WTVB05 Product Data Sheet & User Manual

Product Specifications:

Model: WT-VB05

Description: Vibration sensor

Contents

1. Product Overview

1. The module has its own voltage stabilization circuit, the operating voltage is 5V~36V, and the connection is easy.

2. The use of advanced digital filtering technology can effectively reduce measurement noise and improve measurement accuracy.

3. At the same time, we provide users with various PC terminals , instructions for use, and development manuals, so as to minimize the R&D time for various needs.

4. Supports 485 and CAN interfaces, allowing users to easily select the optimal connection method. The serial port rate is adjustable from 4800bps to 230400bps.

5. Application areas: It can be widely used in bearing vibration measurement and real-time monitoring of rotating machinery such as submersible pumps, fans, steam turbines, coal mills, oxygen generators, generators, centrifuges, compressors, water pumps, motors, etc.

6. Three-axis displacement, three-axis velocity, and three-axis frequency outputs enable users to comprehensively measure vibration and shock, determining whether the measured object (motor or water pump) is damaged. If a machine malfunction is caused by factors such as bearing wear, cracking, poor dynamic balance, and misalignment, the vibration sensor can detect the fault in advance and issue an early warning, preventing the machine from continuing to operate under adverse conditions and causing damage, which could lead to economic losses.

7. Multiple installation methods: magnetic connection, threaded connection. Firm and stable, easy to install and disassemble.

8. Industrial-grade temperature sensing element, faster and more accurate acquisition of ambient temperature

2. Parameter indicators

2.1. Basic parameters

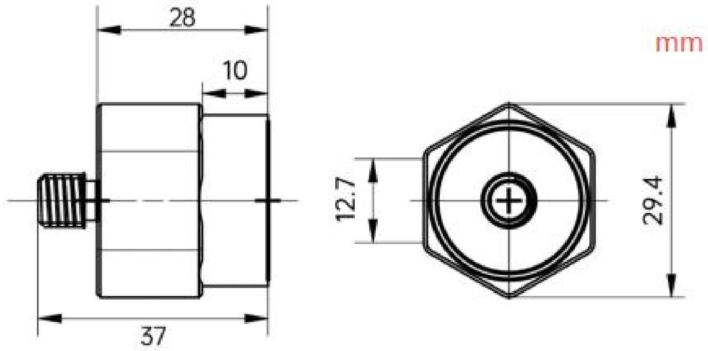
Parameter	Condition	Min	Default	Max
Communication interface	485	4800bps	9600bps	230400bps
	CAN	3K	250K	1M

Output content	On-chip time, 3-axis acceleration, 3-axis vibration velocity, 3-axis vibration displacement, 3-axis vibration frequency , temperature			
Range	Vibration speed: 0~600mm/s, vibration displacement: 0~60000um, vibration frequency: 5~2000Hz, temperature: -20℃~85℃			
Accuracy	<FS±4%			
Operating temperature		-20℃		85℃
Storage temperature		-40℃		85℃
Impact resistant				20000g
Protection level	IP67			

2.2. Parameter comparison

Product Appearance					
Model		WTVB02-485	WTVB01-485	WTVB05	WTVB01-BT50
Output	Vibration acceleration	√	√	√	/
	Vibration speed	√	√	√	√
	Vibration displacement	√	√	√	√
	Vibration frequency	√	√	√	√
	Chip Time	√	√	√	/
	Chip temperature	√	√	Ambient temperature	√
Output rate	Normal mode（1-200Hz)	Send a command and return once(1-200Hz)			1-100Hz (default 20Hz)
Range	Vibration acceleration	±16G	±16G	±16G	/
	Vibration displacement	0~60000um	0-30000um	0-60000um	0-30000um
	Vibration speed	0~600mm/s	0-600mm/s	0-600mm/s	0-600mm/s
	Vibration frequency	5-2000Hz	5-1000Hz	5-2000Hz	5-100Hz
Accuracy		<F.S±4%	<F.S±4%	<F.S±4%	<F.S±5%
Chip sampling rate		16KHz	1KHz	16KHz	1KHz
Communication interface		RS485	RS485	RS485/CAN	BLE5.0/TYPE-C
Communication Protocol		Modbus protocol	Modbus protocol	Modbus protocol CAN protocol	BLE5.0 protocol
Baud rate	RS485	4800bps-230400bps（default 9600bps)			115200bps (fixed)
	CAN	/	/	3K-1M(default 250K)	/
Temperature	Operating temperature	-40°C~85°C			-20°C~+60°C
	Storage temperature	-40°C~85°C			
Waterproof grade		IP67			Not waterproof
Operating voltage		9-36V			5V/3.7V(Battery voltage)
Working current		8mA		12mA (12V)	5mA(3.7V)
Weight		182g		67.5g	20g
Size		47*38*35mm			51.5*36.1*15mm

