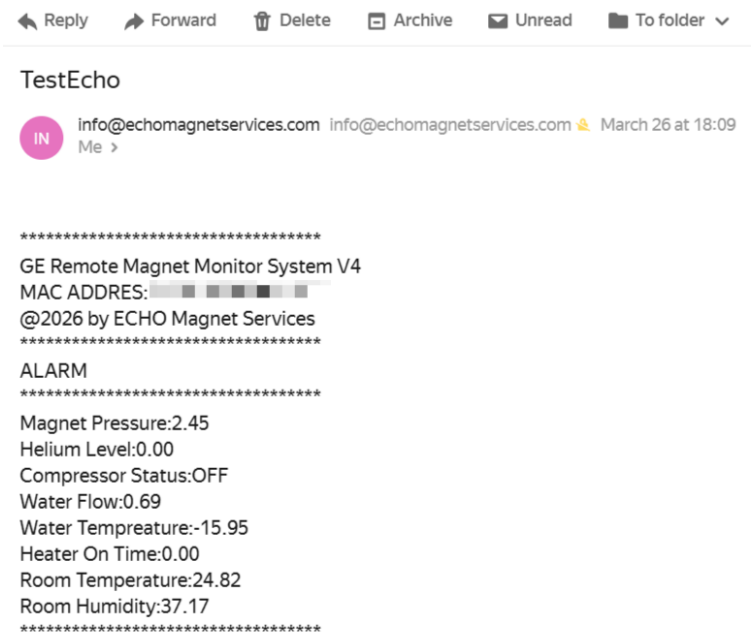

Illustration 5.4 Example of email alert indicating an active alarm condition.

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.