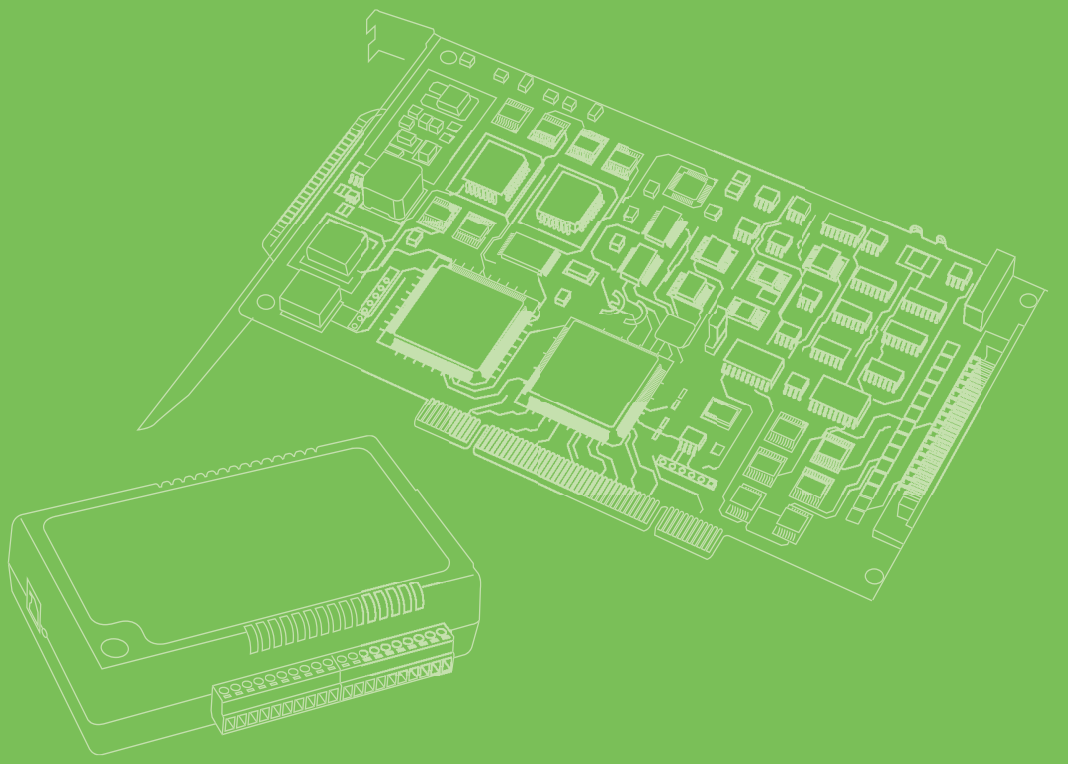


User Manual

WISE-2461

Modbus Smart Vibration Sensor(6kHz@3-axis)

ADVANTECH

Enabling an Intelligent Planet

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Product Warranty (2 years)

Advantech warrants the original purchaser that each of its products will be free from defects in materials and workmanship for two years from the date of purchase.

This warranty does not apply to any products that have been repaired or altered by persons other than repair personnel authorized by Advantech, or products that have been subject to misuse, abuse, accident, or improper installation. Advantech assumes no liability under the terms of this warranty as a consequence of such events.

Because of Advantech's high quality-control standards and rigorous testing, most customers never need to use our repair service. If an Advantech product is defective, it will be repaired or replaced free of charge during the warranty period. For out-of-warranty repairs, customers will be billed according to the cost of replacement materials, service time, and freight. Please consult your dealer for more details.

If you believe your product is defective, follow the steps outlined below.

1. Collect all the information about the problem encountered. (For example, CPU speed, Advantech products used, other hardware and software used, etc.) Note anything abnormal and list any onscreen messages displayed when the problem occurs.
2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information readily available.
3. If your product is diagnosed as defective, obtain a return merchandise authorization (RMA) number from your dealer. This allows us to process your return more quickly.
4. Carefully pack the defective product, a completed Repair and Replacement Order Card, and a proof of purchase date (such as a photocopy of your sales receipt) into a shippable container. Products returned without a proof of purchase date are not eligible for warranty service.
5. Write the RMA number clearly on the outside of the package and ship the package prepaid to your dealer.

Part No. Edition 1

Printed in Taiwan December 2023

Declaration of Conformity

CE

This product has passed the CE test for environmental specifications when shielded cables are used for external wiring. We recommend the use of shielded cables. This type of cable is available from Advantech. Please contact your local supplier for ordering information.

Test conditions for passing also include the equipment being operated within an industrial enclosure. In order to protect the product from damage caused by electro-static discharge (ESD) and EMI leakage, we strongly recommend the use of CE-compliant industrial enclosure products.

Technical Support and Assistance

1. Visit the Advantech website at www.advantech.com/support to obtain the latest product information.
2. Contact your distributor, sales representative, or Advantech's customer service center for technical support if you need additional assistance. Please have the following information ready before calling:
   - Product name and serial number
   - Description of your peripheral attachments
   - Description of your software (operating system, version, application software, etc.)
   - A complete description of the problem
   - The exact wording of any error messages

Safety Precaution - Static Electricity

Follow these simple precautions to protect yourself from harm and the products from damage.