2.3. Product size Parameter comparison



2.4. Electrical parameters

Parameter	Condition	Min	Default	Max
Supply voltage		5V	12V	36V
Working current	Working (12V)		12mA	

Vibration velocity: the speed at which the vibration point of an object moves when it vibrates

Amplitude: The amplitude of the vibration point when the object vibrates (vibration displacement)

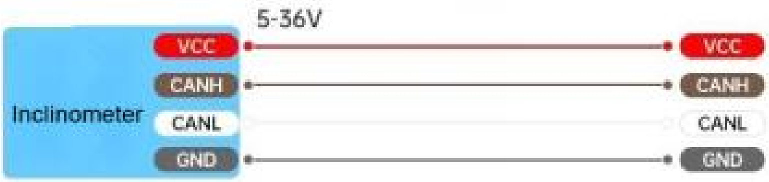
Vibration frequency: The number of times an object shakes per unit time during vibration. The vibration frequency measurement range is 1Hz~2000Hz

3. Hardware connection method

3.1. Wiring method

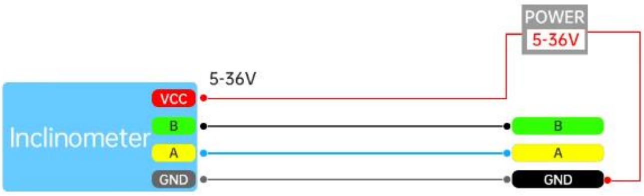
(CAN wiring method)

