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Aurora Smart Vibration Sensor 213MM2-R1 User Manual

texol Inc.

A professional provider of vibration analysis, monitoring, and diagnostic solutions, dedicated to maximizing the value of your products and equipment.



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1 Aurora System Overview

1.1 System Architecture Description

The Aurora Equipment Health Monitoring System is a comprehensive diagnostic solution designed for long-term monitoring and health assessment of rotating machinery components such as motors, bearings, and robotic arms. Aurora provides proactive early warning alerts and residual useful life (RUL) predictions, enabling plant engineers to schedule maintenance and component replacements in advance, thereby preventing unexpected equipment breakdowns and catastrophic production halts. As shown in Figure 1-1, the Aurora framework supports flexible, multi-tiered deployment topographies tailored to specific factory environments, comprising the following core building blocks:

1. Wired and wireless smart sensors responsible for high-bandwidth physical sensing and edge computing data processing.
2. Wireless receivers that collect data from local Bluetooth wireless smart sensors and forward it to central gateways over local networks.
3. Edge gateways that aggregate sensor data across facility areas, display real-time metrics, forward data to upper-level SCADA/MES systems, and execute local AI inference models.
4. On-premise data centers and visualization dashboards maintained by customers.
5. Cloud-based data visualization services.
6. Cloud AI model training, optimization, and deployment services.

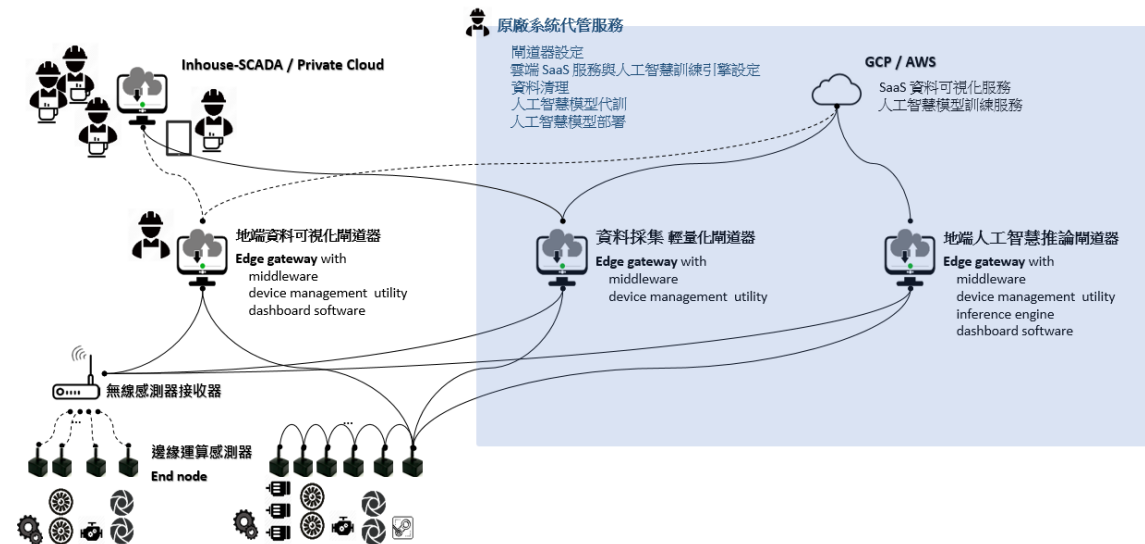


Figure 1-1 System Architecture Diagram

Users can flexibly choose specific smart sensor models, gateways, and cloud visualization or AI services according to actual field deployment requirements.

1.2 Objectives & Scope

The primary objective of this manual is to ensure that users acquire complete technical competence to install, wire, configure, and deploy the Aurora 213MM2-R1 smart vibration sensor on target industrial equipment using factory-provided utility software.

Note: Selecting, configuring, and deploying third-party device hubs, edge gateway condition monitoring setups, gateway visualization platforms, or remote sensor parameter management fall outside the scope of this manual. Please refer to respective technical manuals, including 'Aurora Custom Test Edge Gateway Installation & User Manual' and 'Aurora EG032-RDV02-B231IOTECH Edge Gateway User Manual (V1.0)'.

1.3 Item Description

The Aurora system product family encompasses various wired and wireless smart sensors, wired/wireless receivers, edge gateways, cloud data visualization platforms, and cloud-based equipment health model training services. This manual focuses strictly on ensuring user capability to install the 213MM2-R1 smart sensor, configure its parameters using free factory utility software, and deploy its mounting accessories.

1.3.1 213MM2-R1 Smart Sensor & Accessories

1.3.1.1 213MM2-R1 RS485 Wired Tri-axial Smart Sensor

The 213MM2-R1 is a high-bandwidth smart sensor that measures and analyzes three-dimensional vibration characteristics. It incorporates an integrated surface temperature sensor to simultaneously monitor equipment skin temperature as an auxiliary bearing health indicator. Analysis results are transmitted via Modbus over RS485 to connected device hubs or edge gateways.

Depending on its mounting location on rotating machinery, 213MM2-R1 can be configured into 6 distinct operational modes. The sensor applies specialized internal analytical models and outputs location-tailored damage feature definitions across these modes (factory default: General Mode):

- General Mode
- Motor Drive End - Direct Drive Mode
- Motor Drive End - Belt Drive Mode
- Motor Non-Drive End Mode
- Roller Free End Mode
- Roller Belt-Driven End Mode



Figure1-2 213MM2-R1 Wired Tri-axial Smart Sensor

1.3.1.2 Smart Sensor Base 3838 & Magnetic Mount 3838M

Aurora offers two mounting fixtures for securing the 213MM2-R1 to monitored equipment:

Base 3838 (Non-Magnetic Base Assembly): When purchasing non-magnetic Base 3838, the package includes one non-magnetic base (Figure1-3) and a pair of M3 socket head cap screws (Figure1-5). One surface of the base is glued permanently to the equipment surface using metal epoxy, and the sensor is bolted securely onto the base.

Magnetic Mount 3838M Assembly: When purchasing Magnetic Mount 3838M, the package includes one magnetic mount (Figure1-4) and a pair of M3 socket screws (Figure1-5). The magnetic base attaches directly to ferromagnetic equipment surfaces for temporary or portable condition testing.



Figure1-3 Smart Sensor Base 3838



Figure1-4 Smart Sensor Magnetic Base 3838M



Figure1-5 M3 Socket Head Cap Screw

1.3.1.3 Aurora Modbus Utility Installation Guide

The Aurora Modbus Utility is a Windows-based software tool for configuring 213MM2-R1 sensor parameters. Installation procedure:

Step 1: Execute setup.exe by double-clicking (Figure1-6)

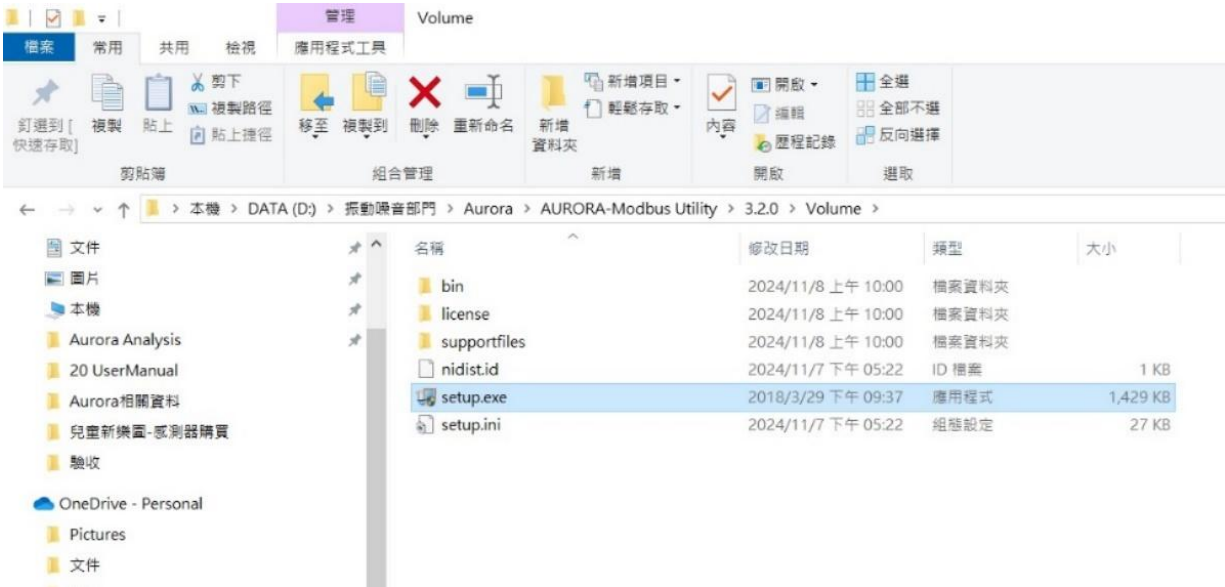


Figure1-6 Aurora Modbus Utility Install Software

Step 2: Select target installation directory and click 'Next' (Figure1-7)

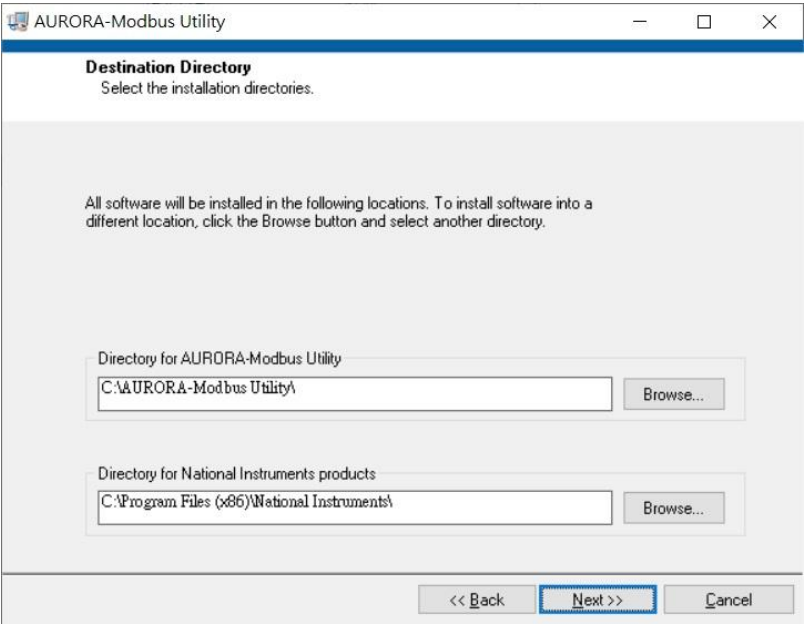


Figure1-7 Aurora Modbus Utility Select Installation Directory

Step 3: Review license agreement, select 'I Accept', and click 'Next' (Figure1-8).

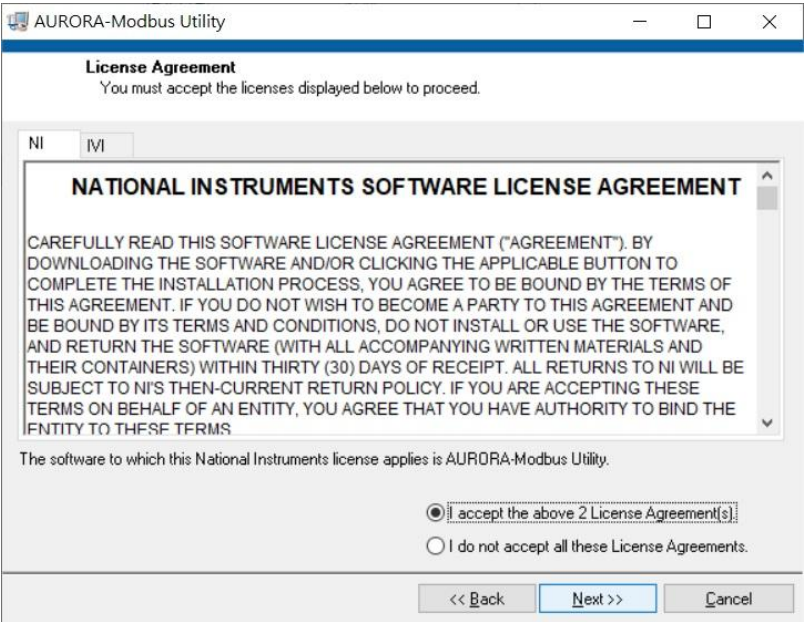


Figure1-8 Aurora Modbus Utility License Select

Step 4: Confirm installation items and click 'Next' to begin installation (Figure1-9)

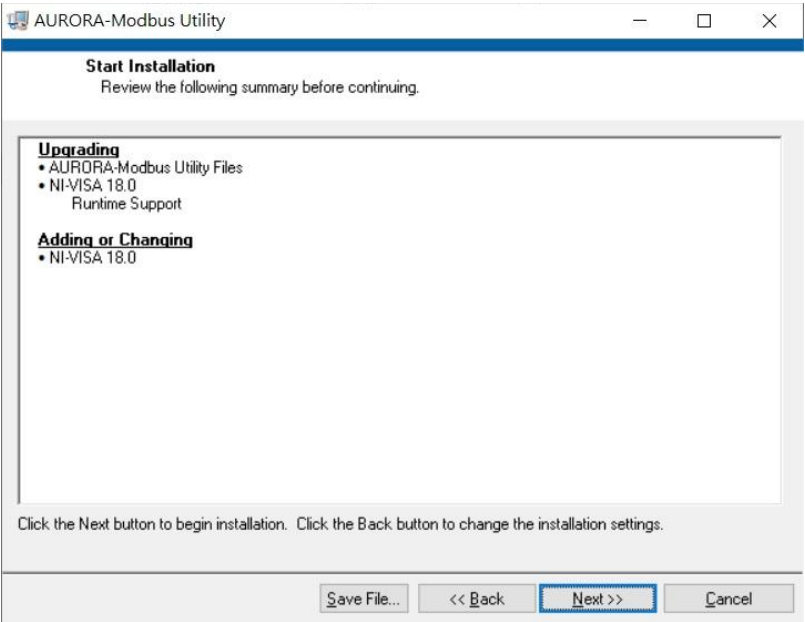


Figure1-9 Aurora Modbus Utility Select Next

Step 5: Monitor setup progress until completion (Figure1-10).

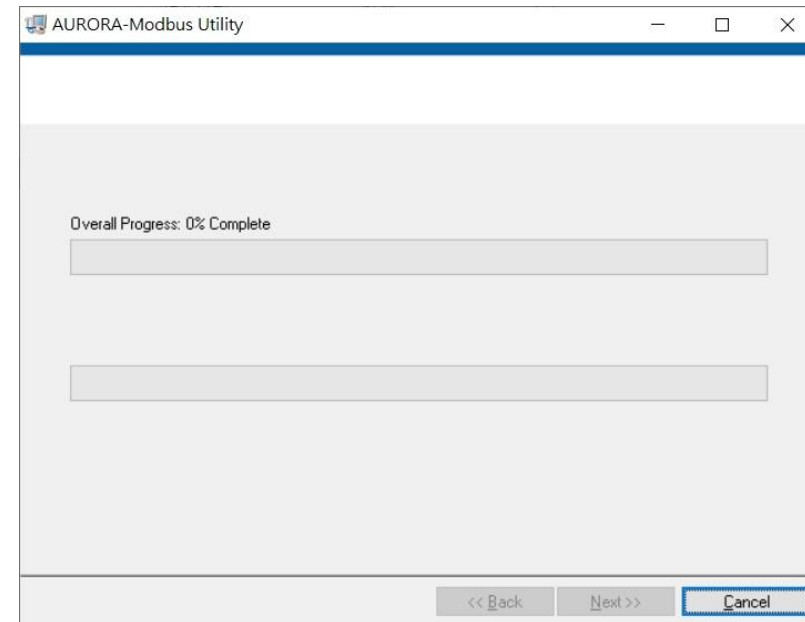


Figure1-10 Aurora Modbus Utility Installation Ready Screen

Step 6: Click Next upon installation completion (Figure1-11).

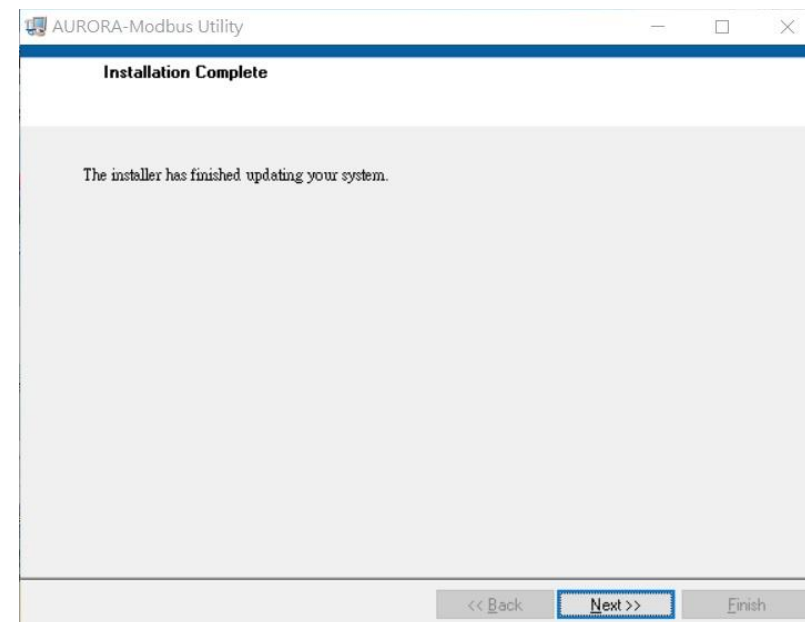


Figure1-11 Aurora Modbus Utility Install Finish

Step 7: Reboot the computer as prompted to finalize driver and software registration (Figure1-12).



Figure1-12 Aurora Modbus Utility Restart After Installation

As shown in Figure1-13, this is the installation path after the Aurora Modbus Utility software is installed.

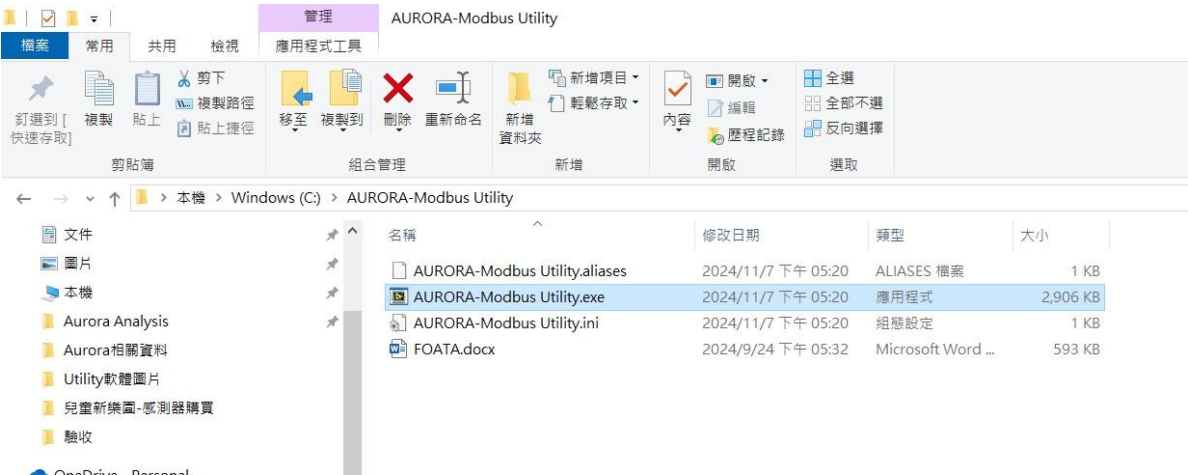


Figure1-13 Aurora Modbus Utility Software Path

2 213MM2-R1 Smart Sensor Specifications & Operations

2.1 Features & ISO-20816 Vibration Severity Standards

The 213MM2-R1 measures high-bandwidth vibration along three orthogonal axes (indicated by white direction arrows on the sensor housing) and records surface temperature to assist in bearing health monitoring.

ISO-20816 Vibration Health Severity Standard: The Overall vibration velocity RMS calculated by 213MM2-R1 conforms strictly to the ISO-20816 standard (released in 2022 to replace ISO-10816). Main differences include expanding the lower frequency evaluation limit from 5 Hz down to 2 Hz (range: 2 Hz to 1 kHz) and integrating pumps into standard rotating machinery categories (eliminating Group 3 and Group 4, retaining Group 1 and Group 2), as shown in Figure2-1 and Table 2-1. Health Classification Zone Definitions:

ISO-20816 Severity Zone Definitions:

- Green (Zone A - Newly Commissioned Machinery): Excellent vibration quality. Unrestricted long-term operation without specific time limit.
- Yellow (Zone B - Unrestricted Operation): Acceptable for long-term continuous operation without restriction.
- Orange (Zone C - Restricted Operation): Unsatisfactory vibration level. Machine may

ISI/DIS 20816-3	Medium-size Machines		Large Machines	
Advisor	Group 2		Group 1	
Velocity	Rated Power			
mm/s RMS	15 kW - 300 kW		300 kW - up	
11.0	DAMAGE OCCURS			
7.1	RESTRICTED OPERATION			
4.5	UNRESTRICTED OPERATION			
3.5				
2.8				
2.3				
1.4				
0.7	NEWLY COMMISSIONED MACHINERY			
0.0				
Foundation	Rigid	Flexible	Rigid	Flexible

Figure2-1 ISO-20816 Health Grading Metrics

Group	Machine Type	Power (W)	Support Type	Green (mm/s)	Yellow (mm/s)	Orange (mm/s)	Red (mm/s)
Group1	Large Machines	> 300 kW	Flexible	< 3.5	3.5 – 7.1	7.1 – 11.0	> 11.0
			Rigid	< 2.3	2.3 – 4.5	4.5 – 7.1	> 7.1
Group2	Medium Machines	15 kW – 300 kW	Flexible	< 2.3	2.3 – 4.5	4.5 – 7.1	> 7.1
			Rigid	< 1.4	1.4 – 2.8	2.8 – 4.5	> 4.5

Table 2-1 ISO-20816 Health Grading Metrics Description

operate for a limited period until maintenance can be scheduled.

- Red (Zone D - Damage Occurs): Vibration severity is sufficient to cause machine damage. Shutdown and repair required immediately.

Operational Application Modes:

The 213MM2-R1 smart sensor applies specialized internal analysis algorithms and output feature definitions tailored to its mounting location on rotating machinery:

- General Mode

Applied when the user is uncertain which specific mode or mounting location to select, or when monitoring custom target frequency bands. Parameter setup details are provided in Section 2.6.1.1

- Motor Drive End - Direct Drive

The motor drive end is directly coupled to loads such as fans or pumps without intermediate transmission mechanisms like gears or belts. Commonly utilized in automation systems and pump equipment (as illustrated in Figure2-2 and Figure2-3). For parameter configuration, please refer to Section 2.6.1.4.

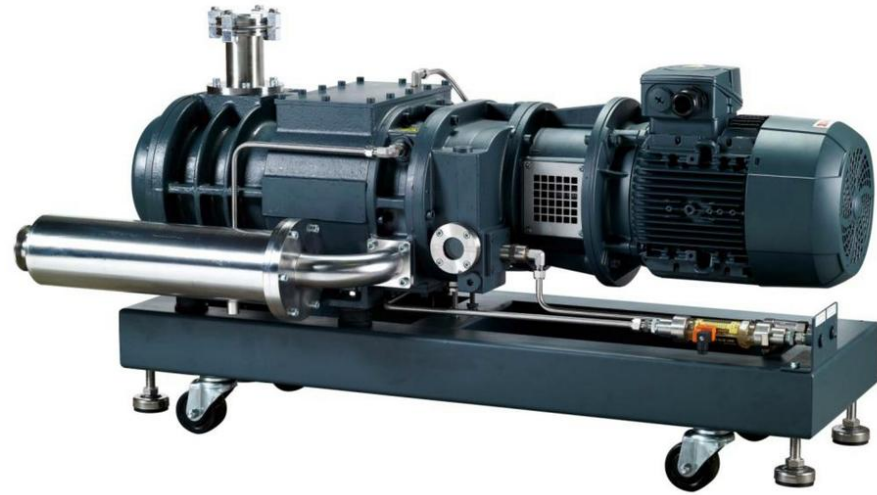
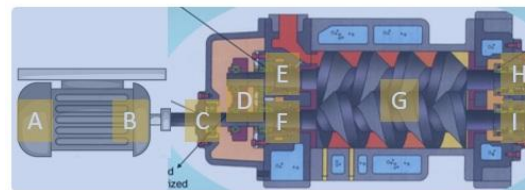


Figure2-2 Motor Drive End - Direct Drive



Key Components

Bearing: A, B, C, E, F, H, I
Timing Gear: D
Screw Rotor: G



Figure2-3 Motor Drive End - Direct Drive

- Motor Drive End - Belt Drive

The motor drive end transmits power to driven equipment through a belt system consisting of one or multiple belts. It primarily transfers motor-generated rotational energy via belts to drive downstream mechanical components (as illustrated in Figure2-4 and Figure2-5). For parameter configuration, please refer to Section 2.6.1.3



Figure2-4 Motor Drive End - Belt Drive

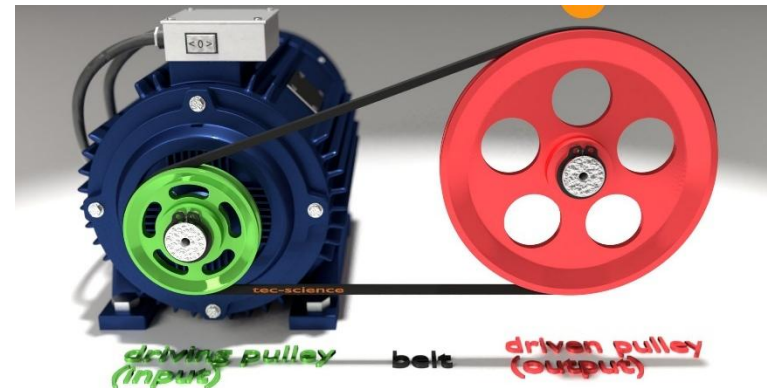


Figure2-5 Motor Drive End - Belt Drive

- **Motor Non-Drive End**

The motor input end opposite the drive end is typically connected to the motor bearing assembly, primarily supporting the rotor. The non-drive end absorbs axial forces and auxiliary loads from the rotor, generally exhibiting lower overall vibration energy than the drive end. Primary vibration sources originate from bearings, rotor unbalance, or foundation looseness (as illustrated in Figure2-6). For parameter configuration, please refer to Section 2.6.1.2

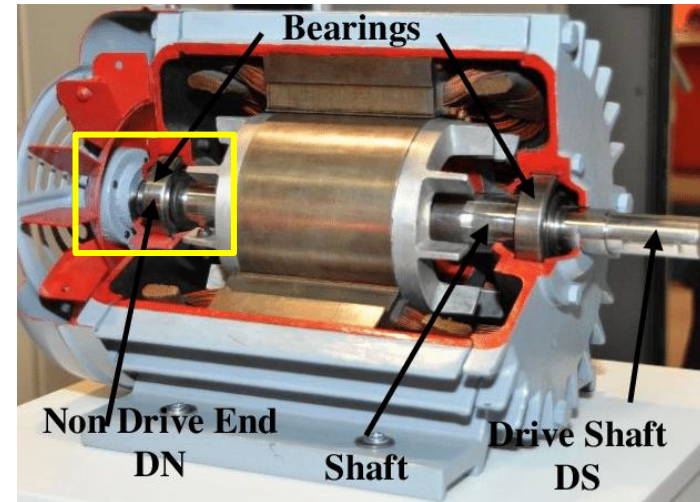


Figure2-6 Motor Non-Drive End

- **Roller Free End**

The non-driven end in a roller or cylinder assembly supported purely by bearings to allow free rotation (as illustrated in Figure2-7). For parameter configuration, please refer to Section 2.6.1.5



Figure2-7 Roller Free End

- Roller Belt-Driven End

The connection interface between the drive belt and the roller in a roller or cylinder system (as illustrated in Figure2-8). For parameter configuration, please refer to Section 2.6.1.6

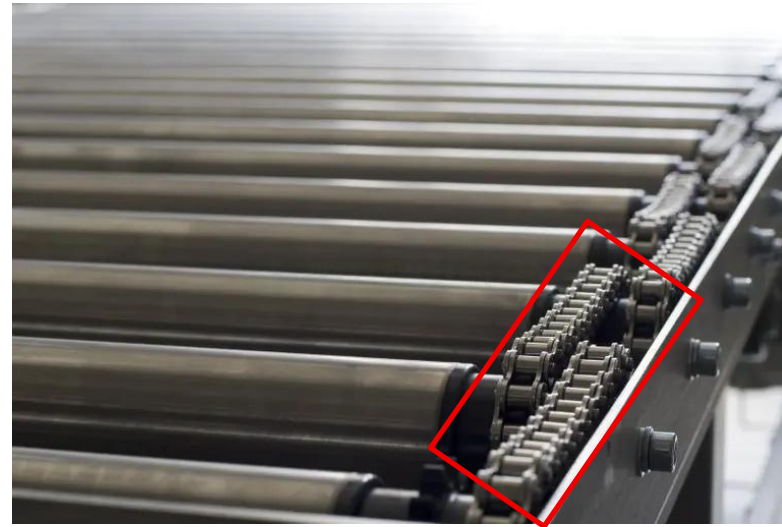


Figure2-8 Roller Belt-Driven End

Regardless of selected operational mode, 213MM2-R1 computes ISO-20816 Overall RMS alongside time-domain features (Peak, Peak-to-Peak, Crest Factor) to evaluate primary equipment health status.

In General Mode, 213MM2-R1 includes built-in damage energy calculation models for rotating machinery, computing individual vibration energies and failure probability ratios for unbalance, misalignment, foundation looseness, bearing defect, gear mesh defect, and vane pass defect inside the sensor. Other modes also feature their respective built-in damage models (Section 2.5).

If built-in damage models do not completely cover monitoring needs, General Mode allows receiving custom parameter settings to compute output energies for user-defined frequency bands or order bands (Band 01 to Band 10). Custom warning/alarm upper limits can be set for all feature outputs, with evaluation results written directly into Modbus Registers.

Measurement Execution Modes: Continuous Uninterrupted Mode, External TTL Trigger Mode, and Internal Trigger Mode. When in triggered modes prior to trigger activation, the sensor periodically updates Modbus Registers 30001–30004 so edge gateways can monitor sensor self-health.

2.2 213MM2-R1 communication

architecture

213MM2-R1 transmits analysis results via Modbus over RS485 to connected device hubs (converting RS485 to Modbus over Ethernet or Wi-Fi) or directly to edge gateways. Configuration parameters can be pushed from edge gateways or the Modbus Utility to the sensor.

Various edge gateways provided by TEXOL feature built-in data collection, visualization, and sensor management software. You can adopt the complete TEXOL solution to monitor your equipment, and refer to "Aurora EG032-RDV02-B231IOTECH Edge Gateway Installation and Instruction Manual (V1.0)" to carry out equipment monitoring and diagnosis.

If you adopt a self-built approach to establish a test edge gateway for receiving 213MM2-R1 data, please refer to "Aurora Self-Built Test Edge Gateway Installation and Instruction Manual (V1.0)". After installation, the application within the gateway will store feature data output by the sensor into a CSV file. In addition to acquiring feature data from CSV files for storage, you can also build your own application to scan the Modbus Registers of each 213MM2-R1 to acquire feature data in real-time. For details, please refer to the aforementioned instruction manual.

Table2-2 213MM2-R1 RS485 Connection Parameters describes various RS485 connection setting parameters for the 213MM2-R1. For internal firmware version information query methods of the 213MM2-R1, please refer to descriptions in Section 3.7

Baudrate	115,200 bit/sec
Data bit	8 bits
Parity	None
Stop bit	1 bit
Flow control	None

Table2-2 213MM2-R1 RS485 Connection Parameters

2.3 213MM2-R1 Wiring Definition

The 213MM2-R1 requires external supply of 12-24V DC power. Its wiring definition is shown in Table2-3, where the red wire is positive pole and black wire is negative pole. Green and yellow wires are RS485 DATA+ and DATA-, respectively. The blue wire is external TTL trigger line; normally this pin is maintained at low level. When wishing to trigger 213MM2-B1 for measurement and analysis, pull this pin high. The brown wire is restore factory default trigger line; for usage method, please refer to Section 3.3

Red	VDC+ (12~24V)
Thin Black	GND
Green	RS485 DATA+
Yellow	RS485 DATA-
Blue	TTL External Trigger
Thick Black	Shield

Table2-3 213MM2-R1 Wiring Definition

2.4 213MM2-R1Light Indicator Definition

As shown in Figure2-9, the 213MM2-R1 has three LED lights on its top surface. From top to bottom in order, they are PWR, TX, RX indicators.



Figure2-9 213MM2-R1 Status Indicator Lights

As shown in Table2-4, if the PWR light of smart sensor 213MM2-R1 remains solid on without blinking, it indicates that the sensor is in Trigger mode operating state but not triggered, and will not execute calculation analysis, nor update any values in the Modbus register table. If the light blinks once per second, it indicates that the sensor is executing calculation analysis and updating Modbus registers at a fixed frequency of once per second. If the PWR light is off, it indicates abnormal power supply or sensor damage; please check power supply status, or further contact agent service. If PWR, TX, and RX are all solid on, it indicates 213MM2-R1 firmware is damaged and has entered recovery mode; please further contact agent service.

PWR solid on, not blinking	213MM2-R1 not triggered, does not execute calculation analysis.
PWR blinks once	213MM2-R1 executing calculation analysis.
PWR, TX, RX all solid on	213MM2-R1 firmware damaged, entered recovery mode.

Table2-4 213MM2-R1 Operating Status Indicator Definitions

As shown in Table2-5, when calculation analysis data uploading or analysis parameter downloading takes place between smart sensor 213MM2-R1 and various edge gateways, TX and RX indicator lights will blink. If TX and RX indicator lights remain off, it indicates abnormal signal wiring between 213MM2-R1 and edge gateway, edge gateway did not issue read command or analysis parameters, or sensor is damaged; please inspect the above possibilities, or further contact agent service.

TX blinks once	213MM2-R1 uploading data via RS-485 interface
RX blinks once	213MM2-R1 downloading parameters via RS-485 interface

Table2-5 213MM2-R1Data Exchange Indicator Definitions

2.5 Definition and Reading of 213MM2-R1 Output Vibration Feature Data

2.5.1 213MM2-R1 Output Vibration Feature Data Definition and Units

The 213MM2-R1 adopts the Modbus over RS485 communication interface to transmit analysis results to various connected device hubs and edge gateways. This section will table and list the physical meanings and factory default definitions of all feature output items of the 213MM2-R1.

The feature data of the 213MM2-R1 includes time-domain features usable for roughly judging equipment health status, energy magnitude features corresponding to various damage modes calculated by built-in models, and user-defined energy magnitude features within the frequency domain. The 213MM2-R1 samples approximately 26,667 raw vibration signals (raw signals) per second, and based on these raw vibration signals, calculates and updates the aforementioned feature data once per second.

The 213MM2-R1 provides modes including General Mode (General), Motor Load End with Rear-End Load Direct Driven (Motor.DriveEnd.DirectDrive), Motor Load End with Rear-End Load Belt Driven (Motor.DriveEnd.DriveBelt), Motor Non-Drive End (Motor.NonDriveEnd), Roller Free End (Roller.FreeEnd), and Roller Belt Connection End (Roller.BeltDrivenEnd) for users to select. For detailed descriptions, please refer to Section 2.1. The damage mode feature data definitions supported by each mode are also different. Users can configure settings according to usage conditions and refer to the vibration feature data descriptions for each mode in subsequent sections:

2.5.1.1 General Mode Vibration Feature Data Definition and Units

The table on the right Table2-6 describes the physical meanings and units of various time-domain features used to roughly judge equipment health status output by the 213MM2-R1.

Under General Mode, the 213MM2-R1 features several built-in damage energy calculation models common to rotating equipment, which can calculate inside the sensor the vibration energy and failure probability weight individually caused by damage modes such as unbalance, misalignment, base looseness, bearing damage, gear damage, and impeller transport inefficiency. If you feel the aforementioned damage modes cannot fully cover your monitoring needs, the 213MM2-R1 General Mode can also receive your analysis parameter settings to calculate and output the damage energy magnitude of each frequency band or order band within the frequency domain.

The table on the right Table2-7 describes the physical meanings and units of various feature values output by the 213MM2-R1 used for carrying out various damage mode identifications and residual life model building and inference.

Item	Unit	Physical Meaning
Overall (OA)	mm/s, rms	Vibration magnitude indicator defined by ISO-20816, root mean square value of vibration velocity signal per unit time.
Peak	mm/s	Peak value of vibration velocity signal per unit time.
Peak to peak	mm/s	Peak-to-peak value of vibration velocity signal per unit time.
Crest factor	Dimensionless	Crest factor, usable as an indicator value for early bearing damage.

Table2-6 213MM2-R1 Output Time Domain Feature Definitions (General)

Item	Unit	Physical Meaning
Bearing	Dimensionless	Bearing health degree
Imbalance	(mm/s, rms) ²	Energy generated by balance failure mode
Misalignment	(mm/s, rms) ²	Energy generated by misalignment mode
Looseness	(mm/s, rms) ²	Energy generated by base or bearing housing looseness mode
Gear mesh	(mm/s, rms) ²	Energy generated by gear damage or tooth breakage
Van Pass	(mm/s, rms) ²	Energy generated by impeller damage or poor impeller design
Bearing percentage	%	Bearing failure severity percentage
Imbalance percentage	%	Balance failure severity percentage
Misalignment percentage	%	Misalignment failure severity percentage
Looseness percentage	%	Base looseness failure severity percentage
Gear mesh percentage	%	Gear damage failure severity percentage
Van Pass percentage	%	Impeller damage failure severity percentage

Table2-7 213MM2-R1 Output Damage Definitions (General)

The table on the right Table2-8 describes the physical meanings and units of various user-defined frequency-domain features used for carrying out various damage mode identifications and residual life model building and inference for the 213MM2-R1.

Item	Unit	Factory Default Definition	Physical Meaning
Power in band 01	(mm/s, rms) ²	Energy within 1X order band	Energy generated by unbalance, misalignment, looseness, severe bearing damage, and other failure modes
Power in band 02	(mm/s, rms) ²	Energy within 2X order band	Energy generated by misalignment, looseness, severe bearing damage, and other failure modes
Power in band 03	(mm/s, rms) ²	Energy within 3X order band	Energy generated by looseness and other failure modes
Power in band 04	(mm/s, rms) ²	Energy within 2 – 200 Hz	
Power in band 05	(mm/s, rms) ²	Energy within 201 – 500 Hz	
Power in band 06	(mm/s, rms) ²	Energy within 501 – 1,000 Hz	
Power in band 07	(mm/s, rms) ²	Energy within 1,001 – 2,000 Hz	
Power in band 08	(mm/s, rms) ²	Energy within 2,001 – 3,000 Hz	
Power in band 09	(mm/s, rms) ²	Energy within 3,001 – 4,000 Hz	
Power in band 10	(mm/s, rms) ²	Energy within 4,001 – 5,000 Hz	

Table2-8 Output Frequency Domain Feature Definitions (General)

2.5.1.2 Motor Non-Drive End Mode

Vibration Feature Data Definition and Units

The table on the right Table2-9 describes the physical meanings and units of various time-domain features used to roughly judge equipment health status output by the 213MM2-R1.

Item	Unit	Physical Meaning
Overall (OA)	mm/s, rms	Vibration magnitude indicator defined by ISO-20816, root mean square value of vibration velocity signal per unit time.
Crest factor	Dimensionless	Crest factor, usable as an indicator value for early bearing damage.

Table2-9 213MM2-R1 Output Time Domain Feature Definitions (Motor.NonDriveEnd)

The table on the right Table2-10 describes the physical meanings and units of various feature values output by the 213MM2-R1 used for carrying out various damage mode identifications and residual life model building and inference.

Item	Unit	Physical Meaning
Def_Bea	Dimensionless	Bearing health degree
Def_Imb	(mm/s, rms) ²	Energy generated by balance failure mode
Def_Mis	(mm/s, rms) ²	Energy generated by misalignment mode
Def_Loo/CRB	(mm/s, rms) ²	Energy generated by base, bearing housing looseness, or rotor bar breakage mode
Def_LSW/SE/RE/SL	(mm/s, rms) ²	Energy generated by coil looseness, inter-turn short circuit, rotor or stator eccentricity

Table2-10 213MM2-R1 Output Frequency Domain Feature Definitions (Motor.NonDriveEnd)

2.5.1.3 Motor Load End, and Rear-End Load Belt Driven (Motor.DriveEnd.DriveBelt) Mode Vibration Feature Data Definition and Units

The table on the right Table2-11 describes the physical meanings and units of various time-domain features used to roughly judge equipment health status output by the 213MM2-R1 under Motor.DriveEnd.DriveBelt mode.

Item	Unit	Physical Meaning
Overall (OA)	mm/s, rms	Vibration magnitude indicator defined by ISO-20816, root mean square value of vibration velocity signal per unit time.
Crest factor	Dimensionless	Crest factor, usable as an indicator value for early bearing damage.

Table2-11 213MM2-R1 Output Time Domain Feature Definitions (Motor.DriveEnd.DriveBelt)

The table on the right Table2-12 describes the physical meanings and units of various feature values output by the 213MM2-R1 under Motor.DriveEnd.DriveBelt mode used for carrying out various damage mode identifications and residual life model building and inference.

Item	Unit	Physical Meaning
Def_Bea	Dimensionless	Bearing health degree
Def_Imb/BR/IBT	(mm/s, rms) ²	Energy generated by balance failure, belt resonance, or abnormal belt tension modes
Def_Mis	(mm/s, rms) ²	Energy generated by misalignment mode
Def_Loo/CRB	(mm/s, rms) ²	Energy generated by base, bearing housing looseness, or rotor bar breakage mode
Def_LSW/SE/RE/SL	(mm/s, rms) ²	Energy generated by coil looseness, inter-turn short circuit, rotor or stator eccentricity

Table2-12 213MM2-R1 Output Frequency Domain Feature Definitions (Motor.DriveEnd.DriveBelt)

2.5.1.4 Motor Load End, and Rear-End Load Direct Driven (Motor.DriveEnd.DirectDrive) Mode Vibration Feature Data Definition and Units

The table on the right Table2-13 describes the physical meanings and units of various time-domain features used to roughly judge equipment health status output by the 213MM2-R1 under Motor.DriveEnd.DirectDrive mode.

Item	Unit	Physical Meaning
Overall (OA)	mm/s, rms	Vibration magnitude indicator defined by ISO-20816, root mean square value of vibration velocity signal per unit time.
Crest factor	Dimensionless	Crest factor, usable as an indicator value for early bearing damage.

Table2-13 213MM2-R1 Output Time Domain Feature Definitions (Motor.DriveEnd.DirectDrive)

The table on the right Table2-14 describes the physical meanings and units of various feature values output by the 213MM2-R1 under Motor.DriveEnd.DirectDrive mode used for carrying out various damage mode identifications and residual life model building and inference.

Item	Unit	Physical Meaning
Def_Bea	Dimensionless	Bearing health degree
Def_Imb	(mm/s, rms) ²	Energy generated by balance failure mode
Def_Mis	(mm/s, rms) ²	Energy generated by misalignment mode
Def_Loo/CRB	(mm/s, rms) ²	Energy generated by base, bearing housing looseness, or rotor bar breakage mode
Def_LSW/SE/RE/SL	(mm/s, rms) ²	Energy generated by coil looseness, inter-turn short circuit, rotor or stator eccentricity

Table2-14 213MM2-R1 Output Frequency Domain Feature Definitions (Motor.DriveEnd.DirectDrive)

2.5.1.5 Roller Free End (Roller.FreeEnd) Mode Vibration Feature Data Definition and Units

The table on the right Table2-15 describes the physical meanings and units of various time-domain features used to roughly judge equipment health status output by the 213MM2-R1 under Roller.FreeEnd mode.

Item	Unit	Physical Meaning
Overall (OA)	mm/s, rms	Vibration magnitude indicator defined by ISO-20816, root mean square value of vibration velocity signal per unit time.
Crest factor	Dimensionless	Crest factor, usable as an indicator value for early bearing damage.

Table2-15 213MM2-R1 Output Time Domain Feature Definitions (Roller.FreeEnd)

The table on the right Table2-16 describes the physical meanings and units of various feature values output by the 213MM2-R1 under Roller.FreeEnd mode used for carrying out various damage mode identifications and residual life model building and inference.

Item	Unit	Physical Meaning
Def_Bea	Dimensionless	Bearing health degree
Def_Imb	(mm/s, rms) ²	Energy generated by balance failure mode
Def_Mis	(mm/s, rms) ²	Energy generated by misalignment mode
Def_Loo	(mm/s, rms) ²	Energy generated by base or bearing housing looseness mode

Table2-16 213MM2-R1 Output Frequency Domain Feature Definitions (Roller.FreeEnd)

2.5.1.6 Roller Belt Connection End (Roller.BeltDrivenEnd) Mode Vibration Feature Data Definition and Units

The table on the right Table2-17 describes the physical meanings and units of various time-domain features used to roughly judge equipment health status output by the 213MM2-R1 under Roller.BeltDrivenEnd mode.

Item	Unit	Physical Meaning
Overall (OA)	mm/s, rms	Vibration magnitude indicator defined by ISO-20816, root mean square value of vibration velocity signal per unit time.
Crest factor	Dimensionless	Crest factor, usable as an indicator value for early bearing damage.

Table2-17 213MM2-R1 Output Time Domain Feature Definitions (Roller.BeltDrivenEnd)

The table on the right Table2-18 describes the physical meanings and units of various feature values output by the 213MM2-R1 under Roller.BeltDrivenEnd mode used for carrying out various damage mode identifications and residual life model building and inference.

Item	Unit	Physical Meaning
Def_Bea	Dimensionless	Bearing health degree
Def_Imb/BR/IBT	(mm/s, rms) ²	Energy generated by balance failure, belt resonance, or abnormal belt tension modes
Def_Mis	(mm/s, rms) ²	Energy generated by misalignment mode
Def_Loo	(mm/s, rms) ²	Energy generated by base or bearing housing looseness mode

Table2-18 213MM2-R1 Output Frequency Domain Feature Definitions (Roller.BeltDrivenEnd)

2.5.2 Reading 213MM2-R1 Feature Data

The 213MM2-R1 adopts the Modbus over RS485 communication interface to upload various feature data onto various device hubs and edge gateways. We recommend using the built-in functions of TEXOL factory edge gateways to acquire, store, and manage data, which is more convenient. For operational instructions on adding 213MM2-R1 sensors and managing data inside the edge gateway, please refer to "Aurora EG032-RDV02-B231IOTECH Edge Gateway Instruction Manual (V1.0)".

If you do not adopt a factory edge gateway and instead build an upper-level data management system yourself, you must scan and acquire your required data items from the Modbus registers yourself.

The 213MM2-R1 provides modes including General Mode (General), Motor Load End with Rear-End Load Direct Driven (Motor.DriveEnd.DirectDrive), Motor Load End with Rear-End Load Belt Driven (Motor.DriveEnd.DriveBelt), Motor Non-Drive End (Motor.NonDriveEnd), Roller Free End (Roller.FreeEnd), and Roller Belt Connection End (Roller.BeltDrivenEnd) for users to select. For detailed descriptions, please refer to Section 2.1. The damage mode feature data definitions supported by each mode are also different. Please refer to the feature data location descriptions for each mode below:

2.5.2.1 General Mode Feature Data

Under General mode, the Modbus definition classification of output data items for 213MM2-R1 can refer to Table2-19 on the right. For complete Register Table definition details, please refer to Appendix C. When you read Modbus locations, note that if the internal firmware version of your 213MM2-R1 is prior to V4.0, in all location segments, lower-addressed content represents high-order bytes, and higher-addressed content represents low-order bytes (taking location segment 30011~30012 as an example, 30011 is high byte, 30012 is low byte); if the internal firmware version of your 213MM2-R1 is V4.0 or later, the Sensor serial number Sensor ID (locations 30005-30007) allocation method for high and low bytes can be adjusted by the user, for adjustment methods please refer to descriptions in Section 3.8, while other parameters still maintain lower-addressed content as high byte and higher-addressed content as low byte. Regardless of firmware version, location segments 30011 to 30120 are integer outputs, which must be multiplied by the Scale parameter to obtain correct feature data. For firmware version query methods, please refer to Section 3.7.

Location	Item	Description
30001 – 30004	Data Output Count	Every time feature data is updated once, Data Output Count automatically increments by one, informing subscribers that the read feature data is updated data.
30005 – 30007	Sensor ID	Sensor serial number
30008	Slave ID	Sensor Modbus station number (Modbus slave ID)
30009	Machine Type	0 when using General mode
30010	RPM	Equipment real-time rotation speed
30011 – 30034		Values of various time-domain features
30035 – 30094		Values of various user-defined frequency-domain features
30095 – 30106		Feature values of various damage modes
30107 – 30118		Severity percentage proportions of various damage modes
30119 – 30120	Temperature	Equipment surface temperature
30121 – 30132		Failure determination results of various time-domain features
30133 – 30162		Failure determination results of various user-defined frequency-domain features
30163 – 30168		Failure determination results of various damage mode features
30169		Equipment surface temperature failure determination result

Table2-19 213MM2-R1 Modbus Output General Feature Data Table

2.5.2.2 Motor Non-Drive End (Motor.NonDriveEnd) Mode Feature Data

Under Motor.NonDriveEnd mode, the Modbus definition classification of output data items for 213MM2-R1 can refer to Table2-20 on the right. For complete Register Table definition details, please refer to Appendix D. High/low byte rules and integer scaling are identical to Section 2.5.2.1.