- To avoid electrical shock, always disconnect the power from the PC chassis before manual handling. Do not touch any components on the CPU card or other cards while the PC is powered on.
- Disconnect the power before making any configuration changes. A sudden rush of power after connecting a jumper or installing a module may damage sensitive electronic components.

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Chapter 1

Hardware Profile

WISE-2461 is a robust RS-485 smart vibration sensor integrated with an ARM Cortex-M33 processor, 6KHz@3-axis high detection range accelerometer and temperature sensor. This powerful computing device balances the bandwidth between edge devices and the application service on the user side.

WISE-2461 builds-in several measurements of vibration, such like velocity RMS, acceleration RMS, acceleration Peak, displacement and so on. By using Advantech WISE Studio utility, users can easily config all the setting, like ISO 10816 alarm threshold setting, customize the 6 detection ranges between 5 ~ 6,000Hz and others.

1.1 Common Specification

1.1.1 General

- **Power Input:** 10 ~ 30VDC
- **LED Indicator:** Status, TX, RX
- **Configuration Interface:** RS-485 (Modbus/RTU)
- **Connector:** M12, D-code Male
- **Cable Length:** 1m
- **IP Class:** IP68
- **Mounting:** Stud mount, mounting pad with adhesives, magnetic base
- **Dimension:** (W x H x D) 30 x 30 x 13 mm
- **Certification:** FCC, CE

1.1.2 Environment

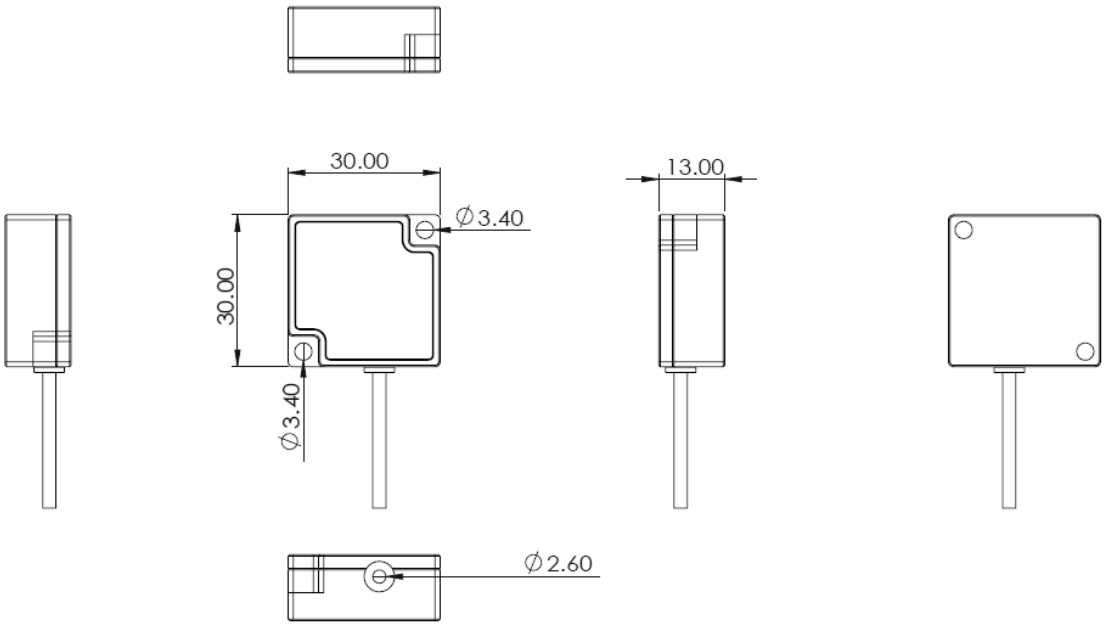
- **Operating Temperature:** -40°C ~ 85°C
- **Operating Humidity:** 10% ~ 95% RH
- **Storage Temperature :** -40°C ~ 90°C
- **Storage Humidity:** 5% ~ 95% RH

1.1.3 3-Axis Accelerometer Sensor

- **Axis:** X/Y/Z
- **Frequency Range:** 5~6000Hz
- **Amplitude Range:** ±16g
- **Output Data Rate:** 26667Hz
- **Accuracy:** 5-4000Hz (5%); 4001~6000Hz (20%)
- **Noise:** 75 μg/√Hz in ±16g@X/Y-axis; 110 μg/√Hz in ±16g@Z-axis
- **Sensitivity Change Due to Temperature:** ±1%