Writing	Red	Gray	Brown	White
	VCC	GND	CANH	CANL

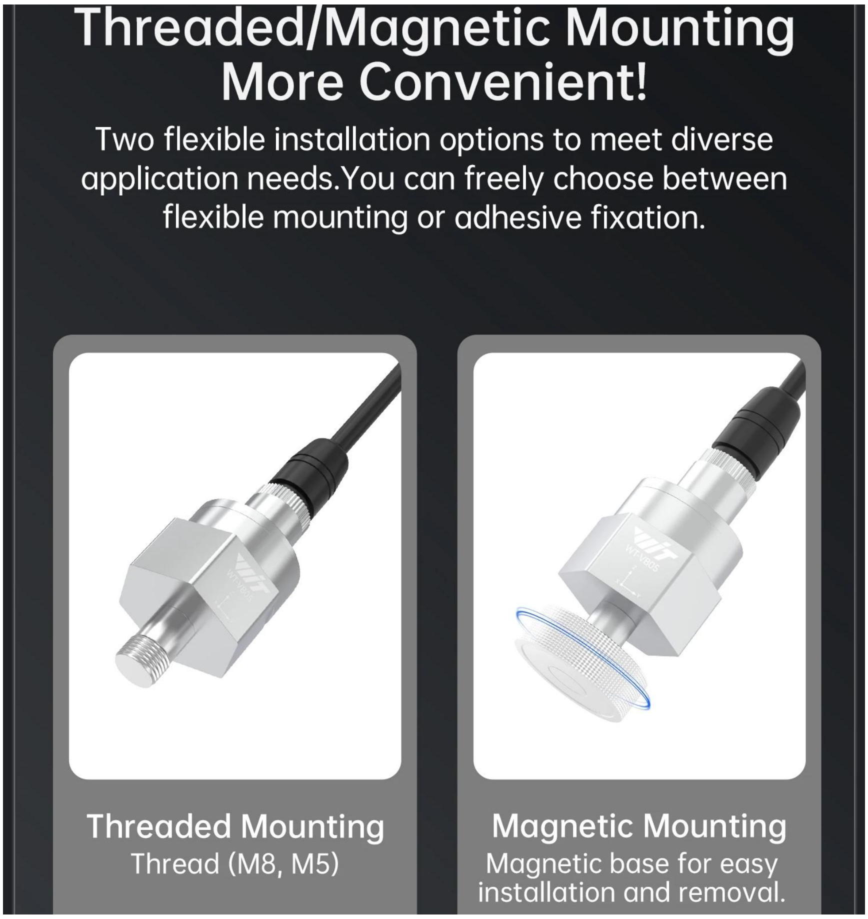


(485 Wiring Method)

Wire Color Function	RED	YELLOW	GREEN	BLACK
	VCC 5~36V	A	B	GND



3.2. Installation



4. How to use the software

4.1. PC software download

1. CH340 driver download link:

https://drive.google.com/file/d/1JidopB42R9EsCzMAYC3Ya9eJ8JbHapRF/view?usp=drive_link

2. Witmotion software download link:
https://drive.google.com/file/d/10xysnkuyUwi3AK_t3965SLr5Yt6YKE-u/view?usp=drive_link

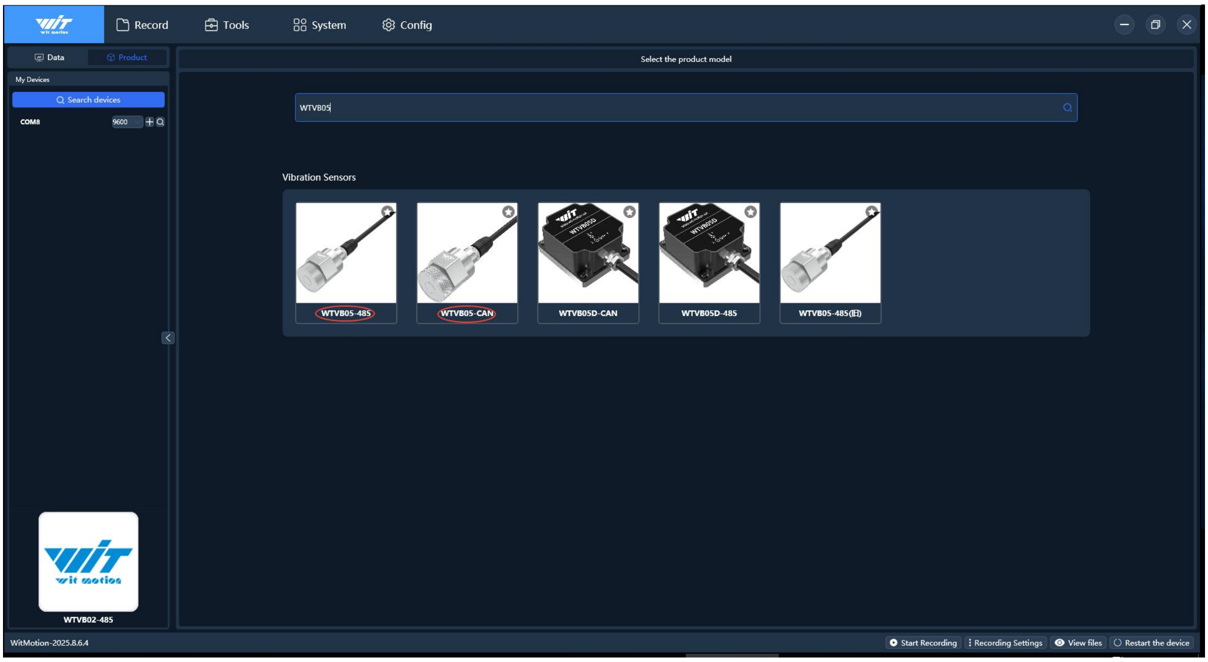
4.2. Connect to the PC software

to the computer via a USB adapter , open Witmotion.exe , and after installing the CH340 driver, you can query the corresponding port number in the device manager, as shown in the figure:

After the device is connected, open the Witmotion.exe software.