Location	Item	Description
30001 – 30004	Data Output Count	Every time feature data is updated once, Data Output Count automatically increments by one, informing subscribers that the read feature data is updated data.
30005 – 30007	Sensor ID	Sensor serial number
30008	Slave ID	Sensor Modbus station number (Modbus slave ID)
30009	Machine Type	3 when using Motor.NonDriveEnd mode
30010	RPM	Equipment real-time rotation speed
30011 – 30022		Values of various time-domain features
30023 – 30024	Temperature	Equipment surface temperature
30025 – 30034		Feature values of various damage modes
30039 – 30041		Failure determination results of various time-domain features

Table2-20 213MM2-R1 Modbus Output Motor.NonDriveEnd Feature Data Table

2.5.2.3 Motor Load End, and Rear-End Load Belt Driven (Motor.DriveEnd.DriveBelt) Mode Feature Data

Under Motor.DriveEnd.DriveBelt mode, the Modbus definition classification of output data items for 213MM2-R1 can refer to Table2-21 on the right. For complete Register Table definition details, please refer to Appendix E. High/low byte rules and integer scaling are identical to Section 2.5.2.1.

Location	Item	Description
30001 – 30004	Data Output Count	Every time feature data is updated once, Data Output Count automatically increments by one, informing subscribers that the read feature data is updated data.
30005 – 30007	Sensor ID	Sensor serial number
30008	Slave ID	Sensor Modbus station number (Modbus slave ID)
30009	Machine Type	1 when using Motor.DriveEnd.DriveBelt mode
30010	RPM	Equipment real-time rotation speed
30011 – 30022		Values of various time-domain features
30023 – 30024	Temperature	Equipment surface temperature
30025 – 30034		Feature values of various damage modes
30039 – 30041		Failure determination results of various time-domain features

Table2-21 213MM2-R1 Modbus Output Motor.DriveEnd.DriveBelt Feature Data Table

2.5.2.4 Motor Load End, and Rear-End Load Direct Driven (Motor.DriveEnd.DirectDrive) Mode Feature Data

Under Motor.DriveEnd.DirectDrive mode, the Modbus definition classification of output data items for 213MM2-R1 can refer to Table2-22 on the right. For complete Register Table definition details, please refer to Appendix F. High/low byte rules and integer scaling are identical to Section 2.5.2.1.

Location	Item	Description
30001 – 30004	Data Output Count	Every time feature data is updated once, Data Output Count automatically increments by one, informing subscribers that the read feature data is updated data.
30005 – 30007	Sensor ID	Sensor serial number
30008	Slave ID	Sensor Modbus station number (Modbus slave ID)
30009	Machine Type	2 when using Motor.DriveEnd.DirectDrive mode
30010	RPM	Equipment real-time rotation speed
30011 – 30022		Values of various time-domain features
30023 – 30024	Temperature	Equipment surface temperature
30025 – 30034		Feature values of various damage modes
30039 – 30041		Failure determination results of various time-domain features

Table2-22 213MM2-R1 Modbus Output Motor.DriveEnd.DirectDrive Feature Data Table

2.5.2.5 Roller Free End (Roller.FreeEnd) Mode Feature Data

Under Roller.FreeEnd mode, the Modbus definition classification of output data items for 213MM2-R1 can refer to Table2-23 on the right. For complete Register Table definition details, please refer to Appendix G. High/low byte rules and integer scaling are identical to Section 2.5.2.1.

Location	Item	Description
30001 – 30004	Data Output Count	Every time feature data is updated once, Data Output Count automatically increments by one, informing subscribers that the read feature data is updated data.
30005 – 30007	Sensor ID	Sensor serial number
30008	Slave ID	Sensor Modbus station number (Modbus slave ID)
30009	Machine Type	5 when using Roller.FreeEnd mode
30010	RPM	Equipment real-time rotation speed
30011 – 30022		Values of various time-domain features
30023 – 30024	Temperature	Equipment surface temperature
30025 – 30032		Feature values of various damage modes
30033 – 30035		Failure determination results of various time-domain features

Table2-23 213MM2-R1 Modbus Output Roller.FreeEnd Feature Data Table

2.5.2.6 Roller Belt Connection End (Roller.BeltDrivenEnd) Mode Feature Data

Under Roller.BeltDrivenEnd mode, the Modbus definition classification of output data items for 213MM2-R1 can refer to Table2-24 on the right. For complete Register Table definition details, please refer to Appendix H. High/low byte rules and integer scaling are identical to Section 2.5.2.1.

Location	Item	Description
30001 – 30004	Data Output Count	Every time feature data is updated once, Data Output Count automatically increments by one, informing subscribers that the read feature data is updated data.
30005 – 30007	Sensor ID	Sensor serial number
30008	Slave ID	Sensor Modbus station number (Modbus slave ID)
30009	Machine Type	4 when using Roller.BeltDrivenEnd mode
30010	RPM	Equipment real-time rotation speed
30011 – 30022		Values of various time-domain features
30023 – 30024	Temperature	Equipment surface temperature
30025 – 30032		Feature values of various damage modes
30033 – 30035		Failure determination results of various time-domain features

Table2-24 213MM2-R1 Modbus Output Roller.BeltDrivenEnd Feature Data Table

2.6 Setting and Reading of 213MM2-R1

Vibration Analysis Parameter

Definitions

2.6.1 213MM2-R1 Vibration Analysis Parameter Description

The 213MM2-R1 adopts the Modbus over RS485 communication interface to issue sensor analysis parameter definitions from various device hubs and edge gateways to the 213MM2-R1. This section will first list the physical meanings and factory default values of analysis parameter items that can be issued to the 213MM2-R1.

The 213MM2-R1 provides modes including General Mode (General), Motor Load End with Rear-End Load Direct Driven (Motor.DriveEnd.DirectDrive), Motor Load End with Rear-End Load Belt Driven (Motor.DriveEnd.DriveBelt), Motor Non-Drive End (Motor.NonDriveEnd), Roller Free End (Roller.FreeEnd), and Roller Belt Connection End (Roller.BeltDrivenEnd) for users to select. For detailed descriptions, please refer to Section 2.1. The analysis parameter items supported for issuing in each mode are different. Users can, according to usage conditions, refer to the following descriptions of the physical meanings and factory default values of analysis parameters for each mode:

2.6.1.1 Physical Meanings and Factory Default Values of General Mode Analysis Parameter Items

Item	Unit	Physical Meaning
Sensitivity	mg/LSB	Calibration sensitivity
Hardware Trigger	Dimensionless	0: Disable TTL hardware trigger function 1: Enable TTL hardware trigger function
Trigger Level	g	Software trigger level determines when the smart sensor starts acquiring signals and executing calculation analysis. If your monitoring object is non-steady-state equipment, you can set a suitable trigger level so that the smart sensor monitors its health status only when the equipment is moving, and stops monitoring when the equipment stops running or is idling.
Delay Time	sec	How many seconds after trigger before starting calculation analysis.
Analyze	sec	How long to analyze after trigger.
RPM Start	RPM	Reasonable speed range of rotating equipment. When you adopt the order band method to define equipment damage modes, you need to inform the smart sensor of the reasonable speed range of the equipment to facilitate the smart sensor in accurately estimating the equipment's current speed in real-time and converting order bands.
RPM End	RPM	
Power in band Band/Order	Dimensionless	0: Order; 1: Band. Choose one of two. Adopt left-right frequency band interval method (Band) to define damage modes, or adopt order band and bandwidth (Order) to define damage modes. Order band is applicable only to monitoring rotating equipment; do not choose order band damage definitions for non-rotating equipment.

The table on the right Table2-25 describes the physical meanings and units of various adjustable analysis parameters for 213MM2-R1 under General mode.

Power in band Start/Stop	Hz	The corresponding left boundary and right boundary defined by left-right frequency band intervals.
Power in band Order/Bandwidth	Order (X)	The corresponding center order and order bandwidth defined by order band.
Power in band Magnification	Dimensionless	Output magnification factor when calculating damage energy.
Instrument Type	Dimensionless	Which equipment category defined in ISO-20816 the monitored equipment belongs to. 0: Does not belong to ISO-20816 definition; the sensor judges basic health status failure according to user-defined warning upper limits. 1-4: Equipment belongs to categories 1-4 defined in ISO-20816; the sensor judges basic health status failure according to warning upper limits defined in ISO-20816. 1 represents ISO-20816 - Group 1 – Flexible, and so on, 4 represents ISO-20816 – Group 2 – Rigid.
Gear Van Pass Enable/Disable	Dimensionless	Whether to enable gear and impeller damage analysis modes 00000000(b): Disable both 00000001(b): Enable gear damage analysis mode 00000010(b): Enable impeller damage analysis mode 00000011(b): Enable both
Gear number	Dimensionless	Number of teeth
Van number	Dimensionless	Number of blades

Table2-25 213MM2-R1 Vibration-Related Adjustable Analysis Parameter Definitions under General Mode

The table on the right Table2-26 describes the factory default values of various adjustable parameters for 213MM2-R1 under General mode.

Item		Unit	Factory Default Value
Sensitivity		mg/LSB	Factory calibration result
Hardware Trigger		Dimensionless	0
Trigger Level		g	0.001
Delay Time		sec	0
Analyze		sec	5
RPM Start		RPM	3,000
RPM End		RPM	4,000
Power in band 01	Band/Order	Dimensionless	Order
	Central/Bandwidth	Order (X)	1 / 0.5
	Magnification	Dimensionless	1
Power in band 02	Band/Order	Dimensionless	Order
	Central/Bandwidth	Order (X)	2 / 0.5
	Magnification	Dimensionless	1
Power in band 03	Band/Order	Dimensionless	Order
	Central/Bandwidth	Order (X)	3 / 0.5
	Magnification	Dimensionless	1
Power in band 04	Band/Order	Dimensionless	Band
	Left/Right	Hz	2 / 200
	Magnification	Dimensionless	1
Power in band 05	Band/Order	Dimensionless	Band
	Left/Right	Hz	201 / 500
	Magnification	Dimensionless	1
Power in band 06	Band/Order	Dimensionless	Band
	Left/Right	Hz	501 / 1,000
	Magnification	Dimensionless	1
Power in band 07	Band/Order	Dimensionless	Band
	Left/Right	Hz	1,001 / 2,000
	Magnification	Dimensionless	1
Power in band 08	Band/Order	Dimensionless	Band
	Left/Right	Hz	2,001 / 3,000
	Magnification	Dimensionless	1

Power in band 09	Band/Order	Dimensionless	Band
	Left/Right	Hz	3,001 / 4,000
	Magnification	Dimensionless	1
Power in band 10	Band/Order	Dimensionless	Band
	Left/Right	Hz	4,001 / 5,000
	Magnification	Dimensionless	1
Instrument Type		Dimensionless	0 (Customized category)
Gear Van Pass Enable/Disable		Dimensionless	0 (Disable)
Gear number		Dimensionless	5
Van number		Dimensionless	3

Table2-26 Factory Default Values of Various Adjustable Analysis Parameters under 213MM2-R1
General Mode

2.6.1.2 Physical Meanings and Factory Default Values of Motor Non-Drive End (Motor.NonDriveEnd) Mode Analysis Parameter Items

The table on the right Table2-27 describes the physical meanings and units of various adjustable analysis parameters for 213MM2-R1 under Motor.NonDriveEnd mode.

Item	Unit	Physical Meaning
Sensitivity	mg/LSB	Calibration sensitivity
Hardware Trigger	Dimensionless	0: Disable TTL hardware trigger function 1: Enable TTL hardware trigger function
Trigger Level	g	Software trigger level determines when the smart sensor starts acquiring signals and executing calculation analysis. If your monitoring object is non-steady-state equipment, you can set a suitable trigger level so that the smart sensor monitors its health status only when the equipment is moving, and stops monitoring when the equipment stops running or is idling.
Delay Time	sec	How many seconds after trigger before starting calculation analysis.
Analyze	sec	How long to analyze after trigger.
RPM Start	RPM	Reasonable speed range of rotating equipment. When you adopt the order band method to define equipment damage modes, you need to inform the smart sensor of the reasonable speed range of the equipment to facilitate the smart sensor in accurately estimating the equipment's current speed in real-time and converting order bands.
RPM End	RPM	
Line Frequency	Hz	AC power frequency
Instrument Type	Dimensionless	Which equipment category defined in ISO-20816 the monitored equipment belongs to. 0: Does not belong to ISO-20816 definition; the sensor judges basic health status failure according to user-defined warning upper limits. 1-4: Equipment belongs to categories 1-4 defined in ISO-20816; the sensor judges basic health status failure according to warning upper limits defined in ISO-20816. 1 represents ISO-20816 - Group 1 – Flexible, and so on, 4 represents ISO-20816 – Group 2 – Rigid.

Table2-27 Vibration-Related Adjustable Analysis Parameter Definitions under 213MM2-R1 Motor.NonDriveEnd Mode

The table on the right Table2-28 describes the factory default values of various adjustable parameters for 213MM2-R1 under Motor.NonDriveEnd mode.

Item	Unit	Factory Default Value
Sensitivity	mg/LSB	Factory calibration result
Hardware Trigger	Dimensionless	0
Trigger Level	g	0.001
Delay Time	sec	0
Analyze	sec	5
RPM Start	RPM	3,000
RPM End	RPM	4,000
Line Frequency	Hz	60
Instrument Type	Dimensionless	0 (Customized category)

Table2-28 Factory Default Values of Various Adjustable Analysis Parameters under 213MM2-R1 Motor.NonDriveEnd Mode

2.6.1.3 Physical Meanings and Factory Default Values of Motor Load End, Rear-End Load Belt Driven (Motor.DriveEnd.DriveBelt) Mode Analysis Parameter Items

The table on the right Table2-29 describes the physical meanings and units of various adjustable analysis parameters for 213MM2-R1 under Motor.DriveEnd.DriveBelt mode.

Item	Unit	Physical Meaning
Sensitivity	mg/LSB	Calibration sensitivity
Hardware Trigger	Dimensionless	0: Disable TTL hardware trigger function 1: Enable TTL hardware trigger function
Trigger Level	g	Software trigger level determines when the smart sensor starts acquiring signals and executing calculation analysis. If your monitoring object is non-steady-state equipment, you can set a suitable trigger level so that the smart sensor monitors its health status only when the equipment is moving, and stops monitoring when the equipment stops running or is idling.
Delay Time	sec	How many seconds after trigger before starting calculation analysis.
Analyze	sec	How long to analyze after trigger.
RPM Start	RPM	Reasonable speed range of rotating equipment. When you adopt the order band method to define equipment damage modes, you need to inform the smart sensor of the reasonable speed range of the equipment to facilitate the smart sensor in accurately estimating the equipment's current speed in real-time and converting order bands.
RPM End	RPM	
Line Frequency	Hz	AC power frequency
Instrument Type	Dimensionless	Which equipment category defined in ISO-20816 the monitored equipment belongs to. 0: Does not belong to ISO-20816 definition; the sensor judges basic health status failure according to user-defined warning upper limits. 1-4: Equipment belongs to categories 1-4 defined in ISO-20816; the sensor judges basic health status failure according to warning upper limits defined in ISO-20816. 1 represents ISO-20816 - Group 1 – Flexible, and so on, 4 represents ISO-20816 – Group 2 – Rigid.

Table2-29 Vibration-Related Adjustable Analysis Parameter Definitions under 213MM2-R1 Motor.DriveEnd.DriveBelt Mode

The table on the right Table2-30 describes the factory default values of various adjustable parameters for 213MM2-R1 under Motor.DriveEnd.DriveBelt mode.

Item	Unit	Factory Default Value
Sensitivity	mg/LSB	Factory calibration result
Hardware Trigger	Dimensionless	0
Trigger Level	g	0.001
Delay Time	sec	0
Analyze	sec	5
RPM Start	RPM	3,000
RPM End	RPM	4,000
Line Frequency	Hz	60
Instrument Type	Dimensionless	0 (Customized category)

Table2-30 Factory Default Values of Various Adjustable Analysis Parameters under 213MM2-R1 Motor.DriveEnd.DriveBelt Mode

2.6.1.4 Physical Meanings and Factory Default Values of Motor Load End, Rear-End Load Direct Driven (Motor.DriveEnd.DirectDrive) Mode Analysis Parameter Items

The table on the right Table2-31 describes the physical meanings and units of various adjustable analysis parameters for 213MM2-R1 under Motor.DriveEnd.DirectDrive mode.

Item	Unit	Physical Meaning
Sensitivity	mg/LSB	Calibration sensitivity
Hardware Trigger	Dimensionless	0: Disable TTL hardware trigger function 1: Enable TTL hardware trigger function
Trigger Level	g	Software trigger level determines when the smart sensor starts acquiring signals and executing calculation analysis. If your monitoring object is non-steady-state equipment, you can set a suitable trigger level so that the smart sensor monitors its health status only when the equipment is moving, and stops monitoring when the equipment stops running or is idling.
Delay Time	sec	How many seconds after trigger before starting calculation analysis.
Analyze	sec	How long to analyze after trigger.
RPM Start	RPM	Reasonable speed range of rotating equipment. When you adopt the order band method to define equipment damage modes, you need to inform the smart sensor of the reasonable speed range of the equipment to facilitate the smart sensor in accurately estimating the equipment's current speed in real-time and converting order bands.
RPM End	RPM	
Line Frequency	Hz	AC power frequency
Instrument Type	Dimensionless	Which equipment category defined in ISO-20816 the monitored equipment belongs to. 0: Does not belong to ISO-20816 definition; the sensor judges basic health status failure according to user-defined warning upper limits. 1-4: Equipment belongs to categories 1-4 defined in ISO-20816; the sensor judges basic health status failure according to warning upper limits defined in ISO-20816. 1 represents ISO-20816 - Group 1 – Flexible, and so on, 4 represents ISO-20816 – Group 2 – Rigid.

Table2-31 Vibration-Related Adjustable Analysis Parameter Definitions under 213MM2-R1 Motor.DriveEnd.DirectDrive Mode

The table on the right Table2-32 describes the factory default values of various adjustable parameters for 213MM2-R1 under Motor.DriveEnd.DirectDrive mode.

Item	Unit	Factory Default Value
Sensitivity	mg/LSB	Factory calibration result
Hardware Trigger	Dimensionless	0
Trigger Level	g	0.001
Delay Time	sec	0
Analyze	sec	5
RPM Start	RPM	3,000
RPM End	RPM	4,000
Line Frequency	Hz	60
Instrument Type	Dimensionless	0 (Customized category)

Table2-32 Factory Default Values of Various Adjustable Analysis Parameters under 213MM2-R1 Motor.DriveEnd.DirectDrive Mode

2.6.1.5 Physical Meanings and Factory Default Values of Roller Free End (Roller.FreeEnd) Mode Analysis Parameter Items

The table on the right Table2-33 describes the physical meanings and units of various adjustable analysis parameters for 213MM2-R1 under Roller.FreeEnd mode.

Item	Unit	Physical Meaning
Sensitivity	mg/LSB	Calibration sensitivity
Hardware Trigger	Dimensionless	0: Disable TTL hardware trigger function 1: Enable TTL hardware trigger function
Trigger Level	g	Software trigger level determines when the smart sensor starts acquiring signals and executing calculation analysis. If your monitoring object is non-steady-state equipment, you can set a suitable trigger level so that the smart sensor monitors its health status only when the equipment is moving, and stops monitoring when the equipment stops running or is idling.
Delay Time	sec	How many seconds after trigger before starting calculation analysis.
Analyze	sec	How long to analyze after trigger.
RPM Start	RPM	Reasonable speed range of rotating equipment. When you adopt the order band method to define equipment damage modes, you need to inform the smart sensor of the reasonable speed range of the equipment to facilitate the smart sensor in accurately estimating the equipment's current speed in real-time and converting order bands.
RPM End	RPM	
Instrument Type	Dimensionless	Which equipment category defined in ISO-20816 the monitored equipment belongs to. 0: Does not belong to ISO-20816 definition; the sensor judges basic health status failure according to user-defined warning upper limits. 1-4: Equipment belongs to categories 1-4 defined in ISO-20816; the sensor judges basic health status failure according to warning upper limits defined in ISO-20816. 1 represents ISO-20816 - Group 1 – Flexible, and so on, 4 represents ISO-20816 – Group 2 – Rigid.

Table2-33 Vibration-Related Adjustable Analysis Parameter Definitions under 213MM2-R1 Roller.FreeEnd Mode

The table on the right Table2-34 describes the factory default values of various adjustable parameters for 213MM2-R1 under Roller.FreeEnd mode.

Item	Unit	Factory Default Value
Sensitivity	mg/LSB	Factory calibration result
Hardware Trigger	Dimensionless	0
Trigger Level	g	0.001
Delay Time	sec	0
Analyze	sec	5
RPM Start	RPM	3,000
RPM End	RPM	4,000
Instrument Type	Dimensionless	0 (Customized category)

Table2-34 Factory Default Values of Various Adjustable Analysis Parameters under 213MM2-R1 Roller.FreeEnd Mode

2.6.1.6 Physical Meanings and Factory Default Values of Roller Belt Connection End (Roller.BeltDrivenEnd) Mode Analysis Parameter Items

The table on the right Table2-35 describes the physical meanings and units of various adjustable analysis parameters for 213MM2-R1 under Roller.BeltDrivenEnd mode.

Item	Unit	Physical Meaning
Sensitivity	mg/LSB	Calibration sensitivity
Hardware Trigger	Dimensionless	0: Disable TTL hardware trigger function 1: Enable TTL hardware trigger function
Trigger Level	g	Software trigger level determines when the smart sensor starts acquiring signals and executing calculation analysis. If your monitoring object is non-steady-state equipment, you can set a suitable trigger level so that the smart sensor monitors its health status only when the equipment is moving, and stops monitoring when the equipment stops running or is idling.
Delay Time	sec	How many seconds after trigger before starting calculation analysis.
Analyze	sec	How long to analyze after trigger.
RPM Start	RPM	Reasonable speed range of rotating equipment. When you adopt the order band method to define equipment damage modes, you need to inform the smart sensor of the reasonable speed range of the equipment to facilitate the smart sensor in accurately estimating the equipment's current speed in real-time and converting order bands.
RPM End	RPM	
Instrument Type	Dimensionless	Which equipment category defined in ISO-20816 the monitored equipment belongs to. 0: Does not belong to ISO-20816 definition; the sensor judges basic health status failure according to user-defined warning upper limits. 1-4: Equipment belongs to categories 1-4 defined in ISO-20816; the sensor judges basic health status failure according to warning upper limits defined in ISO-20816. 1 represents ISO-20816 - Group 1 – Flexible, and so on, 4 represents ISO-20816 – Group 2 – Rigid.

Table2-35 Vibration-Related Adjustable Analysis Parameter Definitions under 213MM2-R1 Roller.BeltDrivenEnd Mode

The table on the right Table2-36 describes the factory default values of various adjustable parameters for 213MM2-R1 under Roller.BeltDrivenEnd mode.

Item	Unit	Factory Default Value
Sensitivity	mg/LSB	Factory calibration result
Hardware Trigger	Dimensionless	0
Trigger Level	g	0.001
Delay Time	sec	0
Analyze	sec	5
RPM Start	RPM	3,000
RPM End	RPM	4,000
Instrument Type	Dimensionless	0 (Customized category)

Table2-36 Factory Default Values of Various Adjustable Analysis Parameters under 213MM2-R1 Roller.BeltDrivenEnd Mode

2.6.2 Reading Stored Vibration Analysis Parameters of 213MM2-R1

The 213MM2-R1 adopts the Modbus over RS485 communication interface to upload various vibration analysis parameters onto various device hubs and edge gateways for user queries. We recommend using the built-in functions of TEXOL factory edge gateways to acquire and manage these parameters, which is more convenient. For operational instructions on acquiring analysis parameters inside the edge gateway, please refer to "Aurora EG032-RDV02-B231IOTECH Edge Gateway Instruction Manual (V1.0)".

If you do not adopt a factory edge gateway or the Aurora Modbus Utility software, and instead build an upper-level data management system yourself, you must scan and acquire your required analysis parameter items from the Modbus registers yourself.

The 213MM2-R1 provides modes including General Mode (General), Motor Load End with Rear-End Load Direct Driven (Motor.DriveEnd.DirectDrive), Motor Load End with Rear-End Load Belt Driven (Motor.DriveEnd.DriveBelt), Motor Non-Drive End (Motor.NonDriveEnd), Roller Free End (Roller.FreeEnd), and Roller Belt Connection End (Roller.BeltDrivenEnd) for users to select. For detailed descriptions, please refer to Section 2.1. The readable vibration analysis parameters under each mode are also different. Users can, according to usage conditions, refer to the following vibration analysis parameter descriptions for each mode:

2.6.2.1 General (General) Mode Vibration Analysis Parameter Locations

Under General mode, the Modbus definition classification used by the 213MM2-R1 to store analysis parameter items can refer to Table2-37 on the right. For complete Register Table definition details, please refer to Appendix I. Note that from location 30235 to 30629 are integer outputs, which must be multiplied by the Scale parameter to obtain correct analysis parameters.

Location	Item	Description
30235 – 30240	Sensitivity	Sensor sensitivity
30241 – 30242	Trigger Level	Software trigger level
30243	Delay Time	How many seconds after trigger before starting calculation analysis
30244	Analyze	How long to analyze after trigger
30245 – 30248	RPM	Reasonable speed range of rotating equipment
30249 – 30428		Frequency band definition parameters of user-defined frequency domain features
30429	Hardware Trigger	Whether hardware trigger function is enabled
30430	Instrument Type	Which equipment category defined in ISO-20816 the monitored equipment belongs to
30431	Gear Van Pass Enable/Disable	Whether gear and impeller damage analysis modes are enabled
30432	Gear Number	Number of teeth
30433	Van Number	Number of blades
30434 – 30481		Failure determination thresholds for time domain features
30482 – 30601		Failure determination thresholds for user-defined frequency domain features
30602 – 30625		Failure determination thresholds for built-in damage mode features
30626 – 30629		Over-temperature determination threshold

Table2-37 213MM2-R1 General Mode Analysis Parameter Memory Location Classification Table

2.6.2.2 Motor Non-Drive End (Motor.NonDriveEnd) Mode Vibration Analysis Parameter Locations

Under Motor.NonDriveEnd mode, the Modbus definition classification used by the 213MM2-R1 to store analysis parameter items can refer to Table2-38 on the right. For complete Register Table definition details, please refer to Appendix J. Note that from location 30235 to 30264 are integer outputs, which must be multiplied by the Scale parameter to obtain correct analysis parameters.

Location	Item	Description
30235 – 30240	Sensitivity	Sensor sensitivity
30241 – 30242	Trigger Level	Software trigger level
30243	Delay Time	How many seconds after trigger before starting calculation analysis
30244	Analyze	How long to analyze after trigger
30245 – 30248	RPM	Reasonable speed range of rotating equipment
30249	Hardware Trigger	Whether hardware trigger function is enabled
30250 – 30251	Line Frequency	AC power frequency
30252	Instrument Type	Which equipment category defined in ISO-20816 the monitored equipment belongs to
30253 – 30264		Over-temperature determination threshold

Table2-38 213MM2-R1 Motor.NonDriveEnd Mode Analysis Parameter Memory Location Classification Table

2.6.2.3 Motor Load End, Rear-End Load Belt Driven (Motor.DriveEnd.DriveBelt) Mode Vibration Analysis Parameter Locations

Under Motor.DriveEnd.DriveBelt mode, the Modbus definition classification used by the 213MM2-R1 to store analysis parameter items can refer to Table2-39 on the right. For complete Register Table definition details, please refer to Appendix K. Note that from location 30235 to 30264 are integer outputs, which must be multiplied by the Scale parameter to obtain correct analysis parameters.

Location	Item	Description
30235 – 30240	Sensitivity	Sensor sensitivity
30241 – 30242	Trigger Level	Software trigger level
30243	Delay Time	How many seconds after trigger before starting calculation analysis
30244	Analyze	How long to analyze after trigger
30245 – 30248	RPM	Reasonable speed range of rotating equipment
30249	Hardware Trigger	Whether hardware trigger function is enabled
30250 – 30251	Line Frequency	AC power frequency
30252	Instrument Type	Which equipment category defined in ISO-20816 the monitored equipment belongs to
30253 – 30264		Over-temperature determination threshold

Table2-39 213MM2-R1 Motor.DriveEnd.DriveBelt Mode Analysis Parameter Memory Location Classification Table

2.6.2.4 Motor Load End, Rear-End Load

Direct Driven

(Motor.DriveEnd.DirectDrive) Mode

Vibration Analysis Parameter

Locations

Under Motor.DriveEnd.DirectDrive mode, the Modbus definition classification used by the 213MM2-R1 to store analysis parameter items can refer to Table2-40 on the right. For complete Register Table definition details, please refer to Appendix L. Note that from location 30235 to 30264 are integer outputs, which must be multiplied by the Scale parameter to obtain correct analysis parameters.

Location	Item	Description
30235 – 30240	Sensitivity	Sensor sensitivity
30241 – 30242	Trigger Level	Software trigger level
30243	Delay Time	How many seconds after trigger before starting calculation analysis
30244	Analyze	How long to analyze after trigger
30245 – 30248	RPM	Reasonable speed range of rotating equipment
30249	Hardware Trigger	Whether hardware trigger function is enabled
30250 – 30251	Line Frequency	AC power frequency
30252	Instrument Type	Which equipment category defined in ISO-20816 the monitored equipment belongs to
30253 – 30264		Over-temperature determination threshold

Table2-40 213MM2-R1 Motor.DriveEnd.DirectDrive Mode Analysis Parameter Memory Location Classification Table

2.6.2.5 Roller Free End (Roller.FreeEnd)

Mode Vibration Analysis Parameter

Locations

Under Roller.FreeEnd mode, the Modbus definition classification used by the 213MM2-R1 to store analysis parameter items can refer to Table2-41 on the right. For complete Register Table definition details, please refer to Appendix M. Note that from location 30235 to 30262 are integer outputs, which must be multiplied by the Scale parameter to obtain correct analysis parameters.

Location	Item	Description
30235 – 30240	Sensitivity	Sensor sensitivity
30241 – 30242	Trigger Level	Software trigger level
30243	Delay Time	How many seconds after trigger before starting calculation analysis
30244	Analyze	How long to analyze after trigger
30245 – 30248	RPM	Reasonable speed range of rotating equipment
30249	Hardware Trigger	Whether hardware trigger function is enabled
30250	Instrument Type	Which equipment category defined in ISO-20816 the monitored equipment belongs to
30251 – 30262		Over-temperature determination threshold

Table2-41 213MM2-R1 Roller.FreeEnd Mode Analysis Parameter Memory Location Classification Table

2.6.2.6 Roller Belt Connection End (Roller.BeltDrivenEnd) Mode Vibration Analysis Parameter Locations

Under Roller.BeltDrivenEnd mode, the Modbus definition classification used by the 213MM2-R1 to store analysis parameter items can refer to Table2-42 on the right. For complete Register Table definition details, please refer to Appendix N. Note that from location 30235 to 30262 are integer outputs, which must be multiplied by the Scale parameter to obtain correct analysis parameters.

Location	Item	Description
30235 – 30240	Sensitivity	Sensor sensitivity
30241 – 30242	Trigger Level	Software trigger level
30243	Delay Time	How many seconds after trigger before starting calculation analysis
30244	Analyze	How long to analyze after trigger
30245 – 30248	RPM	Reasonable speed range of rotating equipment
30249	Hardware Trigger	Whether hardware trigger function is enabled
30250	Instrument Type	Which equipment category defined in ISO-20816 the monitored equipment belongs to
30251 – 30262		Over-temperature determination threshold

Table2-42 213MM2-R1 Roller.BeltDrivenEnd Mode Analysis Parameter Memory Location
Classification Table

2.6.3 Issuing 213MM2-R1 Vibration Analysis Parameters

The 213MM2-R1 adopts the Modbus over RS485 communication interface to issue sensor analysis parameter definitions from Aurora Modbus Utility or various device hubs and edge gateways to the 213MM2-R1. Since issuing parameters from edge gateways to sensors involves a series of handshake commands, we recommend using built-in functions of TEXOL factory edge gateways, or at least using the Aurora Modbus Utility provided by TEXOL factory to complete parameter changes, which is more convenient. For operational instructions on issuing settings inside the edge gateway, please refer to "Aurora Self-Built Test Edge Gateway Installation and Instruction Manual" or "Aurora EG032-RDV02-B231IOTECH Edge Gateway Instruction Manual (V1.0)".

2.6.3.1 Using Aurora Modbus Utility to Issue 213MM2-R1 Vibration Analysis Parameters

If you adopt the Aurora Modbus Utility software to configure the 213MM2-R1 sensor, the setting steps are as follows:

First step, please enable the Com port to connect with the 213MM2-R1. After starting and executing AURORA-Modbus Utility.exe, a screen as shown in Figure2-10 on the right will appear. Please select the Com Port you wish to enable from the "Com Port Connect" drop-down menu, and select Parity from the drop-down menu. If the firmware version of your 213MM2-R1 is prior to V4.0, please

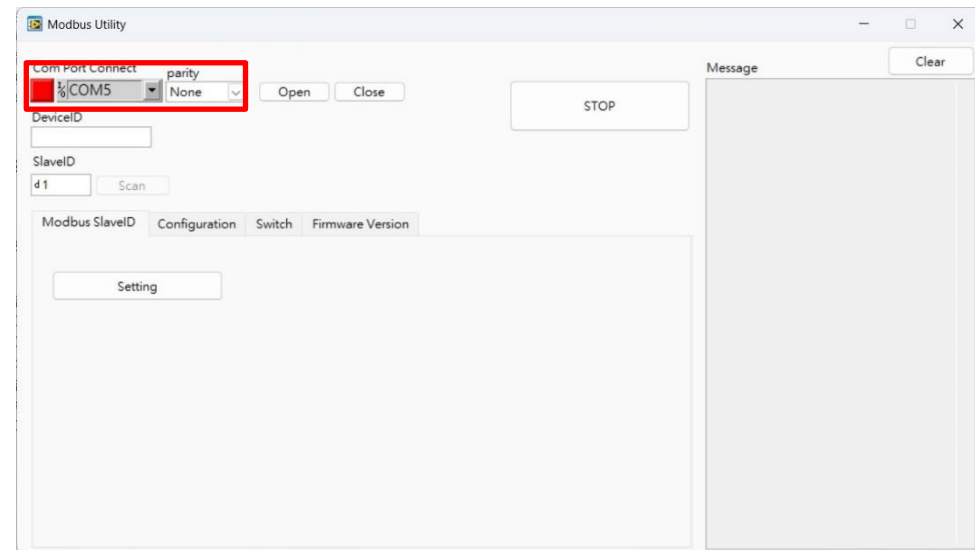


Figure2-10 Aurora Modbus Utility Select Com Port and Parity

select Even; otherwise, please select None. If you do not know the firmware version, it is recommended to select None first. Press Open to enable Com port connection.

If Com port function is normal, the upper-left red light will turn green, as shown in Figure2-11. If Com port remains red light, it indicates that the selected Com port function is abnormal and cannot provide sensor connection functions.

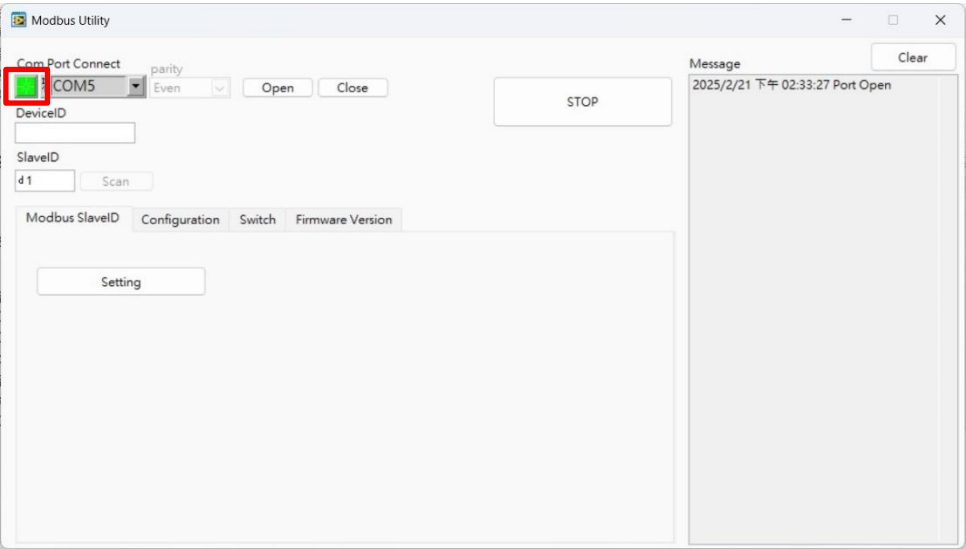


Figure2-11 Aurora Modbus Utility After Com Port Enabled Normally

Enter the Device ID (6 digits in total) on the 213MM2-R1 sensor barcode. At this time, the Scan button will be Enabled, allowing you to click to query the Slave ID of this sensor on the Modbus loop, as shown in Figure2-12.

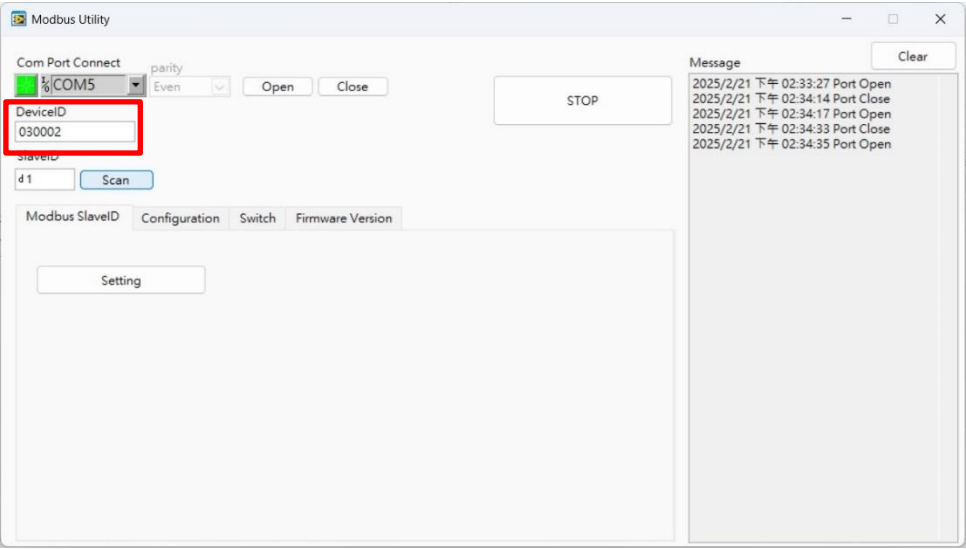


Figure2-12 2-12 Aurora Modbus Utility Enter Device ID

If you do not know the Modbus Slave ID of this 213MM2-R1 to be configured, you can use the search function. After clicking the Scan button, a window will pop up prompting you to enter the Slave ID range you wish to scan. Since the firmware version inside this sensor may be prior to or after V4.0, you can also choose whether the sensor Device ID used during scanning requires high and low byte swapping. After entering, press OK to perform scanning, as shown in Figure2-13.

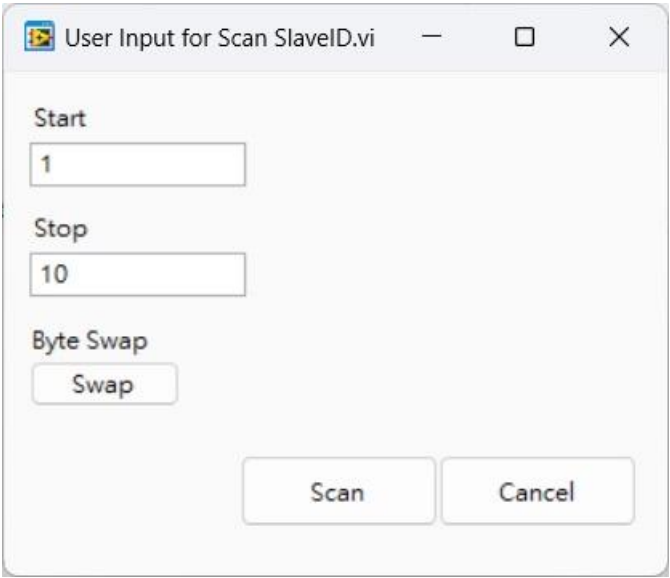


Figure2-13 Aurora Modbus Utility Enter Slave ID Search Range

As shown in Figure2-14, if the Parity information selected when enabling the Com port differs from the Parity information inside the 213MM2-R1 to be configured, or if the Device ID high and low byte order is selected incorrectly, or if the search range is incorrect, "The device does not exist" will pop up. At this time, please re-press Scan, and re-configure the search range, or re-select the Device ID high and low byte order, and press OK to scan once again, as shown in Figure2-15.

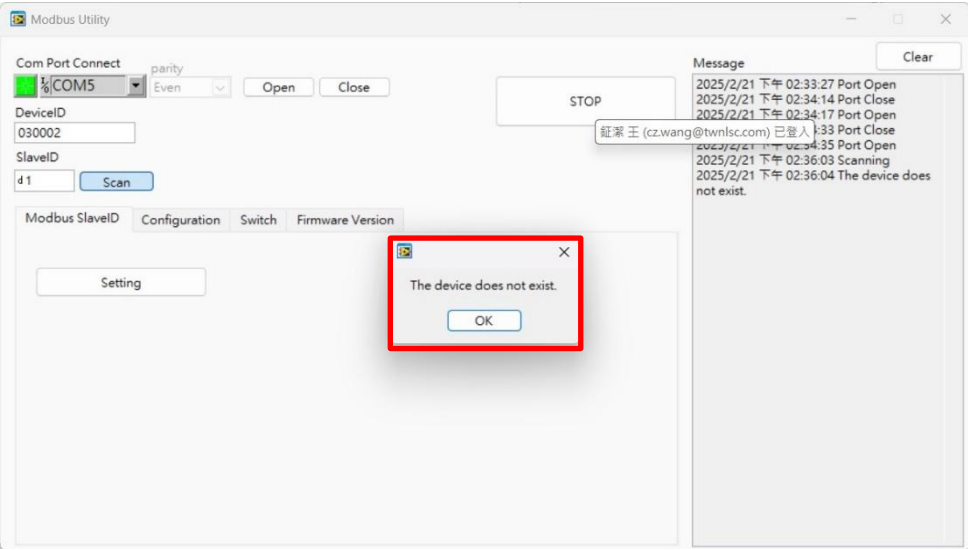


Figure2-14 Aurora Modbus Utility View Slave ID

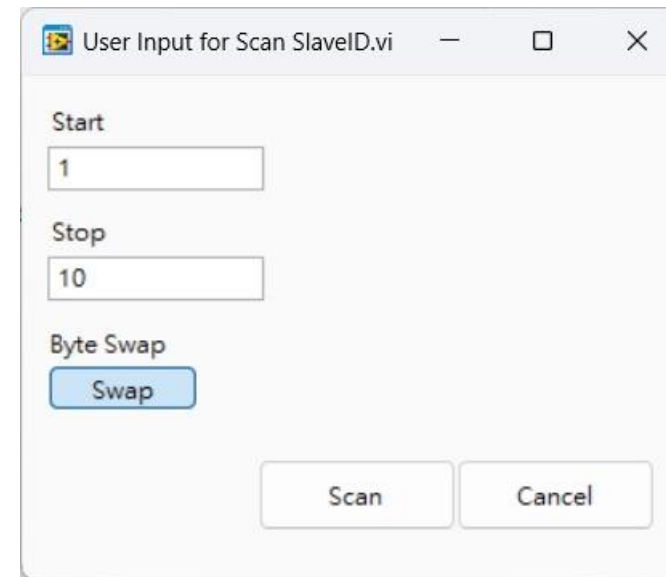


Figure2-15 Aurora Modbus Utility View Slave ID Swap Device ID High and Low Bytes

If re-scanning still shows "The device does not exist", please click Close, change Parity, and press Open to re-enable Com port, as shown in Figure2-16. Then return to the step in Figure2-12 to scan again.

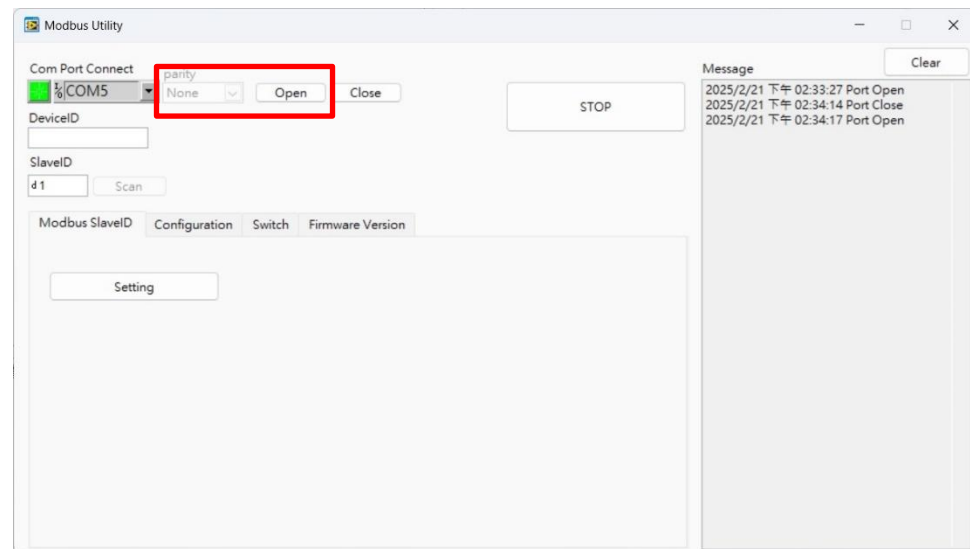


Figure2-16 Aurora Modbus Utility Change Parity

If your Parity information and Device ID high/low byte order information are both entered correctly and the search range is correct, after waiting about 2-3 seconds, the system will automatically pop up the current Slave ID and populate it into the Slave ID field, as shown in Figure2-17

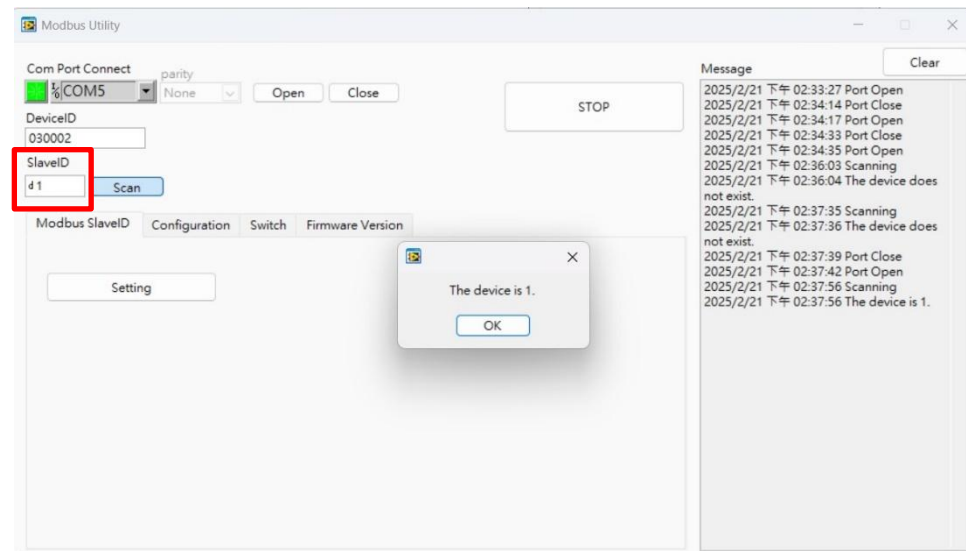


Figure2-17 Aurora Modbus Utility View Slave ID

When configuring analysis parameters, please switch to the Configuration page and click the Setting button, as shown in Figure2-18

When configuring analysis parameters, please first select the mode (Component) you wish to use. The system currently provides General Mode (General), Motor Load End Direct Driven (Motor.DriveEnd.DirectDrive), Motor Load End Belt Driven (Motor.DriveEnd.DriveBelt), Motor Non-Drive End (Motor.NonDriveEnd), Roller Free End (Roller.FreeEnd), and Roller Belt Connection End (Roller.BeltDrivenEnd) for users to select. For detailed descriptions, please refer to Section 2.1. The analysis parameters required for setting in each mode are different. Users can refer to the following descriptions according to usage conditions:

2.6.3.1.1 General Mode Analysis Parameter Configuration

As shown in Figure2-19, the analysis parameter setting descriptions for 213MM2-R1 under General mode are as follows. Please note that the readings displayed on the software interface are all existing active analysis parameters inside the sensor.Base Page:

- X-Sensitivity, Y-Sensitivity, Z-Sensitivity: X-axis sensitivity, Y-axis sensitivity, and Z-axis sensitivity. Readings are factory calibration values; change only if sent for re-calibration.