1.2 Dimensions

Unit: mm



1.3 M12 connector pin define

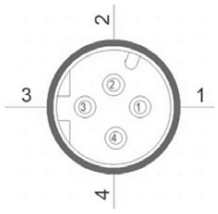


Table 1.1: M12 Connector Pin Define

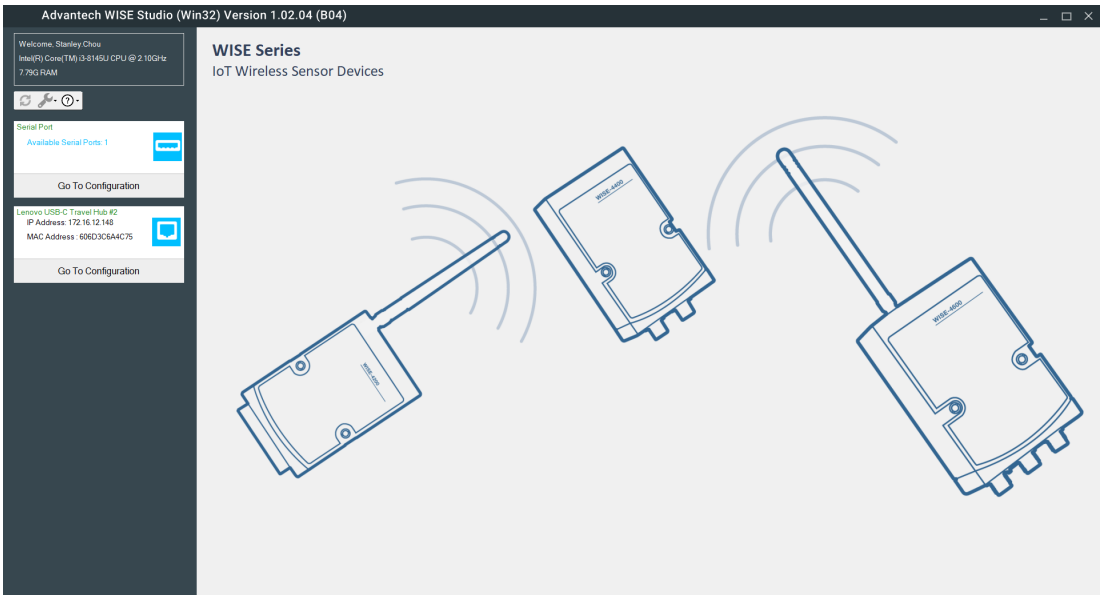
Pin Number	Pin Name
1	+VS
2	Data+
3	-VS
4	Data-

Chapter 2

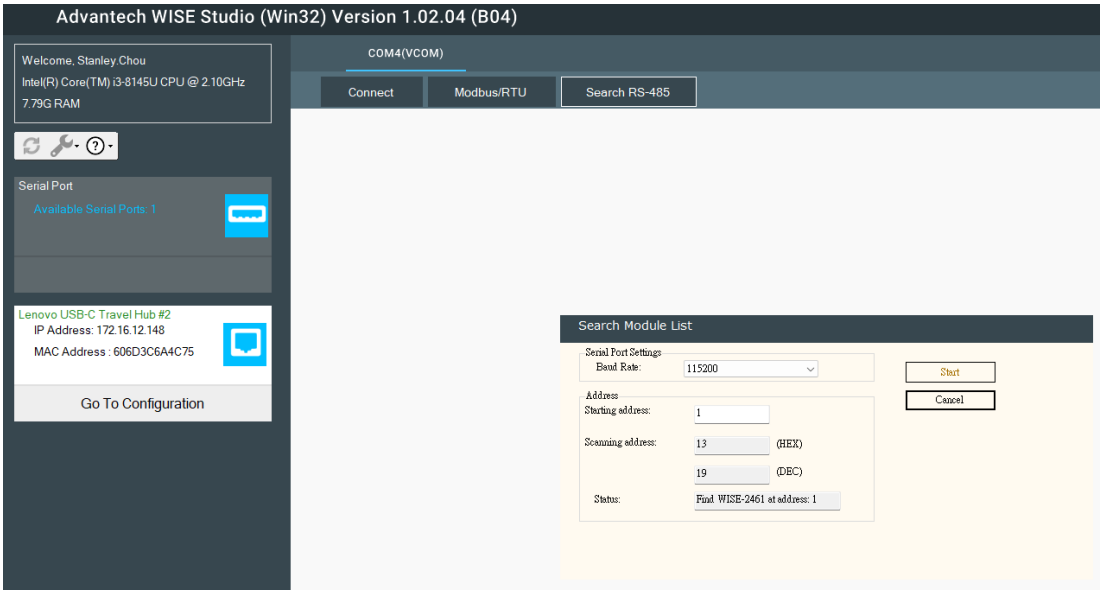
Software Settings

2.1 Quick Start Guide: Connecting WISE-2461 to WISE Studio

1. **Software Installation** Visit the WISE-2461 product page to download and install the **WISE Studio** software on your PC.
2. **Hardware Connection** Connect the WISE-2461 to your PC using an **RS-485** to USB converter, then launch the WISE Studio software.
3. **Serial Port Activation** Check the serial port status on the left-hand panel. Once the port is active, click **"Go to Configuration."**



4. Device Discovery Click the **"Search RS-485"** button at the top of the screen and press **"Start."** When the status displays **"Find WISE-2461,"** the connection is successful. You may then close the Search Module List window by clicking the **"Cancel"** button.

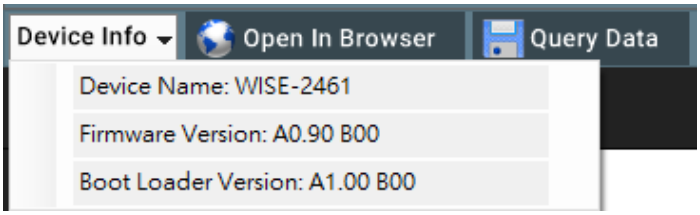


5. **Accessing Device Settings** WISE Studio will display the connected device (e.g., **WISE-2461(01h)**) at the top of the interface. Click on the device you wish to configure, and the system will automatically navigate to the device settings page.