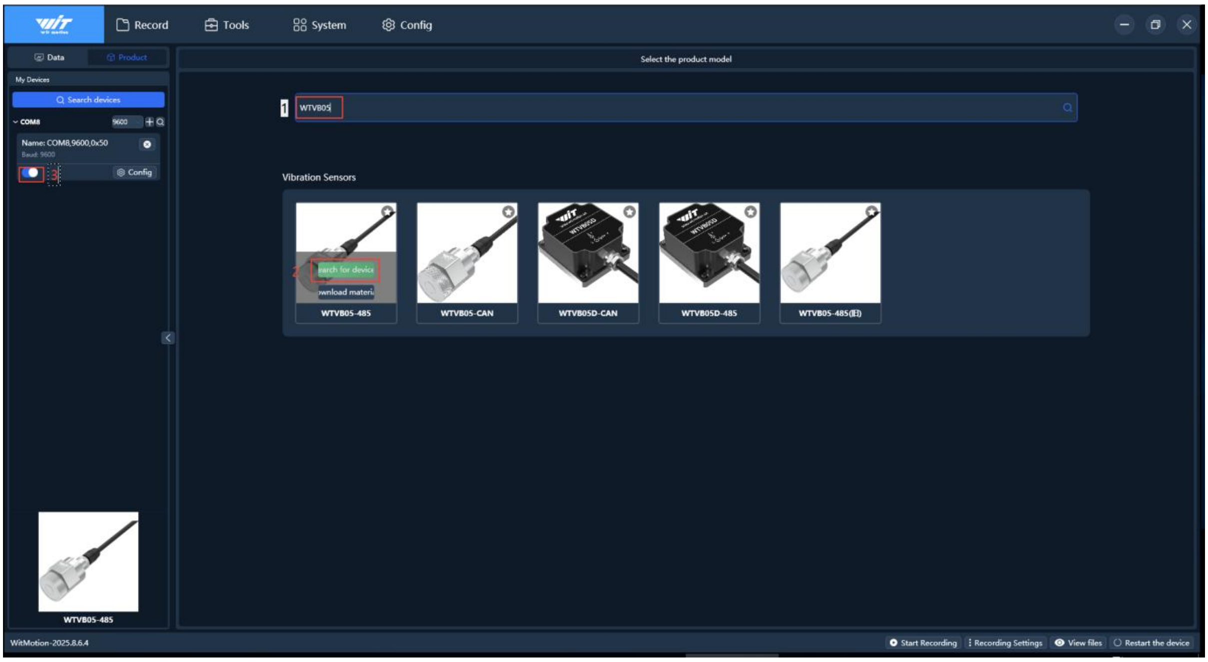
4.2.1. Automatic Search

1. Select WTVB05-485/WTVB05-CAN (WTVB05-485 is used for demonstration below).

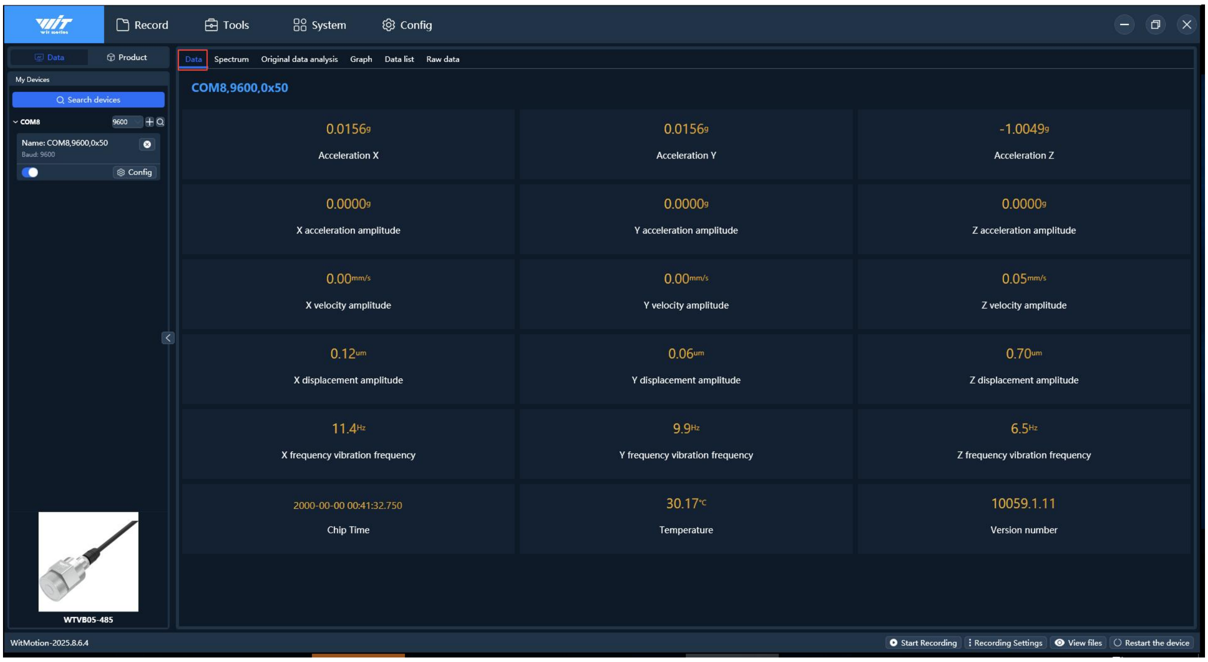


2. Click Search device.

3. Check the serial port number.



After the connection is successful, the data will be displayed on the software, as shown below:



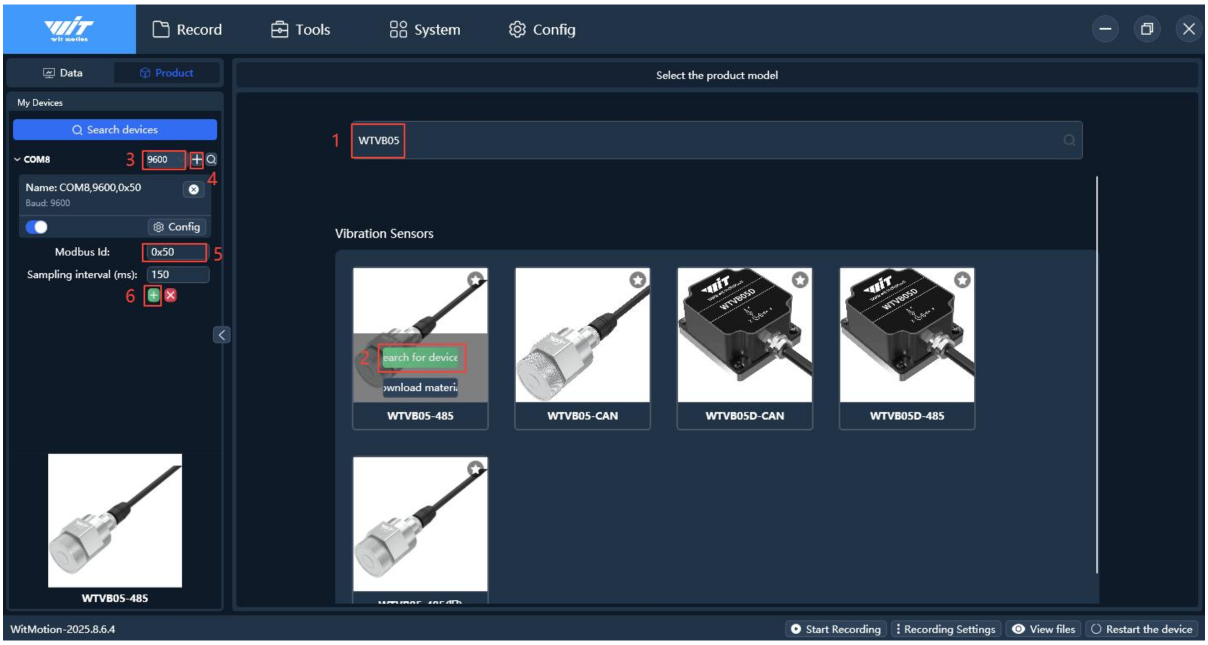
4.2.2. Manual connection

1. Select the model number WTVB05-485.

2. Select the baud rate of the corresponding port. The default baud rate is 9600

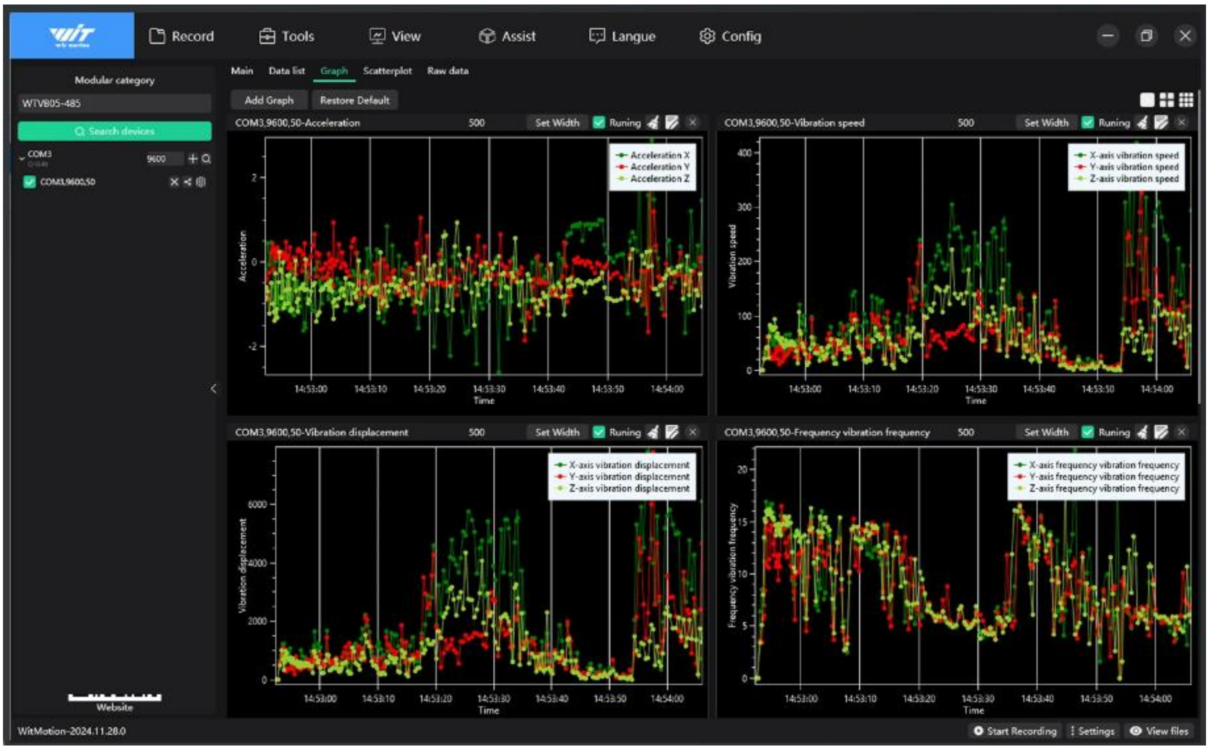
3. Enter the corresponding ID (the default is 0x50) and click the + sign to add the device.