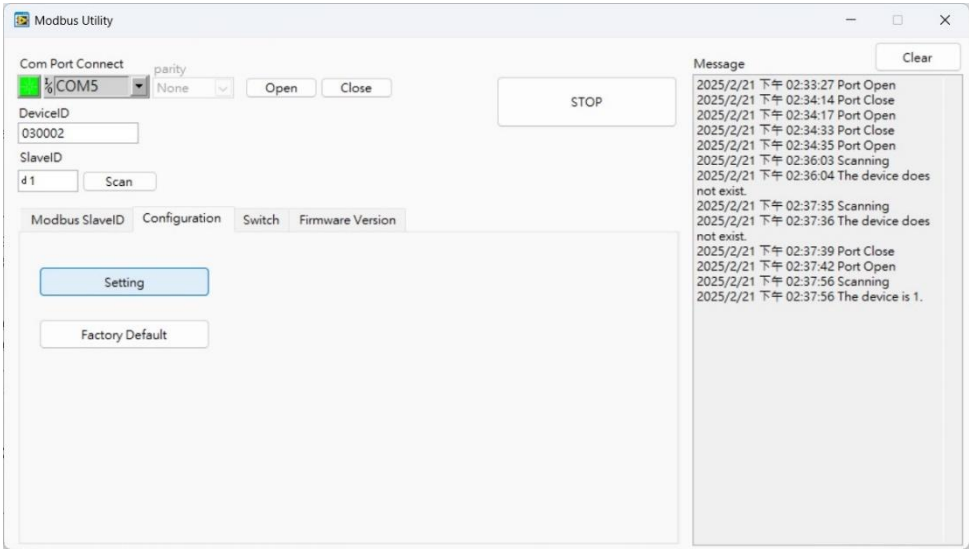


Figure2-18 Aurora Modbus Utility Analysis Parameters Page

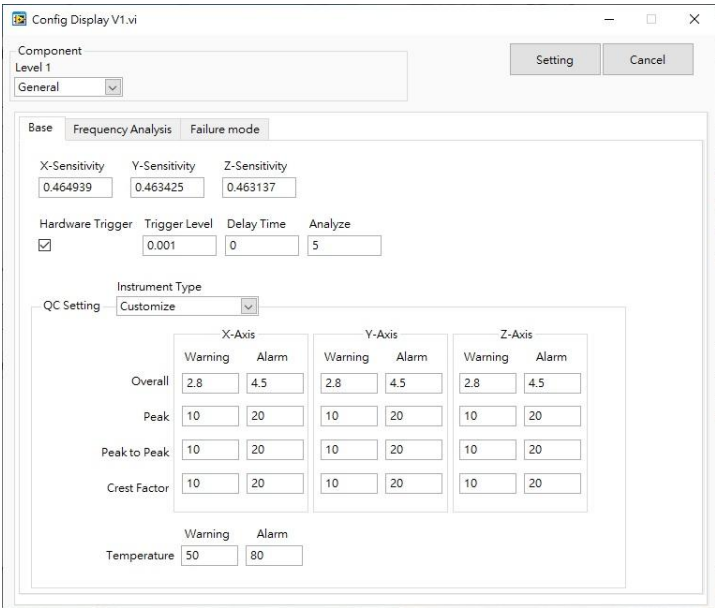


Figure2-19 Aurora Modbus Utility General Mode Analysis Parameter Settings Page

- **Hardware Trigger:** Whether to use hardware trigger; reading displays using hardware trigger.
- **Trigger Level:** Software trigger level; reading displays 0.001 (g).
- **Delay Time:** How many seconds after trigger before starting calculation analysis; reading displays 0.
- **Analyze:** Analysis time duration after trigger; reading displays 5 operation cycles, i.e., 5 seconds.
- **Instrument Type:** Which equipment category defined in ISO-20816 the monitored equipment belongs to, as shown in Figure2-20; reading displays Group2-Rigid.
- **Overall QC Setting:** Failure determination thresholds for Overall in tri-axial time-domain features. Readings for all three axes display Warning 2.8, Alarm 4.5, as shown in Figure2-19; if an equipment category defined in ISO-20816 is selected, the system will automatically populate the failure determination thresholds defined by ISO-20816, as shown in Figure2-21.
- **Peak QC Setting:** Failure determination thresholds for Peak in tri-axial time-domain features. Readings for all three axes display Warning 10, Alarm 20, as shown in Figure2-19.
- **Peak to Peak QC Setting:** Failure determination thresholds for Peak-Peak in tri-axial time-domain features. Readings for all three axes

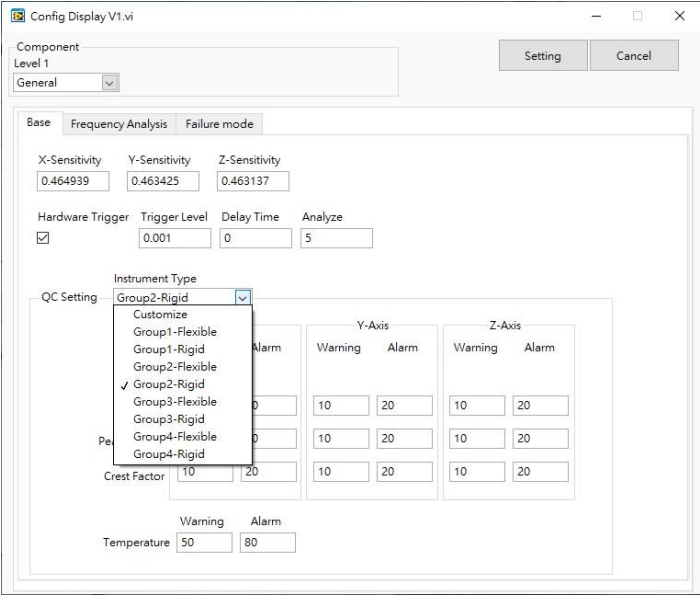


Figure2-20 Aurora Modbus Utility ISO-20816 Defined Equipment Category under General Mode

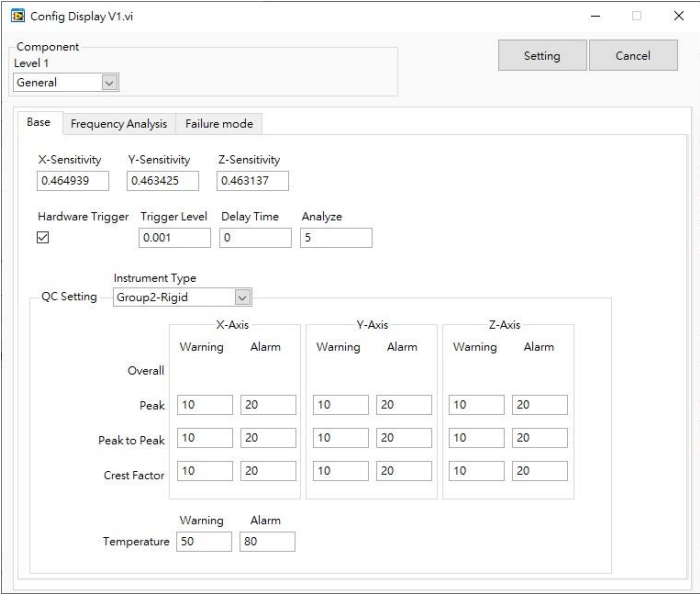


Figure2-21 Aurora Modbus Utility Time-Domain Feature Analysis Parameter Settings under General Mode

display Warning 10, Alarm 20, as shown in Figure2-19.

- Crest Factor QC Setting: Failure determination thresholds for Crest Factor in tri-axial time-domain features. Readings for all three axes display Warning 10, Alarm 20, as shown in Figure2-19.
- Temperature QC Setting: Tri-axial time-domain feature failure determination threshold; readings for all three axes display Warning 50, Alarm 80, as shown in Figure 2-19.

Frequency Analysis Page:

- RPM: Speed range of rotating machinery; speed range must be set to accurately judge damage energy. Readings are Start 3000, End 4000, as shown in Figure2-22, Figure2-23, and Figure2-24.

One can switch X, Y, Z tri-axial custom frequency band page settings. Factory settings display identical readings for all three axes, as follows:

- Power in Band 01: First custom frequency band reading is Order 1, 0.5X order band, magnification factor 1, Warning 10, Alarm 20, as shown in Figure2-22, Figure2-23, Figure2-24.
- Power in Band 02: Second custom frequency band reading is Order 2, 0.5X order band, magnification factor 1, Warning 10, Alarm 20, as shown in Figure2-22, Figure2-23, Figure2-24.

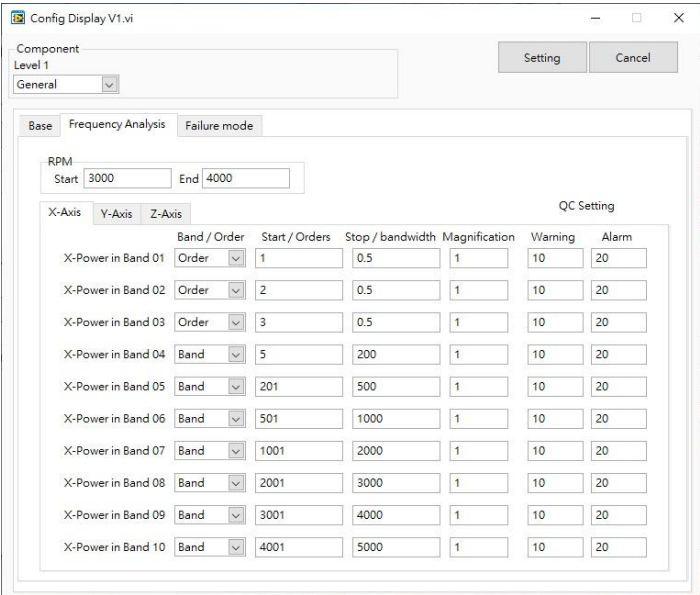


Figure2-22 Aurora Modbus Utility Frequency Analysis X-Axis Parameter Settings under General Mode

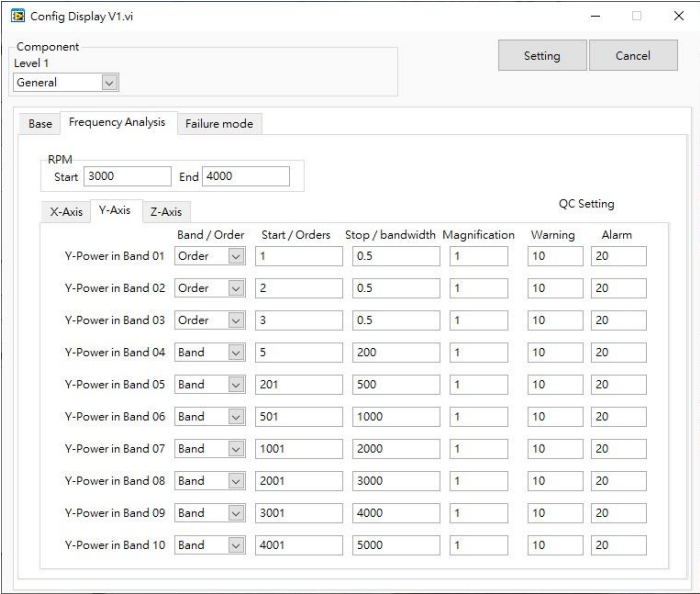


Figure2-23 Aurora Modbus Utility Frequency Analysis Y-Axis Parameter Settings under General Mode

- Power in Band 03: Third custom frequency band reading is Order 3, 0.5X order band, magnification factor 1, Warning 10, Alarm 20, as shown in Figure2-22, Figure2-23, Figure2-24.
- Power in Band 04: Fourth custom frequency band reading is Band 2 to 200Hz, magnification factor 1, Warning 10, Alarm 20, as shown in Figure2-22, Figure2-23, Figure2-24.
- Power in Band 05: Fifth custom frequency band reading is Band 201 to 500Hz, magnification factor 1, Warning 10, Alarm 20, as shown in Figure2-22, Figure2-23, Figure2-24.
- Power in Band 06: Sixth custom frequency band reading is Band 501 to 1000Hz, magnification factor 1, Warning 10, Alarm 20, as shown in Figure2-22, Figure2-23, Figure2-24.
- Power in Band 07: Seventh custom frequency band reading is Band 1001 to 2000Hz, magnification factor 1, Warning 10, Alarm 20, as shown in Figure2-22, Figure2-23, Figure2-24.
- Power in Band 08: Eighth custom frequency band reading is Band 2001 to 3000Hz, magnification factor 1, Warning 10, Alarm 20, as shown in Figure2-22, Figure2-23, Figure2-24.
- Power in Band 09: Ninth custom frequency band reading is Band 3001 to 4000Hz, magnification factor 1, Warning 10, Alarm 20,

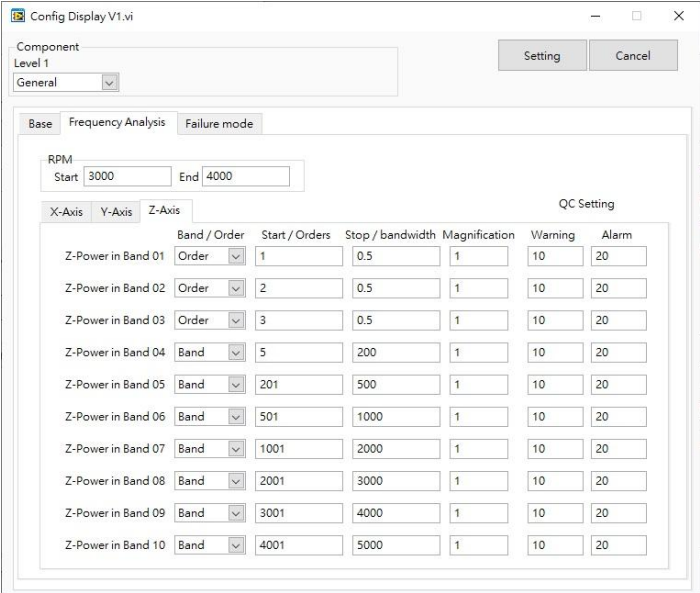


Figure2-24 Aurora Modbus Utility Frequency Analysis Z-Axis Parameter Settings under General Mode

as shown in Figure2-22, Figure2-23, Figure2-24.

- Power in Band 10: Tenth custom frequency band reading is Band 4001 to 5000Hz, magnification factor 1, Warning 10, Alarm 20, as shown in Figure2-22, Figure2-23, Figure2-24.

Failure Mode Page:

- Gear: Number of teeth setting in gear pair damage energy failure model; reading displays disabled. When enabled, number of teeth and QC failure determination threshold must be set (number of teeth reading is 5, QC Warning 10000, Alarm 20000), as shown in Figure2-25.
- Van: Number of blades setting in impeller damage energy failure model; reading displays disabled. When enabled, number of blades and QC failure determination threshold must be set (number of blades reading is 3, QC Warning 10000, Alarm 20000), as shown in Figure2-25.
- Bearing QC setting: Bearing feature failure determination threshold; reading is Warning 10000, Alarm 20000, as shown in Figure2-25.
- Looseness QC setting: Looseness feature failure determination threshold; reading is Warning 10000, Alarm 20000, as shown in Figure2-25.
- Misalignment QC setting: Misalignment feature failure determination threshold;

The screenshot shows the 'Config Display V1.vi' window with the 'Failure mode' tab selected. The 'General' component is chosen. The 'Gear' and 'Van' checkboxes are checked, with 'Gear Ratio' set to 5 and 'Van Pass' set to 3. The 'QC Setting' table displays the following thresholds:

	Warning	Alarm
Bearing Defect	10000	20000
Looseness	10000	20000
Misalignment	10000	20000
Unbalance	10000	20000
Gear mesh Defect	10000	20000
Vane Pass Defec	10000	20000

Figure2-25 Aurora Modbus Utility Failure Analysis Parameter Settings under General Mode

reading is Warning 10000, Alarm 20000, as shown in Figure 2-25.

- Unbalance QC setting: Unbalance feature failure determination threshold; reading is Warning 10000, Alarm 20000, as shown in Figure2-25.

2.6.3.1.2 Motor Non-Drive End (Motor.NonDriveEnd) Mode Analysis Parameter Configuration

As shown in Figure2-26, analysis parameter setting descriptions for 213MM2-R1 under Motor NonDriveEnd mode are as follows. Please note that readings displayed on the software interface are all existing active analysis parameters inside the sensor.

- X-Sensitivity, Y-Sensitivity, Z-Sensitivity: X-axis sensitivity, Y-axis sensitivity, and Z-axis sensitivity. Readings are factory calibration values; change only if sent for re-calibration.
- Hardware Trigger: Whether to use hardware trigger; reading displays using hardware trigger.
- Trigger Level: Software trigger level; reading displays 0.001 (g).
- Delay Time: How many seconds after trigger before starting calculation analysis; reading displays 0.
- Analyze: Analysis time duration after trigger; reading displays 5 operation cycles, i.e., 5 seconds.
- RPM: Speed range of rotating machinery; speed range must be set to accurately judge damage energy. Readings are Start 3000, End 4000, as shown in Figure2-26.
- Line Frequency: AC power frequency used; reading displays 60Hz, as shown in Figure2-26.

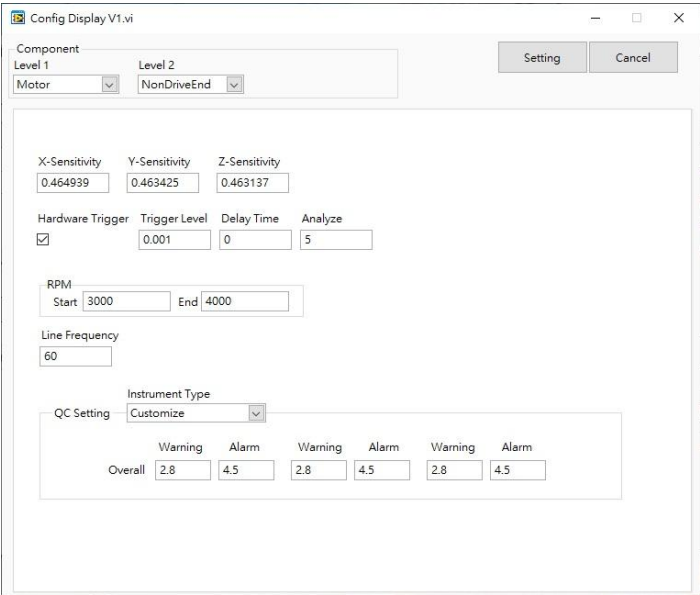


Figure2-26 Aurora Modbus Utility Motor.NonDriveEnd Mode Analysis Parameter Settings Page

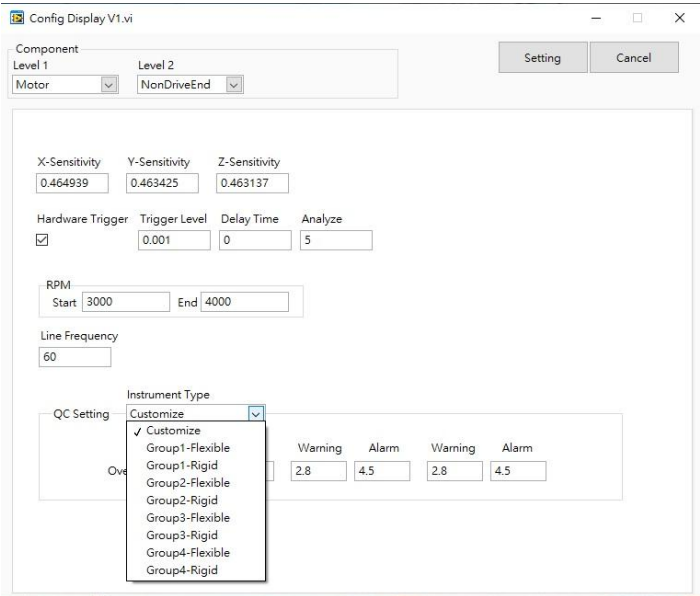


Figure2-27 Aurora Modbus Utility ISO-20816 Defined Equipment Category under Motor.NonDriveEnd Mode

- Instrument Type: Which equipment category defined in ISO-20816 the monitored equipment belongs to, as shown in Figure2-27; reading displays Customize.
- Overall QC Setting: Tri-axial time-domain feature failure determination thresholds; readings for all three axes display Warning 2.8, Alarm 4.5, as shown in Figure2-26; if an equipment category defined in ISO-20816 is selected, the system will automatically populate QC, as shown in Figure2-28.

The screenshot shows the 'Config Display V1.vi' dialog box. At the top, there are two tabs: 'Level 1' and 'Level 2'. Under 'Level 1', the 'Component' dropdown is set to 'Motor'. Under 'Level 2', the 'NonDriveEnd' dropdown is selected. To the right of these tabs are 'Setting' and 'Cancel' buttons. The main area of the dialog contains several input fields and checkboxes:

- Sensitivity:** X-Sensitivity (0.464939), Y-Sensitivity (0.463425), Z-Sensitivity (0.463137).
- Hardware Trigger:** A checked checkbox, Trigger Level (0.001), Delay Time (0), and Analyze (5).
- RPM:** Start (3000) and End (4000) fields.
- Line Frequency:** A field set to 60.
- Instrument Type:** A dropdown menu set to 'Group2-Rigid'.
- QC Setting:** A section with a table of settings:

QC Setting	Warning	Alarm	Warning	Alarm	Warning	Alarm
Overall						

Figure2-28 Aurora Modbus Utility ISO-20816 Analysis Parameter Settings under Motor.NonDriveEnd Mode

2.6.3.1.3 Motor Load End, Rear-End Load Belt Driven (Motor.DriveEnd.DriveBelt) Mode Analysis Parameter Configuration

As shown in Figure2-29, analysis parameter setting descriptions for 213MM2-R1 under Motor.DriveEnd DriveBelt mode are as follows:

- X-Sensitivity, Y-Sensitivity, Z-Sensitivity: X-axis sensitivity, Y-axis sensitivity, and Z-axis sensitivity. Readings are factory calibration values; change only if sent for re-calibration.
- Hardware Trigger: Whether to use hardware trigger; reading displays using hardware trigger.
- Trigger Level: Software trigger level; reading displays 0.001 (g).
- Delay Time: How many seconds after trigger before starting calculation analysis; reading displays 0.
- Analyze: Analysis time duration after trigger; reading displays 5 operation cycles, i.e., 5 seconds.
- RPM: Speed of rotating machinery; speed range must be set to accurately judge damage energy. Readings are Start 3000, End 4000, as shown in Figure2-29.
- Line Frequency: AC power frequency used; reading displays 60Hz, as shown in Figure2-29.
- Instrument Type: Which equipment category defined in ISO-20816 the monitored

The screenshot shows the 'Config Display V1.vi' window with the following settings:

- Component: Level 1 (Motor), Level 2 (DriveEnd), Level 3 (DriveBelt)
- X-Sensitivity: 0.464939, Y-Sensitivity: 0.463425, Z-Sensitivity: 0.463137
- Hardware Trigger: ☒ (checked)
- Trigger Level: 0.001
- Delay Time: 0
- Analyze: 5
- RPM: Start 3000, End 4000
- Line Frequency: 60
- Instrument Type: Customized (dropdown menu)
- QC Setting: Customized (dropdown menu)
- Warning/Alarm values: Overall (Warning: 2.8, Alarm: 4.5), Group1 (Warning: 2.8, Alarm: 4.5), Group2 (Warning: 2.8, Alarm: 4.5), Group3 (Warning: 2.8, Alarm: 4.5), Group4 (Warning: 2.8, Alarm: 4.5)

Figure2-29 Aurora Modbus Utility Motor DriveEnd DriveBelt Mode Analysis Parameter Settings Page

The screenshot shows the 'Config Display V1.vi' window with the 'Instrument Type' dropdown menu open, displaying the following options:

- Customize (checked)
- Group1-Flexible
- Group1-Rigid
- Group2-Flexible
- Group2-Rigid
- Group3-Flexible
- Group3-Rigid
- Group4-Flexible
- Group4-Rigid

Figure2-30 Aurora Modbus Utility ISO-20816 Defined Equipment Category under Motor.DriveEnd.DriveBelt Mode

equipment belongs to, as shown in Figure2-30; reading displays Customize.

- Overall QC Setting: Tri-axial time-domain feature failure determination thresholds; readings for all three axes display Warning 2.8, Alarm 4.5, as shown in Figure2-29; if an equipment category defined in ISO-20816 is selected, the system will automatically populate QC, as shown in Figure2-31.

The screenshot shows the 'Config Display V1.vi' window. At the top, there are three dropdown menus for 'Level 1' (Motor), 'Level 2' (DriveEnd), and 'Level 3' (DriveBelt). Below these are input fields for 'X-Sensitivity' (0.464939), 'Y-Sensitivity' (0.463425), and 'Z-Sensitivity' (0.463137). There is a 'Hardware Trigger' checkbox (checked) and input fields for 'Trigger Level' (0.001), 'Delay Time' (0), and 'Analyze' (5). Below these are 'RPM' input fields for 'Start' (3000) and 'End' (4000). There is a 'Line Frequency' input field (60). At the bottom, there is a 'QC Setting' dropdown menu (Group2-Rigid) and a table of settings.

Instrument Type	Warning	Alarm	Warning	Alarm	Warning	Alarm
Group2-Rigid						
Overall						

Figure2-31 Aurora Modbus Utility ISO-20816 Analysis Parameter Settings under Motor.DriveEnd.DriveBelt Mode

2.6.3.1.4 Motor Load End, and Rear-End Load Direct Driven (Motor.DriveEnd.DirectDrive) Mode Analysis Parameter Configuration

As shown inFigure2-32, the analysis parameter setting descriptions for 213MM2-R1 under under Motor.DriveEnd.DirectDrive mode are as follows:

- X-Sensitivity, Y-Sensitivity, Z-Sensitivity: X-axis sensitivity, Y-axis sensitivity, and Z-axis sensitivity. Readings are factory calibration values; change only if sent for re-calibration.
- Hardware Trigger: Whether to use hardware trigger; reading displays using hardware trigger.
- Trigger Level: Software trigger level; reading displays 0.001 (g).
- Delay Time: How many seconds after trigger before starting calculation analysis; reading displays 0.
- Analyze: Analysis time duration after trigger; reading displays 5 operation cycles, i.e., 5 seconds.
- RPM: Speed of rotating machinery; speed range must be set to accurately judge damage energy. Readings are Start 3000, End 4000, as shown in Figure2-32.
- Line Frequency: AC power frequency used; reading displays 60Hz, as shown in Figure2-32.
- Instrument Type: Which equipment category defined in ISO-20816 the monitored

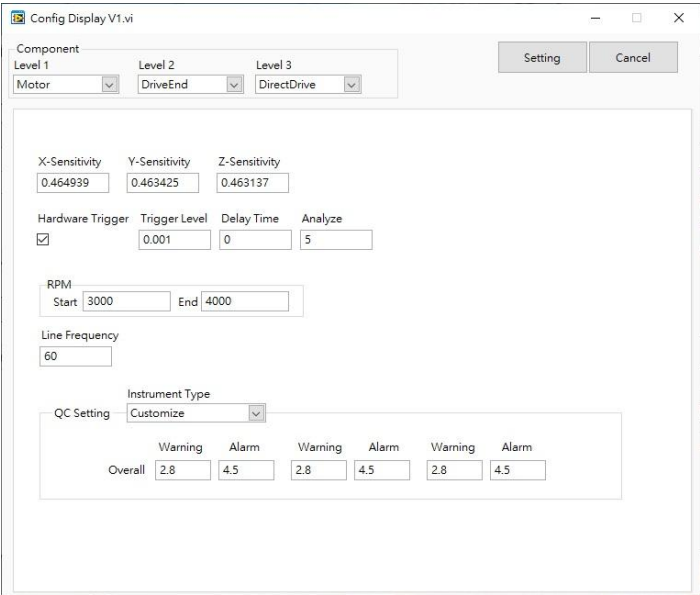


Figure2-32 Aurora Modbus Utility Motor.DriveEnd.DirectDrive Mode Analysis Parameter Settings Page

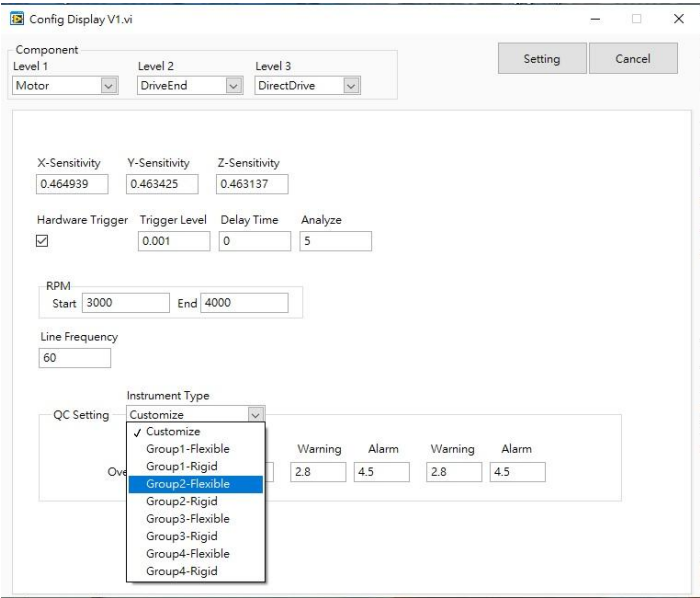


Figure2-33 Aurora Modbus Utility ISO-20816 Defined Equipment Category under Motor.DriveEnd.DirectDrive Mode

equipment belongs to, as shown in Figure2-33; reading displays Customize.

- Overall QC Setting: Tri-axial time-domain feature failure determination thresholds; readings for all three axes display Warning 2.8, Alarm 4.5, as shown in Figure2-32; if an equipment category defined in ISO-20816 is selected, the system will automatically populate QC, as shown in Figure2-34.

The screenshot shows the 'Config Display V1.vi' window. At the top, there are three dropdown menus for 'Level 1' (Motor), 'Level 2' (DriveEnd), and 'Level 3' (DirectDrive). Below these are input fields for 'X-Sensitivity' (0.464939), 'Y-Sensitivity' (0.463425), and 'Z-Sensitivity' (0.463137). There is a 'Hardware Trigger' checkbox (checked) and a table for 'Trigger Level', 'Delay Time', and 'Analyze' with values 0.001, 0, and 5 respectively. Below this is an 'RPM' section with 'Start' (3000) and 'End' (4000) fields. Then 'Line Frequency' (60). At the bottom, 'Instrument Type' is set to 'Group2-Rigid', and 'QC Setting' is set to 'Group2-Rigid'. Below these are six status indicators: 'Overall', 'Warning', 'Alarm', 'Warning', 'Alarm', 'Warning', 'Alarm'.

Figure2-34 Aurora Modbus Utility ISO-20816 Analysis Parameter Settings under Motor.DriveEnd.DirectDrive Mode

2.6.3.1.5 Roller Free End (Roller.FreeEnd)
Mode Analysis Parameter
Configuration

As shown in Figure2-35, the analysis parameter setting descriptions for 213MM2-R1 under Roller.FreeEnd mode are as follows:

- X-Sensitivity, Y-Sensitivity, Z-Sensitivity: X-axis sensitivity, Y-axis sensitivity, and Z-axis sensitivity. Readings are factory calibration values; change only if sent for re-calibration.
- Hardware Trigger: Whether to use hardware trigger; reading displays using hardware trigger.
- Trigger Level: Software trigger level; reading displays 0.001 (g).
- Delay Time: How many seconds after trigger before starting calculation analysis; reading displays 0.
- Analyze: Analysis time duration after trigger; reading displays 5 operation cycles, i.e., 5 seconds.
- RPM: Speed of rotating machinery; speed range must be set to accurately judge damage energy. Readings are Start 3000, End 4000, as shown in Figure2-35.
- Instrument Type: Which equipment category defined in ISO-20816 the monitored equipment belongs to, as shown in Figure2-36; reading displays Customize.

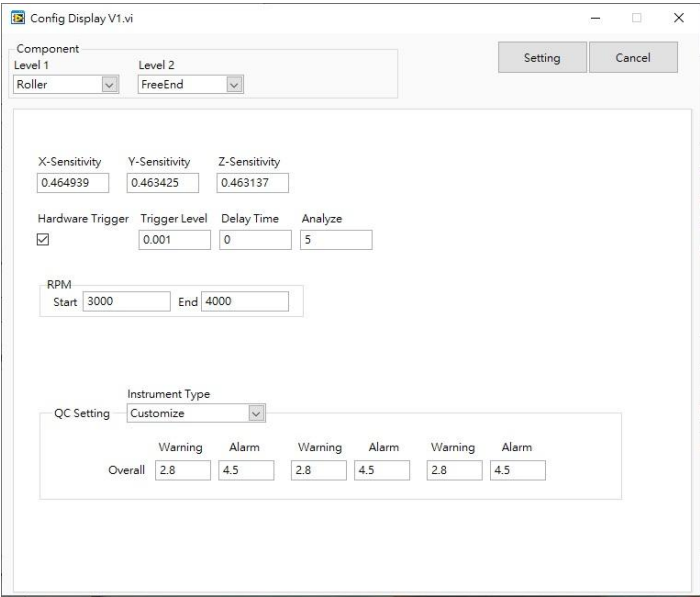


Figure2-35 Aurora Modbus Utility Roller.FreeEnd Mode Analysis Parameter Settings Page

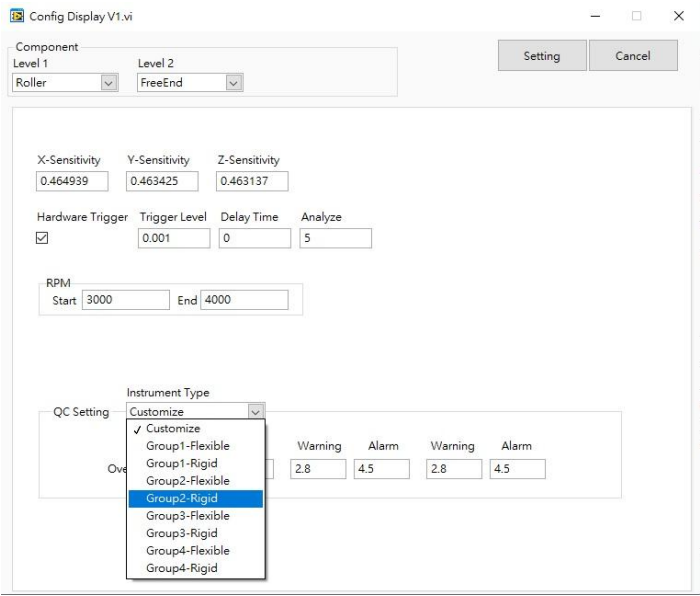


Figure2-36 Aurora Modbus Utility ISO-20816 Defined Equipment Category under Roller.FreeEnd Mode

- Overall QC Setting: Tri-axial time-domain feature failure determination thresholds; readings for all three axes display Warning 2.8, Alarm 4.5, as shown in Figure2-35; if an equipment category defined in ISO-20816 is selected, the system will automatically populate QC, as shown in Figure2-37.

The screenshot shows a software window titled "Config Display V1.vi" with a standard Windows interface (minimize, maximize, close buttons). The window contains several configuration sections:

- Component:** A section with two dropdown menus. "Level 1" is set to "Roller" and "Level 2" is set to "FreeEnd". To the right of these are "Setting" and "Cancel" buttons.
- Sensitivity:** Three input fields for "X-Sensitivity", "Y-Sensitivity", and "Z-Sensitivity". The values are 0.464939, 0.463425, and 0.463137 respectively.
- Hardware Trigger:** A section with a checked checkbox, a "Trigger Level" of 0.001, a "Delay Time" of 0, and an "Analyze" value of 5.
- RPM:** A section with "Start" and "End" input fields. The values are 3000 and 4000 respectively.
- QC Setting:** A section with a dropdown menu labeled "Instrument Type" set to "Group2-Rigid". Below this, there are four pairs of "Warning" and "Alarm" labels, and an "Overall" label at the bottom.

Figure2-37 Aurora Modbus Utility ISO-20816 Analysis Parameter Settings under Roller.FreeEnd Mode

2.6.3.1.6 Roller Belt Connection End
(Roller.BeltDrivenEnd) Mode
Analysis Parameter Configuration

As shown in Figure2-38, the analysis parameter setting descriptions for 213MM2-R1 under Roller.BeltDrivenEnd mode are as follows:

- X-Sensitivity, Y-Sensitivity, Z-Sensitivity: X-axis sensitivity, Y-axis sensitivity, and Z-axis sensitivity. Readings are factory calibration values; change only if sent for re-calibration.
- Hardware Trigger: Whether to use hardware trigger; reading displays using hardware trigger.
- Trigger Level: Software trigger level; reading displays 0.001 (g).
- Delay Time: How many seconds after trigger before starting calculation analysis; reading displays 0.
- Analyze: Analysis time duration after trigger; reading displays 5 operation cycles, i.e., 5 seconds.
- RPM: Speed of rotating machinery; speed range must be set to accurately judge damage energy. Readings are Start 3000, End 4000, as shown in Figure2-38.
- Instrument Type: Which equipment category defined in ISO-20816 the monitored equipment belongs to, as shown in Figure2-39; reading displays Customize.

The screenshot shows the 'Config Display V1.vi' window. At the top, 'Component' is set to 'Roller' and 'Level 2' is set to 'BeltDrivenEnd'. Below this, there are input fields for 'X-Sensitivity' (0.464939), 'Y-Sensitivity' (0.463425), and 'Z-Sensitivity' (0.463137). A 'Hardware Trigger' checkbox is checked. 'Trigger Level' is 0.001, 'Delay Time' is 0, and 'Analyze' is 5. The 'RPM' section has 'Start' at 3000 and 'End' at 4000. The 'Instrument Type' dropdown is set to 'Customize'. Below it, there are 'Warning' and 'Alarm' settings for 'Overall' and three other categories, all with values 2.8 and 4.5 respectively.

Figure2-38 Aurora Modbus Utility Roller.BeltDrivenEnd Mode Analysis Parameter Settings Page

This screenshot is similar to Figure2-38, but the 'Instrument Type' dropdown menu is open, showing a list of options: 'Customize' (which is selected with a checkmark), 'Group1-Flexible', 'Group1-Rigid', 'Group2-Flexible', 'Group2-Rigid', 'Group3-Flexible', 'Group3-Rigid', 'Group4-Flexible', and 'Group4-Rigid'. The rest of the settings in the window are the same as in Figure2-38.

Figure2-39 Aurora Modbus Utility ISO-20816 Defined Equipment Category under Roller.BeltDrivenEnd Mode

- Overall QC Setting: Tri-axial time-domain feature failure determination thresholds; readings for all three axes display Warning 2.8, Alarm 4.5, as shown in Figure2-38; if an equipment category defined in ISO-20816 is selected, the system will automatically populate QC, as shown in Figure2-40.

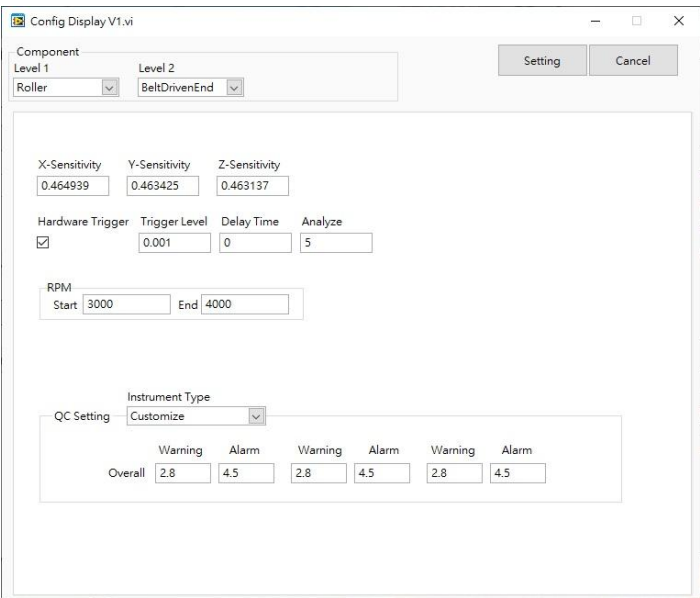


Figure2-40 Aurora Modbus Utility ISO-20816 Analysis Parameter Settings under Roller.BeltDrivenEnd Mode

After settings are complete, press the Setting button. After writing is completed, "Success" will be visible in the status field, as shown in Figure2-41. If this wording does not appear, it indicates writing failed; please try once more.

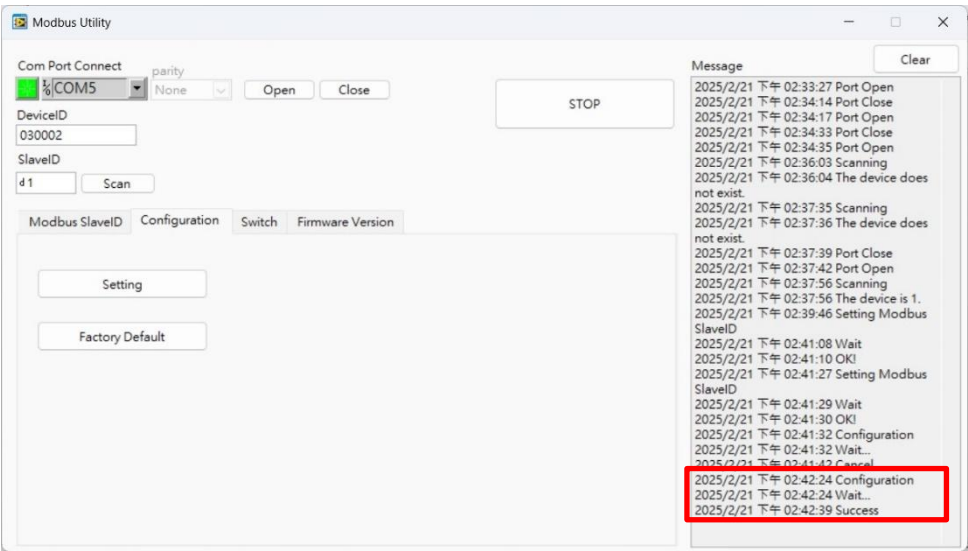


Figure2-41 Aurora Modbus Utility Writing Analysis Parameters into Sensor

2.6.3.2 Using External Software to Issue 213MM2-R1 Vibration Analysis Parameters

If you do not adopt a factory edge gateway or the Aurora Modbus Utility software, and instead build an upper-level data management system yourself, you must write program code yourself or adopt general Modbus communication software to issue the analysis parameter items requiring configuration into the Modbus registers of 213MM2-R1 through a series of handshake commands.

The 213MM2-R1 provides modes including General Mode (General), Motor Load End Direct Driven (Motor.DriveEnd.DirectDrive), Motor Load End Belt Driven (Motor.DriveEnd.DriveBelt), Motor Non-Drive End (Motor.NonDriveEnd), Roller Free End (Roller.FreeEnd), and Roller Belt Connection End (Roller.BeltDrivenEnd) for users to select. For detailed descriptions, please refer to Section 2.1. The Modbus registers for handshake commands in each mode are also different. Users can, according to usage conditions, refer to the following Modbus definition classification descriptions for analysis parameter items in each mode:

2.6.3.2.1 General Mode Analysis Parameter Item Modbus Definitions

Under General mode, the Modbus definition classification used by 213MM2-R1 to receive analysis parameter items can refer to Table2-43 on the right. For complete Register Table definition details, including reasonable ranges for each analysis parameter, please refer to Appendix O. Note that from location 40006 to 40402 are integer inputs, which require multiplying the analysis parameters by Scale parameters first before issuing to 213MM2-R1.

Location	Item	Description
40006 – 40011	Sensitivity	Sensor sensitivity
40012	Slave ID	Sensor Modbus station number
40013	Machine Type	Set to 0 for General mode machine type
40014 – 40015	Trigger Level	Software trigger level
40016	Delay Time	How many seconds after trigger before starting calculation analysis
40017	Analyze	How long to analyze after trigger
40018 – 40021	RPM	Reasonable speed range of rotating equipment
40022 – 40201		Frequency band definition parameters for user-defined frequency-domain features
40202	Hardware Trigger	Whether hardware trigger function is enabled
40203	Instrument Type	Which equipment category defined in ISO-20816 the monitored equipment belongs to
40204	Gear Van Pass Enable/Disable	Whether gear and impeller damage analysis modes are enabled
40205	Gear Number	Number of teeth
40206	Van Number	Number of blades
40207 – 40254		Failure determination thresholds for time-domain features
40255 – 40374		Failure determination thresholds for user-defined frequency-domain features
40375– 40398		Failure determination thresholds for built-in damage mode features
40399 – 40402		Over-temperature determination threshold

Table2-43 General Mode Receiving Analysis Parameter Location Classification Table

Each analysis parameter has its reasonable interval; for the rationality range of each parameter, please refer to Appendix O. The 213MM2-R1 will check the rationality of issued parameters. When writing program code yourself or issuing analysis parameter items into the Modbus registers of 213MM2-R1 through commercial Modbus communication software, 213MM2-R1 will feedback whether analysis parameters are rational in locations 10030 – 10220. Its rationality information classification is shown in Table2-44 on the right; for details, please refer to Appendix U.

Writing program code yourself or issuing analysis parameter items requiring configuration into the Modbus registers of 213MM2-R1 through commercial Modbus communication software must follow the procedure shown in Figure2-42 on the right:

- Modify analysis parameters in Holding Register locations 4x0005 - 4x0402.
- Wait for 1x0001 in Input Register to be 0 (Flash not updating) before writing parameters.
- Change Coil Register 0x0006 to 1 to notify 213MM2-R1 via handshake to execute analysis parameter rationality check.
- Read Input Register position 1x0004 and position 1x0005. If 1x0004 is True and 1x0005 is False, it indicates analysis parameters are rational, and 213MM2-R1 has copied these analysis parameters into storage locations 3x0234 – 3x0728 in Input Register. Conversely, it indicates analysis parameters are irrational and not written; please read feedback in range 1x0030 – 1x0200 to confirm which analysis parameter exceeds reasonable range. After correcting, repeat writing operations.

Location	Description
10031	Configuration version number exceeds upper limit
10032 – 10034	Sensitivity exceeds reasonable range
10035 – 10037 10164	Trigger parameters exceed reasonable range
10038 – 10039	Speed setting exceeds reasonable range
10044 – 10163	Frequency band definition parameters for user-defined frequency-domain features exceed reasonable range
10165 – 10168	Mechanism design parameters for built-in damage model features exceed reasonable range
10169 – 10180	Time-domain feature alarm upper/lower limits exceed reasonable range
10181 – 10210	User-defined frequency-domain feature alarm upper/lower limits exceed reasonable range
10211 - 10217	Built-in damage model feature alarm upper/lower limits exceed reasonable range
10218	Sensor Slave ID value exceeds document definition range
10220	Machine type exceeds defined range

Table2-44 213MM2-R1 General Mode Analysis Parameter Rationality Feedback Classification Table

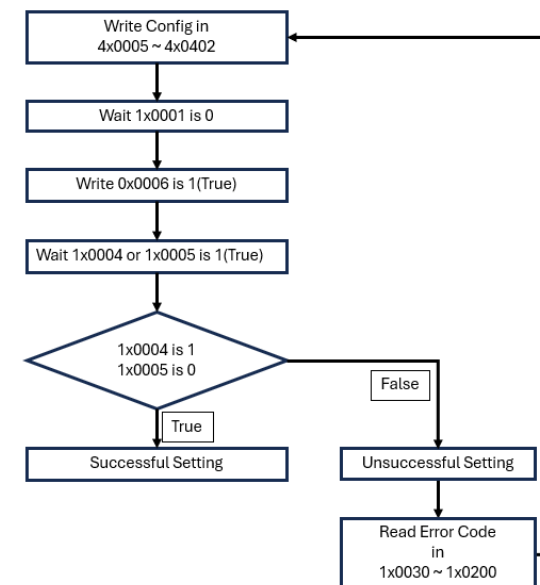


Figure2-42 Workflow for Issuing Analysis Parameters to 213MM2-R1 General Mode

2.6.3.2.2 Motor Non-Drive End (Motor.NonDriveEnd) Mode Analysis Parameter Item Modbus Definitions

Under Motor.NonDriveEnd mode, the Modbus definition classification used by 213MM2-R1 to receive analysis parameter items can refer to Table2-45 on the right. For complete Register Table definition details, including reasonable ranges for each analysis parameter, please refer to Appendix P. Note that from location 40006 to 40037 are integer inputs, which require multiplying analysis parameters by Scale parameters first before issuing to 213MM2-R1.

Each analysis parameter has its reasonable interval; for rationality ranges, please refer to Appendix P. 213MM2-R1 will check the rationality of issued parameters. Feedback classification is shown in Table2-46 on the right; for details, please refer to Appendix U.