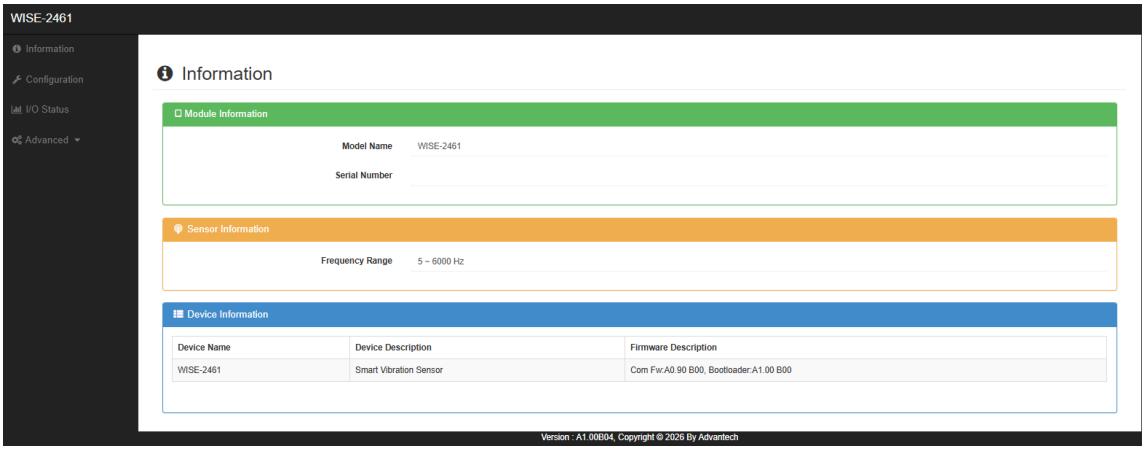


2.2 WISE-2461 Device information

1. **Basic Information:** Click **"Device Info"** at the top of the interface to view the Device Name, Firmware Version, Bootloader Version, and I/O Board Firmware Version.



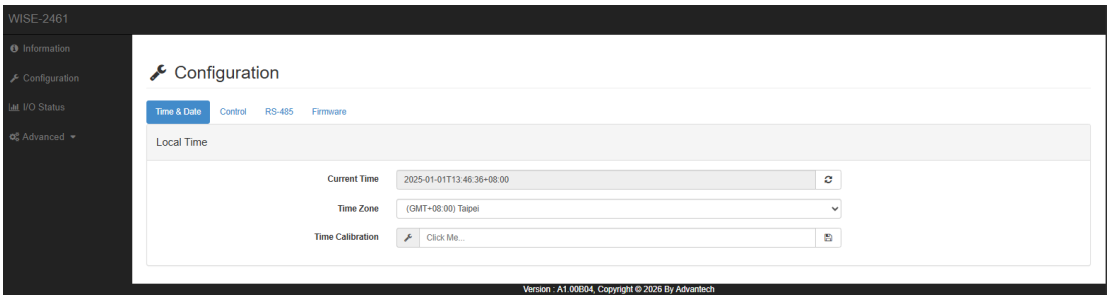
2. **Detailed Information:** Navigate to the information page for more in-depth details, such as the **Serial Number** and the **Sensitivity settings** of your WISE-2461.



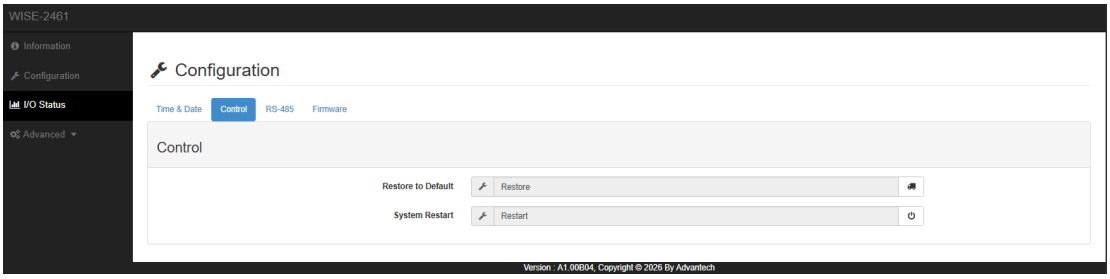
2.3 WISE-2461 System Configuration

The WISE-2461 system configuration is divided into four main sub-pages: Time, Control, RS-485, and Firmware.

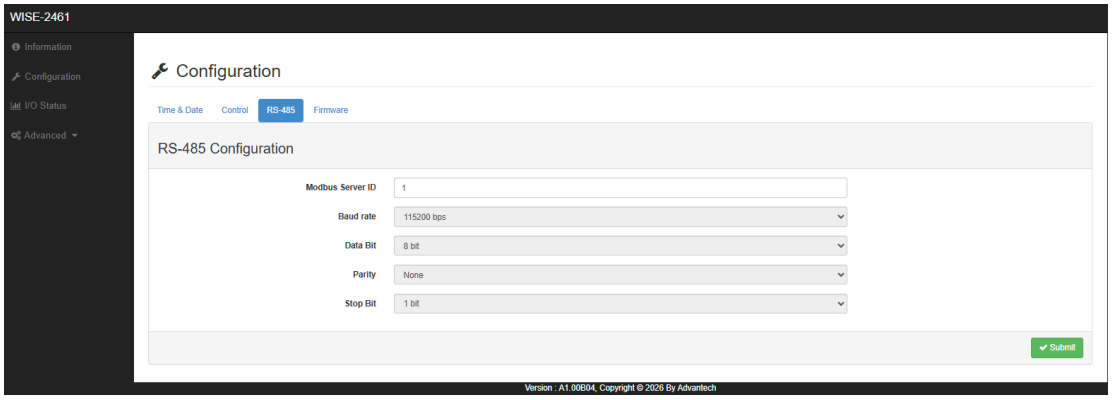
1. **Time & Date:** Use this section to set and synchronize the **Real-Time Clock (RTC)** on the WISE-2461.



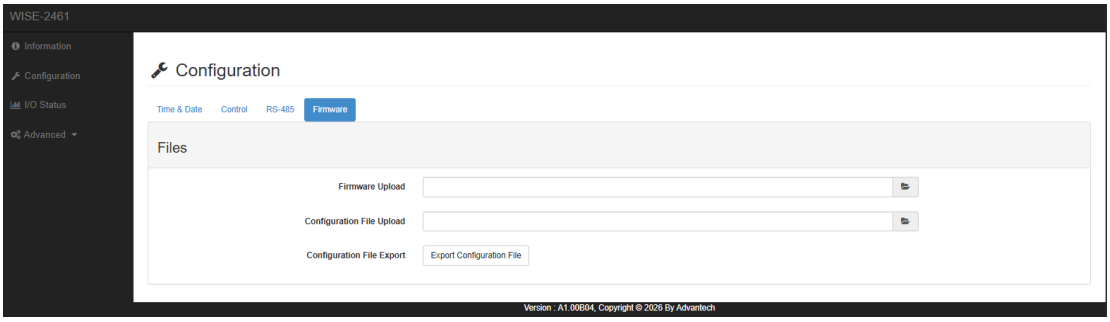
2. **Control:** This page allows you to perform a **Factory Reset** (return to default settings) or a **Forced Reboot** of the device.



3. **RS-485:** Configure the **Serial communication settings** (such as Baud Rate and Modbus ID) for the WISE-2461.



4. **Firmware & Configuration:** This page allows you to perform **Firmware Upgrades** to keep your device up to date. Additionally, you can **Import or Export configuration files**, making it easy to back up your settings or replicate the same configuration across multiple WISE-2461 units.



2.4 WISE-2461 Sensor configuration and value output verification

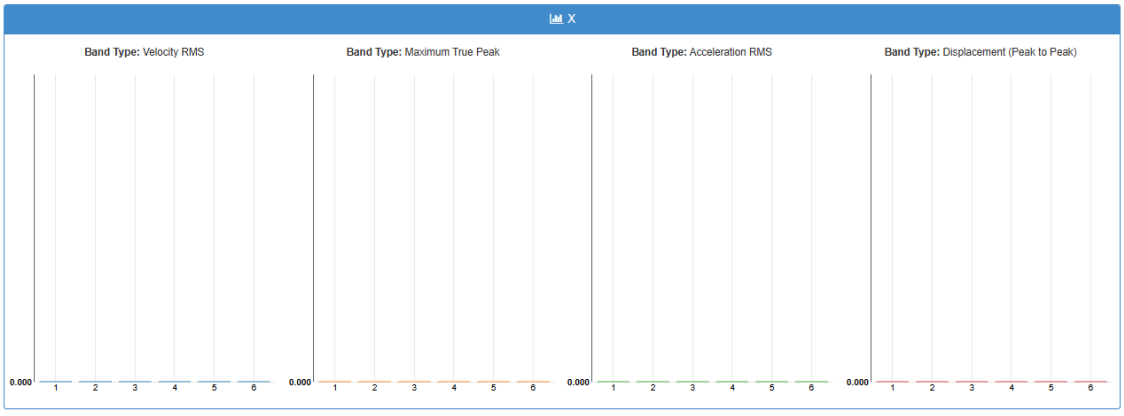
The sensor settings consist of two main sub-pages: **Status** and **Configuration**.

1. **Status:** This page allows you to monitor the real-time output values from the WISE-2461. Detailed definitions of these values and their default settings are provided below for your reference.

Feature

	X	Y	Z
Velocity RMS (mm/s)	0.07	0.09	0.12
Maximum True Peak (g)	0.05	0.04	0.04
Acceleration RMS (g)	0.01	0.00	0.01
Kurtosis	0.00	0.00	-
Crest Factor	8.66	8.94	6.84
Skewness	-0.21	-0.20	-
Standard Deviation	0.01	0.01	-
Peak to Peak Displacement (um)	3.00	3.00	4.00
Clearance Factor	6.48	6.52	-
Shape Factor	0.62	0.60	-
Impulse Factor	5.43	5.44	-