Location	Item	Description
40006 – 40011	Sensitivity	Sensor sensitivity
40012	Slave ID	Sensor Modbus station number
40013	Machine Type	Set to 3 for General mode machine type
40014 – 40015	Trigger Level	Software trigger level
40016	Delay Time	How many seconds after trigger before starting calculation analysis
40017	Analyze	How long to analyze after trigger
40018 – 40021	RPM	Reasonable speed range of rotating equipment
40022	Hardware Trigger	Whether hardware trigger function is enabled
40023~40024	Line Frequency	AC power frequency
40025	Instrument Type	Which equipment category defined in ISO-20816 the monitored equipment belongs to
40026-40037		Failure determination thresholds for time-domain features

Table2-45 213MM2-R1 Motor.NonDriveEnd Mode Receiving Analysis Parameter Location Classification Table

Location	Description
10031	Configuration version number exceeds upper limit
10032 – 10034	Sensitivity exceeds reasonable range
10035 – 10037 10164	Trigger parameters exceed reasonable range
10038 – 10039	Speed setting exceeds reasonable range
10044 – 10163	Frequency band definition parameters for user-defined frequency-domain features exceed reasonable range
10165 – 10168	Mechanism design parameters for built-in damage model features exceed reasonable range
10169 – 10180	Time-domain feature alarm upper/lower limits exceed reasonable range
10181 – 10210	User-defined frequency-domain feature alarm upper/lower limits exceed reasonable range
10211 - 10217	Built-in damage model feature alarm upper/lower limits exceed reasonable range
10218	Sensor Slave ID value exceeds document definition range
10219	Line Frequency exceeds defined range
10220	Machine type exceeds defined range

Table2-46 213MM2-R1 Motor.NonDriveEnd Mode Analysis Parameter Rationality Feedback Classification Table

Writing program code yourself or issuing analysis parameter items requiring configuration into the Modbus registers of 213MM2-R1 through commercial Modbus communication software must follow the procedure shown in Figure2-43 on the right :

- Modify analysis parameters in Holding Register locations 4x0005 - 4x0037.
- Wait for 1x0001 in Input Register to be 0 (Flash not updating) before writing parameters.
- Change Coil Register 0x0006 to 1, notifying 213MM2-R1 via handshake to execute analysis parameter rationality check.
- Read Input Register position 1x0004 and position 1x0005. If 1x0004 is True and 1x0005 is False, it indicates analysis parameters are rational, and 213MM2-R1 has copied this set of analysis parameters to analysis parameter storage locations 3x0234 – 3x0728 in Input Register. Conversely, it indicates analysis parameters are irrational and analysis parameters are not written; please read feedback in range 1x0030 – 1x0200 to confirm which analysis parameter exceeds reasonable range. After correcting, repeat writing operations.

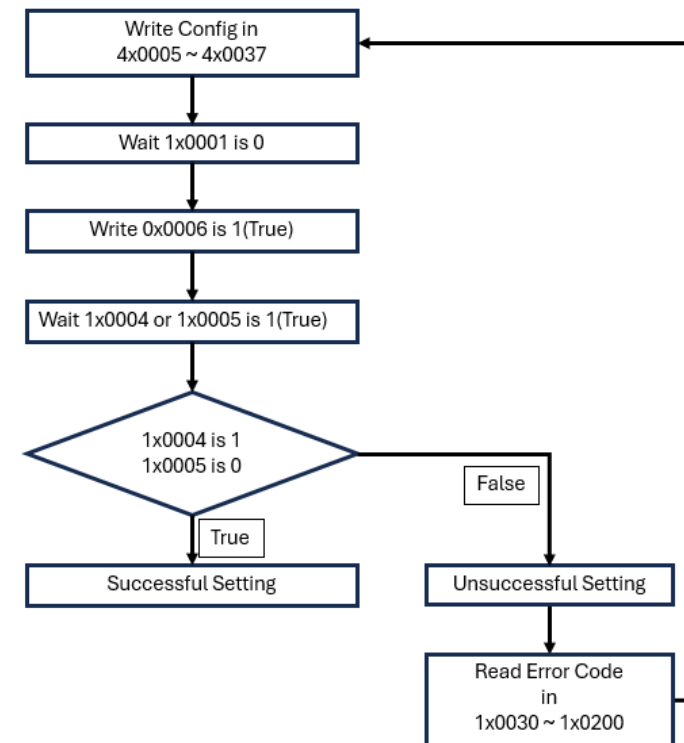


Figure2-43 Workflow for Issuing Analysis Parameters to 213MM2-R1 Motor.NonDriveEnd Mode

2.6.3.2.3 Motor Load End, and Rear-End Load Belt Driven (Motor.DriveEnd.DriveBelt) Mode Analysis Parameter Item Modbus Definitions

Under Motor.DriveEnd.DriveBelt mode, the Modbus definition classification used by 213MM2-R1 to receive analysis parameter items can refer to Table2-47 on the right. For complete Register Table definition details, including reasonable ranges for each analysis parameter, please refer to Appendix Q. Note that from location 40006 to 40037 are integer inputs, which require multiplying analysis parameters by Scale parameters first before issuing to 213MM2-R1.

Each analysis parameter has its reasonable interval; for rationality ranges of each parameter, please refer to Appendix Q. 213MM2-R1 will check the rationality of issued parameters. When writing program code yourself or issuing analysis parameter items into the Modbus registers of 213MM2-R1 through commercial Modbus communication software, 213MM2-R1 will feedback whether analysis parameters are rational in locations 10030 –10220. Its rationality information classification is shown in Table2-48 on the right, and its details please refer to Appendix U.

Location	Item	Description
40006 – 40011	Sensitivity	Sensor sensitivity
40012	Slave ID	Sensor Modbus station number
40013	Machine Type	Set to 3 for General mode machine type
40014 – 40015	Trigger Level	Software trigger level
40016	Delay Time	How many seconds after trigger before starting calculation analysis
40017	Analyze	How long to analyze after trigger
40018 – 40021	RPM	Reasonable speed range of rotating equipment
40022	Hardware Trigger	Whether hardware trigger function is enabled
40023~40024	Line Frequency	AC power frequency
40025	Instrument Type	Which equipment category defined in ISO-20816 the monitored equipment belongs to
40026-40037		Failure determination thresholds for time-domain features

Table2-47 213MM2-R1 Motor.DriveEnd.DriveBelt Mode Receiving Analysis Parameter Location Classification Table

Location	Description
10031	Configuration version number exceeds upper limit
10032 – 10034	Sensitivity exceeds reasonable range
10035 – 10037 10164	Trigger parameters exceed reasonable range
10038 – 10039	Speed setting exceeds reasonable range
10044 – 10163	Frequency band definition parameters for user-defined frequency-domain features exceed reasonable range
10165 – 10168	Mechanism design parameters for built-in damage model features exceed reasonable range
10169 – 10180	Time-domain feature alarm upper/lower limits exceed reasonable range
10181 – 10210	User-defined frequency-domain feature alarm upper/lower limits exceed reasonable range
10211 - 10217	Built-in damage model feature alarm upper/lower limits exceed reasonable range
10218	Sensor Slave ID value exceeds document definition range
10219	Line Frequency exceeds defined range
10220	Machine type exceeds defined range

Table2-48 213MM2-R1 Motor.DriveEnd.DriveBelt Mode Analysis Parameter Rationality Feedback Classification Table

Writing program code yourself or issuing analysis parameter items requiring configuration into the Modbus registers of 213MM2-R1 through commercial Modbus communication software must follow the procedure shown in Figure2-44 on the right :

- Modify analysis parameters in Holding Register locations 4x0005 - 4x0037.
- Wait for 1x0001 in Input Register to be 0 (Flash not updating) before writing parameters.
- Change Coil Register 0x0006 to 1, notifying 213MM2-R1 via handshake to execute analysis parameter rationality check.
- Read Input Register position 1x0004 and position 1x0005. If 1x0004 is True and 1x0005 is False, it indicates analysis parameters are rational, and 213MM2-R1 has copied this set of analysis parameters to analysis parameter storage locations 3x0234 – 3x0728 in Input Register. Conversely, it indicates analysis parameters are irrational and analysis parameters are not written; please read feedback in range 1x0030 – 1x0200 to confirm which analysis parameter exceeds reasonable range. After correcting, repeat writing operations.

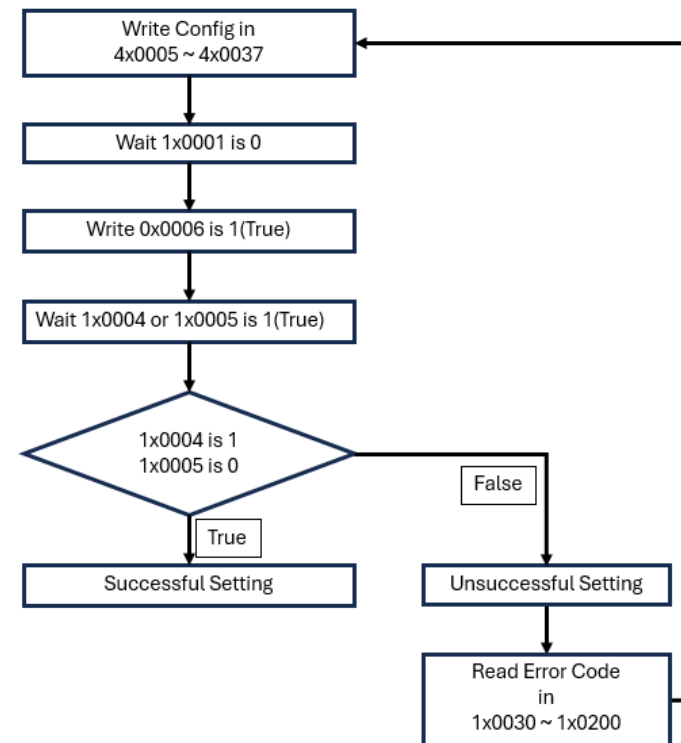


Figure2-44 Workflow for Issuing Analysis Parameters to 213MM2-R1 Motor.DriveEnd.DriveBelt Mode

2.6.3.2.4 Motor Load End, and Rear-End Load Direct Driven (Motor.DriveEnd.DirectDrive) Mode Analysis Parameter Item Modbus Definitions

Under Motor.DriveEnd.DirectDrive mode, the Modbus definition classification used by 213MM2-R1 to receive analysis parameter items can refer to Table2-49 on the right. For complete Register Table definition details, including reasonable ranges for each analysis parameter, please refer to Appendix R. Note that from location 40006 to 40037 are integer inputs, which require multiplying analysis parameters by Scale parameters first before issuing to 213MM2-R1.

Each analysis parameter has its reasonable interval; for rationality ranges of each parameter, please refer to Appendix R. 213MM2-R1 will check the rationality of issued parameters. When writing program code yourself or issuing analysis parameter items into the Modbus registers of 213MM2-R1 through commercial Modbus communication software, 213MM2-R1 will feedback whether analysis parameters are rational in locations 10030 – 10220. Its rationality information classification is shown in Table2-50 on the right, and its details please refer to Appendix U.

Location	Item	Description
40006 – 40011	Sensitivity	Sensor sensitivity
40012	Slave ID	Sensor Modbus station number
40013	Machine Type	Set to 3 for General mode machine type
40014 – 40015	Trigger Level	Software trigger level
40016	Delay Time	How many seconds after trigger before starting calculation analysis
40017	Analyze	How long to analyze after trigger
40018 – 40021	RPM	Reasonable speed range of rotating equipment
40022	Hardware Trigger	Whether hardware trigger function is enabled
40023~40024	Line Frequency	AC power frequency
40025	Instrument Type	Which equipment category defined in ISO-20816 the monitored equipment belongs to
40026-40037		Failure determination thresholds for time-domain features

Table2-49 213MM2-R1 Motor.DriveEnd.DirectDrive Mode Receiving Analysis Parameter Location Classification Table

Location	Description
10031	Configuration version number exceeds upper limit
10032 – 10034	Sensitivity exceeds reasonable range
10035 – 10037 10164	Trigger parameters exceed reasonable range
10038 – 10039	Speed setting exceeds reasonable range
10044 – 10163	Frequency band definition parameters for user-defined frequency-domain features exceed reasonable range
10165 – 10168	Mechanism design parameters for built-in damage model features exceed reasonable range
10169 – 10180	Time-domain feature alarm upper/lower limits exceed reasonable range
10181 – 10210	User-defined frequency-domain feature alarm upper/lower limits exceed reasonable range
10211 - 10217	Built-in damage model feature alarm upper/lower limits exceed reasonable range
10218	Sensor Slave ID value exceeds document definition range
10219	Line Frequency exceeds defined range
10220	Machine type exceeds defined range

Table2-50 213MM2-R1 Motor DriveEnd DirectDrive Mode Analysis Parameter Rationality Feedback Classification Table

Writing program code yourself or issuing analysis parameter items requiring configuration into the Modbus registers of 213MM2-R1 through commercial Modbus communication software must follow the procedure shown in Figure2-45 on the right :

- Modify analysis parameters in Holding Register locations 4x0005 - 4x0037.
- Wait for 1x0001 in Input Register to be 0 (Flash not updating) before writing parameters.
- Change Coil Register 0x0006 to 1, notifying 213MM2-R1 via handshake to execute analysis parameter rationality check.
- Read Input Register position 1x0004 and position 1x0005. If 1x0004 is True and 1x0005 is False, it indicates analysis parameters are rational, and 213MM2-R1 has copied this set of analysis parameters to analysis parameter storage locations 3x0234 – 3x0728 in Input Register. Conversely, it indicates analysis parameters are irrational and analysis parameters are not written; please read feedback in range 1x0030 – 1x0200 to confirm which analysis parameter exceeds reasonable range. After correcting, repeat writing operations.

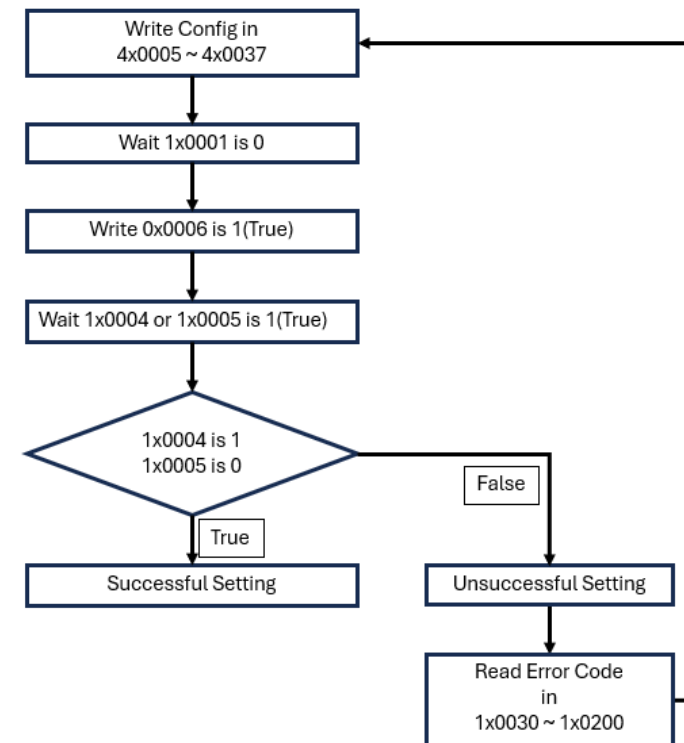


Figure2-45 Workflow for Issuing Analysis Parameters to 213MM2-R1 Motor DriveEnd DirectDrive Mode

2.6.3.2.5 Roller Free End (Roller.FreeEnd) Mode Analysis Parameter Item Modbus Definitions

Under Roller.FreeEnd mode, the Modbus definition classification used by 213MM2-R1 to receive analysis parameter items can refer to Table2-51 on the right. For complete Register Table definition details, including reasonable ranges for each analysis parameter, please refer to Appendix S. Note that from location 40006 to 40035 are integer inputs, which require multiplying analysis parameters by Scale parameters first before issuing to 213MM2-R1.

Each analysis parameter has its reasonable interval; for rationality ranges of each parameter, please refer to Appendix S. 213MM2-R1 will check the rationality of issued parameters. When writing program code yourself or issuing analysis parameter items into the Modbus registers of 213MM2-R1 through commercial Modbus communication software, 213MM2-R1 will feedback whether analysis parameters are rational in locations 10030 – 10220. Its rationality information classification is shown in Table2-52 on the right, and its details please refer to Appendix U.

Location	Item	Description
40006 – 40011	Sensitivity	Sensor sensitivity
40012	Slave ID	Sensor Modbus station number
40013	Machine Type	Set to 3 for General mode machine type
40014 – 40015	Trigger Level	Software trigger level
40016	Delay Time	How many seconds after trigger before starting calculation analysis
40017	Analyze	How long to analyze after trigger
40018 – 40021	RPM	Reasonable speed range of rotating equipment
40022	Hardware Trigger	Whether hardware trigger function is enabled
40023	Instrument Type	Which equipment category defined in ISO-20816 the monitored equipment belongs to
40024-40035		Failure determination thresholds for time-domain features

Table2-51 213MM2-R1 Roller.FreeEnd Mode Receiving Analysis Parameter Location Classification Table

Location	Description
10031	Configuration version number exceeds upper limit
10032 – 10034	Sensitivity exceeds reasonable range
10035 – 10037 10164	Trigger parameters exceed reasonable range
10038 – 10039	Speed setting exceeds reasonable range
10044 – 10163	Frequency band definition parameters for user-defined frequency-domain features exceed reasonable range
10165 – 10168	Mechanism design parameters for built-in damage model features exceed reasonable range
10169 – 10180	Time-domain feature alarm upper/lower limits exceed reasonable range
10181 – 10210	User-defined frequency-domain feature alarm upper/lower limits exceed reasonable range
10211 - 10217	Built-in damage model feature alarm upper/lower limits exceed reasonable range
10218	Sensor Slave ID value exceeds document definition range
10220	Machine type exceeds defined range

Table2-52 213MM2-R1 Roller.FreeEnd Mode Analysis Parameter Rationality Feedback Classification Table

Writing program code yourself or issuing analysis parameter items requiring configuration into the Modbus registers of 213MM2-R1 through commercial Modbus communication software must follow the procedure shown in Figure2-46 on the right :

- Modify analysis parameters in Holding Register locations 4x0005 - 4x0035.
- Wait for 1x0001 in Input Register to be 0 (Flash not updating) before writing parameters.
- Change Coil Register 0x0006 to 1, notifying 213MM2-R1 via handshake to execute analysis parameter rationality check.
- Read Input Register position 1x0004 and position 1x0005. If 1x0004 is True and 1x0005 is False, it indicates analysis parameters are rational, and 213MM2-R1 has copied this set of analysis parameters to analysis parameter storage locations 3x0234 – 3x0728 in Input Register. Conversely, it indicates analysis parameters are irrational and analysis parameters are not written; please read feedback in range 1x0030 – 1x0200 to confirm which analysis parameter exceeds reasonable range. After correcting, repeat writing operations.

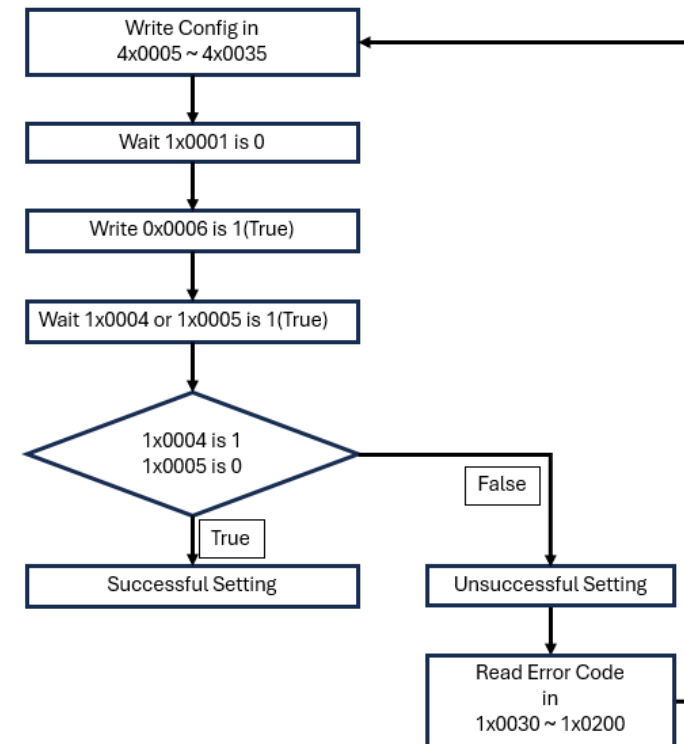


Figure2-46 Workflow for Issuing Analysis Parameters to 213MM2-R1 Roller.FreeEnd Mode

2.6.3.2.6 Roller Belt Connection End (Roller.BeltDrivenEnd) Mode Analysis Parameter Item Modbus Definitions

Under Roller.BeltDrivenEnd mode, the Modbus definition classification used by 213MM2-R1 to receive analysis parameter items can refer to Table2-53 on the right. For complete Register Table definition details, including reasonable ranges for each analysis parameter, please refer to Appendix T. Note that from location 40006 to 40035 are integer inputs, which require multiplying analysis parameters by Scale parameters first before issuing to 213MM2-R1.

Each analysis parameter has its reasonable interval; for rationality ranges of each parameter, please refer to Appendix T. 213MM2-R1 will check the rationality of issued parameters. When writing program code yourself or issuing analysis parameter items into the Modbus registers of 213MM2-R1 through commercial Modbus communication software, 213MM2-R1 will feedback whether analysis parameters are rational in locations 10030 – 10220. Its rationality information classification is shown in Table2-54 on the right, and its details please refer to Appendix U.

Location	Item	Description
40006 – 40011	Sensitivity	Sensor sensitivity
40012	Slave ID	Sensor Modbus station number
40013	Machine Type	Set to 3 for General mode machine type
40014 – 40015	Trigger Level	Software trigger level
40016	Delay Time	How many seconds after trigger before starting calculation analysis
40017	Analyze	How long to analyze after trigger
40018 – 40021	RPM	Reasonable speed range of rotating equipment
40022	Hardware Trigger	Whether hardware trigger function is enabled
40023	Instrument Type	Which equipment category defined in ISO-20816 the monitored equipment belongs to
40024-40035		Failure determination thresholds for time-domain features

Table2-53 213MM2-R1 Roller.BeltDrivenEnd Mode Receiving Analysis Parameter Location Classification Table

Location	Description
10031	Configuration version number exceeds upper limit
10032 – 10034	Sensitivity exceeds reasonable range
10035 – 10037 10164	Trigger parameters exceed reasonable range
10038 – 10039	Speed setting exceeds reasonable range
10044 – 10163	Frequency band definition parameters for user-defined frequency-domain features exceed reasonable range
10165 – 10168	Mechanism design parameters for built-in damage model features exceed reasonable range
10169 – 10180	Time-domain feature alarm upper/lower limits exceed reasonable range
10181 – 10210	User-defined frequency-domain feature alarm upper/lower limits exceed reasonable range
10211 - 10217	Built-in damage model feature alarm upper/lower limits exceed reasonable range
10218	Sensor Slave ID value exceeds document definition range
10220	Machine type exceeds defined range

Table2-54 213MM2-R1 Roller.BeltDrivenEnd Mode Analysis Parameter Rationality Feedback Classification Table

Writing program code yourself or issuing analysis parameter items requiring configuration into the Modbus registers of 213MM2-R1 through commercial Modbus communication software must follow the procedure shown in Figure2-47 on the right :

- Modify analysis parameters in Holding Register locations 4x0005 - 4x0035.
- Wait for 1x0001 in Input Register to be 0 (Flash not updating) before writing parameters.
- Change Coil Register 0x0006 to 1, notifying 213MM2-R1 via handshake to execute analysis parameter rationality check.
- Read Input Register position 1x0004 and position 1x0005. If 1x0004 is True and 1x0005 is False, it indicates analysis parameters are rational, and 213MM2-R1 has copied this set of analysis parameters to analysis parameter storage locations 3x0234 – 3x0728 in Input Register. Conversely, it indicates analysis parameters are irrational and analysis parameters are not written; please read feedback in range 1x0030 – 1x0200 to confirm which analysis parameter exceeds reasonable range. After correcting, repeat writing operations.

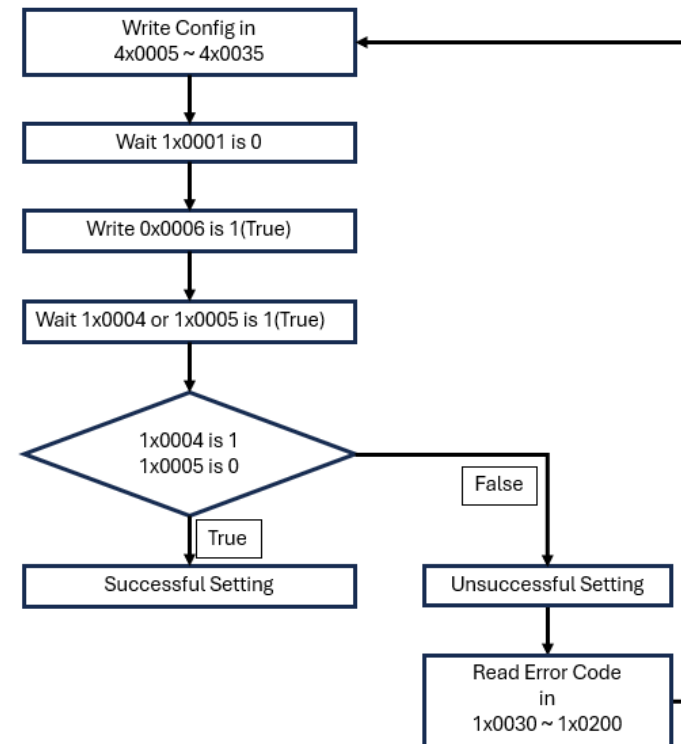


Figure2-47 Workflow for Issuing Analysis Parameters to 213MM2-R1 Roller.BeltDrivenEnd Mode

3 Sensor Deployment Guide

213MM2-R1 field deployment work includes: offline Slave ID configuration, field mounting and fixing, as well as field wiring. For details on each work item, please refer to the following sections.

3.1 Changing Modbus Slave ID

213MM2-R1 uses Modbus protocol to communicate with various device hubs and edge gateways. On the same RS485 loop, each 213MM2-R1 needs to have a Slave ID distinct from other sensors. The factory default Slave ID of 213MM2-R1 is 1.

We recommend using the AURORA Modbus Utility software under Microsoft Windows environment provided by Syscom to change the Slave ID of 213MM2-R1. If for any reason AURORA Modbus Utility cannot be used, you can set the Slave ID through any commercial Modbus software. However, when you forget the Slave ID previously set on this sensor and cannot connect via Modbus communication to change it first, please directly issue commands via RS485 interface to perform the change.

3.1.1 Using Aurora Modbus Utility to Change Modbus Slave ID

Before you utilize Aurora Modbus Utility to change the Slave ID of 213MM2-R1, please first refer to the description of Table2-3 in Section 2.3 to distribute power for 213MM2-R1. And likewise refer to the description of Section 2.2 and Table2-2 to establish the physical Com port connection between 213MM2-R1 and the work computer. If your work computer only provides USB ports, then you can adopt any commercially available RS485 to USB converter as shown in Figure3-1 to connect your sensor to the work computer.



Figure3-1 RS485 USB Interface Converter

First step, please enable the Com port to connect with the 213MM2-R1. After starting and executing AURORA-Modbus Utility.exe, a screen as shown in Figure3-2 on the right will appear. Please select the Com Port you wish to enable from the "Com Port Connect" drop-down menu, and select Parity from the drop-down menu. If the firmware version of your 213MM2-R1 is prior to V4.0, please select Even; otherwise, please select None. If you do not know the firmware version, it is recommended to select None first. Press Open to enable Com port connection.

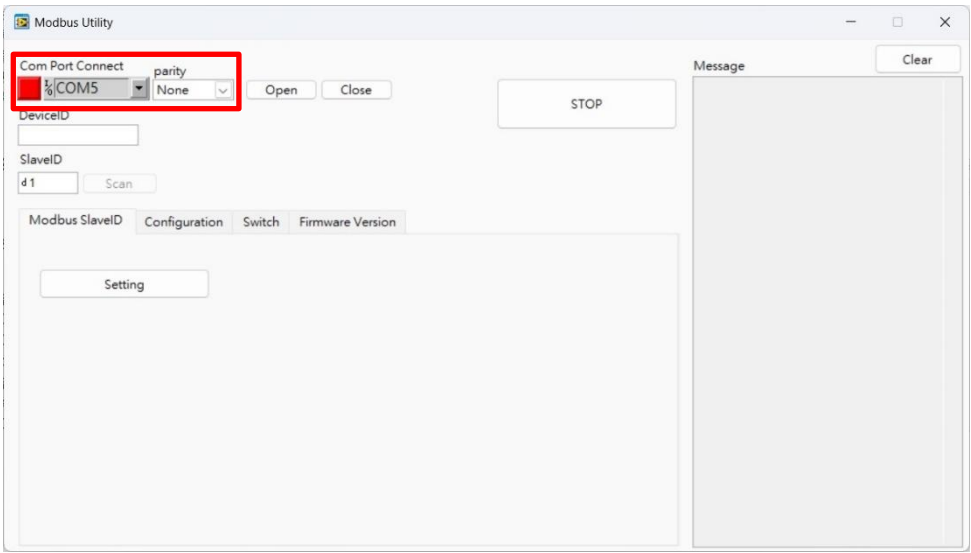


Figure3-2 Aurora Modbus Utility Select Com Port and Parity

If Com port function is normal, the upper-left red light will turn green, as shown in Figure3-3. If Com port remains red light, it indicates that the selected Com port function is abnormal and cannot provide sensor connection functions.

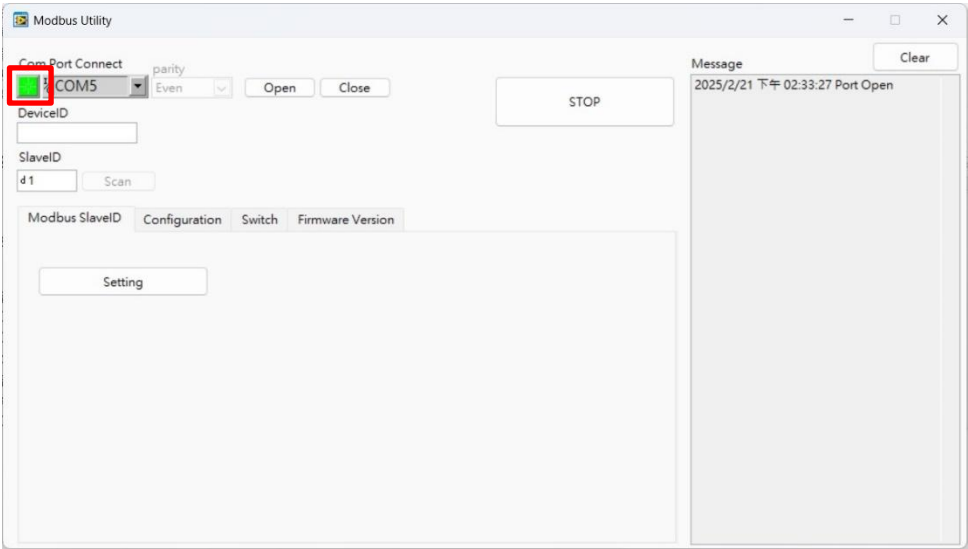


Figure3-3 Aurora Modbus Utility After Com Port Enabled Normally

Enter the Device ID (6 digits in total) on the 213MM2-R1 sensor barcode. At this time, the Scan button will be Enabled, allowing you to click to query the Slave ID of this sensor on the Modbus loop, as shown in Figure3-4.

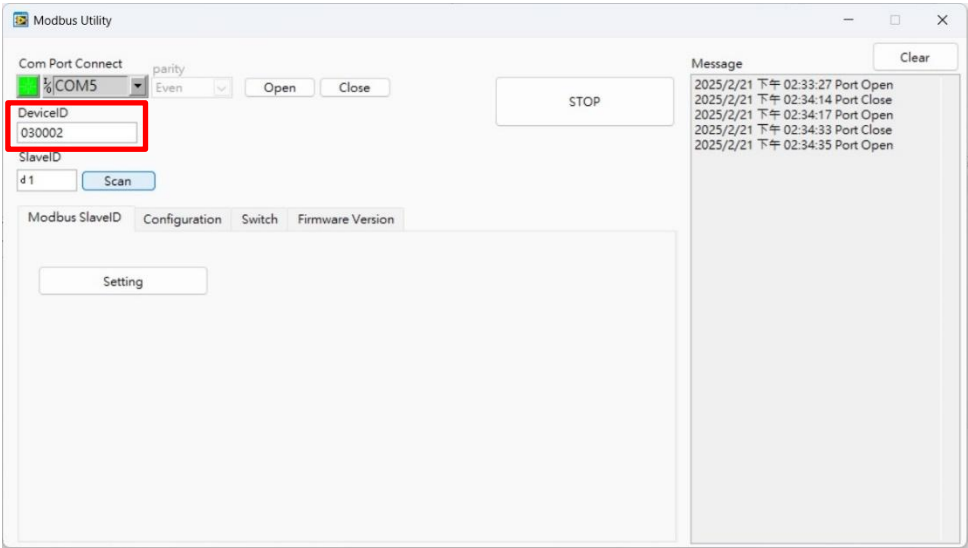


Figure3-4 Aurora Modbus Utility Enter Device ID

If you do not know the Modbus Slave ID of this 213MM2-R1 to be configured, you can use the search function. After clicking the Scan button, a window will pop up prompting you to enter the Slave ID range you wish to scan. Since the firmware version inside this sensor may be prior to or after V4.0, you can also choose whether the sensor Device ID used during scanning requires high and low byte swapping. After entering, press OK to perform scanning, as shown inFigure3-5.

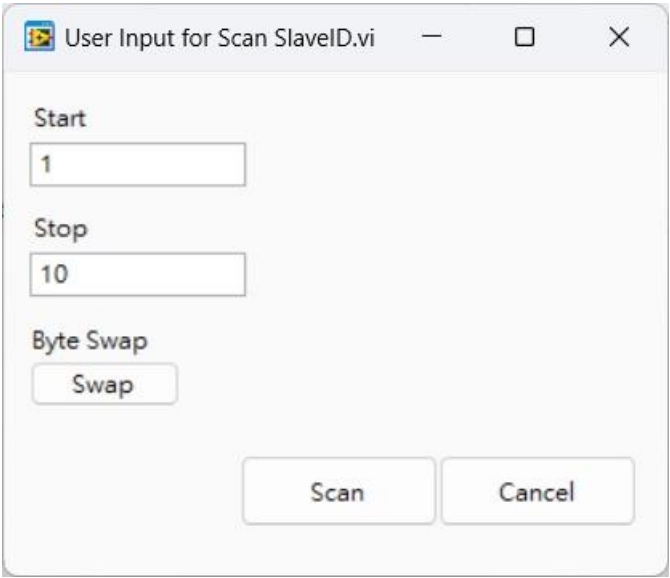


Figure3-5 Aurora Modbus Utility Enter Slave ID Search Range

As shown in Figure3-6, if the Parity information selected when enabling the Com port differs from the Parity information inside the 213MM2-R1 to be configured, or if the Device ID high and low byte order is selected incorrectly, or if the search range is incorrect, "The device does not exist" will pop up. At this time, please re-press Scan, and re-configure the search range, or re-select the Device ID high and low byte order, and press OK to scan once again, as shown in Figure3-7.

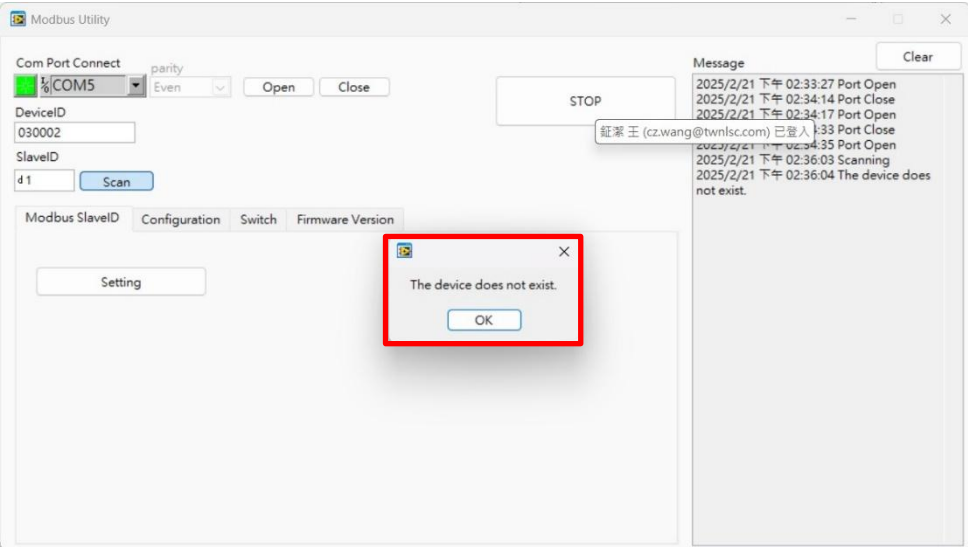


Figure3-6 Aurora Modbus Utility View Slave ID

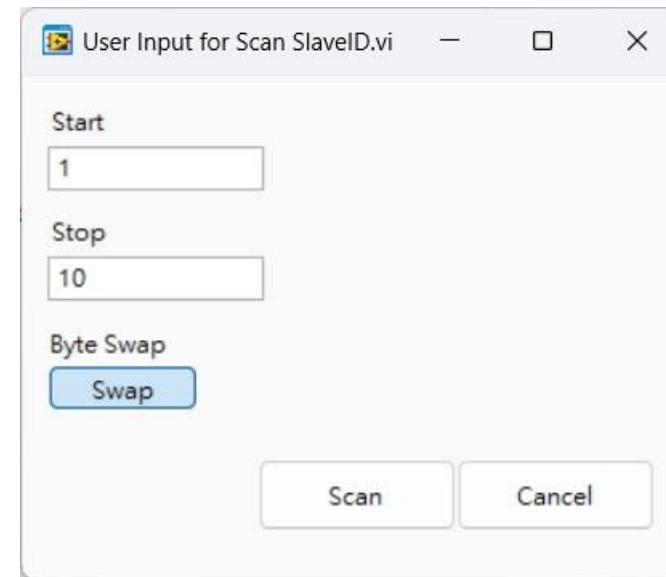


Figure3-7 Aurora Modbus Utility View Slave ID Swap Device ID High and Low Bytes

If re-scanning still shows "The device does not exist", please click Close, change Parity, and press Open to re-enable Com port, as shown in Figure3-8. Then return to the step in Figure3-4 to scan again.

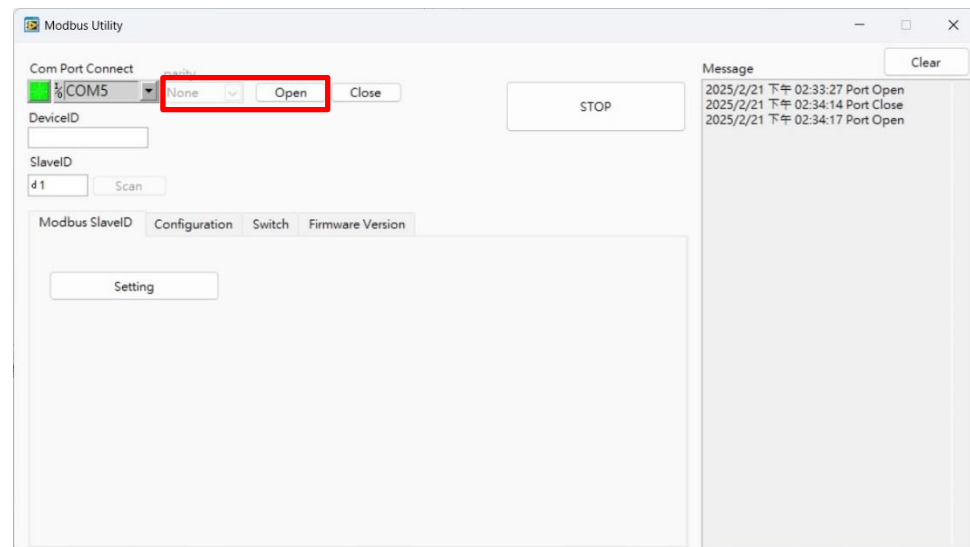


Figure3-8 Aurora Modbus Utility Change Parity

If your Parity information and Device ID high/low byte order information are both entered correctly and the search range is correct, after waiting about 2-3 seconds, the system will automatically pop up the current Slave ID and populate it into the Slave ID field, as shown in Figure3-9.

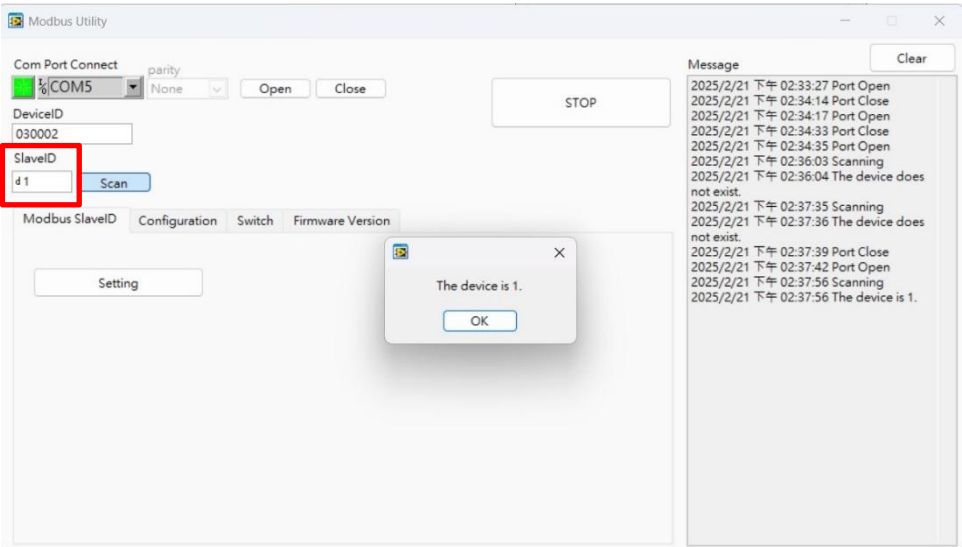


Figure3-9 Aurora Modbus Utility View Slave ID

When configuring analysis parameters, please switch to the Configuration page and click the Setting button, as shown in Figure3-10.

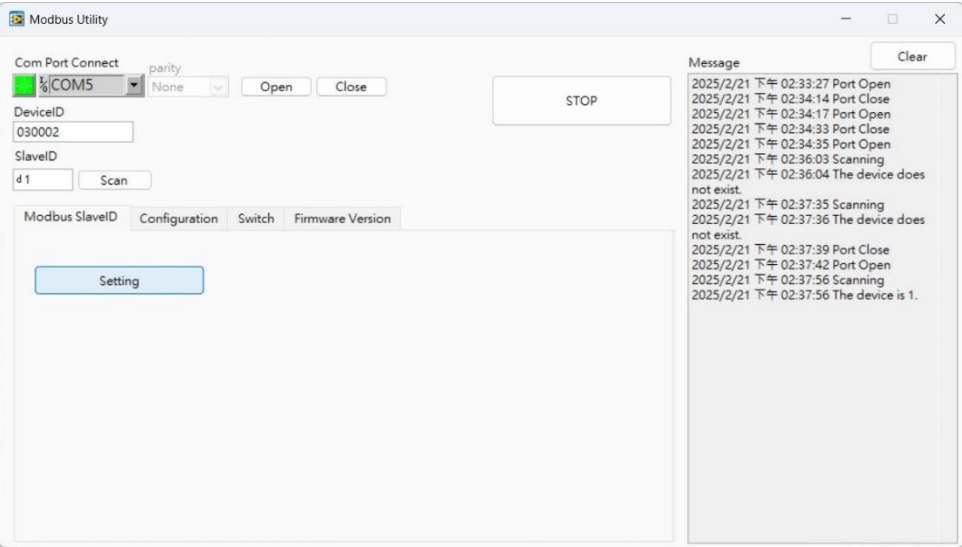


Figure3-10 Aurora Modbus Utility Analysis Parameters Page

As shown in Figure3-11, input the Slave ID you want to change to, then press the Setting button.

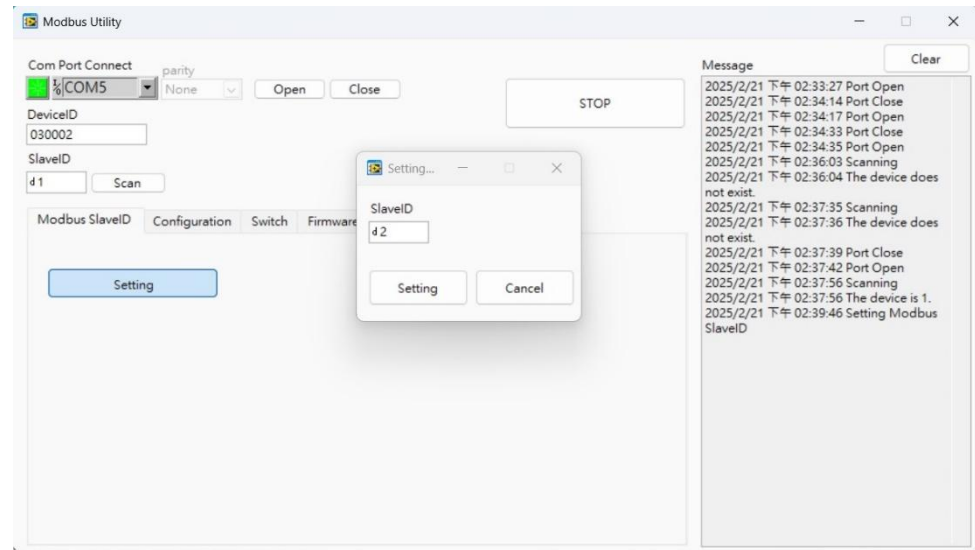


Figure3-11 Aurora Modbus Utility Inputting Changed Slave ID

As shown in Figure3-12, if setting is successful, you can see the OK wording in the status column, and the Slave ID will follow and update; otherwise, you need to attempt once more.

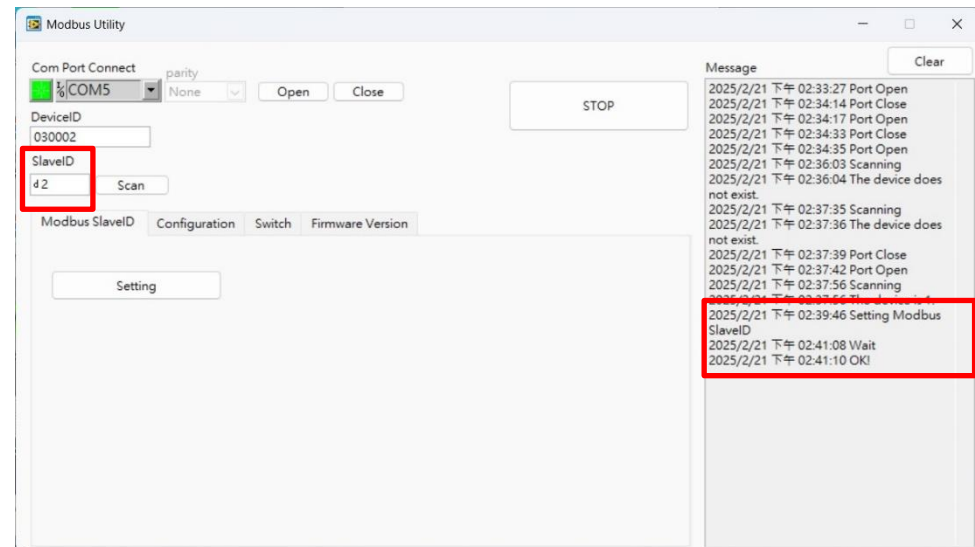


Figure3-12 Aurora Modbus Utility Slave ID Change Complete

3.1.2 Using General Commercial Modbus Software to Set Modbus Slave ID

When not using Aurora Modbus Utility to set Slave ID, at this time you need to configure via other communication software (such as commercial Modbus software). The setting methods are as shown in Table3-1 to Table3-3. The user can read the current slave ID of this 213MM2-R1 unit through position 3x0008; and can write new Slave through position 4x0012. When the written new slave ID station number exceeds range, it will be fed back via position 1x0218.

Writing new slave ID into 213MM2-R1 by writing program code yourself or through commercial Modbus communication software must follow the procedure shown in Figure3-13 on the right:

- Modify slave ID in location 4x0012 in Holding Register.
- Wait for 1x0001 in Input Register to be 0 (Flash not updating) when writing parameters.
- Change Coil Register 0x0011 to 1, notifying 213MM2-R1 via handshake to execute slave ID parameter rationality check.
- Read Input Register position 1x0004 and position 1x0005. If 1x0004 is True and 1x0005 is False, it indicates slave ID parameter is rational, and 213MM2-R1 has copied this

Location	Item	Description
30008	Slave ID	Sensor current Modbus station number

Table3-1 213MM2-R1 slave ID Parameter Memory Location Table

Location	Item	Description
40012	Slave ID	Sensor new Modbus station number

Table3-2 213MM2-R1 slave ID Parameter Location Table

Location	Description
10218	Sensor new Modbus station number exceeds defined range

Table3-3 213MM2-R1 slave ID Parameter Rationality Feedback Information Table

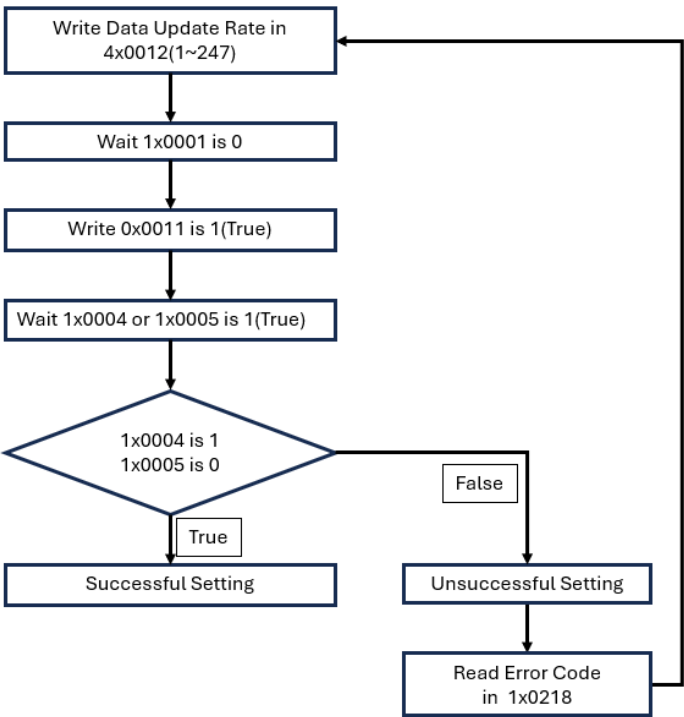


Figure3-13 213MM2-R1 Workflow for Issuing slave ID

analysis parameter to analysis parameter storage location 3x0008 in Input Register. Conversely, it indicates slave ID parameter is irrational, slave ID parameter is not written; please read feedback of 1x0218 to confirm whether slave ID parameter exceeds reasonable range. After correcting, repeat writing operations.