Band



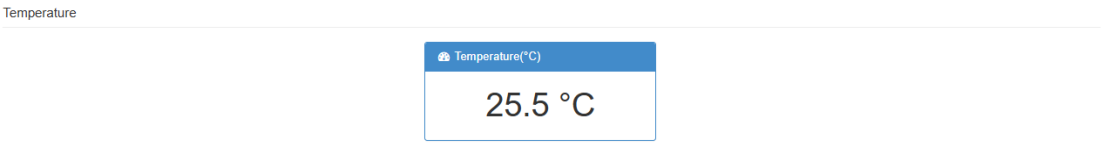
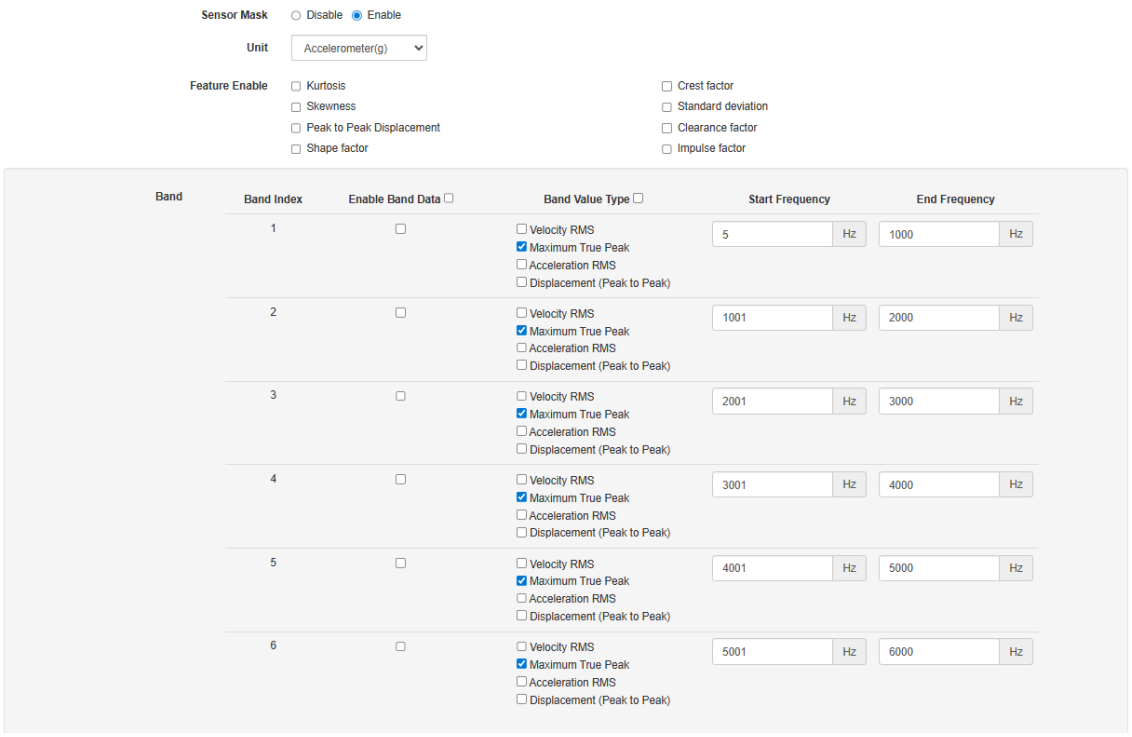


Table 2.1: Status

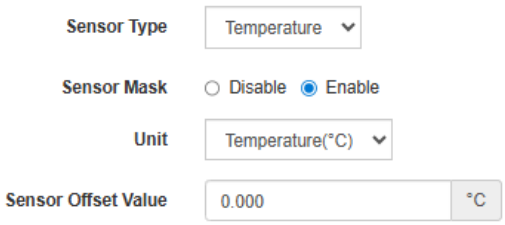
Feature (Unit)	Frequency Range	Description
Velocity RMS (mm/s)	10 ~ 1,000 Hz	Measures the destructive energy of the vibration. It is the best indicator for general machine health and unbalance.
Maximum True Peak (g)	5 ~ 6,000 Hz	The maximum acceleration value detected. Helps identify sudden impacts or severe mechanical shocks.
Acceleration RMS (g)	5 ~ 6,000 Hz	Reflects the overall vibration energy in terms of acceleration. Useful for detecting early-stage bearing or gear defects.
Kurtosis	Full Range	A statistical measure of the "peakiness" of the signal. High values indicate the presence of repetitive impacts, often used for early bearing fault detection.
Crest Factor	Full Range	The ratio of the Peak value to the RMS value. Used to detect changes in the signal's impulsiveness, such as initial bearing wear.
Skewness	Full Range	Measures the asymmetry of the vibration signal. Helps identify if the vibration is biased in one direction, often due to structural looseness.
Standard Deviation	Full Range	Represents the amount of variation or dispersion of the vibration data. Used to assess the stability of the machine's operation.
Peak to Peak Displacement (μm)	10 ~ 1,000 Hz	Measures the total distance of the vibration swing. It is critical for monitoring low-speed machinery and structural movement.
Clearance Factor	Full Range	Similar to Crest Factor but more sensitive to changes in the signal's distribution. Used for detecting faults in rolling element bearings.
Shape Factor	Full Range	The ratio of RMS to the average absolute value. It describes the overall shape of the vibration waveform.
Impulse Factor	Full Range	Compares the peak value to the average value. Effective in detecting impulsive shocks in gearboxes or bearings.

2. Configuration: There are two primary configuration categories for the WISE-2461 sensor. First, for the X, Y, and Z axes, users can set the measurement units, toggle specific vibration feature values, and configure up to six custom frequency bands. Second, users can adjust temperature units and set Offset calibrations. The custom frequency band feature is designed to allow users to focus on specific fundamental and harmonic frequencies. By analyzing the energy levels within these key frequencies, users can gain insights into the internal degradation of the equipment.

I. Vibration section



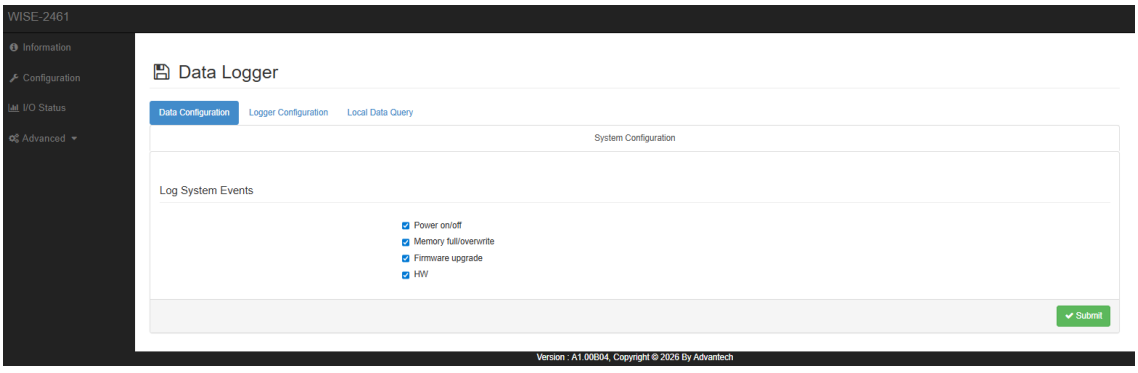
II. Temperature section



2.5 WISE-2461 Device Data Logger configuration

The Data Logger function is divided into three sub-pages: **Data Configuration, Logger Configuration**, and **Local Data Query**.

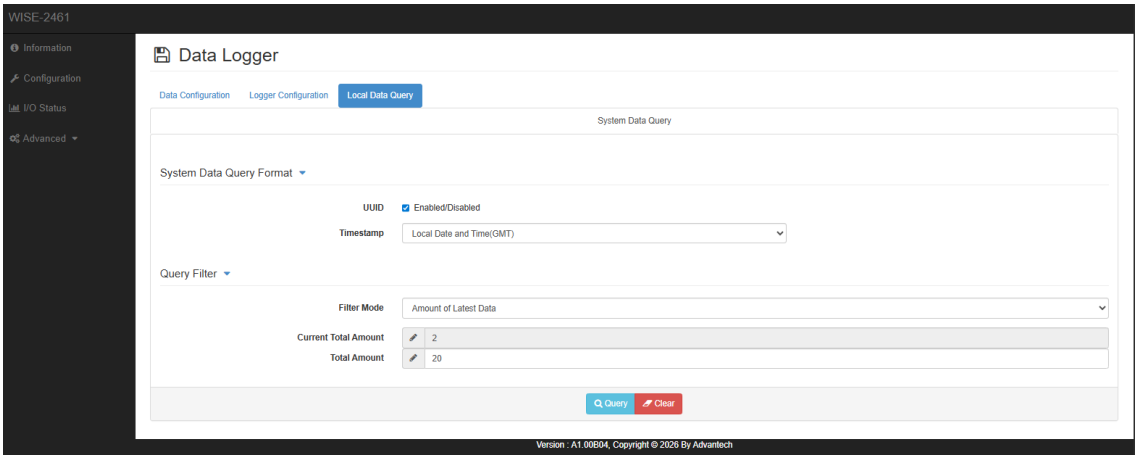
1. **Data Configuration:** Enable or disable specific event log items to be recorded.



2. **Logger Configuration:** Enable or disable the overall logging function of the device.



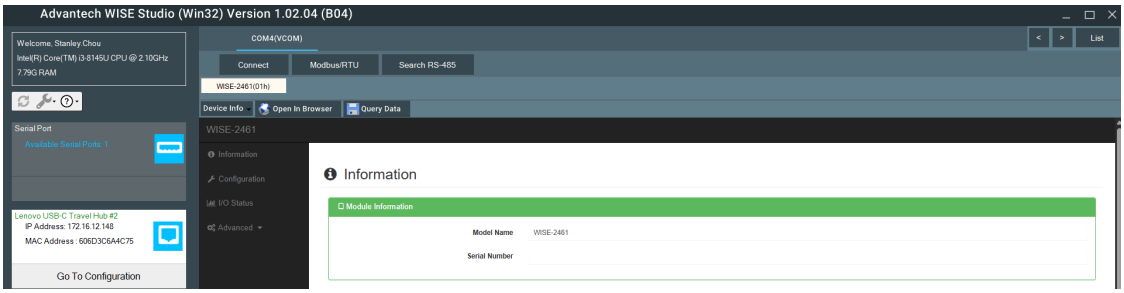
3. **Local Data Query:** Retrieve log data from the WISE-2461 and view it directly within WISE Studio.