3.1.3 Directly Issuing RS485 Communication Commands to Change Modbus Slave ID

If not using Aurora Modbus Utility to set Slave ID, and when you forget the Slave ID previously set on this 213MM2-R1 unit, being unable to connect via Modbus communication to change it first, you can use RS485 communication commands to change Modbus Slave ID, and please execute according to the following steps.

Modbus Slave ID writing command and return workflow, as shown in Figure3-14 on the right, after completion position in Table3-1 can be read to confirm Slave ID location.

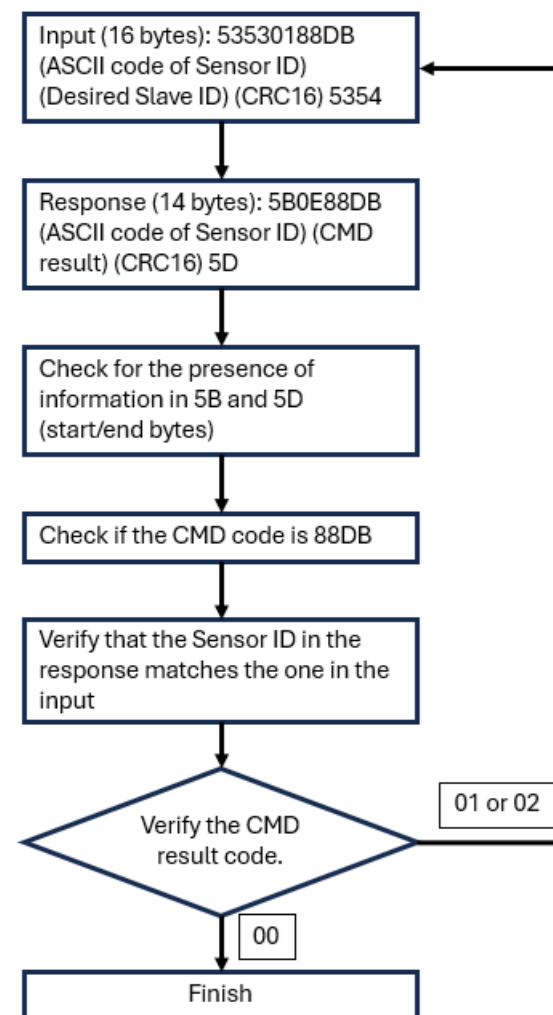


Figure3-14 Command Workflow

Concrete input command composition is a 16 Bytes hexadecimal code instruction. As shown in Table3-4 on the right, wherein:

- Start Bytes: Start code, fixed as 5353.
- Length Bytes: Length, fixed as 10.
- CMD: Fixed as 88DB.
- Sensor ID: Serial number of 213MM2-R1, needs to be converted into ASCII code (e.g. 030001 after conversion is 303330303031).
- Slave ID: New station number (01~F7).
- Checksum: CRC16, produced by combining 12 Bytes from Start Bytes to Slave ID. If Checksum is incorrect, sensor will not execute any work, nor give response messages. As shown in Figure3-15 on the right, for CRC16 calculation rules, reference can be made to the following website
<https://cht.nahua.com.tw/software/crc16/index.php>
- End Bytes: End code, fixed as 5354.

Bytes	Name	
2	Start Bytes	0x53 0x53
1	Length Byte	0x10 (16)
2	CMD	0x88 + 0xDB
6	Sensor ID	XXXXXX
1	New Slave ID	1~247 (0x01 ~ 0xF7)
2	Checksum	CRC16
2	End Bytes	0x53 0x54

Table3-4 213MM2-R1 Slave ID Setting Command Composition

Modbus RTU CRC

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[Homepage](#) ▶ [Development/Graphics Control Software](#) ▶ [Calculation Modbus RTU Check Code](#)

The RTU checksum (CRC) calculation follows these rules:

- Step 1: Set the 16-bit temporary register (CRC temporary register) to 0xFFFF.
- Step 2: Exclusive OR. The first 8-bit byte message instruction and the lower 16-bit CRC register are used to perform an Exclusive OR and store the result in the CRC register.
- Step 3: Shift the CRC register one bit to the right and fill the high-order bits with 0.
- Step 4: Check the value shifted to the right. If it is 0, store the new value from Step 3 into the CRC register. Otherwise, use Exclusive OR 0xA001 with the CRC register and store the result into the CRC register.
- Step 5: Repeat steps 3 and 4 to complete all 8-bit operations.
- Step 6: Repeat steps 2 through 5, fetching the next 8-bit message instruction, until all message instructions have been processed. Finally, the value of the CRC register is the CRC checksum. It is important to note that the CRC checksum must be swapped within the checksum of the message instruction.

Enter Modbus data (separated by spaces).	Check Code (CRC)
53 53 10 88 DB 30 33 30 30 31 01	4B 64
calculate	

Figure3-15 CRC16 Calculation Rules

Specific response command composition consists of a 14 Bytes hexadecimal code instruction. As shown in Table3-5 on the right, wherein:

- Start Bytes: Start code, fixed as 5B.
- Length Bytes: Length, fixed as 0E.
- CMD: Fixed as 88DB.
- Sensor ID: The serial number of the 213MM2-R1 in the sensor return new Slave ID, which needs to be converted back to a string (such as ASCII code 303330303031 converted as 030001).
- Checksum: CRC16, a CRC16 check code generated by combining 11 Bytes from Start Bytes to CMD result.
- End Bytes: End code, fixed as 5D.

Bytes	Name	
1	Start Bytes	0x5B
1	Length Byte	0x0E (14)
2	CMD	0x88 + 0xDB
6	Sensor ID	XXXXXX
1	CMD result	0x00: Change successful 0x01: Slave ID out of defined range 0x02: Change failed
2	Checksum	Check code
1	End Bytes	0x5D

Table3-5 213MM2-R1 Slave ID Setting Response Composition

3.2 On-Site Fixing Smart Sensors

The fixing fixtures of the smart sensor include two types: magnetic mount and base.

Magnetic mount is used for temporary testing occasions; long-term monitoring is not suitable to adopt magnetic mount fixing. The equipment fixing surface must possess magnetism; when in use, it only requires locking this fixture with the smart sensor, and placing it on the machine table possessing magnetism, as shown in Figure3-16.



Figure3-16 Magnetic Mount

For formal long-term monitoring, please adopt the base to fix the smart sensor on the equipment surface. As shown in Figure3-17, the base assembly includes a metal base and a pair of M3 screws.



Figure3-17 Base Assembly

The fixing method between the base and the equipment surface uses metal-use AB glue. As shown in Figure3-18, it is recommended to adopt PowerBonR Resin series AB glue.



Figure3-18 Recommended AB Glue Brand and Model

As shown in Figure3-19, before applying AB glue onto the base, please pre-lock the screws into the screw holes first, and reserve a space of one to two threads, in order to avoid excessive AB glue squeezing into the screw holes when fixing.



Figure3-19 Pre-locking Screws

As shown in Figure3-20, after uniformly mixing AB glue in a 1:1 ratio, apply it onto the base. The thickness of application is about 1mm; absolutely do not be too thin and absolutely do not be too thick, to prevent inability to fix or fixing time being too long.



Figure3-20 Applying AB Glue onto Base

As shown in Figure3-21, fix the fixture on the equipment surface, and apply pressure for at least 10 minutes. If not adopting the recommended AB glue brand model, then according to the fixing time recommended by that AB glue brand, apply pressure for at least twice the time, to ensure bonding quality.



Figure3-21 Fixing Base on Equipment Surface

As shown in Figure3-22, wait for AB glue to set and cure. Different brands of AB glue require different setting and curing times; this time is approximately 1 hour to 24 hours varying, during which there is no need to apply pressure. After completely setting and curing, one can lock and fix 213MM2-R1 onto base 3838.



Figure3-22 Waiting for AB Glue to Cured

Between 213MM2-R1 and base 3838, it is fixed by a pair of M3 hexagon socket head cap screws; what Figure3-23 shows is the screw hole position locations. After aligning the holes of the smart sensor with the holes of the base or magnetic mount, use a hexagon socket screw wrench to lock and fix, then completing installation.

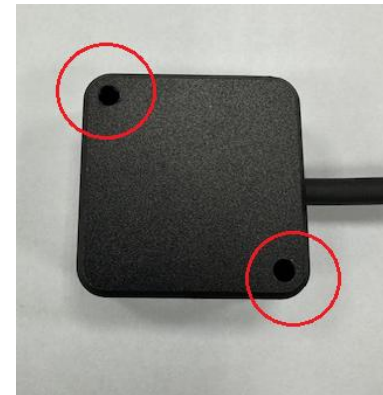


Figure3-23 Hexagon Socket Screw Fastening

What Figure3-24 shows is the result of successfully placing 213MM2-R1 smart sensor on the equipment motor surface.



Figure3-24 Successfully Placed 213MM2-R1 Smart Sensor

3.3 On-Site Wiring

Please refer to Table2-3 wiring definitions to configure 12 - 24V DC power for 213MM2-R1; red wire is positive pole, black wire is negative pole. In addition, please connect green wire RS485 DATA+ and yellow wire DATA- to any brand Device hub chosen by you. Blue wire is external TTL trigger line; if your application has external hardware trigger requirement, please connect this wire to the TTL pin providing trigger signal of the external controller.

Brown wire is forced restore factory default setting trigger line, which must be used offline off-site; do not wire for it on site, and please do waterproofing isolation protection for it well on site.

3.4 Online Restoring Factory Settings Analysis Parameters

For factory setting values of various analysis parameters of 213MM2-R1, please refer to Default column in Appendix I.

Regardless of out of any reason, if you wish to forcibly restore various analysis parameters inside 213MM2-R1 online to factory setting values, you can adopt built-in software functions of any TEXOL original edge gateway to achieve or Aurora Modbus Utility to achieve; for specific operation procedures please refer to "Aurora EG032-RDV02- B231IOTECH Edge Gateway Installation and Instruction Manual (V1.0)".

3.4.1 Adopting Aurora Modbus Utility to Restore Sensor Factory Settings

When you restore factory settings analysis parameters through TEXOL's Aurora Modbus Utility software, please first disassemble 213MM2-R1 sensor to a work computer with TEXOL's Aurora Modbus Utility software installed, and follow the steps below to restore factory settings:

First step, please enable the Com port to connect with the 213MM2-R1. After starting and executing AURORA-Modbus Utility.exe, a screen as shown in Figure3-25 on the right will appear. Please select the Com Port you wish to enable from the "Com Port Connect" drop-down menu, and select Parity from the drop-down menu. If the firmware version of your 213MM2-R1 is prior to V4.0, please select Even; otherwise, please select None. If you do not know the firmware version, it is recommended to select None first. Press Open to enable Com port connection.

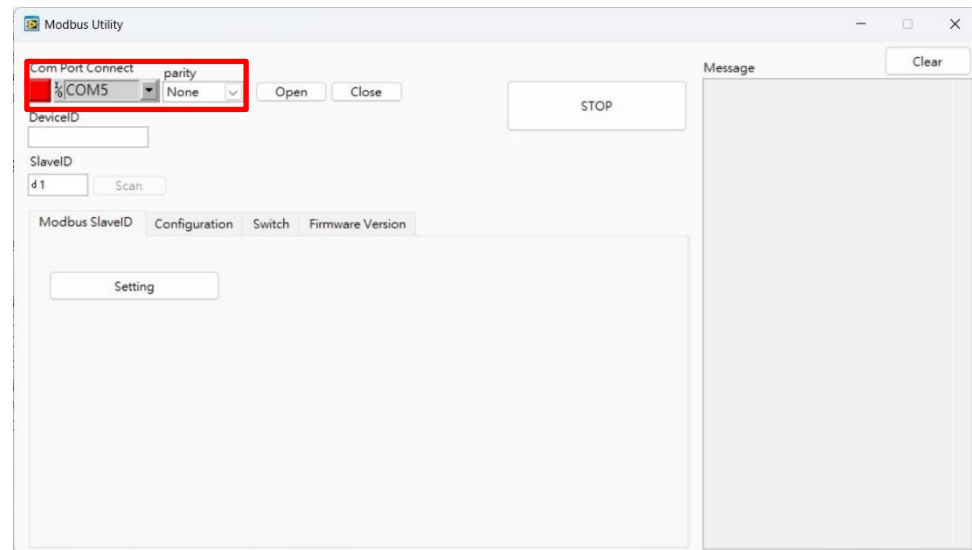


Figure3-25 Aurora Modbus Utility Select Com Port and Parity

If Com port function is normal, the upper-left red light will turn green, as shown in Figure3-26. If Com port remains red light, it indicates that the selected Com port function is abnormal and cannot provide sensor connection functions.

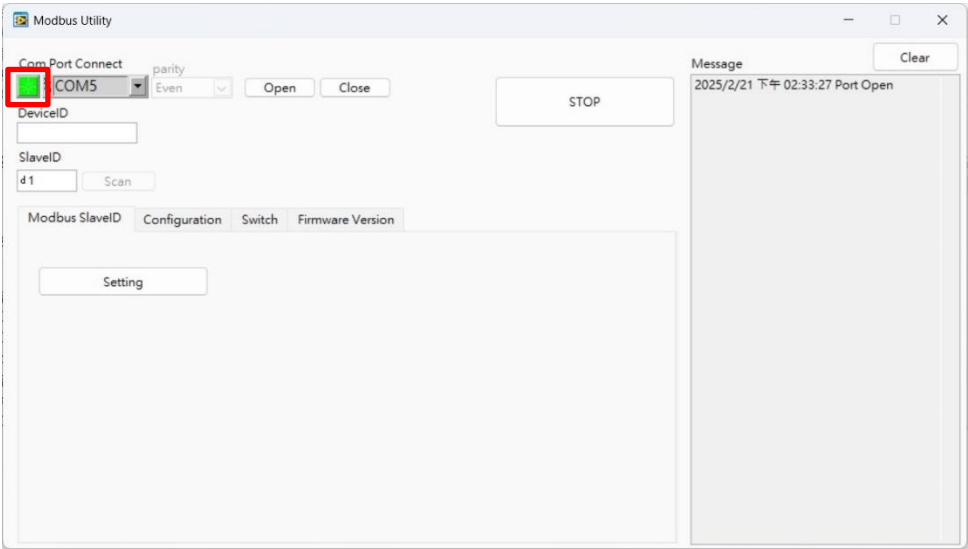


Figure3-26 Aurora Modbus Utility After Com Port Enabled Normally

Enter the Device ID (6 digits in total) on the 213MM2-R1 sensor barcode. At this time, the Scan button will be Enabled, allowing you to click to query the Slave ID of this sensor on the Modbus loop, as shown in Figure3-27.

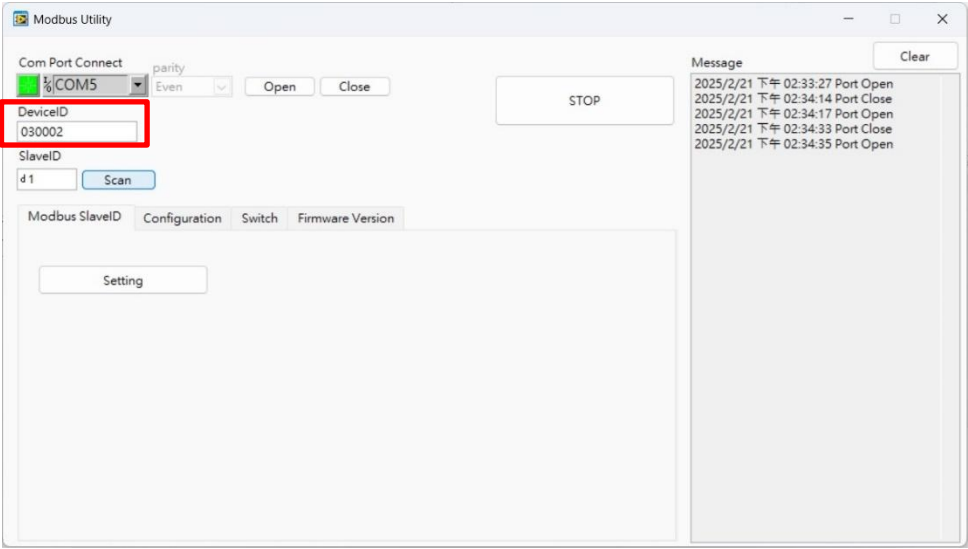


Figure3-27 Aurora Modbus Utility Enter Device ID

If you do not know the Modbus Slave ID of this 213MM2-R1 to be configured, you can use the search function. After clicking the Scan button, a window will pop up prompting you to enter the Slave ID range you wish to scan. Since the firmware version inside this sensor may be prior to or after V4.0, you can also choose whether the sensor Device ID used during scanning requires high and low byte swapping. After entering, press OK to perform scanning, as shown in Figure3-28.

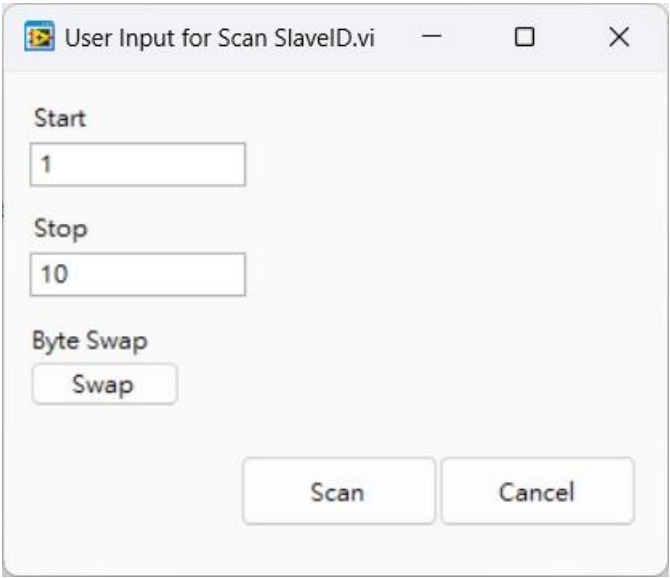


Figure3-28 Aurora Modbus Utility Enter Slave ID Search Range

As shown in Figure3-29, if the Parity information selected when enabling the Com port differs from the Parity information inside the 213MM2-R1 to be configured, or if the Device ID high and low byte order is selected incorrectly, or if the search range is incorrect, "The device does not exist" will pop up. At this time, please re-press Scan, and re-configure the search range, or re-select the Device ID high and low byte order, and press OK to scan once again, as shown in Figure3-30.

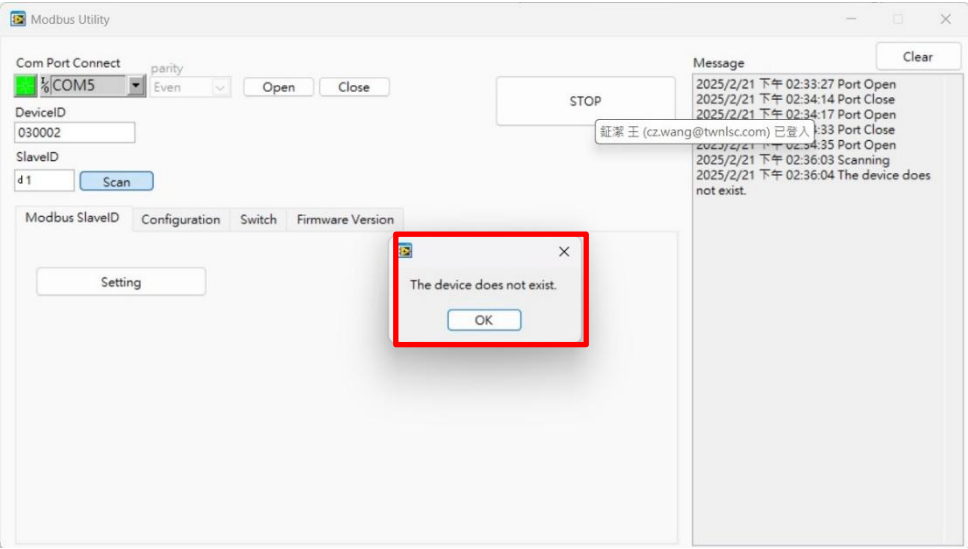


Figure3-29 Aurora Modbus Utility View Slave ID

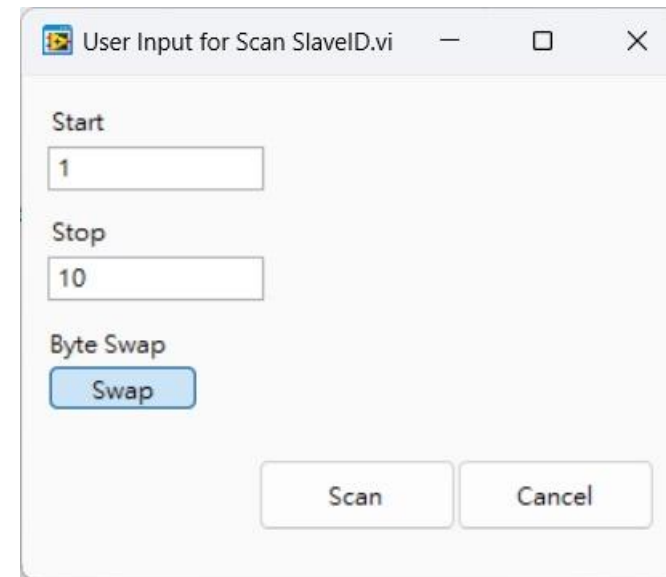


Figure3-30 Aurora Modbus Utility View Slave ID Swap Device ID High and Low Bytes

If re-scanning still shows "The device does not exist", please click Close, change Parity, and press Open to re-enable Com port, as shown in Figure3-31. Then return to the step in Figure3-27 to scan again.

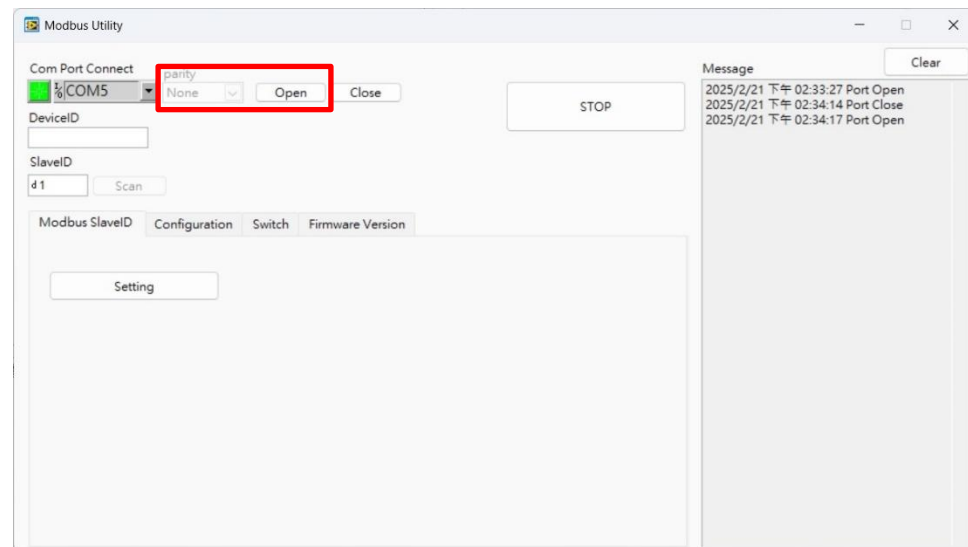


Figure3-31 Aurora Modbus Utility Change Parity

If your Parity information and Device ID high/low byte order information are both entered correctly and the search range is correct, after waiting about 2-3 seconds, the system will automatically pop up the current Slave ID and populate it into the Slave ID field, as shown in Figure3-32.

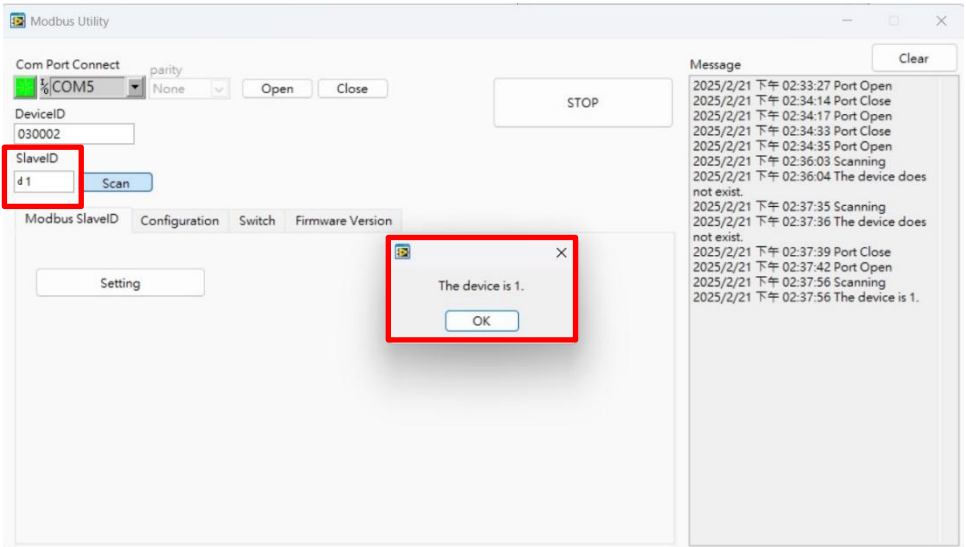


Figure3-32 Aurora Modbus Utility View Slave ID

As shown in Figure3-33, when setting, please first switch to the Configuration page, and press the "Factory Default" button.

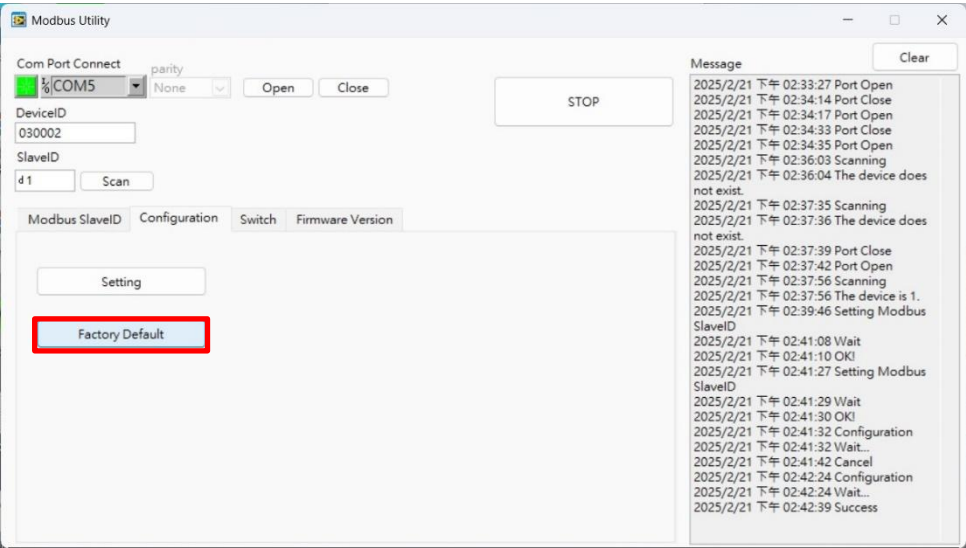


Figure3-33 Aurora Modbus Utility Restore Factory Default Button

As shown in Figure3-34, if setting is successful, the characters OK can be seen on the status bar, conversely then it is required to try once again.

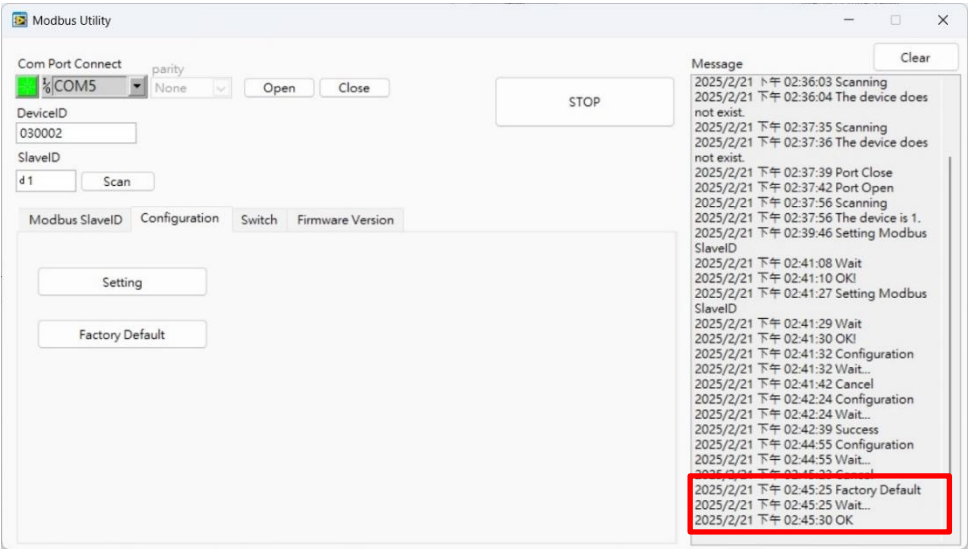


Figure3-34 Aurora Modbus Utility Restore Factory Default Success

3.4.2 Adopting General Commercial Modbus Software to Restore Sensor Factory Settings

Under the circumstance that you do not adopt any TEXOL original edge gateway nor adopt Aurora Modbus Utility, regardless of out of any reason, if you wish to restore various analysis parameters inside 213MM2-R1 online to factory setting values, as shown in Figure3-35, you need to first read the value of 1x0001 and confirm it is 0, then change position 0x0007 of Coil Status Register to 1, finally read positions 1x0004 and 1x0005; if 1x0004 is True and 1x0005 is False, it indicates sensor analysis parameters have been restored to factory setting values. Conversely, it indicates not restored to factory setting values; please user re-execute once again until success. After completion, please refer to operation descriptions in Section 2.6.2 to query and confirm whether stored analysis parameters of 213MM2-R1 at this time have been changed to factory default values.

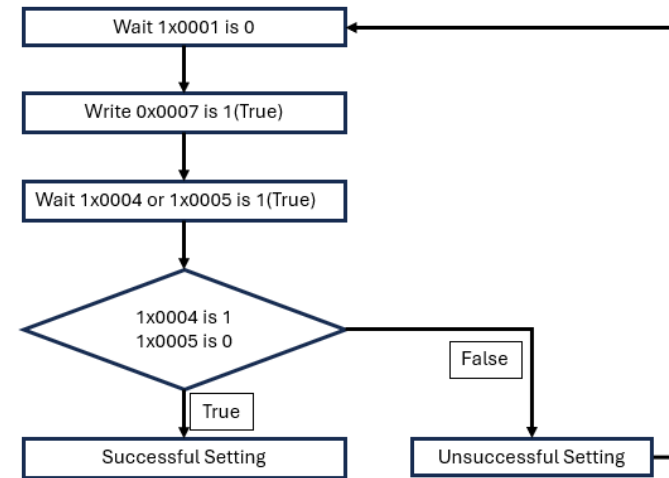


Figure3-35 Flowchart for Restoring Factory Settings Parameters

3.5 Offline Forced Restoring Factory Settings Analysis Parameters

If whether through built-in software functions of any TEXOL original edge gateway, or through method of self changing position 0x0007 numerical value, the results of restoring various analysis parameters inside 213MM2-R1 to factory setting values are all failed, please first move this sensor off-site, and execute following description steps.

Please pay attention again, absolutely do not execute this operation on-site (online).

- Confirm this sensor has been moved off-site (offline).
- Re-power the sensor. Except VDC (red) and GND (thin black), others do not need wiring.
- Give brown wire a TTL signal, completing the work of forced restoring factory settings analysis parameters.
- Power off.
- Re-move this sensor back on-site (online), wire for it, restoring normal operation.

3.6 Online Searching Sensor Location

Regardless of out of any reason, if you wish to find placement location of 213MM2-R1 sensor, you can adopt built-in software functions of any TEXOL original edge gateway or Aurora Modbus Utility to achieve; for specific operation procedures please refer to "Aurora EG032-RDV02-B231IOTECH Edge Gateway Installation and Instruction Manual(V1.0)".

When you find placement location of 213MM2-R1 sensor through TEXOL's Aurora Modbus Utility software, please first move computer with TEXOL's Aurora Modbus Utility software installed to on-site and connect with communication, following the steps below to find 213MM2-R1 sensor:

First step, please enable the Com port to connect with the 213MM2-R1. After starting and executing AURORA-Modbus Utility.exe, a screen as shown in Figure3-36 on the right will appear. Please select the Com Port you wish to enable from the "Com Port Connect" drop-down menu, and select Parity from the drop-down menu. If the firmware version of your 213MM2-R1 is prior to V4.0, please select Even; otherwise, please select None. If you do not know the firmware version, it is recommended to select None first. Press Open to enable Com port connection.

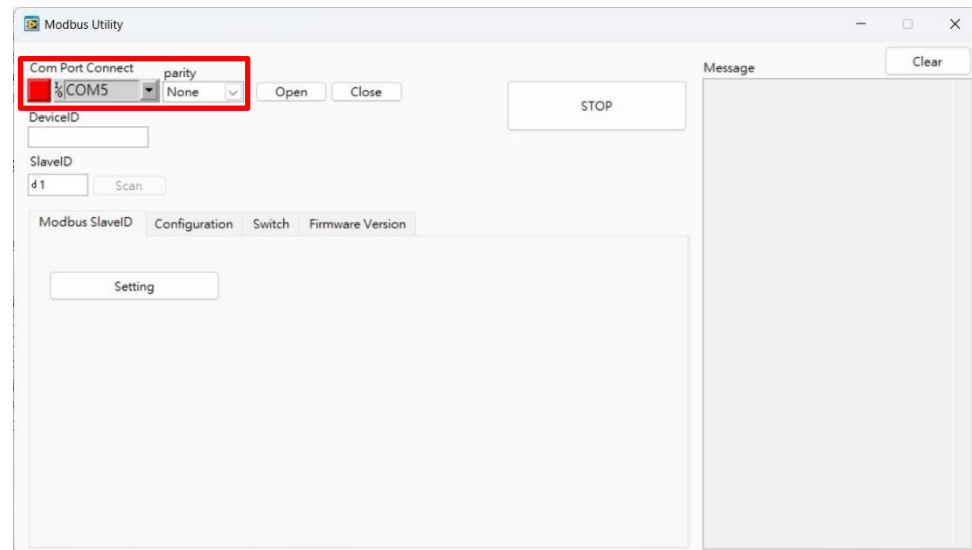


Figure3-36 Aurora Modbus Utility Select Com Port and Parity

If Com port function is normal, the upper-left red light will turn green, as shown in Figure3-37. If Com port remains red light, it indicates that the selected Com port function is abnormal and cannot provide sensor connection functions.

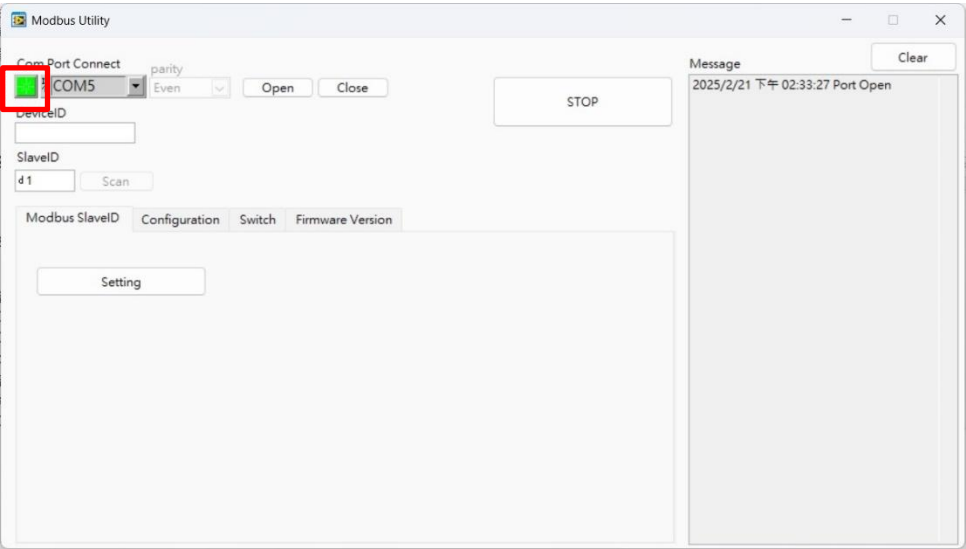


Figure3-37 Aurora Modbus Utility After Com Port Enabled Normally

Enter the Device ID (6 digits in total) on the 213MM2-R1 sensor barcode. At this time, the Scan button will be Enabled, allowing you to click to query the Slave ID of this sensor on the Modbus loop, as shown in Figure3-38.

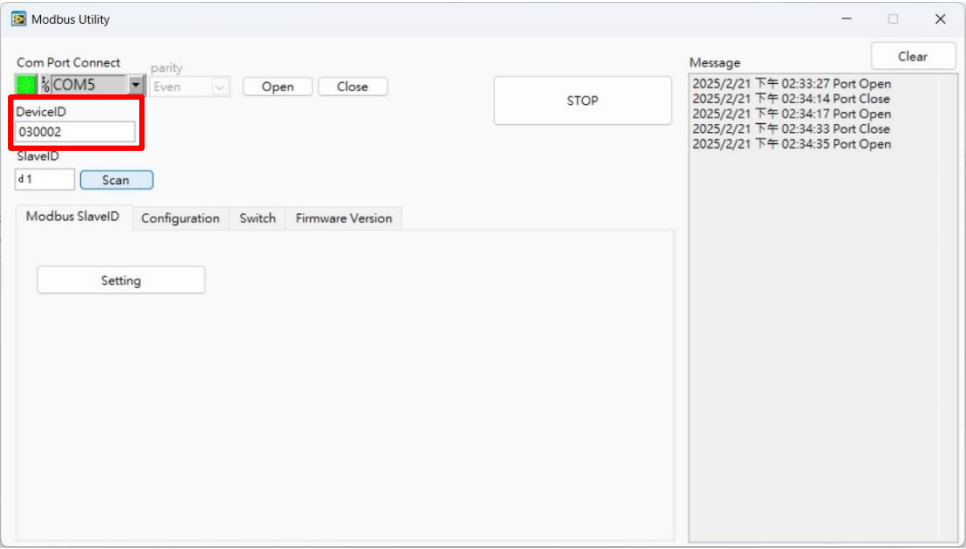


Figure3-38 Aurora Modbus Utility Enter Device ID

If you do not know the Modbus Slave ID of this 213MM2-R1 to be configured, you can use the search function. After clicking the Scan button, a window will pop up prompting you to enter the Slave ID range you wish to scan. Since the firmware version inside this sensor may be prior to or after V4.0, you can also choose whether the sensor Device ID used during scanning requires high and low byte swapping. After entering, press OK to perform scanning, as shown in Figure3-39.

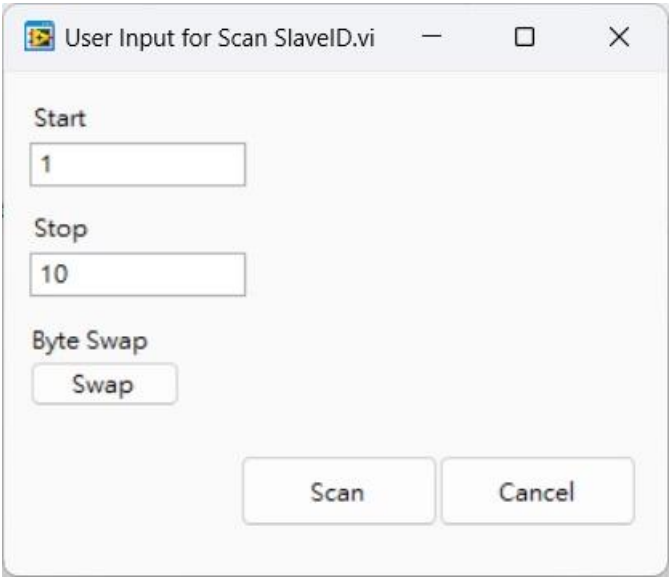


Figure3-39 Aurora Modbus Utility Enter Slave ID Search Range

As shown in Figure3-40, if the Parity information selected when enabling the Com port differs from the Parity information inside the 213MM2-R1 to be configured, or if the Device ID high and low byte order is selected incorrectly, or if the search range is incorrect, "The device does not exist" will pop up. At this time, please re-press Scan, and re-configure the search range, or re-select the Device ID high and low byte order, and press OK to scan once again, as shown in Figure3-41.

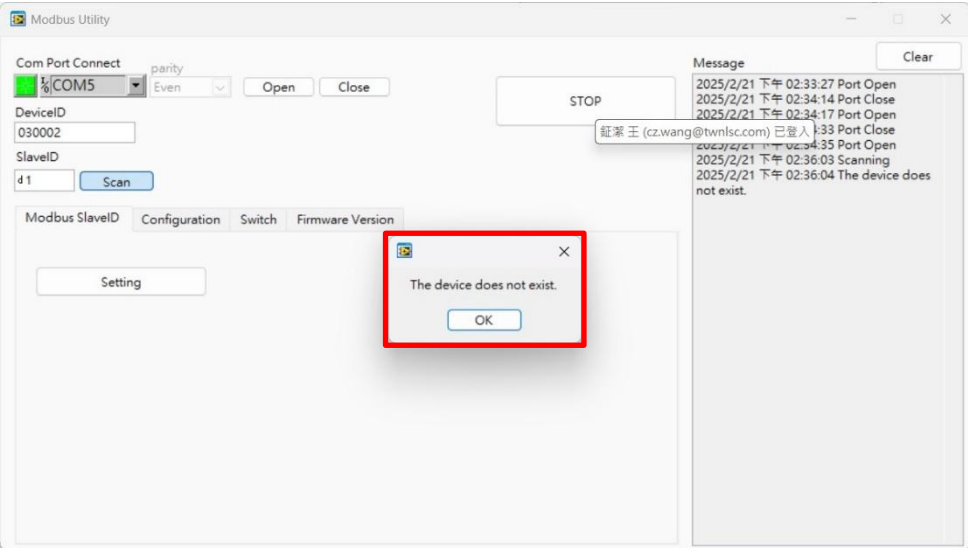


Figure3-40 Aurora Modbus Utility View Slave ID

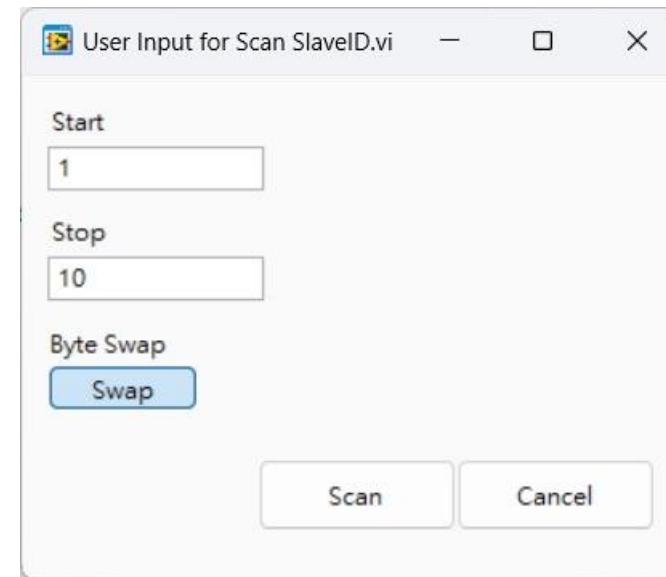


Figure3-41 Aurora Modbus Utility View Slave ID Swap Device ID High and Low Bytes

If re-scanning still shows "The device does not exist", please click Close, change Parity, and press Open to re-enable Com port, as shown in Figure3-42. Then return to the step in Figure3-38 to scan again.

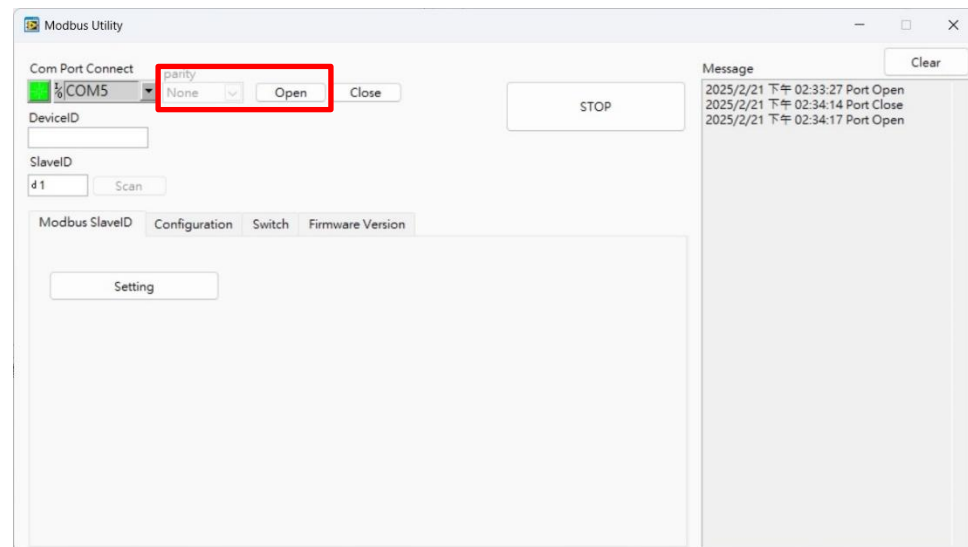


Figure3-42 Aurora Modbus Utility Change Parity

If your Parity information and Device ID high/low byte order information are both entered correctly and the search range is correct, after waiting about 2-3 seconds, the system will automatically pop up the current Slave ID and populate it into the Slave ID field, as shown in Figure2-17.

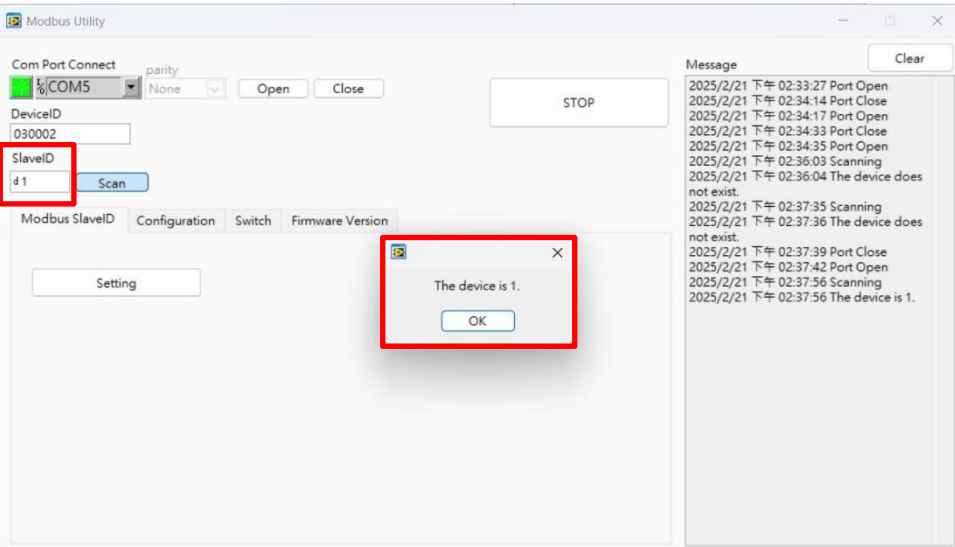


Figure3-43 Aurora Modbus Utility View Slave ID

When searching placement location of 213MM2-R1 sensor, first switch to Switch page, and after pressing Light Identify Mode, then one can see 213MM2-R1 blinking lights, as shown in Figure3-44, Figure3-45, and Figure3-46.

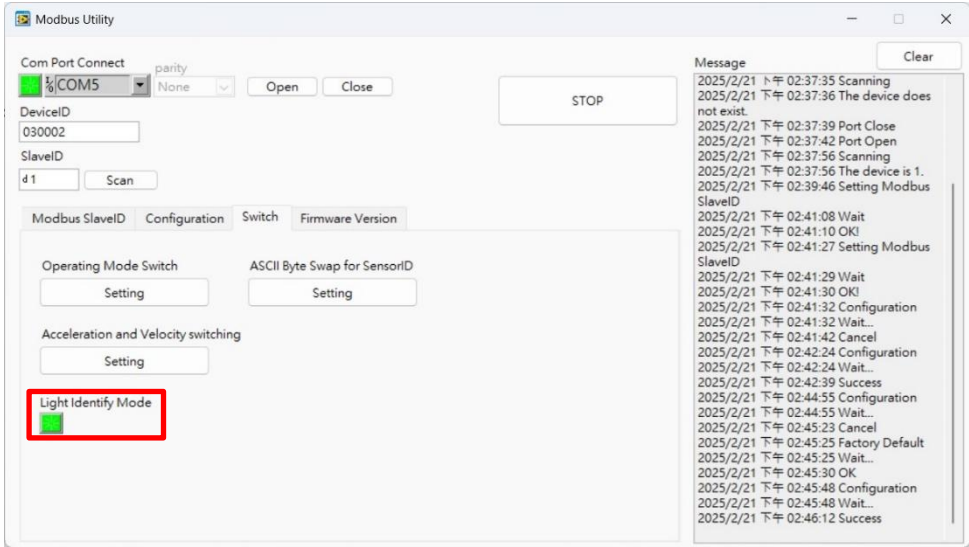


Figure3-44 Aurora Modbus Utility Light Identify Function Pressed



Figure3-45 Blinking Dark



Figure3-46 Blinking Bright

Under the circumstance that you do not adopt any TEXOL original edge gateway nor adopt Aurora Modbus Utility, regardless of out of any reason, if you wish to find placement location of 213MM2-R1 sensor, you can set position 0x0002 in Coil Register of this sensor to 1 (True); at this time this 213MM2-R1 will blink red light, allowing you to find smoothly on-site; after finding, you can set the value of this position to 0, and this sensor will stop blinking, returning to general operating light status, as shown in Figure3-47.

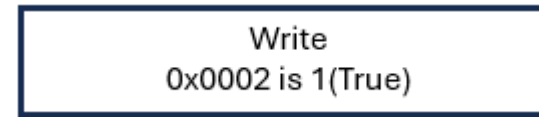


Figure3-47 Flowchart for Finding Sensor Location Parameter

3.7 Querying Sensor Firmware Version

Regardless of out of any reason, if you wish to understand 213MM2-R1 sensor firmware version, you need to achieve through Aurora Modbus Utility.

When you view 213MM2-R1 sensor firmware version through TEXOL Aurora Modbus Utility software, please first move computer with TEXOL's Aurora Modbus Utility software installed to on-site and connect with communication, following the steps below to find 213MM2-R1 sensor:

First step, please enable the Com port to connect with the 213MM2-R1. After starting and executing AURORA-Modbus Utility.exe, a screen as shown in Figure3-48 on the right will appear. Please select the Com Port you wish to enable from the "Com Port Connect" drop-down menu, and select Parity from the drop-down menu. If the firmware version of your 213MM2-R1 is prior to V4.0, please select Even; otherwise, please select None. If you do not know the firmware version, it is recommended to select None first. Press Open to enable Com port connection.

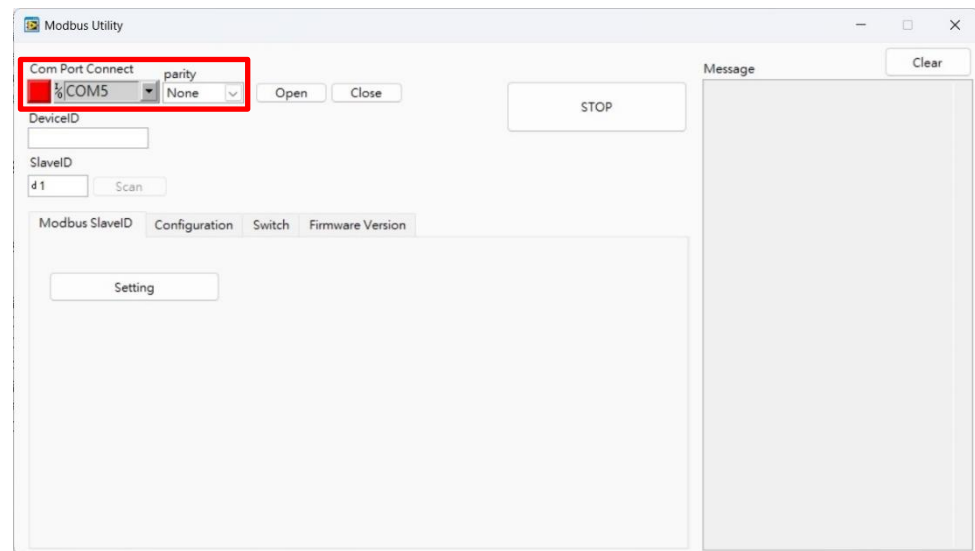


Figure3-48 Aurora Modbus Utility Select Com Port and Parity

If Com port function is normal, the upper-left red light will turn green, as shown in Figure3-49. If Com port remains red light, it indicates that the selected Com port function is abnormal and cannot provide sensor connection functions.

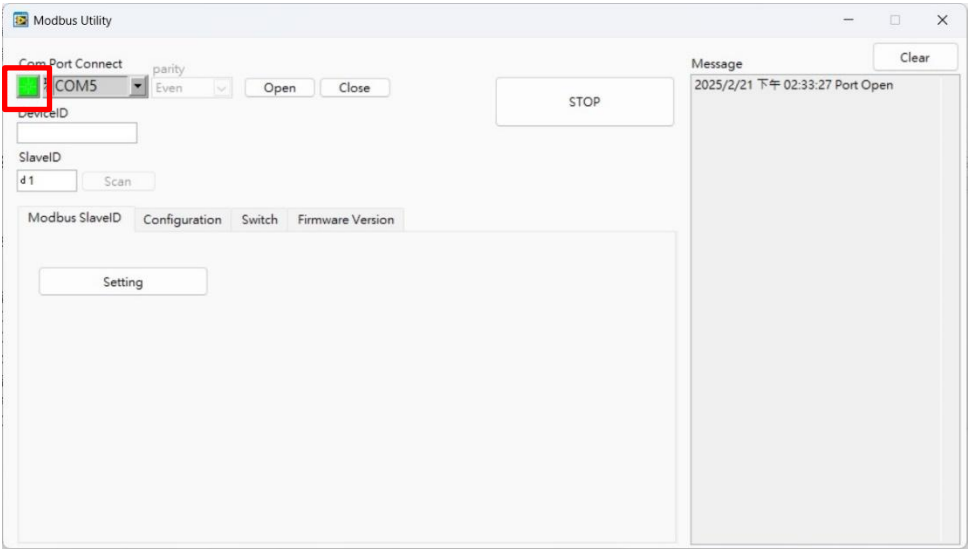


Figure3-49 Aurora Modbus Utility After Com Port Enabled Normally

Enter the Device ID (6 digits in total) on the 213MM2-R1 sensor barcode. At this time, the Scan button will be Enabled, allowing you to click to query the Slave ID of this sensor on the Modbus loop, as shown in Figure3-50.

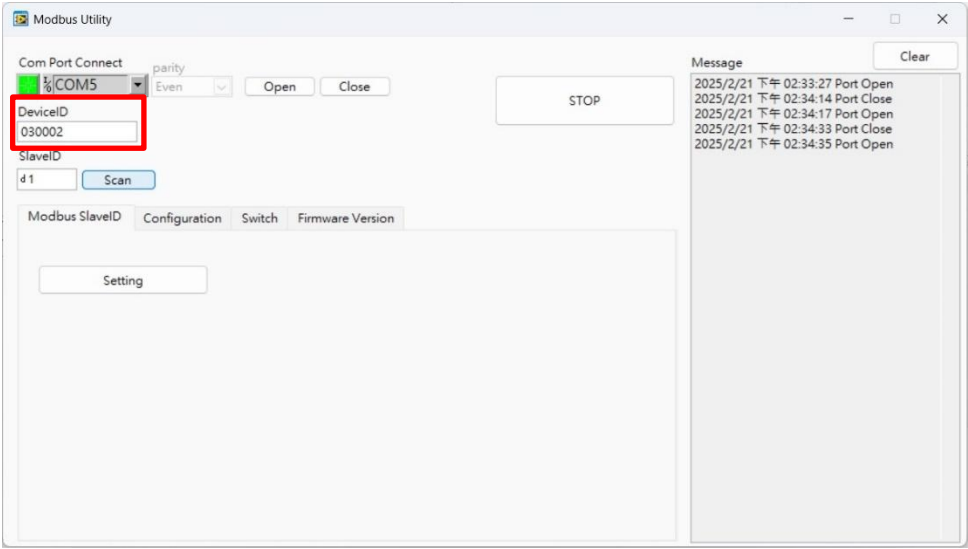


Figure3-50 Aurora Modbus Utility Enter Device ID

If you do not know the Modbus Slave ID of this 213MM2-R1 to be configured, you can use the search function. After clicking the Scan button, a window will pop up prompting you to enter the Slave ID range you wish to scan. Since the firmware version inside this sensor may be prior to or after V4.0, you can also choose whether the sensor Device ID used during scanning requires high and low byte swapping. After entering, press OK to perform scanning, as shown in Figure3-51.

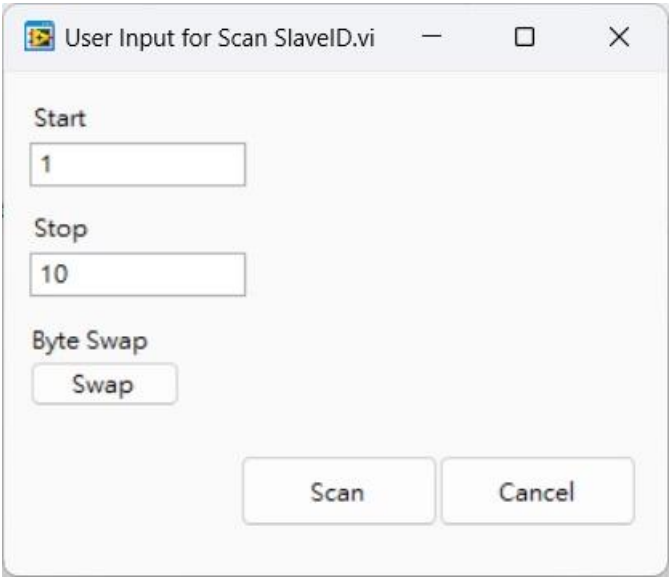


Figure3-51 Aurora Modbus Utility Enter Slave ID Search Range

As shown in Figure3-52, if the Parity information selected when enabling the Com port differs from the Parity information inside the 213MM2-R1 to be configured, or if the Device ID high and low byte order is selected incorrectly, or if the search range is incorrect, "The device does not exist" will pop up. At this time, please re-press Scan, and re-configure the search range, or re-select the Device ID high and low byte order, and press OK to scan once again, as shown in Figure3-53.

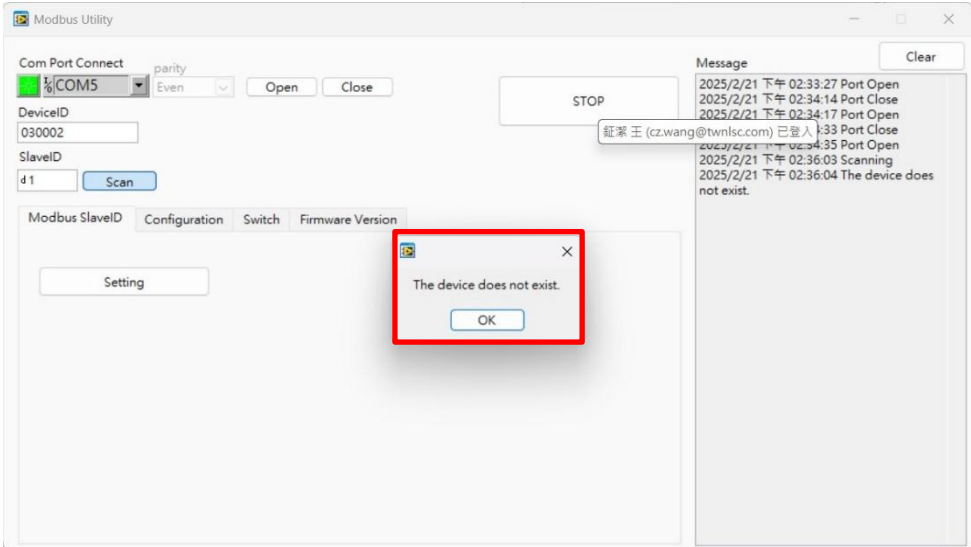


Figure3-52 Aurora Modbus Utility View Slave ID

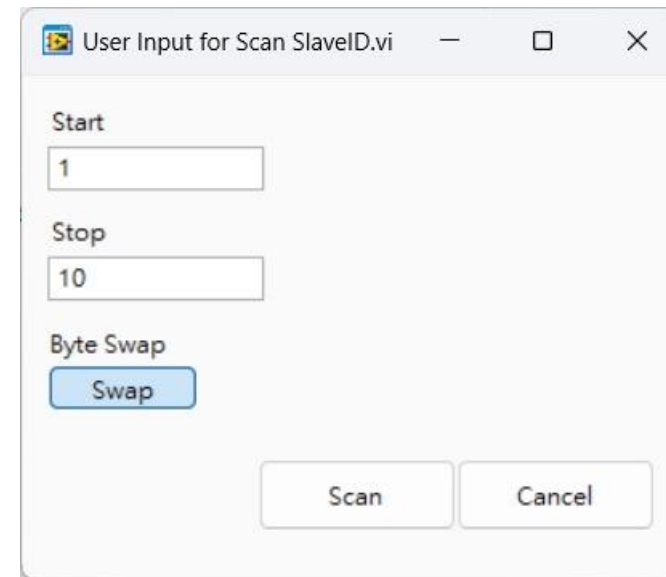


Figure3-53 Aurora Modbus Utility View Slave ID Swap Device ID High and Low Bytes

If re-scanning still shows "The device does not exist", please click Close, change Parity, and press Open to re-enable Com port, as shown in Figure3-54. Then return to the step in Figure3-50 to scan again.

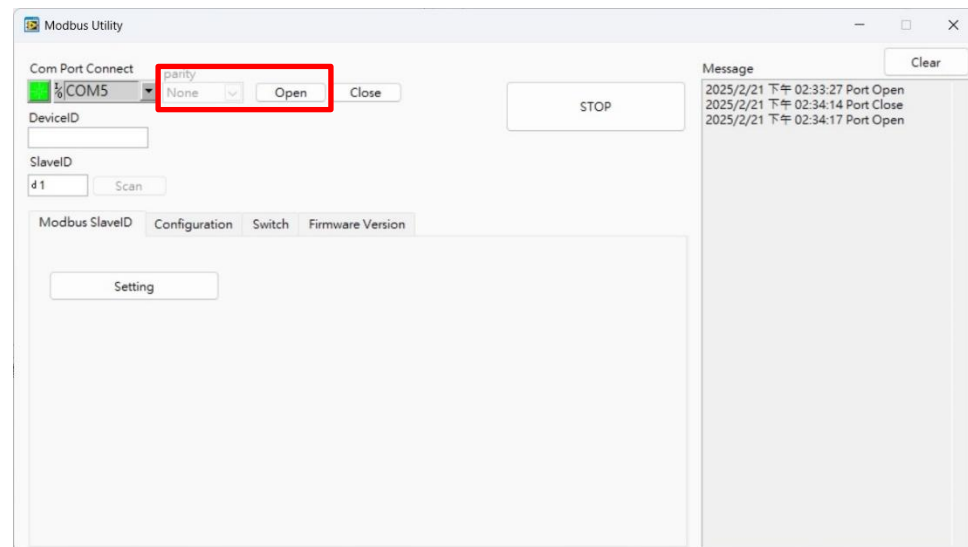


Figure3-54 Aurora Modbus Utility Change Parity

If your Parity information and Device ID high/low byte order information are both entered correctly and the search range is correct, after waiting about 2-3 seconds, the system will automatically pop up the current Slave ID and populate it into the Slave ID field, as shown in Figure3-55.

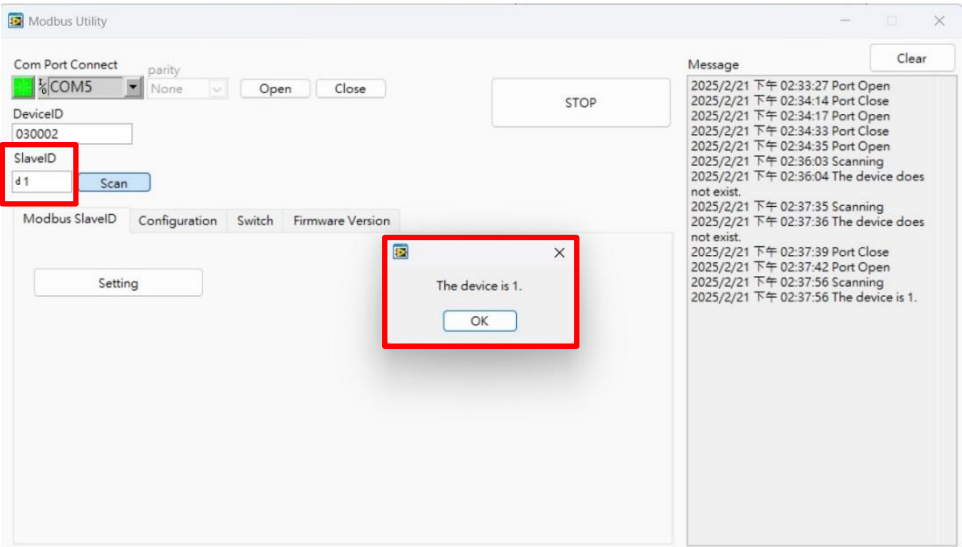


Figure3-55 Aurora Modbus Utility View Slave ID

When viewing 213MM2-R1 sensor firmware version, first switch to Firmware Version page, and then press Get Firmware Version, then one can see version information under Firmware Version, as shown in Figure3-56.

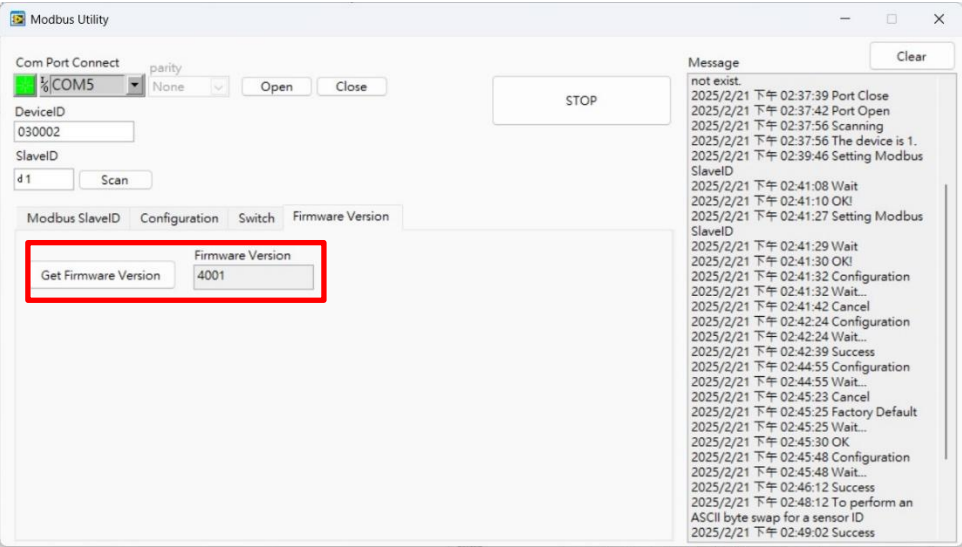


Figure3-56 Aurora Modbus Utility View Firmware Version

3.8 Sensor Device ID ASCII High and Low Byte Swapping

Regardless of out of any reason, if you wish to swap 213MM2-R1 sensor Device ID ASCII high and low bytes, you can adopt built-in software functions of any TEXOL original edge gateway or Aurora Modbus Utility to achieve; for specific operation procedures please refer to "Aurora EG032-RDV02-B231IOTECH Edge Gateway Installation and Instruction Manual (V1.0)".

When you swap 213MM2-R1 sensor Device ID ASCII high and low bytes through TEXOL's Aurora Modbus Utility software, please first move computer with TEXOL's Aurora Modbus Utility software installed to on-site and connect with communication, following the steps below to find 213MM2-R1 sensor:

First step, please enable the Com port to connect with the 213MM2-R1. After starting and executing AURORA-Modbus Utility.exe, a screen as shown in Figure3-57 on the right will appear. Please select the Com Port you wish to enable from the "Com Port Connect" drop-down menu, and select Parity from the drop-down menu. If the firmware version of your 213MM2-R1 is prior to V4.0, please select Even; otherwise, please select None. If you do not know the firmware version, it is recommended to select None first. Press Open to enable Com port connection.

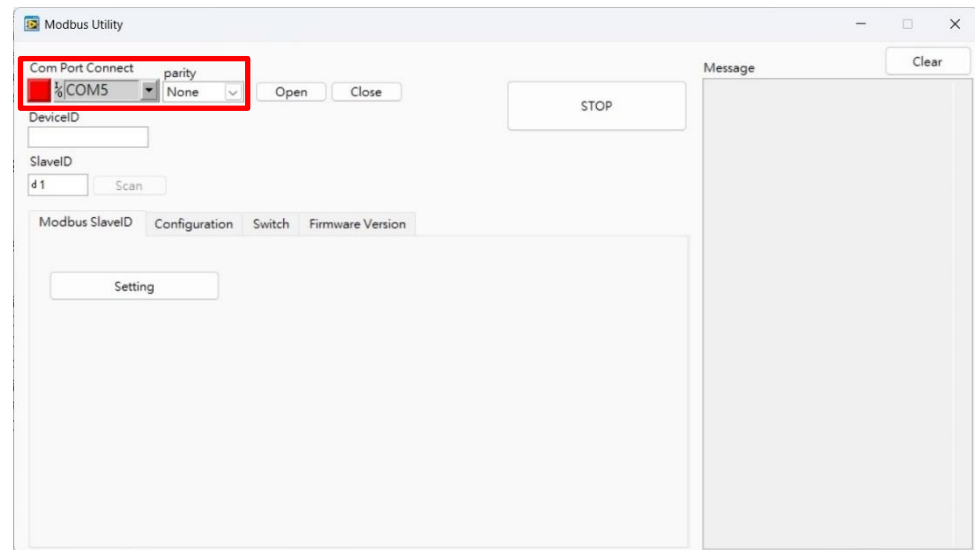


Figure3-57 Aurora Modbus Utility Select Com Port and Parity

If Com port function is normal, the upper-left red light will turn green, as shown in Figure3-58. If Com port remains red light, it indicates that the selected Com port function is abnormal and cannot provide sensor connection functions.

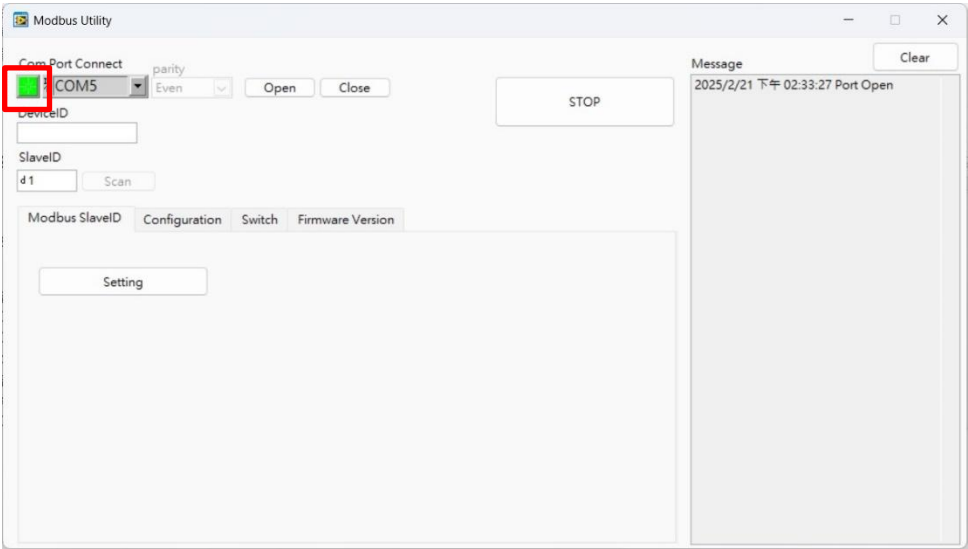


Figure3-58 Aurora Modbus Utility After Com Port Enabled Normally

Enter the Device ID (6 digits in total) on the 213MM2-R1 sensor barcode. At this time, the Scan button will be Enabled, allowing you to click to query the Slave ID of this sensor on the Modbus loop, as shown in Figure3-59.

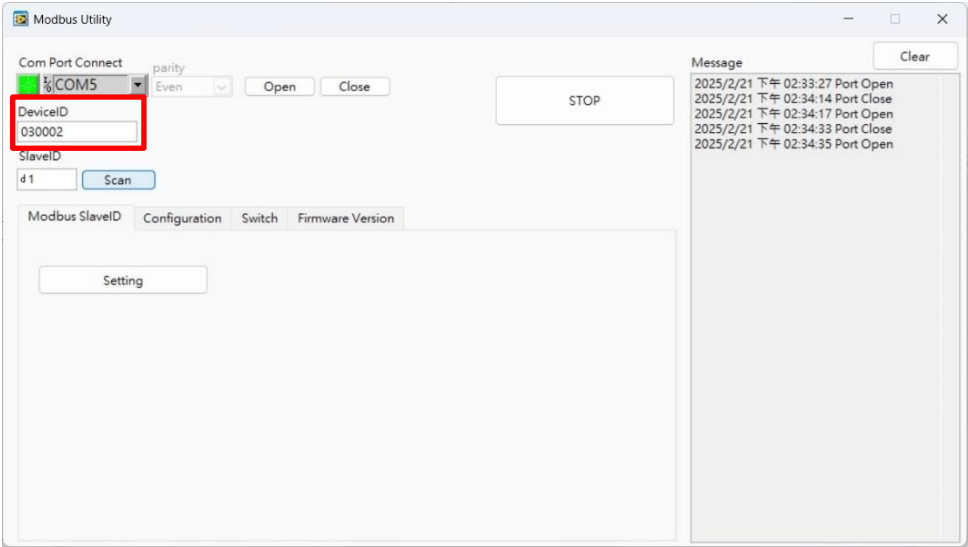


Figure3-59 Aurora Modbus Utility Enter Device ID

If you do not know the Modbus Slave ID of this 213MM2-R1 to be configured, you can use the search function. After clicking the Scan button, a window will pop up prompting you to enter the Slave ID range you wish to scan. Since the firmware version inside this sensor may be prior to or after V4.0, you can also choose whether the sensor Device ID used during scanning requires high and low byte swapping. After entering, press OK to perform scanning, as shown in Figure3-60.

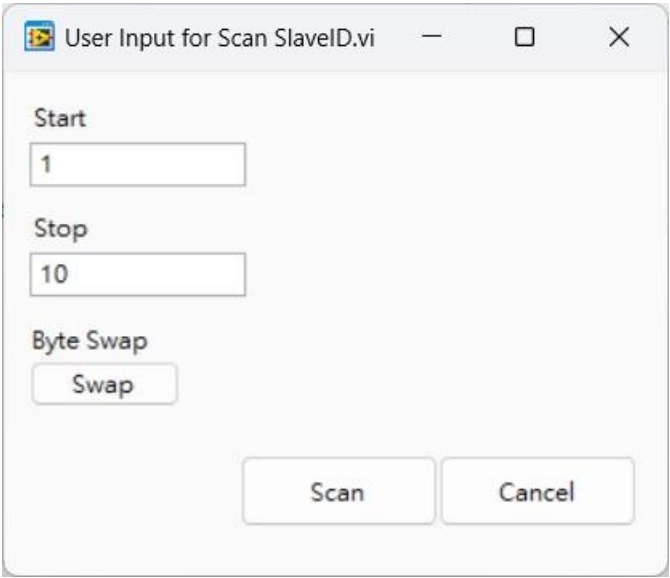


Figure3-60 Aurora Modbus Utility Enter Slave ID Search Range

As shown in Figure3-61, if the Parity information selected when enabling the Com port differs from the Parity information inside the 213MM2-R1 to be configured, or if the Device ID high and low byte order is selected incorrectly, or if the search range is incorrect, "The device does not exist" will pop up. At this time, please re-press Scan, and re-configure the search range, or re-select the Device ID high and low byte order, and press OK to scan once again, as shown in Figure3-62.

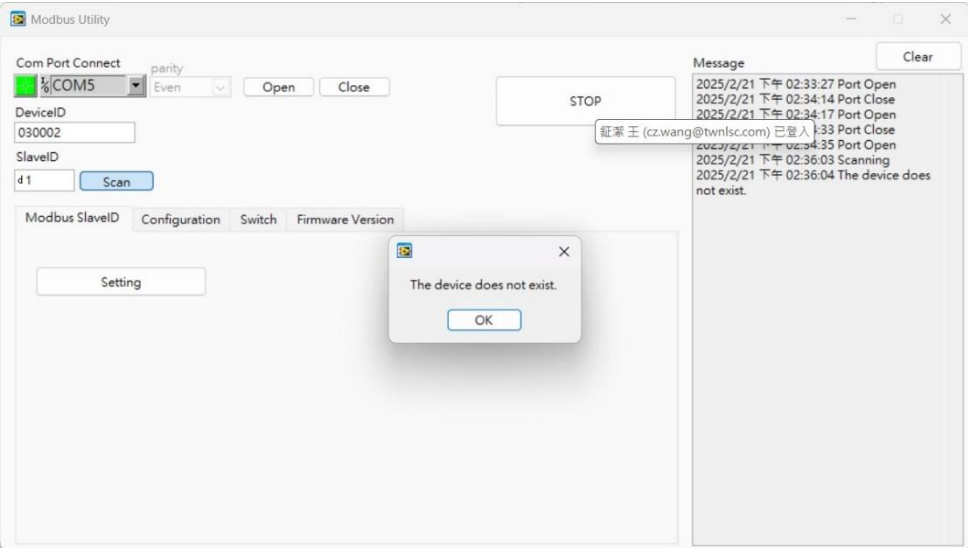


Figure3-61 Aurora Modbus Utility View Slave ID

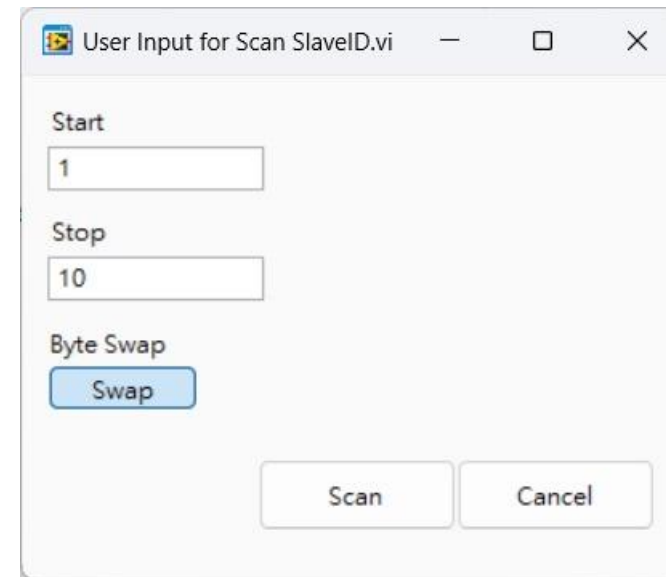


Figure3-62 Aurora Modbus Utility View Slave ID Swap Device ID High and Low Bytes

If re-scanning still shows "The device does not exist", please click Close, change Parity, and press Open to re-enable Com port, as shown in Figure3-63. Then return to the step in Figure3-59 to scan again.

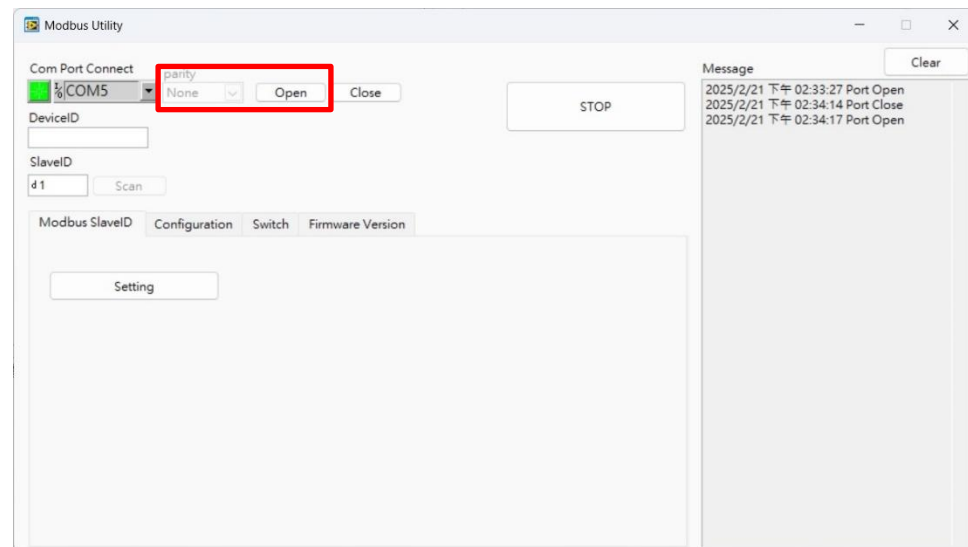


Figure3-63 Aurora Modbus Utility Change Parity

If your Parity information and Device ID high/low byte order information are both entered correctly and the search range is correct, after waiting about 2-3 seconds, the system will automatically pop up the current Slave ID and populate it into the Slave ID field, as shown in Figure3-64.

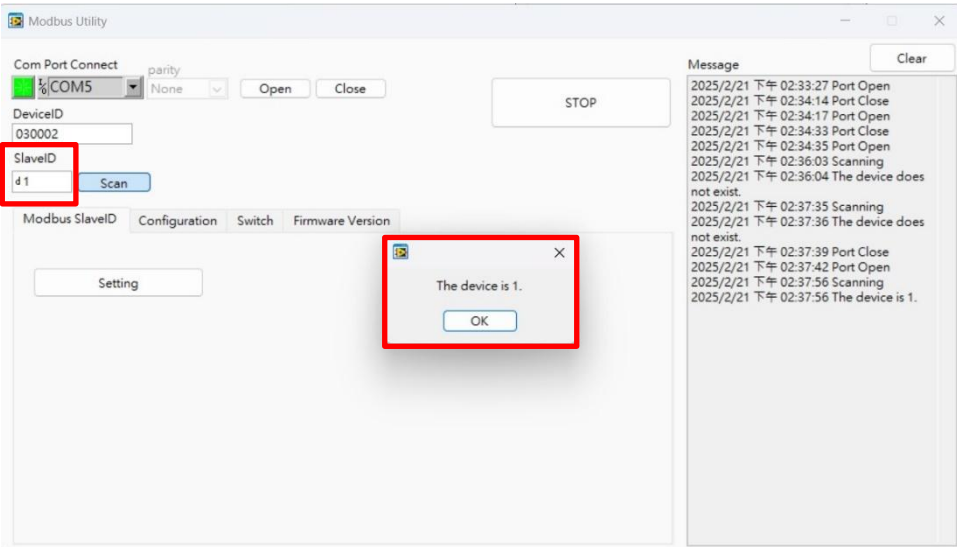


Figure3-64 Aurora Modbus Utility View Slave ID

When Device ID ASCII high and low byte switching, first switch page to Switch page, and then press ASCII Byte Swap for SensorID button, then one can see selection window, default is high and low byte not swapping, if wanting to swap, then required to press Off button that is all, as shown in Figure3-65 and Figure3-66.

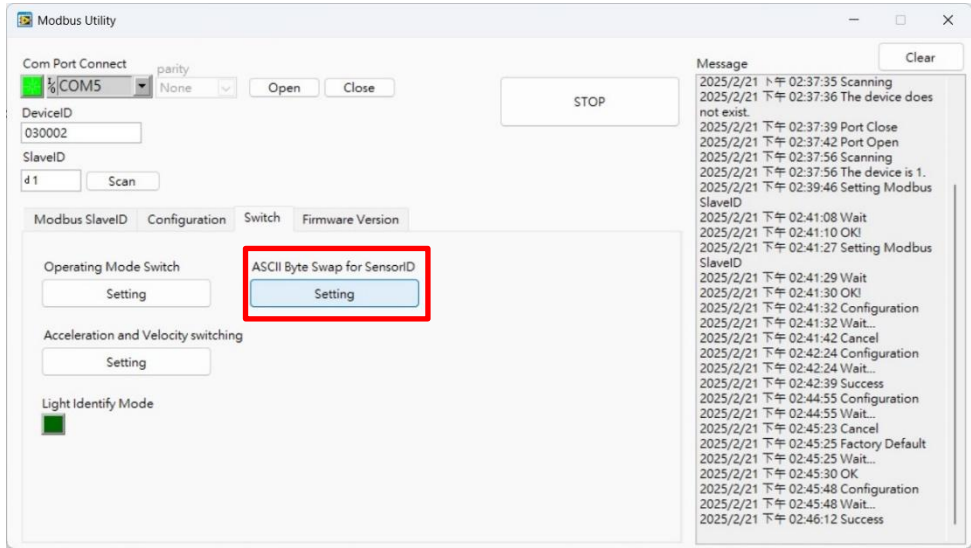


Figure3-65 Aurora Modbus Utility Device ID ASCII High and Low Byte Swapping Function



Figure3-66 Aurora Modbus Utility Device ID ASCII High/Low Byte Function Selection

After pressing Setting button and writing successfully, then one can see Setting successful. Please restart the sensor. window, as shown in Figure3-67; if writing fails, then return to step in Figure3-65 to re-set until success.

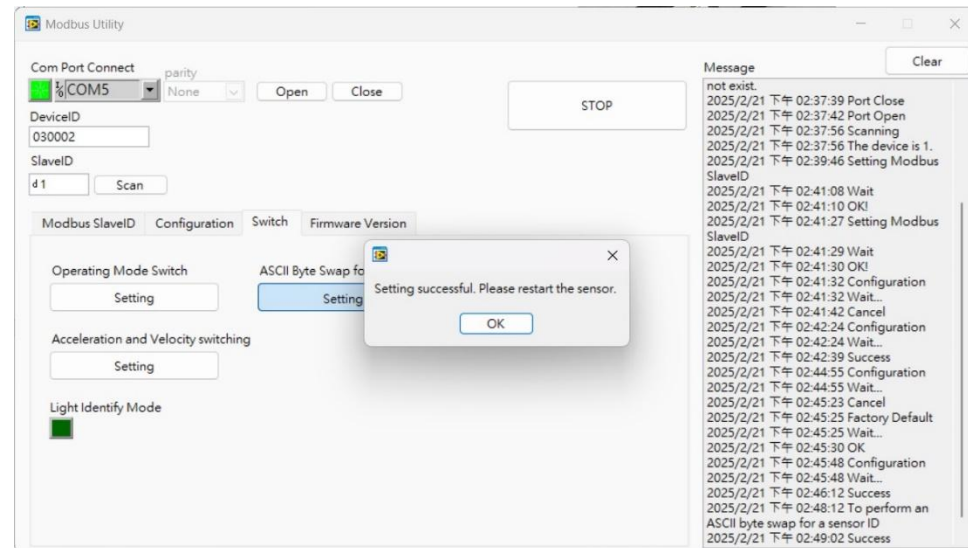


Figure3-67 Aurora Modbus Utility Device ID ASCII High and Low Byte Swapping Complete

Under the circumstance that you do not adopt any TEXOL original edge gateway nor adopt Aurora Modbus Utility, regardless of out of any reason, if you wish to swap Device ID ASCII high and low bytes in 213MM2-R1 sensor, you can set position 0x0012 in Coil Register of this sensor to 1 (True); at this time inside the sensor it will swap Device ID high and low bytes, as shown in Figure3-68.

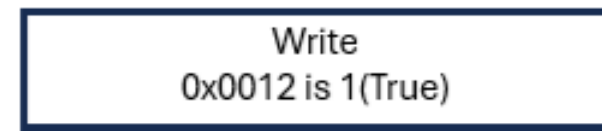


Figure3-68 Device ID ASCII High and Low Byte Swapping Flowchart

4 Customer Service

TEXOL Technical Consulting Co., Ltd. hereby extends twelve hundred thousand thanks to you, thanking you for adopting 213MM2-R1 smart vibration sensor.

We sincerely hope this product can one hundred percent satisfy your requirements in usage, we also hope this user manual can very quickly, and very clearly answer any of your questions regarding installation and usage for 213MM2-R1.

If during the process of your usage of this sensor, whether because there are places in this user manual not yet fully clear, causing any of your installation questions; or you feel this product still has any space for improvement, we wholeheartedly welcome you to contact TEXOL at any time through the following methods, and we will also solve your problem for you as quickly as possible.

- ✓ Telephone contact: 03-6579836
- ✓ E-mail: customer.support@twnlsc.com

Appendix A. Datasheet

Model			213MM2-R1
Vibration measurement capability	Measurement direction		Triaxial (X, Y and Z)
	Amplitude		±16 g
	Sensitivity (±5%)		0.488 mg / LSB
	Frequency response		2 - 5 kHz
	ADC resolution		16 bits
Temperature measurement capability	Measurement Range		-20°C to 85 °C
	Sensitivity (±5%)		256 LSB/°C
	ADC resolution		16-bit
Computing capability	CPU		Arm® Cortex®-M7 32-bit RISC
	Clock speed		480 MHz
	Flash memory		2 Mbytes
	RAM		1 Mbyte
Environmental resistance	Temperature		-20°C to 85 °C
	IP grade		IP65
Power supply	Power voltage		12 to 24 VDC
	Power consumption		0.45 W
	Reverse voltage protection		V
Feature extraction and fail modes identification	Data update rate		1 set/s
	Sampling rate		~ 26,667 Samplings/s
	Sampling mode	Successively	V ^{1*}
		Software trigger	V ^{1*}
		Hardware trigger	V ^{1*}
	Time domain data cleaning		V
	RPM identifier		V
	Time domain features	Overall (mm/s)	V
		Peak (mm/s)	V
		Peak to peak (mm/s)	V
		Crest factor	V
		Health index	ISO-20816 health index
	Frequency domain features	Power in band	30 sets
		Power in order	(10 sets for each X, Y and Z
	Fail mode identification	Energy of fail-modes	Unbalance, Misalignment, Looseness, Bearing defect, Gear mesh defect, Van pass defect
	Failure alarm	Caution	V
		Warning	V
Communication	Method		RS485
	Protocol		Modbus
	Distance		100m
	Upload	Raw data	X
		Time domain features	V
		Freq. domain features	V
		Energy of fail-modes	V
		Failure alarm	V
	Download	Sampling mode	V
		Trigger mode	V
		Band definition	V
Failure alarm		V	
FOTA		X	
Appearance	Dimensions		38 x 38 x 18.1 mm
	Housing material		Aluminum alloy
	Water-proof method		Seal
	Wire		Flexible, insulated, 1m of
	Wire connector		Pigtail V ^{2*}
	LED for running status		V ^{3*}
	LED for communication status		V ^{4*}
Device Management	Acquisition mode configuration		V ^{5*}
	Trigger mode configuration		V ^{5*}
	Fail mode definition configuration		V ^{5*}
	Alarm threshold configuration		V ^{5*}
	FOTA		V ^{5*}

1* Configurable through utility

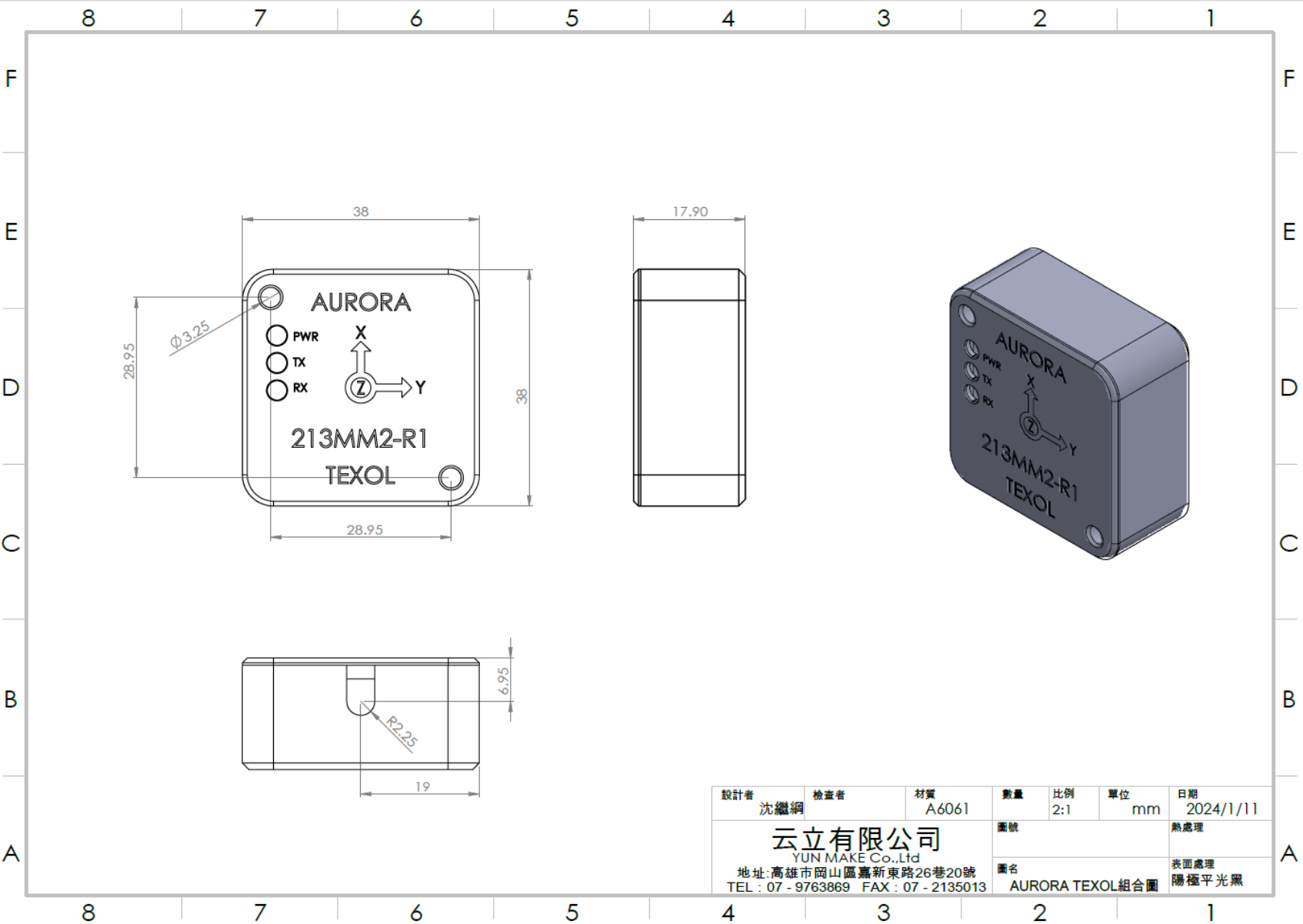
2* RED: 12-24 VDC in, BLACK: GND, GREEN: DATA¹, YELLOW: DATA², BLUE: Hardware trigger (TTL), BROWN: Reset to default (TTL), Thick BLACK: Shielding

3* GREEN LED Flash

4* RED and Orange LED Flash

5* Manage through device management utility

Appendix B. Dimensional Drawing



Appendix C. Modbus Input Register Table – Feature Data Items (General)

INPUT REGISTER				
Address 3X	Item	Attribute	Type	Scale
30001~30004	Data Output Count	R	Binary Data Format	X
30005~30007	Sensor ID	R	ASCII : 030001	X
30008	Module Slave ID	R	U8	X
30009	Machine type	R	U16	X
30010	RPM	R	U16	1
30011~30012	X-Overall(mm/s)	R	U32	0.001
30013~30014	Y-Overall(mm/s)	R	U32	0.001
30015~30016	Z-Overall(mm/s)	R	U32	0.001
30017~30018	X-Peak(mm/s)	R	U32	0.001
30019~30020	Y-Peak(mm/s)	R	U32	0.001
30021~30022	Z-Peak(mm/s)	R	U32	0.001
30023~30024	X-Peak to Peak(mm/s)	R	U32	0.001
30025~30026	Y-Peak to Peak(mm/s)	R	U32	0.001
30027~30028	Z-Peak to Peak(mm/s)	R	U32	0.001
30029~30030	X-Crest Factor	R	U32	0.001
30031~30032	Y-Crest Factor	R	U32	0.001
30033~30034	Z-Crest Factor	R	U32	0.001
30035~30036	X-Power in Band 01((mm/s) ²	R	U32	0.001
30037~30038	X-Power in Band 02((mm/s) ²	R	U32	0.001
30039~30040	X-Power in Band 03((mm/s) ²	R	U32	0.001
30041~30042	X-Power in Band 04((mm/s) ²	R	U32	0.001
30043~30044	X-Power in Band 05((mm/s) ²	R	U32	0.001
30045~30046	X-Power in Band 06((mm/s) ²	R	U32	0.001
30047~30048	X-Power in Band 07((mm/s) ²	R	U32	0.001
30049~30050	X-Power in Band 08((mm/s) ²	R	U32	0.001
30051~30052	X-Power in Band 09((mm/s) ²	R	U32	0.001
30053~30054	X-Power in Band 10((mm/s) ²	R	U32	0.001
30055~30056	Y-Power in Band 01((mm/s) ²	R	U32	0.001
30057~30058	Y-Power in Band 02((mm/s) ²	R	U32	0.001
30059~30060	Y-Power in Band 03((mm/s) ²	R	U32	0.001
30061~30062	Y-Power in Band 04((mm/s) ²	R	U32	0.001
30063~30064	Y-Power in Band 05((mm/s) ²	R	U32	0.001