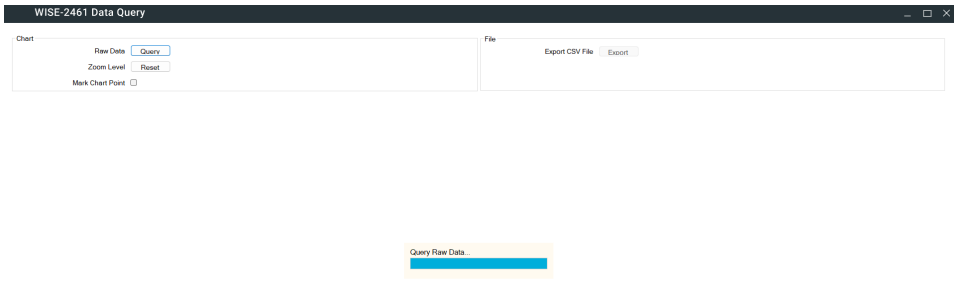
2.6 Retrieving Time-Domain Raw Data from WISE-2461

Users can capture real-time, time-domain raw data directly from the WISE-2461. Please note that it takes approximately 15 seconds to retrieve one complete raw data set. Follow these steps to obtain the data in WISE Studio:

1. Open Query Window: Click "Query Data" in WISE Studio to open the WISE-2461 Data Query pop-up window.



2. Execute Query: Click the "Query" button and wait for the retrieval process to complete.



3. Analyze Data: Once finished, the time-domain raw data will be displayed directly. You can perform the following actions.
   I. Export to CSV: Save the raw data to your PC for further analysis.
   II. Zoom & Reset: Zoom into specific areas of the waveform on the dashboard; use the "Zoom Reset" button to return to the original view.
   III. Mark Chart Points: Enable the "Mark Chart Point" function to make reading individual data points on the dashboard easier.

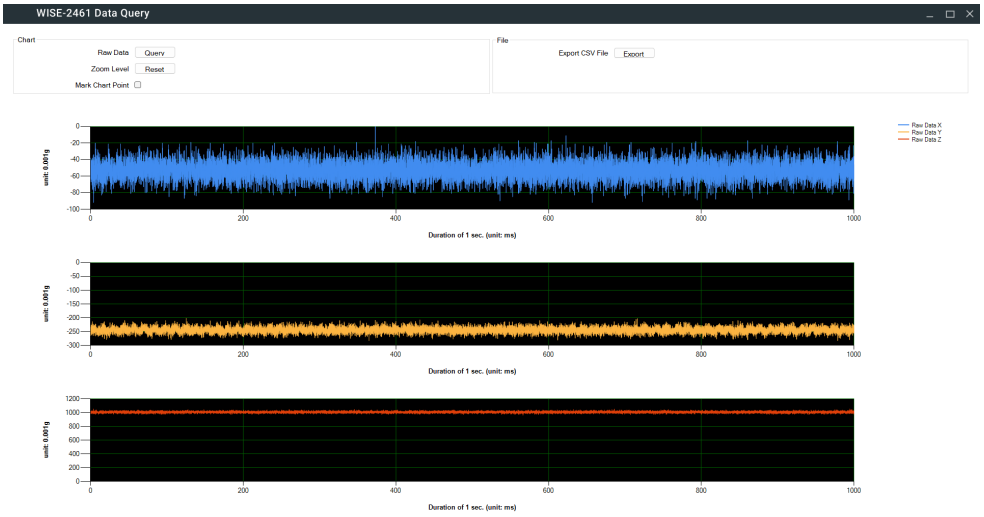


Figure 2.1 Get raw data - dashboard

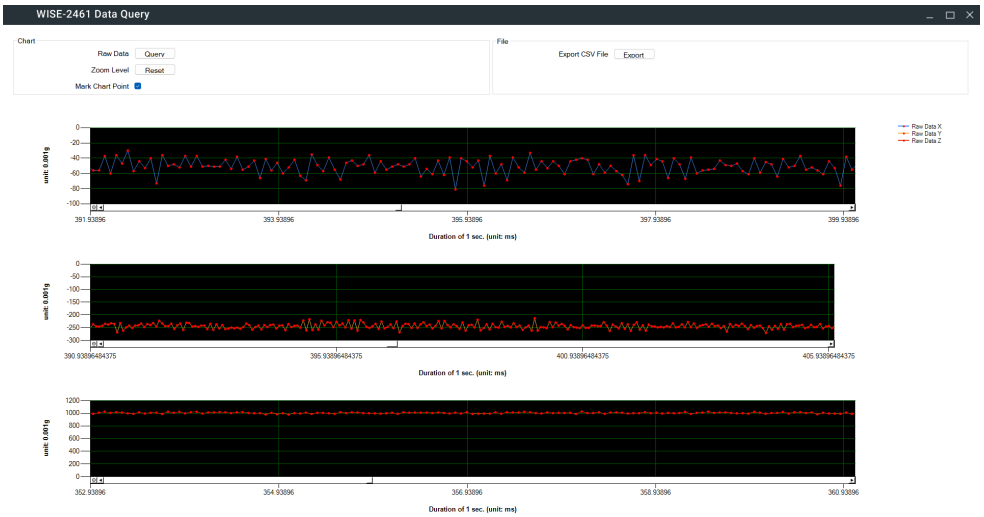


Figure 2.2 Get raw data - dashboard with mark

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All product specifications are subject to change without notice.

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