30065~30066	Y-Power in Band 06((mm/s)2	R	U32	0.001
30067~30068	Y-Power in Band 07((mm/s)2	R	U32	0.001
30069~30070	Y-Power in Band 08((mm/s)2	R	U32	0.001
30071~30072	Y-Power in Band 09((mm/s)2	R	U32	0.001
30073~30074	Y-Power in Band 10((mm/s)2	R	U32	0.001
30075~30076	Z-Power in Band 01((mm/s)2	R	U32	0.001
30077~30078	Z-Power in Band 02((mm/s)2	R	U32	0.001
30079~30080	Z-Power in Band 03((mm/s)2	R	U32	0.001
30081~30082	Z-Power in Band 04((mm/s)2	R	U32	0.001
30083~30084	Z-Power in Band 05((mm/s)2	R	U32	0.001
30085~30086	Z-Power in Band 06((mm/s)2	R	U32	0.001
30087~30088	Z-Power in Band 07((mm/s)2	R	U32	0.001
30089~30090	Z-Power in Band 08((mm/s)2	R	U32	0.001
30091~30092	Z-Power in Band 09((mm/s)2	R	U32	0.001
30093~30094	Z-Power in Band 10((mm/s)2	R	U32	0.001
30095~30096	Bearing	R	U32	0.001
30097~30098	Losseness	R	U32	0.001
30099~30100	Misalignment	R	U32	0.001
30101~30102	Unbalance	R	U32	0.001
30103~30104	Gear mesh	R	U32	0.001
30105~30106	Van Pass	R	U32	0.001
30107~30108	Bearing percentage	R	U32	0.001
30109~30110	Losseness percentage	R	U32	0.001
30111~30112	Misalignment percentage	R	U32	0.001
30113~30114	Unbalance percentage	R	U32	0.001
30115~30116	Gear mesh percentage	R	U32	0.001
30117~30118	Van Pass percentage	R	U32	0.001
30119~30120	Temperature(°C)	R	Int32	0.001
30121	X-Overall(*QC code)	R	2 Bit	X
30122	Y-Overall(*QC code)	R	2 Bit	X
30123	Z-Overall(*QC code)	R	2 Bit	X
30124	X-Peak(*QC code)	R	2 Bit	X
30125	Y-Peak(*QC code)	R	2 Bit	X
30126	Z-Peak(*QC code)	R	2 Bit	X
30127	X-Peak to Peak(*QC code)	R	2 Bit	X
30128	Y-Peak to Peak(*QC code)	R	2 Bit	X

30129	Z-Peak to Peak(*QC code)	R	2 Bit	X
30130	X-Crest Factor(*QC code)	R	2 Bit	X
30131	Y-Crest Factor(*QC code)	R	2 Bit	X
30132	Z-Crest Factor(*QC code)	R	2 Bit	X
30133	X-Power in Band 01(*QC code)	R	2 Bit	X
30134	X-Power in Band 02(*QC code)	R	2 Bit	X
30135	X-Power in Band 03(*QC code)	R	2 Bit	X
30136	X-Power in Band 04(*QC code)	R	2 Bit	X
30137	X-Power in Band 05(*QC code)	R	2 Bit	X
30138	X-Power in Band 06(*QC code)	R	2 Bit	X
30139	X-Power in Band 07(*QC code)	R	2 Bit	X
30140	X-Power in Band 08(*QC code)	R	2 Bit	X
30141	X-Power in Band 09(*QC code)	R	2 Bit	X
30142	X-Power in Band 10(*QC code)	R	2 Bit	X
30143	Y-Power in Band 01(*QC code)	R	2 Bit	X
30144	Y-Power in Band 02(*QC code)	R	2 Bit	X
30145	Y-Power in Band 03(*QC code)	R	2 Bit	X
30146	Y-Power in Band 04(*QC code)	R	2 Bit	X
30147	Y-Power in Band 05(*QC code)	R	2 Bit	X
30148	Y-Power in Band 06(*QC code)	R	2 Bit	X
30149	Y-Power in Band 07(*QC code)	R	2 Bit	X
30150	Y-Power in Band 08(*QC code)	R	2 Bit	X
30151	Y-Power in Band 09(*QC code)	R	2 Bit	X
30152	Y-Power in Band 10(*QC code)	R	2 Bit	X
30153	Z-Power in Band 01(*QC code)	R	2 Bit	X
30154	Z-Power in Band 02(*QC code)	R	2 Bit	X
30155	Z-Power in Band 03(*QC code)	R	2 Bit	X
30156	Z-Power in Band 04(*QC code)	R	2 Bit	X
30157	Z-Power in Band 05(*QC code)	R	2 Bit	X
30158	Z-Power in Band 06(*QC code)	R	2 Bit	X
30159	Z-Power in Band 07(*QC code)	R	2 Bit	X
30160	Z-Power in Band 08(*QC code)	R	2 Bit	X
30161	Z-Power in Band 09(*QC code)	R	2 Bit	X
30162	Z-Power in Band 10(*QC code)	R	2 Bit	X
30163	Bearing(*QC code)	R	2 Bit	X
30164	Losseness(*QC code)	R	2 Bit	X

30165	Misalignment(*QC code)	R	2 Bit	X
30166	Unbalance(*QC code)	R	2 Bit	X
30167	Gear mesh(*QC code)	R	2 Bit	X
30168	Van Pass(*QC code)	R	2 Bit	X
30169	Temperature(*QC code)	R	2 Bit	X

Appendix D. Modbus Input Register Table – Feature Data Items (Motor.NonDriveEnd)

INPUT REGISTER				
Address 3X	Item	Attribute	Type	Scale
30001~30004	Data Output Count	R	Binary Data Format	X
30005~30007	Sensor ID	R	ASCII : 030001	X
30008	Module Slave ID	R	U8	X
30009	Machine type	R	U16	X
30010	RPM	R	U16	1
30011~30012	OA_X_Axial	R	U32	0.001
30013~30014	OA_Y_Axial	R	U32	0.001
30015~30016	OA_Z_Axial	R	U32	0.001
30017~30018	CF_X_Axial	R	U32	0.001
30019~30020	CF_Y_Axial	R	U32	0.001
30021~30022	CF_Z_Axial	R	U32	0.001
30023~30024	Temperature	R	Int32	0.001
30025~30026	Def_Bea	R	U32	0.001
30027~30028	Def_Imb/BR/IBT	R	U32	0.001
30029~30030	Def_Mis	R	U32	0.001
30031~30032	Def_Loo/CRB	R	U32	0.001
30033~30034	Def_LSW/SE/RE/SL	R	U32	0.001
30039	X-Overall(*QC code)	R	2 Bit	X
30040	Y-Overall(*QC code)	R	2 Bit	X
30041	Z-Overall(*QC code)	R	2 Bit	X

Appendix E. Modbus Input Register Table – Feature Data Items (Motor.DriveEnd.DirectBelt)

INPUT REGISTER				
Address 3X	Item	Attribute	Type	Scale
30001~30004	Data Output Count	R	Binary Data Format	X
30005~30007	Sensor ID	R	ASCII : 030001	X
30008	Module Slave ID	R	U8	X
30009	Machine type	R	U16	X
30010	RPM	R	U16	1
30011~30012	OA_X_Axial	R	U32	0.001
30013~30014	OA_Y_Axial	R	U32	0.001
30015~30016	OA_Z_Axial	R	U32	0.001
30017~30018	CF_X_Axial	R	U32	0.001
30019~30020	CF_Y_Axial	R	U32	0.001
30021~30022	CF_Z_Axial	R	U32	0.001
30023~30024	Temperature	R	Int32	0.001
30025~30026	Def_Bea	R	U32	0.001
30027~30028	Def_Imb/BR/IBT	R	U32	0.001
30029~30030	Def_Mis	R	U32	0.001
30031~30032	Def_Loo/CRB	R	U32	0.001
30033~30034	Def_LSW/SE/RE/SL	R	U32	0.001
30039	X-Overall(*QC code)	R	2 Bit	X
30040	Y-Overall(*QC code)	R	2 Bit	X
30041	Z-Overall(*QC code)	R	2 Bit	X

Appendix F. Modbus Input Register Table – Feature Data Items (Motor.DriveEnd.DirectDrive)

INPUT REGISTER				
Address 3X	Item	Attribute	Type	Scale
30001~30004	Data Output Count	R	Binary Data Format	X
30005~30007	Sensor ID	R	ASCII : 030001	X
30008	Module Slave ID	R	U8	X
30009	Machine type	R	U16	X
30010	RPM	R	U16	1
30011~30012	OA_X_Axial	R	U32	0.001
30013~30014	OA_Y_Axial	R	U32	0.001
30015~30016	OA_Z_Axial	R	U32	0.001
30017~30018	CF_X_Axial	R	U32	0.001
30019~30020	CF_Y_Axial	R	U32	0.001
30021~30022	CF_Z_Axial	R	U32	0.001
30023~30024	Temperature	R	Int32	0.001
30025~30026	Def_Bea	R	U32	0.001
30027~30028	Def_Imb/BR/IBT	R	U32	0.001
30029~30030	Def_Mis	R	U32	0.001
30031~30032	Def_Loo/CRB	R	U32	0.001
30033~30034	Def_LSW/SE/RE/SL	R	U32	0.001
30039	X-Overall(*QC code)	R	2 Bit	X
30040	Y-Overall(*QC code)	R	2 Bit	X
30041	Z-Overall(*QC code)	R	2 Bit	X

Appendix G. Modbus Input Register Table – Feature Data Items (Roller.FreeEnd)

INPUT REGISTER				
Address 3X	Item	Attribute	Type	Scale
30001~30004	Data Output Count	R	Binary Data Format	X
30005~30007	Sensor ID	R	ASCII : 030001	X
30008	Module Slave ID	R	U8	X
30009	Machine type	R	U16	X
30010	RPM	R	U16	1
30011~30012	OA_X_Axial	R	U32	0.001
30013~30014	OA_Y_Axial	R	U32	0.001
30015~30016	OA_Z_Axial	R	U32	0.001
30017~30018	CF_X_Axial	R	U32	0.001
30019~30020	CF_Y_Axial	R	U32	0.001
30021~30022	CF_Z_Axial	R	U32	0.001
30023~30024	Temperature	R	Int32	0.001
30025~30026	Def_Bea	R	U32	0.001
30027~30028	Def_Imb/BR/IBT	R	U32	0.001
30029~30030	Def_Mis	R	U32	0.001
30031~30032	Def_Loo	R	U32	0.001
30033	X-Overall(*QC code)	R	2 Bit	X
30034	Y-Overall(*QC code)	R	2 Bit	X
30035	Z-Overall(*QC code)	R	2 Bit	X

Appendix H. Modbus Input Register Table – Feature Data Items (Roller.BeltDrivenEnd)

INPUT REGISTER				
Address 3X	Item	Attribute	Type	Scale
30001~30004	Data Output Count	R	Binary Data Format	X
30005~30007	Sensor ID	R	ASCII : 030001	X
30008	Module Slave ID	R	U8	X
30009	Machine type	R	U16	X
30010	RPM	R	U16	1
30011~30012	OA_X_Axial	R	U32	0.001
30013~30014	OA_Y_Axial	R	U32	0.001
30015~30016	OA_Z_Axial	R	U32	0.001
30017~30018	CF_X_Axial	R	U32	0.001
30019~30020	CF_Y_Axial	R	U32	0.001
30021~30022	CF_Z_Axial	R	U32	0.001
30023~30024	Temperature	R	Int32	0.001
30025~30026	Def_Bea	R	U32	0.001
30027~30028	Def_Imb	R	U32	0.001
30029~30030	Def_Mis	R	U32	0.001
30031~30032	Def_Loo	R	U32	0.001
30033	X-Overall(*QC code)	R	2 Bit	X
30034	Y-Overall(*QC code)	R	2 Bit	X
30035	Z-Overall(*QC code)	R	2 Bit	X

Appendix I. Modbus Input Register Table – Internal Analysis Parameter Items (General)

INPUT REGISTER						
Address 3X	Item	Attribute	Type	Scale	Default	Description
30234	Firmware Configuration value version number	R	U8	x	1	0x03
30235~30236	User X-Axis Sensitivity	R	U32	0.000001	0.488281	
30237~30238	User Y-Axis Sensitivity	R	U32	0.000001	0.488281	
30239~30240	User Z-Axis Sensitivity	R	U32	0.000001	0.488281	
30241~30242	Trigger Level	R	U32	0.001	0.001	
30243	Delay Time	R	U8	1	0	
30244	Analyze	R	U8	1	5	
30245~30246	RPM Start	R	U32	1	3000	
30247~30248	RPM End	R	U32	1	4000	
30249	X - Power in Band 01 (band/order)	R	U8	X	0	0: Order 1: Band
30250~30251	X - Power in Band 01 (left/central)	R	U32	0.001/1	1	
30252~30253	X - Power in Band 01 (right/bandwidth)	R	U32	0.001/1	0.5	
30254	X - Power in Band 01 (magnification)	R	U8	1	1	
30255	X - Power in Band 02 (band/order)	R	U8	X	0	0: Order 1: Band
30256~30257	X - Power in Band 02 (left/central)	R	U32	0.001/1	2	
30258~30259	X - Power in Band 02 (right/bandwidth)	R	U32	0.001/1	0.5	
30260	X - Power in Band 02 (magnification)	R	U8	1	1	
30261	X - Power in Band 03 (band/order)	R	U8	X	0	0: Order 1: Band
30262~30263	X - Power in Band 03 (left/central)	R	U32	0.001/1	3	
30264~30265	X - Power in Band 03 (right/bandwidth)	R	U32	0.001/1	0.5	
30266	X - Power in Band 03 (magnification)	R	U8	1	1	
30267	X - Power in Band 04 (band/order)	R	U8	X	1	0: Order 1: Band
30268~30269	X - Power in Band 04 (left/central)	R	U32	0.001/1	2	
30270~30271	X - Power in Band 04 (right/bandwidth)	R	U32	0.001/1	200	
30272	X - Power in Band 04 (magnification)	R	U8	1	1	
30273	X - Power in Band 05 (band/order)	R	U8	X	1	0: Order 1: Band
30274~30275	X - Power in Band 05 (left/central)	R	U32	0.001/1	201	
30276~30277	X - Power in Band 05 (right/bandwidth)	R	U32	0.001/1	500	
30278	X - Power in Band 05 (magnification)	R	U8	1	1	
30279	X - Power in Band 06 (band/order)	R	U8	X	1	0: Order 1: Band

30280~30281	X - Power in Band 06 (left/central)	R	U32	0.001/1	501	
30282~30283	X - Power in Band 06 (right/bandwidth)	R	U32	0.001/1	1000	
30284	X - Power in Band 06 (magnification)	R	U8	1	1	
30285	X - Power in Band 07 (band/order)	R	U8	X	1	0: Order 1: Band
30286~30287	X - Power in Band 07 (left/central)	R	U32	0.001/1	1001	
30288~30289	X - Power in Band 07 (right/bandwidth)	R	U32	0.001/1	2000	
30290	X - Power in Band 07 (magnification)	R	U8	1	1	
30291	X - Power in Band 08 (band/order)	R	U8	X	1	0: Order 1: Band
30292~30293	X - Power in Band 08 (left/central)	R	U32	0.001/1	2001	
30294~30295	X - Power in Band 08 (right/bandwidth)	R	U32	0.001/1	3000	
30296	X - Power in Band 08 (magnification)	R	U8	1	1	
30297	X - Power in Band 09 (band/order)	R	U8	X	1	0: Order 1: Band
30298~30299	X - Power in Band 09 (left/central)	R	U32	0.001/1	3001	
30300~30301	X - Power in Band 09 (right/bandwidth)	R	U32	0.001/1	4000	
30302	X - Power in Band 09 (magnification)	R	U8	1	1	
30303	X - Power in Band 10 (band/order)	R	U8	X	1	0: Order 1: Band
30304~30305	X - Power in Band 10 (left/central)	R	U32	0.001/1	4001	
30306~30307	X - Power in Band 10 (right/bandwidth)	R	U32	0.001/1	5000	
30308	X - Power in Band 10 (magnification)	R	U8	1	1	
30309	Y - Power in Band 01 (band/order)	R	U8	X	0	0: Order 1: Band
30310~30311	Y - Power in Band 01 (left/central)	R	U32	0.001/1	1	
30312~30313	Y - Power in Band 01 (right/bandwidth)	R	U32	0.001/1	0.5	
30314	Y - Power in Band 01 (magnification)	R	U8	1	1	
30315	Y - Power in Band 02 (band/order)	R	U8	X	0	0: Order 1: Band
30316~30317	Y - Power in Band 02 (left/central)	R	U32	0.001/1	2	
30318~30319	Y - Power in Band 02 (right/bandwidth)	R	U32	0.001/1	0.5	
30320	Y - Power in Band 02 (magnification)	R	U8	1	1	
30321	Y - Power in Band 03 (band/order)	R	U8	X	0	0: Order 1: Band
30322~30323	Y - Power in Band 03 (left/central)	R	U32	0.001/1	3	
30324~30325	Y - Power in Band 03 (right/bandwidth)	R	U32	0.001/1	0.5	
30326	Y - Power in Band 03 (magnification)	R	U8	1	1	
30327	Y - Power in Band 04 (band/order)	R	U8	X	1	0: Order 1: Band

30328~30329	Y - Power in Band 04 (left/central)	R	U32	0.001/1	2	
30330~30331	Y - Power in Band 04 (right/bandwidth)	R	U32	0.001/1	200	
30332	Y - Power in Band 04 (magnification)	R	U8	1	1	
30333	Y - Power in Band 05 (band/order)	R	U8	X	1	0: Order 1: Band
30334~30335	Y - Power in Band 05 (left/central)	R	U32	0.001/1	201	
30336~30337	Y - Power in Band 05 (right/bandwidth)	R	U32	0.001/1	500	
30338	Y - Power in Band 05 (magnification)	R	U8	1	1	
30339	Y - Power in Band 06 (band/order)	R	U8	X	1	0: Order 1: Band
30340~30341	Y - Power in Band 06 (left/central)	R	U32	0.001/1	501	
30342~30343	Y - Power in Band 06 (right/bandwidth)	R	U32	0.001/1	1000	
30344	Y - Power in Band 06 (magnification)	R	U8	1	1	
30345	Y - Power in Band 07 (band/order)	R	U8	X	1	0: Order 1: Band
30346~30347	Y - Power in Band 07 (left/central)	R	U32	0.001/1	1001	
30348~30349	Y - Power in Band 07 (right/bandwidth)	R	U32	0.001/1	2000	
30350	Y - Power in Band 07 (magnification)	R	U8	1	1	
30351	Y - Power in Band 08 (band/order)	R	U8	X	1	0: Order 1: Band
30352~30353	Y - Power in Band 08 (left/central)	R	U32	0.001/1	2001	
30354~30355	Y - Power in Band 08 (right/bandwidth)	R	U32	0.001/1	3000	
30356	Y - Power in Band 08 (magnification)	R	U8	1	1	
30357	Y - Power in Band 09 (band/order)	R	U8	X	1	0: Order 1: Band
30358~30359	Y - Power in Band 09 (left/central)	R	U32	0.001/1	3001	
30360~30361	Y - Power in Band 09 (right/bandwidth)	R	U32	0.001/1	4000	
30362	Y - Power in Band 09 (magnification)	R	U8	1	1	
30363	Y - Power in Band 10 (band/order)	R	U8	X	1	0: Order 1: Band
30364~30365	Y - Power in Band 10 (left/central)	R	U32	0.001/1	4001	
30366~30367	Y - Power in Band 10 (right/bandwidth)	R	U32	0.001/1	5000	
30368	Y - Power in Band 10 (magnification)	R	U8	1	1	
30369	Z - Power in Band 01 (band/order)	R	U8	X	0	0: Order 1: Band
30370~30371	Z - Power in Band 01 (left/central)	R	U32	0.001/1	1	
30372~30373	Z - Power in Band 01 (right/bandwidth)	R	U32	0.001/1	0.5	
30374	Z - Power in Band 01 (magnification)	R	U8	1	1	
30375	Z - Power in Band 02 (band/order)	R	U8	X	0	0: Order 1: Band

30376~30377	Z - Power in Band 02 (left/central)	R	U32	0.001/1	2	
30378~30379	Z - Power in Band 02 (right/bandwidth)	R	U32	0.001/1	0.5	
30380	Z - Power in Band 02 (magnification)	R	U8	1	1	
30381	Z - Power in Band 03 (band/order)	R	U8	X	0	0: Order 1: Band
30382~30383	Z - Power in Band 03 (left/central)	R	U32	0.001/1	3	
30384~30385	Z - Power in Band 03 (right/bandwidth)	R	U32	0.001/1	0.5	
30386	Z - Power in Band 03 (magnification)	R	U8	1	1	
30387	Z - Power in Band 04 (band/order)	R	U8	X	1	0: Order 1: Band
30388~30389	Z - Power in Band 04 (left/central)	R	U32	0.001/1	2	
30390~30391	Z - Power in Band 04 (right/bandwidth)	R	U32	0.001/1	200	
30392	Z - Power in Band 04 (magnification)	R	U8	1	1	
30393	Z - Power in Band 05 (band/order)	R	U8	X	1	0: Order 1: Band
30394~30395	Z - Power in Band 05 (left/central)	R	U32	0.001/1	201	
30396~30397	Z - Power in Band 05 (right/bandwidth)	R	U32	0.001/1	500	
30398	Z - Power in Band 05 (magnification)	R	U8	1	1	
30399	Z - Power in Band 06 (band/order)	R	U8	X	1	0: Order 1: Band
30400~30401	Z - Power in Band 06 (left/central)	R	U32	0.001/1	501	
30402~30403	Z - Power in Band 06 (right/bandwidth)	R	U32	0.001/1	1000	
30404	Z - Power in Band 06 (magnification)	R	U8	1	1	
30405	Z - Power in Band 07 (band/order)	R	U8	X	1	0: Order 1: Band
30406~30407	Z - Power in Band 07 (left/central)	R	U32	0.001/1	1001	
30408~30409	Z - Power in Band 07 (right/bandwidth)	R	U32	0.001/1	2000	
30410	Z - Power in Band 07 (magnification)	R	U8	1	1	
30411	Z - Power in Band 08 (band/order)	R	U8	X	1	0: Order 1: Band
30412~30413	Z - Power in Band 08 (left/central)	R	U32	0.001/1	2001	
30414~30415	Z - Power in Band 08 (right/bandwidth)	R	U32	0.001/1	3000	
30416	Z - Power in Band 08 (magnification)	R	U8	1	1	
30417	Z - Power in Band 09 (band/order)	R	U8	X	1	0: Order 1: Band
30418~30419	Z - Power in Band 09 (left/central)	R	U32	0.001/1	3001	
30420~30421	Z - Power in Band 09 (right/bandwidth)	R	U32	0.001/1	4000	
30422	Z - Power in Band 09 (magnification)	R	U8	1	1	
30423	Z - Power in Band 10 (band/order)	R	U8	X	1	0: Order 1: Band

30424~30425	Z - Power in Band 10 (left/central)	R	U32	0.001/1	4001	
30426~30427	Z - Power in Band 10 (right/bandwidth)	R	U32	0.001/1	5000	
30428	Z - Power in Band 10 (magnification)	R	U8	1	1	
30429	Hardwave Trigger	R	U8	X	0	0: OFF 1: ON
30430	Instrument Type	R	U8	X	0	0: customized 1~4: ISO-20816
30431	Gear Van Pass Enable/Disable	R	U8	X	0	0: Both disable 1: Gear enable 2: Van enable 3: Both enable
30432	Gear Number	R	U8	1	5	
30433	Van Number	R	U8	1	3	
30434~30435	X - Overall (Warning)	R	U32	0.001	2.8	
30436~30437	X - Overall (Alarm)	R	U32	0.001	4.5	
30438~30439	Y - Overall (Warning)	R	U32	0.001	2.8	
30440~30441	Y - Overall (Alarm)	R	U32	0.001	4.5	
30442~30443	Z - Overall (Warning)	R	U32	0.001	2.8	
30444~30445	Z - Overall (Alarm)	R	U32	0.001	4.5	
30446~30447	X - Peak (Warning)	R	U32	0.001	10	
30448~30449	X - Peak(Alarm)	R	U32	0.001	20	
30450~30451	Y - Peak (Warning)	R	U32	0.001	10	
30452~30453	Y - Peak(Alarm)	R	U32	0.001	20	
30454~30455	Z - Peak (Warning)	R	U32	0.001	10	
30456~30457	Z - Peak(Alarm)	R	U32	0.001	20	
30458~30459	X - Peak to Peak (Warning)	R	U32	0.001	10	
30460~30461	X - Peak to Peak(Alarm)	R	U32	0.001	20	
30462~30463	Y - Peak to Peak (Warning)	R	U32	0.001	10	
30464~30465	Y - Peak to Peak(Alarm)	R	U32	0.001	20	
30466~30467	Z - Peak to Peak (Warning)	R	U32	0.001	10	
30468~30469	Z - Peak to Peak(Alarm)	R	U32	0.001	20	
30470~30471	X - Crest Factor(Warning)	R	U32	0.001	10	
30472~30473	X - Crest Factor(Alarm)	R	U32	0.001	20	
30474~30475	Y - Crest Factor(Warning)	R	U32	0.001	10	
30476~30477	Y - Crest Factor(Alarm)	R	U32	0.001	20	
30478~30479	Z - Crest Factor(Warning)	R	U32	0.001	10	
30480~30481	Z - Crest Factor(Alarm)	R	U32	0.001	20	
30482~30483	X-Power in Band 01(Warning)	R	U32	0.001	10	
30484~30485	X-Power in Band 01(Alarm)	R	U32	0.001	20	
30486~30487	X-Power in Band 02(Warning)	R	U32	0.001	10	

30488~30489	X-Power in Band 02(Alarm)	R	U32	0.001	20	
30490~30491	X-Power in Band 03(Warning)	R	U32	0.001	10	
30492~30493	X-Power in Band 03(Alarm)	R	U32	0.001	20	
30494~30495	X-Power in Band 04(Warning)	R	U32	0.001	10	
30496~30497	X-Power in Band 04(Alarm)	R	U32	0.001	20	
30498~30499	X-Power in Band 05(Warning)	R	U32	0.001	10	
30500~30501	X-Power in Band 05(Alarm)	R	U32	0.001	20	
30502~30503	X-Power in Band 06(Warning)	R	U32	0.001	10	
30504~30505	X-Power in Band 06(Alarm)	R	U32	0.001	20	
30506~30507	X-Power in Band 07(Warning)	R	U32	0.001	10	
30508~30509	X-Power in Band 07(Alarm)	R	U32	0.001	20	
30510~30511	X-Power in Band 08(Warning)	R	U32	0.001	10	
30512~30513	X-Power in Band 08(Alarm)	R	U32	0.001	20	
30514~30515	X-Power in Band 09(Warning)	R	U32	0.001	10	
30516~30517	X-Power in Band 09(Alarm)	R	U32	0.001	20	
30518~30519	X-Power in Band 10(Warning)	R	U32	0.001	10	
30520~30521	X-Power in Band 10(Alarm)	R	U32	0.001	20	
30522~30523	Y-Power in Band 01(Warning)	R	U32	0.001	10	
30524~30525	Y-Power in Band 01(Alarm)	R	U32	0.001	20	
30526~30527	Y-Power in Band 02(Warning)	R	U32	0.001	10	
30528~30529	Y-Power in Band 02(Alarm)	R	U32	0.001	20	
30530~30531	Y-Power in Band 03(Warning)	R	U32	0.001	10	
30532~30533	Y-Power in Band 03(Alarm)	R	U32	0.001	20	
30534~30535	Y-Power in Band 04(Warning)	R	U32	0.001	10	
30536~30537	Y-Power in Band 04(Alarm)	R	U32	0.001	20	
30538~30539	Y-Power in Band 05(Warning)	R	U32	0.001	10	
30540~30541	Y-Power in Band 05(Alarm)	R	U32	0.001	20	
30542~30543	Y-Power in Band 06(Warning)	R	U32	0.001	10	
30544~30545	Y-Power in Band 06(Alarm)	R	U32	0.001	20	
30546~30547	Y-Power in Band 07(Warning)	R	U32	0.001	10	
30548~30549	Y-Power in Band 07(Alarm)	R	U32	0.001	20	
30550~30551	Y-Power in Band 08(Warning)	R	U32	0.001	10	
30552~30553	Y-Power in Band 08(Alarm)	R	U32	0.001	20	
30554~30555	Y-Power in Band 09(Warning)	R	U32	0.001	10	
30556~30557	Y-Power in Band 09(Alarm)	R	U32	0.001	20	
30558~30559	Y-Power in Band 10(Warning)	R	U32	0.001	10	
30560~30561	Y-Power in Band 10(Alarm)	R	U32	0.001	20	
30562~30563	Z-Power in Band 01(Warning)	R	U32	0.001	10	
30564~30565	Z-Power in Band 01(Alarm)	R	U32	0.001	20	
30566~30567	Z-Power in Band 02(Warning)	R	U32	0.001	10	

30568~30569	Z-Power in Band 02(Alarm)	R	U32	0.001	20	
30570~30571	Z-Power in Band 03(Warning)	R	U32	0.001	10	
30572~30573	Z-Power in Band 03(Alarm)	R	U32	0.001	20	
30574~30575	Z-Power in Band 04(Warning)	R	U32	0.001	10	
30576~30577	Z-Power in Band 04(Alarm)	R	U32	0.001	20	
30578~30579	Z-Power in Band 05(Warning)	R	U32	0.001	10	
30580~30581	Z-Power in Band 05(Alarm)	R	U32	0.001	20	
30582~30583	Z-Power in Band 06(Warning)	R	U32	0.001	10	
30584~30585	Z-Power in Band 06(Alarm)	R	U32	0.001	20	
30586~30587	Z-Power in Band 07(Warning)	R	U32	0.001	10	
30588~30589	Z-Power in Band 07(Alarm)	R	U32	0.001	20	
30590~30591	Z-Power in Band 08(Warning)	R	U32	0.001	10	
30592~30593	Z-Power in Band 08(Alarm)	R	U32	0.001	20	
30594~30595	Z-Power in Band 09(Warning)	R	U32	0.001	10	
30596~30597	Z-Power in Band 09(Alarm)	R	U32	0.001	20	
30598~30599	Z-Power in Band 10(Warning)	R	U32	0.001	10	
30600~30601	Z-Power in Band 10(Alarm)	R	U32	0.001	20	
30602~30603	Bearing Defect(Warning)	R	U32	0.001	10000	
30604~30605	Bearing Defect(Alarm)	R	U32	0.001	20000	
30606~30607	Looseness(Warning)	R	U32	0.001	10000	
30608~30609	Looseness(Alarm)	R	U32	0.001	20000	
30610~30611	Misalignment(Warning)	R	U32	0.001	10000	
30612~30613	Misalignment(Alarm)	R	U32	0.001	20000	
30614~30615	Unbalance(Warning)	R	U32	0.001	10000	
30616~30617	Unbalance(Alarm)	R	U32	0.001	20000	
30618~30619	Gear mesh Defect(Warning)	R	U32	0.001	10000	
30620~30621	Gear mesh Defect(Alarm)	R	U32	0.001	20000	
30622~30623	Vane Pass Defect(Warning)	R	U32	0.001	10000	
30624~30625	Vane Pass Defect(Alarm)	R	U32	0.001	0	
30626~30627	Temperature((Warning)	R	Int32	0.001	50	
30628~30629	Temperature(Alarm)	R	Int32	0.001	80	
30682~30683	Calibration X-Axis Minimum RMS	R	U32			
30684~30685	Calibration X-Axis Average RMS	R	U32			
30686~30687	Calibration X-Axis Maximum RMS	R	U32			
30688~30689	Calibration X-Axis Minimum Sensitivity	R	U32			
30690~30691	Calibration X-Axis Average Sensitivity	R	U32			
30692~30693	Calibration X-Axis Maximum Sensitivity	R	U32			
30694~30695	Calibration Y-Axis Minimum RMS	R	U32			
30696~30697	Calibration Y-Axis Average RMS	R	U32			
30698~30699	Calibration Y-Axis Maximum RMS	R	U32			

30700~30701	Calibration Y-Axis Minimum Sensitivity	R	U32			
30702~30703	Calibration Y-Axis Average Sensitivity	R	U32			
30704~30705	Calibration Y-Axis Maximum Sensitivity	R	U32			
30706~30707	Calibration Z-Axis Minimum RMS	R	U32			
30708~30709	Calibration Z-Axis Average RMS	R	U32			
30710~30711	Calibration Z-Axis Maximum RMS	R	U32			
30712~30713	Calibration Z-Axis Minimum Sensitivity	R	U32			
30714~30715	Calibration Z-Axis Average Sensitivity	R	U32			
30716~30717	Calibration Z-Axis Maximum Sensitivity	R	U32			
30718	Raw Data Mode Count	R	U16			
30719~30720	Factory X-Axis Sensitivity	R	U32			
30721~30722	Factory Y-Axis Sensitivity	R	U32			
30723~30724	Factory Z-Axis Sensitivity	R	U32			
30725	Firmware Number	R	16H			
30726~30728	Module Name	R	ASCII			213MM2

Appendix J. Modbus Input Register Table – Internal Analysis Parameter Items (Motor.NonDriveEnd)

INPUT REGISTER						
Address 3X	Item	Attribute	Type	Scale	Default	Description
30234	Firmware Configuration value version number	R	U8	x	1	0x03
30235~30236	User X-Axial Sensitivity	R	U32	0.000001	0.488281	
30237~30238	User Y-Axial Sensitivity	R	U32	0.000001	0.488281	
30239~30240	User Z-Axial Sensitivity	R	U32	0.000001	0.488281	
30241~30242	Trigger Level	R	U32	0.001	0.001	
30243	Delay Time	R	U8	1	0	
30244	Analyze	R	U8	1	5	
30245~30246	RPM Start	R	U32	1	3000	
30247~30248	RPM End	R	U32	1	4000	
30249	Hardware Trigger	W	U8	X	0	0: OFF 1: ON
30250~30251	Line Frequency	W	U32	1	60	
30252	Instrument Type	W	U8	X	0	0: customized 1~4: ISO-20816
30253~30254	X - Overall (Warning)	W	U32	0.001	2.8	
30255~30256	X - Overall (Alarm)	W	U32	0.001	4.5	
30257~30258	Y - Overall (Warning)	W	U32	0.001	2.8	
30259~30260	Y - Overall (Alarm)	W	U32	0.001	4.5	
30261~30262	Z - Overall (Warning)	W	U32	0.001	2.8	
30263~30264	Z - Overall (Alarm)	W	U32	0.001	4.5	
30682~30683	Calibration X-Axial Minimum RMS	R	U32			
30684~30685	Calibration X-Axial Average RMS	R	U32			
30686~30687	Calibration X-Axial Maximum RMS	R	U32			
30688~30689	Calibration X-Axial Minimum Sensitivity	R	U32			
30690~30691	Calibration X-Axial Average Sensitivity	R	U32			
30692~30693	Calibration X-Axial Maximum Sensitivity	R	U32			
30694~30695	Calibration Y-Axial Minimum RMS	R	U32			
30696~30697	Calibration Y-Axial Average RMS	R	U32			
30698~30699	Calibration Y-Axial Maximum RMS	R	U32			
30700~30701	Calibration Y-Axial Minimum Sensitivity	R	U32			
30702~30703	Calibration Y-Axial Average Sensitivity	R	U32			
30704~30705	Calibration Y-Axial Maximum Sensitivity	R	U32			
30706~30707	Calibration Z-Axial Minimum RMS	R	U32			
30708~30709	Calibration Z-Axial Average RMS	R	U32			
30710~30711	Calibration Z-Axial Maximum RMS	R	U32			

30712~30713	Calibration Z-Axial Minimum Sensitivity	R	U32			
30714~30715	Calibration Z-Axial Average Sensitivity	R	U32			
30716~30717	Calibration Z-Axial Maximum Sensitivity	R	U32			
30718	Raw Data Mode Count	R	U16			
30719~30720	Factory X-Axial Sensitivity	R	U32			
30721~30722	Factory Y-Axial Sensitivity	R	U32			
30723~30724	Factory Z-Axial Sensitivity	R	U32			
30725	Firmware Number	R	16H			V3.0.01 =>3001H
30726~30728	Module Name	R	ASCII			213MM2

Appendix K. Modbus Input Register Table – Internal Analysis Parameter Items (Motor.DriveEnd.DirectBelt)

INPUT REGISTER						
Address 3X	Item	Attribute	Type	Scale	Default	Description
30234	Firmware Configuration value version number	R	U8	x	1	0x03
30235~30236	User X-Axial Sensitivity	R	U32	0.000001	0.488281	
30237~30238	User Y-Axial Sensitivity	R	U32	0.000001	0.488281	
30239~30240	User Z-Axial Sensitivity	R	U32	0.000001	0.488281	
30241~30242	Trigger Level	R	U32	0.001	0.001	
30243	Delay Time	R	U8	1	0	
30244	Analyze	R	U8	1	5	
30245~30246	RPM Start	R	U32	1	3000	
30247~30248	RPM End	R	U32	1	4000	
30249	Hardware Trigger	W	U8	X	0	0: OFF 1: ON
30250~30251	Line Frequency	W	U32	1	60	
30252	Instrument Type	W	U8	X	0	0: customized 1~4: ISO-20816
30253~30254	X - Overall (Warning)	W	U32	0.001	2.8	
30255~30256	X - Overall (Alarm)	W	U32	0.001	4.5	
30257~30258	Y - Overall (Warning)	W	U32	0.001	2.8	
30259~30260	Y - Overall (Alarm)	W	U32	0.001	4.5	
30261~30262	Z - Overall (Warning)	W	U32	0.001	2.8	
30263~30264	Z - Overall (Alarm)	W	U32	0.001	4.5	
30682~30683	Calibration X-Axial Minimum RMS	R	U32			
30684~30685	Calibration X-Axial Average RMS	R	U32			
30686~30687	Calibration X-Axial Maximum RMS	R	U32			
30688~30689	Calibration X-Axial Minimum Sensitivity	R	U32			
30690~30691	Calibration X-Axial Average Sensitivity	R	U32			
30692~30693	Calibration X-Axial Maximum Sensitivity	R	U32			
30694~30695	Calibration Y-Axial Minimum RMS	R	U32			
30696~30697	Calibration Y-Axial Average RMS	R	U32			
30698~30699	Calibration Y-Axial Maximum RMS	R	U32			
30700~30701	Calibration Y-Axial Minimum Sensitivity	R	U32			
30702~30703	Calibration Y-Axial Average Sensitivity	R	U32			
30704~30705	Calibration Y-Axial Maximum Sensitivity	R	U32			
30706~30707	Calibration Z-Axial Minimum RMS	R	U32			
30708~30709	Calibration Z-Axial Average RMS	R	U32			
30710~30711	Calibration Z-Axial Maximum RMS	R	U32			

30712~30713	Calibration Z-Axial Minimum Sensitivity	R	U32			
30714~30715	Calibration Z-Axial Average Sensitivity	R	U32			
30716~30717	Calibration Z-Axial Maximum Sensitivity	R	U32			
30718	Raw Data Mode Count	R	U16			
30719~30720	Factory X-Axial Sensitivity	R	U32			
30721~30722	Factory Y-Axial Sensitivity	R	U32			
30723~30724	Factory Z-Axial Sensitivity	R	U32			
30725	Firmware Number	R	16H			V3.0.01 =>3001H
30726~30728	Module Name	R	ASCII			213MM2

Appendix L. Modbus Input Register Table – Internal Analysis Parameter Items (Motor.DriveEnd.DirectDrive)

INPUT REGISTER						
Address 3X	Item	Attribute	Type	Scale	Default	Description
30234	Firmware Configuration value version number	R	U8	x	1	0x03
30235~30236	User X-Axial Sensitivity	R	U32	0.000001	0.488281	
30237~30238	User Y-Axial Sensitivity	R	U32	0.000001	0.488281	
30239~30240	User Z-Axial Sensitivity	R	U32	0.000001	0.488281	
30241~30242	Trigger Level	R	U32	0.001	0.001	
30243	Delay Time	R	U8	1	0	
30244	Analyze	R	U8	1	5	
30245~30246	RPM Start	R	U32	1	3000	
30247~30248	RPM End	R	U32	1	4000	
30249	Hardware Trigger	W	U8	X	0	0: OFF 1: ON
30250~30251	Line Frequency	W	U32	1	1	
30252	Instrument Type	W	U8	X	0	0: customized 1~4: ISO-20816
30253~30254	X - Overall (Warning)	W	U32	0.001	2.8	
30255~30256	X - Overall (Alarm)	W	U32	0.001	4.5	
30257~30258	Y - Overall (Warning)	W	U32	0.001	2.8	
30259~30260	Y - Overall (Alarm)	W	U32	0.001	4.5	
30261~30262	Z - Overall (Warning)	W	U32	0.001	2.8	
30263~30264	Z - Overall (Alarm)	W	U32	0.001	4.5	
30682~30683	Calibration X-Axial Minimum RMS	R	U32			
30684~30685	Calibration X-Axial Average RMS	R	U32			
30686~30687	Calibration X-Axial Maximum RMS	R	U32			
30688~30689	Calibration X-Axial Minimum Sensitivity	R	U32			
30690~30691	Calibration X-Axial Average Sensitivity	R	U32			
30692~30693	Calibration X-Axial Maximum Sensitivity	R	U32			
30694~30695	Calibration Y-Axial Minimum RMS	R	U32			
30696~30697	Calibration Y-Axial Average RMS	R	U32			
30698~30699	Calibration Y-Axial Maximum RMS	R	U32			
30700~30701	Calibration Y-Axial Minimum Sensitivity	R	U32			
30702~30703	Calibration Y-Axial Average Sensitivity	R	U32			
30704~30705	Calibration Y-Axial Maximum Sensitivity	R	U32			
30706~30707	Calibration Z-Axial Minimum RMS	R	U32			
30708~30709	Calibration Z-Axial Average RMS	R	U32			
30710~30711	Calibration Z-Axial Maximum RMS	R	U32			

30712~30713	Calibration Z-Axial Minimum Sensitivity	R	U32			
30714~30715	Calibration Z-Axial Average Sensitivity	R	U32			
30716~30717	Calibration Z-Axial Maximum Sensitivity	R	U32			
30718	Raw Data Mode Count	R	U16			
30719~30720	Factory X-Axial Sensitivity	R	U32			
30721~30722	Factory Y-Axial Sensitivity	R	U32			
30723~30724	Factory Z-Axial Sensitivity	R	U32			
30725	Firmware Number	R	16H			V3.0.01 =>3001H
30726~30728	Module Name	R	ASCII			213MM2

Appendix M. Modbus Input Register Table – Internal Analysis Parameter Items (Roller.FreeEnd)

INPUT REGISTER						
Address 3X	Item	Attribute	Type	Scale	Default	Description
30234	Firmware Configuration value version number	R	U8	x	1	0x03
30235~30236	User X-Axial Sensitivity	R	U32	0.000001	0.488281	
30237~30238	User Y-Axial Sensitivity	R	U32	0.000001	0.488281	
30239~30240	User Z-Axial Sensitivity	R	U32	0.000001	0.488281	
30241~30242	Trigger Level	R	U32	0.001	0.001	
30243	Delay Time	R	U8	1	0	
30244	Analyze	R	U8	1	5	
30245~30246	RPM Start	R	U32	1	3000	
30247~30248	RPM End	R	U32	1	4000	
30249	Hardware Trigger	W	U8	X	0	0: OFF 1: ON
30250	Instrument Type	W	U8	X	0	0: customized 1~4: ISO-20816
30251~30252	X - Overall (Warning)	W	U32	0.001	2.8	
30253~30254	X - Overall (Alarm)	W	U32	0.001	4.5	
30255~30256	Y - Overall (Warning)	W	U32	0.001	2.8	
30257~30258	Y - Overall (Alarm)	W	U32	0.001	4.5	
30259~30260	Z - Overall (Warning)	W	U32	0.001	2.8	
30261~30262	Z - Overall (Alarm)	W	U32	0.001	4.5	
30682~30683	Calibration X-Axial Minimum RMS	R	U32			
30684~30685	Calibration X-Axial Average RMS	R	U32			
30686~30687	Calibration X-Axial Maximum RMS	R	U32			
30688~30689	Calibration X-Axial Minimum Sensitivity	R	U32			
30690~30691	Calibration X-Axial Average Sensitivity	R	U32			
30692~30693	Calibration X-Axial Maximum Sensitivity	R	U32			
30694~30695	Calibration Y-Axial Minimum RMS	R	U32			
30696~30697	Calibration Y-Axial Average RMS	R	U32			
30698~30699	Calibration Y-Axial Maximum RMS	R	U32			
30700~30701	Calibration Y-Axial Minimum Sensitivity	R	U32			
30702~30703	Calibration Y-Axial Average Sensitivity	R	U32			
30704~30705	Calibration Y-Axial Maximum Sensitivity	R	U32			
30706~30707	Calibration Z-Axial Minimum RMS	R	U32			
30708~30709	Calibration Z-Axial Average RMS	R	U32			
30710~30711	Calibration Z-Axial Maximum RMS	R	U32			
30712~30713	Calibration Z-Axial Minimum Sensitivity	R	U32			

30714~30715	Calibration Z-Axial Average Sensitivity	R	U32			
30716~30717	Calibration Z-Axial Maximum Sensitivity	R	U32			
30718	Raw Data Mode Count	R	U16			
30719~30720	Factory X-Axial Sensitivity	R	U32			
30721~30722	Factory Y-Axial Sensitivity	R	U32			
30723~30724	Factory Z-Axial Sensitivity	R	U32			
30725	Firmware Number	R	16H			V3.0.01 =>3001H
30726~30728	Module Name	R	ASCII			213MM2

Appendix N. Modbus Input Register Table – Internal Analysis Parameter Items (Roller.BeltDrivenEnd)

INPUT REGISTER						
Address 3X	Item	Attribute	Type	Scale	Default	Description
30234	Firmware Configuration value version number	R	U8	x	1	0x03
30235~30236	User X-Axial Sensitivity	R	U32	0.000001	0.488281	
30237~30238	User Y-Axial Sensitivity	R	U32	0.000001	0.488281	
30239~30240	User Z-Axial Sensitivity	R	U32	0.000001	0.488281	
30241~30242	Trigger Level	R	U32	0.001	0.001	
30243	Delay Time	R	U8	1	0	
30244	Analyze	R	U8	1	5	
30245~30246	RPM Start	R	U32	1	3000	
30247~30248	RPM End	R	U32	1	4000	
30249	Hardware Trigger	W	U8	X	0	0: OFF 1: ON
30250	Instrument Type	W	U8	X	0	0: customized 1~4: ISO-20816
30251~30252	X - Overall (Warning)	W	U32	0.001	2.8	
30253~30254	X - Overall (Alarm)	W	U32	0.001	4.5	
30255~30256	Y - Overall (Warning)	W	U32	0.001	2.8	
30257~30258	Y - Overall (Alarm)	W	U32	0.001	4.5	
30259~30260	Z - Overall (Warning)	W	U32	0.001	2.8	
30261~30262	Z - Overall (Alarm)	W	U32	0.001	4.5	
30682~30683	Calibration X-Axial Minimum RMS	R	U32			
30684~30685	Calibration X-Axial Average RMS	R	U32			
30686~30687	Calibration X-Axial Maximum RMS	R	U32			
30688~30689	Calibration X-Axial Minimum Sensitivity	R	U32			
30690~30691	Calibration X-Axial Average Sensitivity	R	U32			
30692~30693	Calibration X-Axial Maximum Sensitivity	R	U32			
30694~30695	Calibration Y-Axial Minimum RMS	R	U32			
30696~30697	Calibration Y-Axial Average RMS	R	U32			
30698~30699	Calibration Y-Axial Maximum RMS	R	U32			
30700~30701	Calibration Y-Axial Minimum Sensitivity	R	U32			
30702~30703	Calibration Y-Axial Average Sensitivity	R	U32			
30704~30705	Calibration Y-Axial Maximum Sensitivity	R	U32			
30706~30707	Calibration Z-Axial Minimum RMS	R	U32			
30708~30709	Calibration Z-Axial Average RMS	R	U32			
30710~30711	Calibration Z-Axial Maximum RMS	R	U32			
30712~30713	Calibration Z-Axial Minimum Sensitivity	R	U32			

30714~30715	Calibration Z-Axial Average Sensitivity	R	U32			
30716~30717	Calibration Z-Axial Maximum Sensitivity	R	U32			
30718	Raw Data Mode Count	R	U16			
30719~30720	Factory X-Axial Sensitivity	R	U32			
30721~30722	Factory Y-Axial Sensitivity	R	U32			
30723~30724	Factory Z-Axial Sensitivity	R	U32			
30725	Firmware Number	R	16H			V3.0.01 =>3001H
30726~30728	Module Name	R	ASCII			213MM2

Appendix O. Modbus Holding Register Table – Analysis Parameter Write Items (General)

INPUT REGISTER							
Address 4X	Item	Attribute	Type	Scale	Min	Max	Description
40005	Firmware Configuration value version number	W	U8	x	1	255	0x03
40006~40007	User Axis Sensitivity	W	U32	1	0.000001		
40008~40009	User Y-Axis Sensitivity	W	U32	1000000	0.000001		
40010~40011	User Z-Axis Sensitivity	W	U32	1000000	0.000001		
40012	Modbus Slave ID	W	U8	X	1	247	1~247 (10)
40013	Machine type	W	U16	X	0	5	0
40014~40015	Trigger Level	W	U32	1000000	0.001	16	
40016	Delay Time	W	U8	1000	0	255	
40017	Analyze	W	U8	1	1	255	
40018~40019	RPM Start	W	U32	1	120	65520	
40020~40021	RPM End	W	U32	1	120	65520	
40022	X - Power in Band 01 (band/order)	W	U8	1	0	1	0: Order 1: Band
40023~40024	X - Power in Band 01 (left/central)	W	U32	left: 1 central: 1000	left: 2 central: 1	left: 5000 central: *1	
40025~40026	X - Power in Band 01 (right/bandwidth)	W	U32	right: 1 bandwidth: 1000	right: 2 bandwidth: 0.1	right: 5000 bandwidth: 1	
40027	X - Power in Band 01 (magnification)	W	U8	1	1	255	
40028	X - Power in Band 02 (band/order)	W	U8	1	0	1	0: Order 1: Band
40029~40030	X - Power in Band 02 (left/central)	W	U32	left: 1 central: 1000	left: 2 central: 1	left: 5000 central: *1	
40031~40032	X - Power in Band 02 (right/bandwidth)	W	U32	right: 1 bandwidth: 1000	right: 2 bandwidth: 0.1	right: 5000 bandwidth: 1	
40033	X - Power in Band 02 (magnification)	W	U8	1	1	255	
40034	X - Power in Band 03 (band/order)	W	U8	1	0	1	0: Order 1: Band
40035~40036	X - Power in Band 03 (left/central)	W	U32	left: 1 central: 1000	left: 2 central: 1	left: 5000 central: *1	
40037~40038	X - Power in Band 03 (right/bandwidth)	W	U32	right: 1 bandwidth: 1000	right: 2 bandwidth: 0.1	right: 5000 bandwidth: 1	
40039	X - Power in Band 03 (magnification)	W	U8	1	1	255	
40040	X - Power in Band 04 (band/order)	W	U8	1	0	1	0: Order 1: Band
40041~40042	X - Power in Band 04 (left/central)	W	U32	left: 1 central: 1000	left: 2 central: 1	left: 5000 central: *1	

40043~40044	X - Power in Band 04 (right/bandwidth)	W	U32	right: 1 bandwidth: 1000	right: 2 bandwidth: 0.1	right: 5000 bandwidth: 1	
40045	X - Power in Band 04 (magnification)	W	U8	1	1	255	
40046	X - Power in Band 05 (band/order)	W	U8	1	0	1	0: Order 1: Band
40047~40048	X - Power in Band 05 (left/central)	W	U32	left: 1 central: 1000	left: 2 central: 1	left: 5000 central: *1	
40049~40050	X - Power in Band 05 (right/bandwidth)	W	U32	right: 1 bandwidth: 1000	right: 2 bandwidth: 0.1	right: 5000 bandwidth: 1	
40051	X - Power in Band 05 (magnification)	W	U8	1	1	255	
40052	X - Power in Band 06 (band/order)	W	U8	1	0	1	0: Order 1: Band
40053~40054	X - Power in Band 06 (left/central)	W	U32	left: 1 central: 1000	left: 2 central: 1	left: 5000 central: *1	
40055~40056	X - Power in Band 06 (right/bandwidth)	W	U32	right: 1 bandwidth: 1000	right: 2 bandwidth: 0.1	right: 5000 bandwidth: 1	
40057	X - Power in Band 06 (magnification)	W	U8	1	1	255	
40058	X - Power in Band 07 (band/order)	W	U8	1	0	1	0: Order 1: Band
40059~40060	X - Power in Band 07 (left/central)	W	U32	left: 1 central: 1000	left: 2 central: 1	left: 5000 central: *1	
40061~40062	X - Power in Band 07 (right/bandwidth)	W	U32	right: 1 bandwidth: 1000	right: 2 bandwidth: 0.1	right: 5000 bandwidth: 1	
40063	X - Power in Band 07 (magnification)	W	U8	1	1	255	
40064	X - Power in Band 08 (band/order)	W	U8	1	0	1	0: Order 1: Band
40065~40066	X - Power in Band 08 (left/central)	W	U32	left: 1 central: 1000	left: 2 central: 1	left: 5000 central: *1	
40067~40068	X - Power in Band 08 (right/bandwidth)	W	U32	right: 1 bandwidth: 1000	right: 2 bandwidth: 0.1	right: 5000 bandwidth: 1	
40069	X - Power in Band 08 (magnification)	W	U8	1	1	255	
40070	X - Power in Band 09 (band/order)	W	U8	1	0	1	0: Order 1: Band
40071~40072	X - Power in Band 09 (left/central)	W	U32	left: 1 central: 1000	left: 2 central: 1	left: 5000 central: *1	
40073~40074	X - Power in Band 09 (right/bandwidth)	W	U32	right: 1 bandwidth: 1000	right: 2 bandwidth: 0.1	right: 5000 bandwidth: 1	
40075	X - Power in Band 09 (magnification)	W	U8	1	1	255	
40076	X - Power in Band 10 (band/order)	W	U8	1	0	1	0: Order 1: Band

40077~40078	X - Power in Band 10 (left/central)	W	U32	left: 1 central: 1000	left: 2 central: 1	left: 5000 central: *1	
40079~40080	X - Power in Band 10 (right/bandwidth)	W	U32	right: 1 bandwidth: 1000	right: 2 bandwidth: 0.1	right: 5000 bandwidth: 1	
40081	X - Power in Band 10 (magnification)	W	U8	1	1	255	
40082	Y - Power in Band 01 (band/order)	W	U8	1	0	1	0: Order 1: Band
40083~40084	Y - Power in Band 01 (left/central)	W	U32	left: 1 central: 1000	left: 2 central: 1	left: 5000 central: *1	
40085~40086	Y - Power in Band 01 (right/bandwidth)	W	U32	right: 1 bandwidth: 1000	right: 2 bandwidth: 0.1	right: 5000 bandwidth: 1	
40087	Y - Power in Band 01 (magnification)	W	U8	1	1	255	
40088	Y - Power in Band 02 (band/order)	W	U8	1	0	1	0: Order 1: Band
40089~40090	Y - Power in Band 02 (left/central)	W	U32	left: 1 central: 1000	left: 2 central: 1	left: 5000 central: *1	
40091~40092	Y - Power in Band 02 (right/bandwidth)	W	U32	right: 1 bandwidth: 1000	right: 2 bandwidth: 0.1	right: 5000 bandwidth: 1	
40093	Y - Power in Band 02 (magnification)	W	U8	1	1	255	
40094	Y - Power in Band 03 (band/order)	W	U8	1	0	1	0: Order 1: Band
40095~40096	Y - Power in Band 03 (left/central)	W	U32	left: 1 central: 1000	left: 2 central: 1	left: 5000 central: *1	
40097~40098	Y - Power in Band 03 (right/bandwidth)	W	U32	right: 1 bandwidth: 1000	right: 2 bandwidth: 0.1	right: 5000 bandwidth: 1	
40099	Y - Power in Band 03 (magnification)	W	U8	1	1	255	
40100	Y - Power in Band 04 (band/order)	W	U8	1	0	1	0: Order 1: Band
40101~40102	Y - Power in Band 04 (left/central)	W	U32	left: 1 central: 1000	left: 2 central: 1	left: 5000 central: *1	
40103~40104	Y - Power in Band 04 (right/bandwidth)	W	U32	right: 1 bandwidth: 1000	right: 2 bandwidth: 0.1	right: 5000 bandwidth: 1	
40105	Y - Power in Band 04 (magnification)	W	U8	1	1	255	
40106	Y - Power in Band 05 (band/order)	W	U8	1	0	1	0: Order 1: Band
40107~40108	Y - Power in Band 05 (left/central)	W	U32	left: 1 central: 1000	left: 2 central: 1	left: 5000 central: *1	
40109~40110	Y - Power in Band 05 (right/bandwidth)	W	U32	right: 1 bandwidth: 1000	right: 2 bandwidth: 0.1	right: 5000 bandwidth: 1	
40111	Y - Power in Band 05 (magnification)	W	U8	1	1	255	

40112	Y - Power in Band 06 (band/order)	W	U8	1	0	1	0: Order 1: Band
40113~40114	Y - Power in Band 06 (left/central)	W	U32	left: 1 central: 1000	left: 2 central: 1	left: 5000 central: *1	
40115~40116	Y - Power in Band 06 (right/bandwidth)	W	U32	right: 1 bandwidth: 1000	right: 2 bandwidth: 0.1	right: 5000 bandwidth: 1	
40117	Y - Power in Band 06 (magnification)	W	U8	1	1	255	
40118	Y - Power in Band 07 (band/order)	W	U8	1	0	1	0: Order 1: Band
40119~40120	Y - Power in Band 07 (left/central)	W	U32	left: 1 central: 1000	left: 2 central: 1	left: 5000 central: *1	
40121~40122	Y - Power in Band 07 (right/bandwidth)	W	U32	right: 1 bandwidth: 1000	right: 2 bandwidth: 0.1	right: 5000 bandwidth: 1	
40123	Y - Power in Band 07 (magnification)	W	U8	1	1	255	
40124	Y - Power in Band 08 (band/order)	W	U8	1	0	1	0: Order 1: Band
40125~40126	Y - Power in Band 08 (left/central)	W	U32	left: 1 central: 1000	left: 2 central: 1	left: 5000 central: *1	
40127~40128	Y - Power in Band 08 (right/bandwidth)	W	U32	right: 1 bandwidth: 1000	right: 2 bandwidth: 0.1	right: 5000 bandwidth: 1	
40129	Y - Power in Band 08 (magnification)	W	U8	1	1	255	
40130	Y - Power in Band 09 (band/order)	W	U8	1	0	1	0: Order 1: Band
40131~40132	Y - Power in Band 09 (left/central)	W	U32	left: 1 central: 1000	left: 2 central: 1	left: 5000 central: *1	
40133~40134	Y - Power in Band 09 (right/bandwidth)	W	U32	right: 1 bandwidth: 1000	right: 2 bandwidth: 0.1	right: 5000 bandwidth: 1	
40135	Y - Power in Band 09 (magnification)	W	U8	1	1	255	
40136	Y - Power in Band 10 (band/order)	W	U8	1	0	1	0: Order 1: Band
40137~40138	Y - Power in Band 10 (left/central)	W	U32	left: 1 central: 1000	left: 2 central: 1	left: 5000 central: *1	
40139~40140	Y - Power in Band 10 (right/bandwidth)	W	U32	right: 1 bandwidth: 1000	right: 2 bandwidth: 0.1	right: 5000 bandwidth: 1	
40141	Y - Power in Band 10 (magnification)	W	U8	1	1	255	
40142	Z - Power in Band 01 (band/order)	W	U8	1	0	1	0: Order 1: Band
40143~40144	Z - Power in Band 01 (left/central)	W	U32	left: 1 central: 1000	left: 2 central: 1	left: 5000 central: *1	
40145~40146	Z - Power in Band 01 (right/bandwidth)	W	U32	right: 1	right: 2	right: 5000	

				bandwidth: 1000	bandwidth: 0.1	bandwidth: 1	
40147	Z - Power in Band 01 (magnification)	W	U8	1	1	255	
40148	Z - Power in Band 02 (band/order)	W	U8	1	0	1	0: Order 1: Band
40149~40150	Z - Power in Band 02 (left/central)	W	U32	left: 1 central: 1000	left: 2 central: 1	left: 5000 central: *1	
40151~40152	Z - Power in Band 02 (right/bandwidth)	W	U32	right: 1 bandwidth: 1000	right: 2 bandwidth: 0.1	right: 5000 bandwidth: 1	
40153	Z - Power in Band 02 (magnification)	W	U8	1	1	255	
40154	Z - Power in Band 03 (band/order)	W	U8	1	0	1	0: Order 1: Band
40155~40156	Z - Power in Band 03 (left/central)	W	U32	left: 1 central: 1000	left: 2 central: 1	left: 5000 central: *1	
40157~40158	Z - Power in Band 03 (right/bandwidth)	W	U32	right: 1 bandwidth: 1000	right: 2 bandwidth: 0.1	right: 5000 bandwidth: 1	
40159	Z - Power in Band 03 (magnification)	W	U8	1	1	255	
40160	Z - Power in Band 04 (band/order)	W	U8	1	0	1	0: Order 1: Band
40161~40162	Z - Power in Band 04 (left/central)	W	U32	left: 1 central: 1000	left: 2 central: 1	left: 5000 central: *1	
40163~40164	Z - Power in Band 04 (right/bandwidth)	W	U32	right: 1 bandwidth: 1000	right: 2 bandwidth: 0.1	right: 5000 bandwidth: 1	
40165	Z - Power in Band 04 (magnification)	W	U8	1	1	255	
40166	Z - Power in Band 05 (band/order)	W	U8	1	0	1	0: Order 1: Band
40167~40168	Z - Power in Band 05 (left/central)	W	U32	left: 1 central: 1000	left: 2 central: 1	left: 5000 central: *1	
40169~40170	Z - Power in Band 05 (right/bandwidth)	W	U32	right: 1 bandwidth: 1000	right: 2 bandwidth: 0.1	right: 5000 bandwidth: 1	
40171	Z - Power in Band 05 (magnification)	W	U8	1	1	255	
40172	Z - Power in Band 06 (band/order)	W	U8	1	0	1	0: Order 1: Band
40173~40174	Z - Power in Band 06 (left/central)	W	U32	left: 1 central: 1000	left: 2 central: 1	left: 5000 central: *1	
40175~40176	Z - Power in Band 06 (right/bandwidth)	W	U32	right: 1 bandwidth: 1000	right: 2 bandwidth: 0.1	right: 5000 bandwidth: 1	
40177	Z - Power in Band 06 (magnification)	W	U8	1	1	255	
40178	Z - Power in Band 07 (band/order)	W	U8	1	0	1	0: Order 1: Band
40179~40180	Z - Power in Band 07 (left/central)	W	U32	left: 1	left: 2	left: 5000	

				central: 1000	central: 1	central: *1	
40181~40182	Z - Power in Band 07 (right/bandwidth)	W	U32	right: 1 bandwidth: 1000	right: 2 bandwidth: 0.1	right: 5000 bandwidth: 1	
40183	Z - Power in Band 07 (magnification)	W	U8	1	1	255	
40184	Z - Power in Band 08 (band/order)	W	U8	1	0	1	0: Order 1: Band
40185~40186	Z - Power in Band 08 (left/central)	W	U32	left: 1 central: 1000	left: 2 central: 1	left: 5000 central: *1	
40187~40188	Z - Power in Band 08 (right/bandwidth)	W	U32	right: 1 bandwidth: 1000	right: 2 bandwidth: 0.1	right: 5000 bandwidth: 1	
40189	Z - Power in Band 08 (magnification)	W	U8	1	1	255	
40190	Z - Power in Band 09 (band/order)	W	U8	1	0	1	0: Order 1: Band
40191~40192	Z - Power in Band 09 (left/central)	W	U32	left: 1 central: 1000	left: 2 central: 1	left: 5000 central: *1	
40193~40194	Z - Power in Band 09 (right/bandwidth)	W	U32	right: 1 bandwidth: 1000	right: 2 bandwidth: 0.1	right: 5000 bandwidth: 1	
40195	Z - Power in Band 09 (magnification)	W	U8	1	1	255	
40196	Z - Power in Band 10 (band/order)	W	U8	1	0	1	0: Order 1: Band
40197~40198	Z - Power in Band 10 (left/central)	W	U32	left: 1 central: 1000	left: 2 central: 1	left: 5000 central: *1	
40199~40200	Z - Power in Band 10 (right/bandwidth)	W	U32	right: 1 bandwidth: 1000	right: 2 bandwidth: 0.1	right: 5000 bandwidth: 1	
40201	Z - Power in Band 10 (magnification)	W	U8	1	1	255	
40202	Hardware Trigger	W	U8	X	0	1	0: OFF 1: ON
40203	Instrument Type	W	U8	X	0	4	0: customized 1~4: ISO-20816
40204	Gear Van Pass Enable/Disable	W	U8	X	0	255	0: Both disable 1: Gear enable 2: Van enable 3: Both enable
40205	Gear Number	W	U8	1	5	255	
40206	Van Pass	W	U8	1	3	255	
40207~40208	X - Overall (Warning)	W	U32	0.001	0	float32 range	
40209~40210	X - Overall (Alarm)	W	U32	0.001	0	float32 range	
40211~40212	Y - Overall (Warning)	W	U32	0.001	0	float32 range	
40213~40214	Y - Overall (Alarm)	W	U32	0.001	0	float32 range	
40215~40216	Z - Overall (Warning)	W	U32	0.001	0	float32 range	

40217~40218	Z - Overall (Alarm)	W	U32	0.001	0	float32 range	
40219~40220	X - Peak (Warning)	W	U32	0.001	0	float32 range	
40221~40222	X - Peak(Alarm)	W	U32	0.001	0	float32 range	
40223~40224	Y - Peak (Warning)	W	U32	0.001	0	float32 range	
40225~40226	Y - Peak(Alarm)	W	U32	0.001	0	float32 range	
40227~40228	Z - Peak (Warning)	W	U32	0.001	0	float32 range	
40229~40230	Z - Peak(Alarm)	W	U32	0.001	0	float32 range	
40231~40232	X - Peak to Peak (Warning)	W	U32	0.001	0	float32 range	
40233~40234	X - Peak to Peak(Alarm)	W	U32	0.001	0	float32 range	
40235~40236	Y - Peak to Peak (Warning)	W	U32	0.001	0	float32 range	
40237~40238	Y - Peak to Peak(Alarm)	W	U32	0.001	0	float32 range	
40239~40240	Z - Peak to Peak (Warning)	W	U32	0.001	0	float32 range	
40241~40242	Z - Peak to Peak(Alarm)	W	U32	0.001	0	float32 range	
40243~40244	X - Crest Factor(Warning)	W	U32	0.001	0	float32 range	
40245~40246	X - Crest Factor(Alarm)	W	U32	0.001	0	float32 range	
40247~40248	Y - Crest Factor(Warning)	W	U32	0.001	0	float32 range	
40249~40250	Y - Crest Factor(Alarm)	W	U32	0.001	0	float32 range	
40251~40252	Z - Crest Factor(Warning)	W	U32	0.001	0	float32 range	
40253~40254	Z - Crest Factor(Alarm)	W	U32	0.001	0	float32 range	
40255~40256	Power in Band 01(Warning)	W	U32	0.001	0	float32 range	
40257~40258	Power in Band 01(Alarm)	W	U32	0.001	0	float32 range	
40259~40260	Power in Band 02(Warning)	W	U32	0.001	0	float32 range	
40261~40262	Power in Band 02(Alarm)	W	U32	0.001	0	float32 range	
40263~40264	Power in Band 03(Warning)	W	U32	0.001	0	float32 range	
40265~40266	Power in Band 03(Alarm)	W	U32	0.001	0	float32 range	
40267~40268	Power in Band 04(Warning)	W	U32	0.001	0	float32 range	
40269~40270	Power in Band 04(Alarm)	W	U32	0.001	0	float32 range	
40271~40272	Power in Band 05(Warning)	W	U32	0.001	0	float32 range	
40273~40274	Power in Band 05(Alarm)	W	U32	0.001	0	float32 range	
40275~40276	Power in Band 06(Warning)	W	U32	0.001	0	float32 range	
40277~40278	Power in Band 06(Alarm)	W	U32	0.001	0	float32 range	
40279~40280	Power in Band 07(Warning)	W	U32	0.001	0	float32 range	
40281~40282	Power in Band 07(Alarm)	W	U32	0.001	0	float32 range	
40283~40284	Power in Band 08(Warning)	W	U32	0.001	0	float32 range	
40285~40286	Power in Band 08(Alarm)	W	U32	0.001	0	float32 range	
40287~40288	Power in Band 09(Warning)	W	U32	0.001	0	float32 range	
40289~40290	Power in Band 09(Alarm)	W	U32	0.001	0	float32 range	
40291~40292	Power in Band 10(Warning)	W	U32	0.001	0	float32 range	
40293~40294	Power in Band 10(Alarm)	W	U32	0.001	0	float32 range	
40295~40296	Y-Power in Band 01(Warning)	W	U32	0.001	0	float32 range	

40297~40298	Y-Power in Band 01(Alarm)	W	U32	0.001	0	float32 range	
40299~40300	Y-Power in Band 02(Warning)	W	U32	0.001	0	float32 range	
40301~40302	Y-Power in Band 02(Alarm)	W	U32	0.001	0	float32 range	
40303~40304	Y-Power in Band 03(Warning)	W	U32	0.001	0	float32 range	
40305~40306	Y-Power in Band 03(Alarm)	W	U32	0.001	0	float32 range	
40307~40308	Y-Power in Band 04(Warning)	W	U32	0.001	0	float32 range	
40309~40310	Y-Power in Band 04(Alarm)	W	U32	0.001	0	float32 range	
40311~40312	Y-Power in Band 05(Warning)	W	U32	0.001	0	float32 range	
40313~40314	Y-Power in Band 05(Alarm)	W	U32	0.001	0	float32 range	
40315~40316	Y-Power in Band 06(Warning)	W	U32	0.001	0	float32 range	
40317~40318	Y-Power in Band 06(Alarm)	W	U32	0.001	0	float32 range	
40319~40320	Y-Power in Band 07(Warning)	W	U32	0.001	0	float32 range	
40321~40322	Y-Power in Band 07(Alarm)	W	U32	0.001	0	float32 range	
40323~40324	Y-Power in Band 08(Warning)	W	U32	0.001	0	float32 range	
40325~40326	Y-Power in Band 08(Alarm)	W	U32	0.001	0	float32 range	
40327~40328	Y-Power in Band 09(Warning)	W	U32	0.001	0	float32 range	
40329~40330	Y-Power in Band 09(Alarm)	W	U32	0.001	0	float32 range	
40331~40332	Y-Power in Band 10(Warning)	W	U32	0.001	0	float32 range	
40333~40334	Y-Power in Band 10(Alarm)	W	U32	0.001	0	float32 range	
40335~40336	Z-Power in Band 01(Warning)	W	U32	0.001	0	float32 range	
40337~40338	Z-Power in Band 01(Alarm)	W	U32	0.001	0	float32 range	
40339~40340	Z-Power in Band 02(Warning)	W	U32	0.001	0	float32 range	
40341~40342	Z-Power in Band 02(Alarm)	W	U32	0.001	0	float32 range	
40343~40344	Z-Power in Band 03(Warning)	W	U32	0.001	0	float32 range	
40345~40346	Z-Power in Band 03(Alarm)	W	U32	0.001	0	float32 range	
40347~40348	Z-Power in Band 04(Warning)	W	U32	0.001	0	float32 range	
40349~40350	Z-Power in Band 04(Alarm)	W	U32	0.001	0	float32 range	
40351~40352	Z-Power in Band 05(Warning)	W	U32	0.001	0	float32 range	
40353~40354	Z-Power in Band 05(Alarm)	W	U32	0.001	0	float32 range	
40355~40356	Z-Power in Band 06(Warning)	W	U32	0.001	0	float32 range	
40357~40358	Z-Power in Band 06(Alarm)	W	U32	0.001	0	float32 range	
40359~40360	Z-Power in Band 07(Warning)	W	U32	0.001	0	float32 range	
40361~40362	Z-Power in Band 07(Alarm)	W	U32	0.001	0	float32 range	
40363~40364	Z-Power in Band 08(Warning)	W	U32	0.001	0	float32 range	
40365~40366	Z-Power in Band 08(Alarm)	W	U32	0.001	0	float32 range	
40367~40368	Z-Power in Band 09(Warning)	W	U32	0.001	0	float32 range	
40369~40370	Z-Power in Band 09(Alarm)	W	U32	0.001	0	float32 range	
40371~40372	Z-Power in Band 10(Warning)	W	U32	0.001	0	float32 range	
40373~40374	Z-Power in Band 10(Alarm)	W	U32	0.001	0	float32 range	
40375~40376	Bearing Defect(Warning)	W	U32	0.001	0	float32 range	

40377~40378	Bearing Defect(Alarm)	W	U32	0.001	0	float32 range	
40379~40380	Looseness(Warning)	W	U32	0.001	0	float32 range	
40381~40382	Looseness(Alarm)	W	U32	0.001	0	float32 range	
40383~40384	Misalignment(Warning)	W	U32	0.001	0	float32 range	
40385~40386	Misalignment(Alarm)	W	U32	0.001	0	float32 range	
40387~40388	Unbalance(Warning)	W	U32	0.001	0	float32 range	
40389~40390	Unbalance(Alarm)	W	U32	0.001	0	float32 range	
40391~40392	Gear mesh Defect(Warning)	W	U32	0.001	0	float32 range	
40393~40394	Gear mesh Defect(Alarm)	W	U32	0.001	0	float32 range	
40395~40396	Vane Pass Defect(Warning)	W	U32	0.001	0	float32 range	
40397~40398	Vane Pass Defect(Alarm)	W	U32	0.001	0	float32 range	
40399~40400	Temperature(Warning)	W	Inter32	0.001	-20	85	
40401~40402	Temperature(Alarm)	W	Inter32	0.001	-20	85	

*1: $\text{floor}\left(\frac{5000}{\text{RPM}_{\text{End}}/60} - \text{bandwidth}\right)$

Appendix P. Modbus Holding Register Table – Analysis Parameter Write Items (Motor.NonDriveEnd)

INPUT REGISTER							
Address 4X	Item	Attribute	Type	Scale	Min	Max	Description
40005	Firmware Configuration value version number	W	U8	x	1	255	0x03
40006~40007	User Axial Sensitivity	W	U32	0.000001	0.000001		
40008~40009	User Y-Axial Sensitivity	W	U32	0.000001	0.000001		
40010~40011	User Z-Axial Sensitivity	W	U32	0.000001	0.000001		
40012	Modbus Slave ID	W	U8	X	1	247	1~247 (10)
40013	Machine type	W	U16	X	0	5	3
40014~40015	Trigger Level	W	U32	0.001	0.001	16	
40016	Delay Time	W	U8	1	0	255	
40017	Analyze	W	U8	1	1	255	
40018~40019	RPM Start	W	U32	1	120	65520	
40020~40021	RPM End	W	U32	1	120	65520	
40022	Hardware Trigger	W	U8	X	0	1	0: OFF 1: ON
40023~40024	Line Frequency	W	U32	1	6	2494	
40025	Instrument Type	W	U8	X	0	4	0: customized 1~4: ISO-20816
40026~40027	X - Overall (Warning)	W	U32	0.001	0	float32 range	
40028~40029	X - Overall (Alarm)	W	U32	0.001	0	float32 range	
40030~40031	Y - Overall (Warning)	W	U32	0.001	0	float32 range	
40032~40033	Y - Overall (Alarm)	W	U32	0.001	0	float32 range	
40034~40035	Z - Overall (Warning)	W	U32	0.001	0	float32 range	
40036~40037	Z - Overall (Alarm)	W	U32	0.001	0	float32 range	

*1:
$$\text{floor}\left(\frac{5000}{\text{RPM}_{\text{End}}/60} - \text{bandwidth}\right)$$

Appendix Q. Modbus Holding Register Table – Analysis Parameter Write Items (Motor.DriveEnd.DirectBelt)

INPUT REGISTER							
Address 4X	Item	Attribute	Type	Scale	Min	Max	Description
40005	Firmware Configuration value version number	W	U8	x	1	255	0x03
40006~40007	User Axial Sensitivity	W	U32	0.000001	0.000001		
40008~40009	User Y-Axial Sensitivity	W	U32	0.000001	0.000001		
40010~40011	User Z-Axial Sensitivity	W	U32	0.000001	0.000001		
40012	Modbus Slave ID	W	U8	X	1	247	1~247 (10)
40013	Machine type	W	U16	X	0	5	1
40014~40015	Trigger Level	W	U32	0.001	0.001	16	
40016	Delay Time	W	U8	1	0	255	
40017	Analyze	W	U8	1	1	255	
40018~40019	RPM Start	W	U32	1	120	65520	
40020~40021	RPM End	W	U32	1	120	65520	
40022	Hardware Trigger	W	U8	X	0	1	0: OFF 1: ON
40023~40024	Line Frequency	W	U32	1	6	2494	
40025	Instrument Type	W	U8	X	0	4	0: customized 1~4: ISO-20816
40026~40027	X - Overall (Warning)	W	U32	0.001	0	float32 range	
40028~40029	X - Overall (Alarm)	W	U32	0.001	0	float32 range	
40030~40031	Y - Overall (Warning)	W	U32	0.001	0	float32 range	
40032~40033	Y - Overall (Alarm)	W	U32	0.001	0	float32 range	
40034~40035	Z - Overall (Warning)	W	U32	0.001	0	float32 range	
40036~40037	Z - Overall (Alarm)	W	U32	0.001	0	float32 range	

*1:
$$\text{floor}\left(\frac{5000}{\text{RPM}_{\text{End}}/60} - \text{bandwidth}\right)$$

Appendix R. Modbus Holding Register Table – Analysis Parameter Write Items (Motor.DriveEnd.DirectDrive)

INPUT REGISTER							
Address 4X	Item	Attribute	Type	Scale	Min	Max	Description
40005	Firmware Configuration value version number	W	U8	x	1	255	0x03
40006~40007	User Axial Sensitivity	W	U32	0.000001	0.000001		
40008~40009	User Y-Axial Sensitivity	W	U32	0.000001	0.000001		
40010~40011	User Z-Axial Sensitivity	W	U32	0.000001	0.000001		
40012	Modbus Slave ID	W	U8	X	1	247	1~247 (10)
40013	Machine type	W	U16	X	0	5	2
40014~40015	Trigger Level	W	U32	0.001	0.001	16	
40016	Delay Time	W	U8	1	0	255	
40017	Analyze	W	U8	1	1	255	
40018~40019	RPM Start	W	U32	1	120	65520	
40020~40021	RPM End	W	U32	1	120	65520	
40022	Hardware Trigger	W	U8	X	0	1	0: OFF 1: ON
40023~40024	Line Frequency	W	U32	1	6	2494	
40025	Instrument Type	W	U8	X	0	4	0: customized 1~4: ISO-20816
40026~40027	X - Overall (Warning)	W	U32	0.001	0	float32 range	
40028~40029	X - Overall (Alarm)	W	U32	0.001	0	float32 range	
40030~40031	Y - Overall (Warning)	W	U32	0.001	0	float32 range	
40032~40033	Y - Overall (Alarm)	W	U32	0.001	0	float32 range	
40034~40035	Z - Overall (Warning)	W	U32	0.001	0	float32 range	
40036~40037	Z - Overall (Alarm)	W	U32	0.001	0	float32 range	

*1:
$$\text{floor}\left(\frac{5000}{\text{RPM}_{\text{End}}/60} - \text{bandwidth}\right)$$

Appendix S. Modbus Holding Register Table – Analysis Parameter Write Items (Roller.FreeEnd)

INPUT REGISTER							
Address 4X	Item	Attribute	Type	Scale	Min	Max	Description
40005	Firmware Configuration value version number	W	U8	x	1	255	0x03
40006~40007	User Axial Sensitivity	W	U32	0.000001	0.000001		
40008~40009	User Y-Axial Sensitivity	W	U32	0.000001	0.000001		
40010~40011	User Z-Axial Sensitivity	W	U32	0.000001	0.000001		
40012	Modbus Slave ID	W	U8	X	1	247	1~247 (10)
40013	Machine type	W	U16	X	0	5	5
40014~40015	Trigger Level	W	U32	0.001	0.001	16	
40016	Delay Time	W	U8	1	0	255	
40017	Analyze	W	U8	1	1	255	
40018~40019	RPM Start	W	U32	1	120	65520	
40020~40021	RPM End	W	U32	1	120	65520	
40022	Hardware Trigger	W	U8	X	0	1	0: OFF 1: ON
40023	Instrument Type	W	U8	X	0	4	0: customized 1~4: ISO-20816
40024~40025	X - Overall (Warning)	W	U32	0.001	0	float32 range	
40026~40027	X - Overall (Alarm)	W	U32	0.001	0	float32 range	
40028~40029	Y - Overall (Warning)	W	U32	0.001	0	float32 range	
40030~40031	Y - Overall (Alarm)	W	U32	0.001	0	float32 range	
40032~40033	Z - Overall (Warning)	W	U32	0.001	0	float32 range	
40034~40035	Z - Overall (Alarm)	W	U32	0.001	0	float32 range	

*1: $\text{floor}\left(\frac{5000}{\text{RPM}_{\text{End}}/60} - \text{bandwidth}\right)$

Appendix T. Modbus Holding Register Table – Analysis Parameter Write Items (Roller.BeltDrivenEnd)

INPUT REGISTER							
Address 4X	Item	Attribute	Type	Scale	Min	Max	Description
40005	Firmware Configuration value version number	W	U8	x	1	255	0x03
40006~40007	User Axial Sensitivity	W	U32	0.000001	0.000001		
40008~40009	User Y-Axial Sensitivity	W	U32	0.000001	0.000001		
40010~40011	User Z-Axial Sensitivity	W	U32	0.000001	0.000001		
40012	Modbus Slave ID	W	U8	X	1	247	1~247 (10)
40013	Machine type	W	U16	X	0	5	4
40014~40015	Trigger Level	W	U32	0.001	0.001	16	
40016	Delay Time	W	U8	1	0	255	
40017	Analyze	W	U8	1	1	255	
40018~40019	RPM Start	W	U32	1	120	65520	
40020~40021	RPM End	W	U32	1	120	65520	
40022	Hardware Trigger	W	U8	X	0	1	0: OFF 1: ON
40023	Instrument Type	W	U8	X	0	4	0: customized 1~4: ISO-20816
40024~40025	X - Overall (Warning)	W	U32	0.001	0	float32 range	
40026~40027	X - Overall (Alarm)	W	U32	0.001	0	float32 range	
40028~40029	Y - Overall (Warning)	W	U32	0.001	0	float32 range	
40030~40031	Y - Overall (Alarm)	W	U32	0.001	0	float32 range	
40032~40033	Z - Overall (Warning)	W	U32	0.001	0	float32 range	
40034~40035	Z - Overall (Alarm)	W	U32	0.001	0	float32 range	

*1:
$$\text{floor}\left(\frac{5000}{\text{RPM}_{\text{End}}/60} - \text{bandwidth}\right)$$

Appendix U. Analysis Parameter Error Codes

Address	Description (0 is okay, 1 is error)	Attribute
10030	Checksum error	R
10031	Configuration version number exceeds supported versions	R
10032	User Sensitivity exceeds document definition range	R
10033	User Y-Sensitivity exceeds document definition range	R
10034	User Z-Sensitivity exceeds document definition range	R
10035	Trigger Level is not within accelerometer detectable g value range	R
10036	Delay Time value is not within acceptable range	R
10037	Analyze value is not within acceptable range	R
10038	RPM Start and End are not within accelerometer detectable frequency range	R
10039	RPM Start is greater than End	R
10044	X -Power in Band 01 did not select Band or Orders	R
10045	X -Power in Band 01 Start and Stop range are not within accelerometer detectable frequency range	R
10046	X -Power in Band 01 Start is greater than Stop	R
10047	X -Power in Band 01 Orders and bandwidth values are not within acceptable range	R
10048	X -Power in Band 02 did not select Band or Orders	R
10049	X -Power in Band 02 Start and Stop range are not within accelerometer detectable frequency range	R
10050	X -Power in Band 02 Start is greater than Stop	R
10051	X -Power in Band 02 Orders and bandwidth values are not within acceptable range	R
10052	X -Power in Band 03 did not select Band or Orders	R
10053	X -Power in Band 03 Start and Stop range are not within accelerometer detectable frequency range	R
10054	X -Power in Band 03 Start is greater than Stop	R
10055	X -Power in Band 03 Orders and bandwidth values are not within acceptable range	R
10056	X -Power in Band 04 did not select Band or Orders	R
10057	X -Power in Band 04 Start and Stop range are not within accelerometer detectable frequency range	R
10058	X -Power in Band 04 Start is greater than Stop	R
10059	X -Power in Band 04 Orders and bandwidth values are not within acceptable range	R
10060	X -Power in Band 05 did not select Band or Orders	R
10061	X -Power in Band 05 Start and Stop range are not within accelerometer detectable frequency range	R

10062	X -Power in Band 05 Start is greater than Stop	R
10063	X -Power in Band 05 Orders and bandwidth values are not within acceptable range	R
10064	X -Power in Band 06 did not select Band or Orders	R
10065	X -Power in Band 06 Start and Stop range are not within accelerometer detectable frequency range	R
10066	X -Power in Band 06 Start is greater than Stop	R
10067	X -Power in Band 06 Orders and bandwidth values are not within acceptable range	R
10068	X -Power in Band 07 did not select Band or Orders	R
10069	X -Power in Band 07 Start and Stop range are not within accelerometer detectable frequency range	R
10070	X -Power in Band 07 Start is greater than Stop	R
10071	X -Power in Band 07 Orders and bandwidth values are not within acceptable range	R
10072	X -Power in Band 08 did not select Band or Orders	R
10073	X -Power in Band 08 Start and Stop range are not within accelerometer detectable frequency range	R
10074	X -Power in Band 08 Start is greater than Stop	R
10075	X -Power in Band 08 Orders and bandwidth values are not within acceptable range	R
10076	X -Power in Band 09 did not select Band or Orders	R
10077	X -Power in Band 09 Start and Stop range are not within accelerometer detectable frequency range	R
10078	X -Power in Band 09 Start is greater than Stop	R
10079	X -Power in Band 09 Orders and bandwidth values are not within acceptable range	R
10080	X -Power in Band 10 did not select Band or Orders	R
10081	X -Power in Band 10 Start and Stop range are not within accelerometer detectable frequency range	R
10082	X -Power in Band 10 Start is greater than Stop	R
10083	X -Power in Band 10 Orders and bandwidth values are not within acceptable range	R
10084	Y -Power in Band 01 did not select Band or Orders	R
10085	Y -Power in Band 01 Start and Stop range are not within accelerometer detectable frequency range	R
10086	Y -Power in Band 01 Start is greater than Stop	R
10087	Y -Power in Band 01 Orders and bandwidth values are not within acceptable range	R
10088	Y -Power in Band 02 did not select Band or Orders	R

10089	Y -Power in Band 02 Start and Stop range are not within accelerometer detectable frequency range	R
10090	Y -Power in Band 02 Start is greater than Stop	R
10091	Y -Power in Band 02 Orders and bandwidth values are not within acceptable range	R
10092	Y -Power in Band 03 did not select Band or Orders	R
10093	Y -Power in Band 03 Start and Stop range are not within accelerometer detectable frequency range	R
10094	Y -Power in Band 03 Start is greater than Stop	R
10095	Y -Power in Band 03 Orders and bandwidth values are not within acceptable range	R
10096	Y -Power in Band 04 did not select Band or Orders	R
10097	Y -Power in Band 04 Start and Stop range are not within accelerometer detectable frequency range	R
10098	Y -Power in Band 04 Start is greater than Stop	R
10099	Y -Power in Band 04 Orders and bandwidth values are not within acceptable range	R
10100	Y -Power in Band 05 did not select Band or Orders	R
10101	Y -Power in Band 05 Start and Stop range are not within accelerometer detectable frequency range	R
10102	Y -Power in Band 05 Start is greater than Stop	R
10103	Y -Power in Band 05 Orders and bandwidth values are not within acceptable range	R
10104	Y -Power in Band 06 did not select Band or Orders	R
10105	Y -Power in Band 06 Start and Stop range are not within accelerometer detectable frequency range	R
10106	Y -Power in Band 06 Start is greater than Stop	R
10107	Y -Power in Band 06 Orders and bandwidth values are not within acceptable range	R
10108	Y -Power in Band 07 did not select Band or Orders	R
10109	Y -Power in Band 07 Start and Stop range are not within accelerometer detectable frequency range	R
10110	Y -Power in Band 07 Start is greater than Stop	R
10111	Y -Power in Band 07 Orders and bandwidth values are not within acceptable range	R
10112	Y -Power in Band 08 did not select Band or Orders	R
10113	Y -Power in Band 08 Start and Stop range are not within accelerometer detectable frequency range	R
10114	Y -Power in Band 08 Start is greater than Stop	R
10115	Y -Power in Band 08 Orders and bandwidth values are not within acceptable range	R

10116	Y -Power in Band 09 did not select Band or Orders	R
10117	Y -Power in Band 09 Start and Stop range are not within accelerometer detectable frequency range	R
10118	Y -Power in Band 09 Start is greater than Stop	R
10119	Y -Power in Band 09 Orders and bandwidth values are not within acceptable range	R
10120	Y -Power in Band 10 did not select Band or Orders	R
10121	Y -Power in Band 10 Start and Stop range are not within accelerometer detectable frequency range	R
10122	Y -Power in Band 10 Start is greater than Stop	R
10123	Y -Power in Band 10 Orders and bandwidth values are not within acceptable range	R
10124	Z -Power in Band 01 did not select Band or Orders	R
10125	Z -Power in Band 01 Start and Stop range are not within accelerometer detectable frequency range	R
10126	Z -Power in Band 01 Start is greater than Stop	R
10127	Z -Power in Band 01 Orders and bandwidth values are not within acceptable range	R
10128	Z -Power in Band 02 did not select Band or Orders	R
10129	Z -Power in Band 02 Start and Stop range are not within accelerometer detectable frequency range	R
10130	Z -Power in Band 02 Start is greater than Stop	R
10131	Z -Power in Band 02 Orders and bandwidth values are not within acceptable range	R
10132	Z -Power in Band 03 did not select Band or Orders	R
10133	Z -Power in Band 03 Start and Stop range are not within accelerometer detectable frequency range	R
10134	Z -Power in Band 03 Start is greater than Stop	R
10135	Z -Power in Band 03 Orders and bandwidth values are not within acceptable range	R
10136	Z -Power in Band 04 did not select Band or Orders	R
10137	Z -Power in Band 04 Start and Stop range are not within accelerometer detectable frequency range	R
10138	Z -Power in Band 04 Start is greater than Stop	R
10139	Z -Power in Band 04 Orders and bandwidth values are not within acceptable range	R
10140	Z -Power in Band 05 did not select Band or Orders	R
10141	Z -Power in Band 05 Start and Stop range are not within accelerometer detectable frequency range	R
10142	Z -Power in Band 05 Start is greater than Stop	R

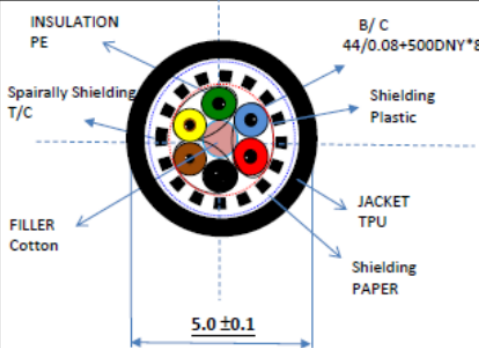
10143	Z -Power in Band 05 Orders and bandwidth values are not within acceptable range	R
10144	Z -Power in Band 06 did not select Band or Orders	R
10145	Z -Power in Band 06 Start and Stop range are not within accelerometer detectable frequency range	R
10146	Z -Power in Band 06 Start is greater than Stop	R
10147	Z -Power in Band 06 Orders and bandwidth values are not within acceptable range	R
10148	Z -Power in Band 07 did not select Band or Orders	R
10149	Z -Power in Band 07 Start and Stop range are not within accelerometer detectable frequency range	R
10150	Z -Power in Band 07 Start is greater than Stop	R
10151	Z -Power in Band 07 Orders and bandwidth values are not within acceptable range	R
10152	Z -Power in Band 08 did not select Band or Orders	R
10153	Z -Power in Band 08 Start and Stop range are not within accelerometer detectable frequency range	R
10154	Z -Power in Band 08 Start is greater than Stop	R
10155	Z -Power in Band 08 Orders and bandwidth values are not within acceptable range	R
10156	Z -Power in Band 09 did not select Band or Orders	R
10157	Z -Power in Band 09 Start and Stop range are not within accelerometer detectable frequency range	R
10158	Z -Power in Band 09 Start is greater than Stop	R
10159	Z -Power in Band 09 Orders and bandwidth values are not within acceptable range	R
10160	Z -Power in Band 10 did not select Band or Orders	R
10161	Z -Power in Band 10 Start and Stop range are not within accelerometer detectable frequency range	R
10162	Z -Power in Band 10 Start is greater than Stop	R
10163	Z -Power in Band 10 Orders and bandwidth values are not within acceptable range	R
10164	Hardware Trigger is not within selectable range	R
10165	Instrument Type is not within selectable range	R
10166	Enable/Disable is non-correct input	R
10167	Gear Ratio is not within document definition range	R
10168	Van Pass is not within document definition range	R
10169	X -Overall Warning is greater than Alarm	R
10170	Y -Overall Warning is greater than Alarm	R
10171	Z -Overall Warning is greater than Alarm	R
10172	X -Peak Warning is greater than Alarm	R

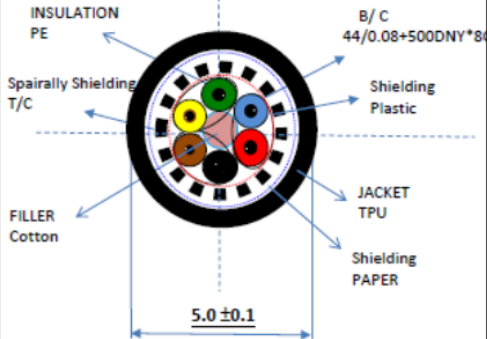
10173	Y -Peak Warning is greater than Alarm	R
10174	Y -Peak Warning is greater than Alarm	R
10175	X -Peak to Peak Warning is greater than Alarm	R
10176	Y -Peak to Peak Warning is greater than Alarm	R
10177	Z -Peak to Peak Warning is greater than Alarm	R
10178	X -Crest Factor Warning is greater than Alarm	R
10179	Y -Crest Factor Warning is greater than Alarm	R
10180	Z -Crest Factor Warning is greater than Alarm	R
10181	X -Power in Band 01 Warning is greater than Alarm	R
10182	X -Power in Band 02 Warning is greater than Alarm	R
10183	X -Power in Band 03 Warning is greater than Alarm	R
10184	X -Power in Band 04 Warning is greater than Alarm	R
10185	X -Power in Band 05 Warning is greater than Alarm	R
10186	X -Power in Band 06 Warning is greater than Alarm	R
10187	X -Power in Band 07 Warning is greater than Alarm	R
10188	X -Power in Band 08 Warning is greater than Alarm	R
10189	X -Power in Band 09 Warning is greater than Alarm	R
10190	X -Power in Band 10 Warning is greater than Alarm	R
10191	Y-Power in Band 01 Warning is greater than Alarm	R
10192	Y-Power in Band 02 Warning is greater than Alarm	R
10193	Y-Power in Band 03 Warning is greater than Alarm	R
10194	Y-Power in Band 04 Warning is greater than Alarm	R
10195	Y-Power in Band 05 Warning is greater than Alarm	R
10196	Y-Power in Band 06 Warning is greater than Alarm	R
10197	Y-Power in Band 07 Warning is greater than Alarm	R
10198	Y-Power in Band 08 Warning is greater than Alarm	R
10199	Y-Power in Band 09 Warning is greater than Alarm	R
10200	Y-Power in Band 10 Warning is greater than Alarm	R
10201	Z-Power in Band 01 Warning is greater than Alarm	R
10202	Z-Power in Band 02 Warning is greater than Alarm	R
10203	Z-Power in Band 03 Warning is greater than Alarm	R
10204	Z-Power in Band 04 Warning is greater than Alarm	R
10205	Z-Power in Band 05 Warning is greater than Alarm	R
10206	Z-Power in Band 06 Warning is greater than Alarm	R
10207	Z-Power in Band 07 Warning is greater than Alarm	R
10208	Z-Power in Band 08 Warning is greater than Alarm	R
10209	Z-Power in Band 09 Warning is greater than Alarm	R
10210	Z-Power in Band 10 Warning is greater than Alarm	R
10211	Bearing Warning is greater than Alarm	R
10212	Looseness Warning is greater than Alarm	R
10213	Misalignment Warning is greater than Alarm	R

10214	Unbalance Warning is greater than Alarm	R
10215	Gear mesh Warning is greater than Alarm	R
10216	Van pass Warning is greater than Alarm	R
10217	Temperature Warning is greater than Alarm	R
10218	Modbus Slave ID value exceeds document definition range	R
10219	Line Frequency exceeds defined range	R
10220	Machine Type exceeds defined range	R

Appendix V. Aurora Cable Specifications

DRAWING NO : YF200103				A1		SPECIFICATION			
REMARKS :						CONDUCTORS	Material	Bare Copper	
1. RoHS COMPLIANT							AWG	#24 * 3P	
2. REACH							Construction	44/0.08+500DNY	
							Material	PE	
						INSULATION	O. D.	0.85±0.05 mm	
							Color	1. BR*BK 2. YL*GN 3. BL*RD	
							Material	Plastic Myla	
						Shielding	Coverage	25% ↑	
							Spirally Shielding	Material	Tinned Copper
						FILLER	Coverage	90% ↑	
							Shielding	Material	Cotton
						JACKET	Material	PAPEER	
							Coverage	25% ↑	
							Material	TPU	
							THICKNESS AVG.	0.5 mm ↑	
							O. D.	5.0 ±0.1 mm	
						ELECTRIC CHARACTERS	Color	BLACK	
							Rater Temperature	-20 ~ 125℃	
							Rated Voltage	300 (V-AC)	
							Resistance of Insulation	10 MΩ/300m	
							Withstand Voltage Spark	1 KV/sec	

DRAWING NO : YF200103				A1	
REMARKS :					
1. RoHS COMPLIANT					
2. REACH					
					
製圖:	May	審核:	Philli	日期:	2020.03.02



製圖: May 審核: Philli 日期: 2020.03.02

Appendix W. Manual Version and Description

[illegible]