As shown in the figure below:

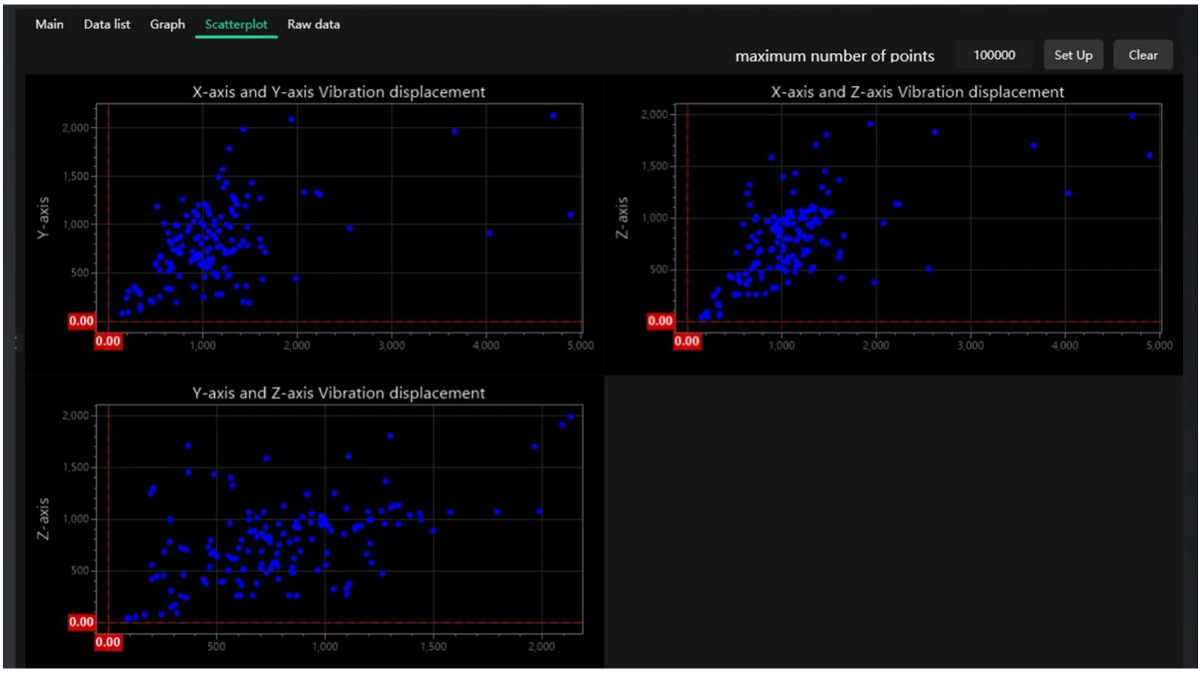


4.3. Graph

Click on the graph to see graphs of vibration speed, vibration frequency, vibration displacement and temperature:



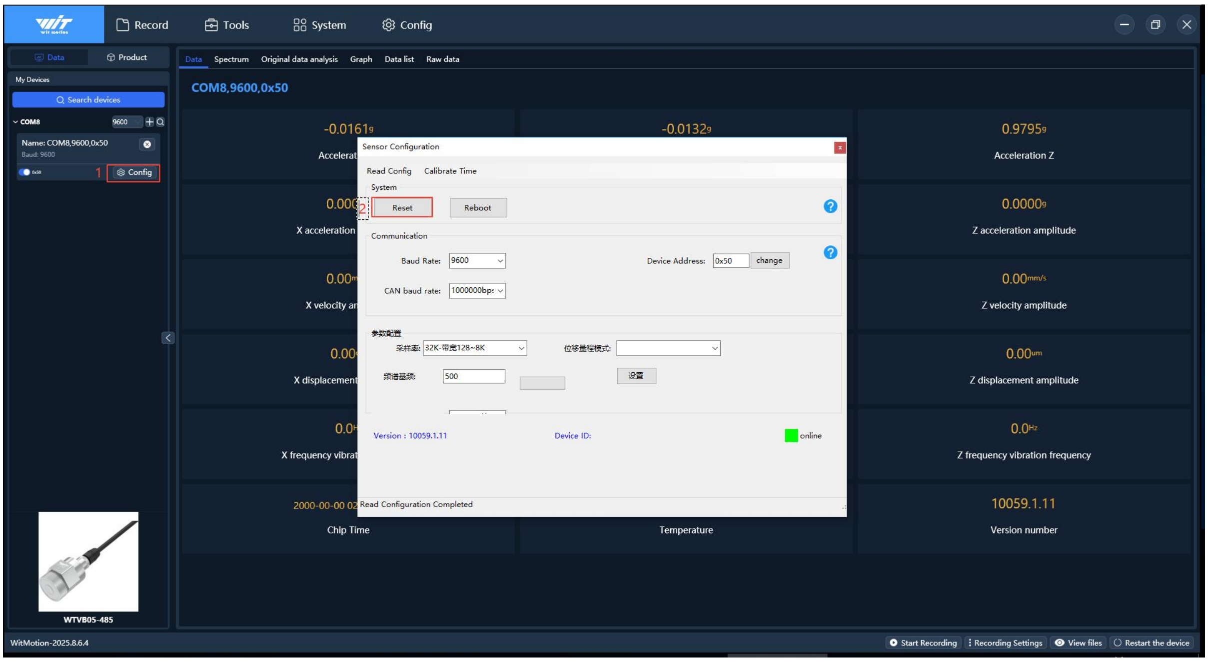
4.4. Scatter plot



5. Software Configuration

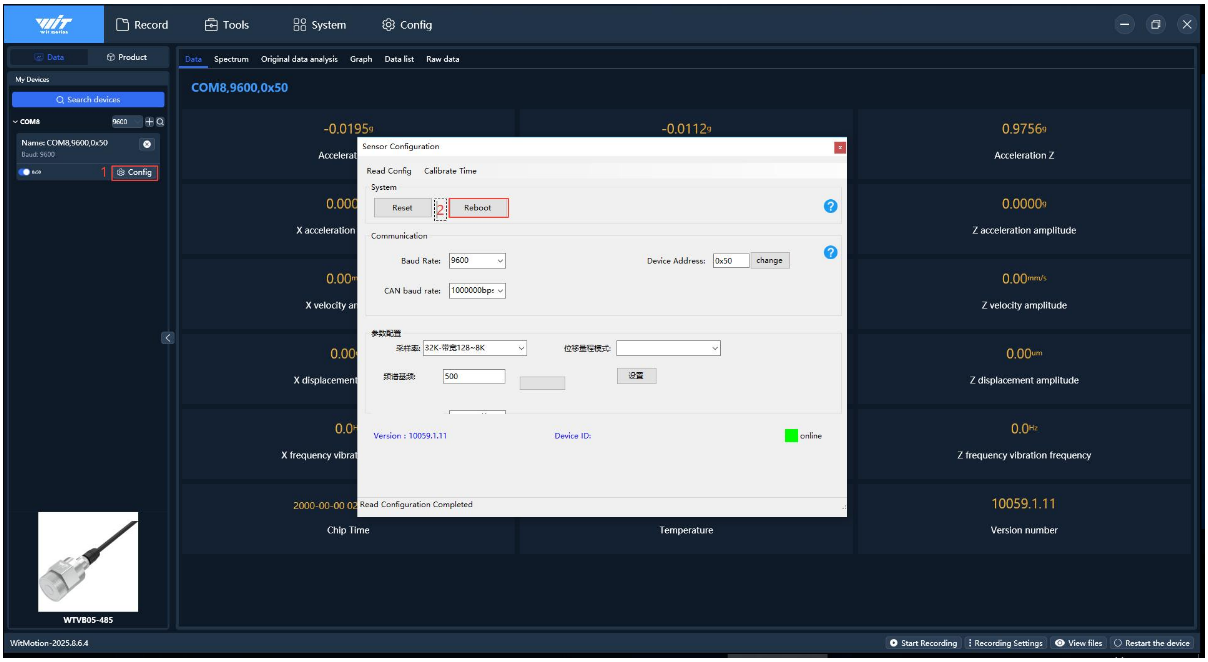
5.1. Reset Settings

Click "Configuration" and then click "Reset Settings" in the sensor configuration interface to Reset the factory settings, as shown below:



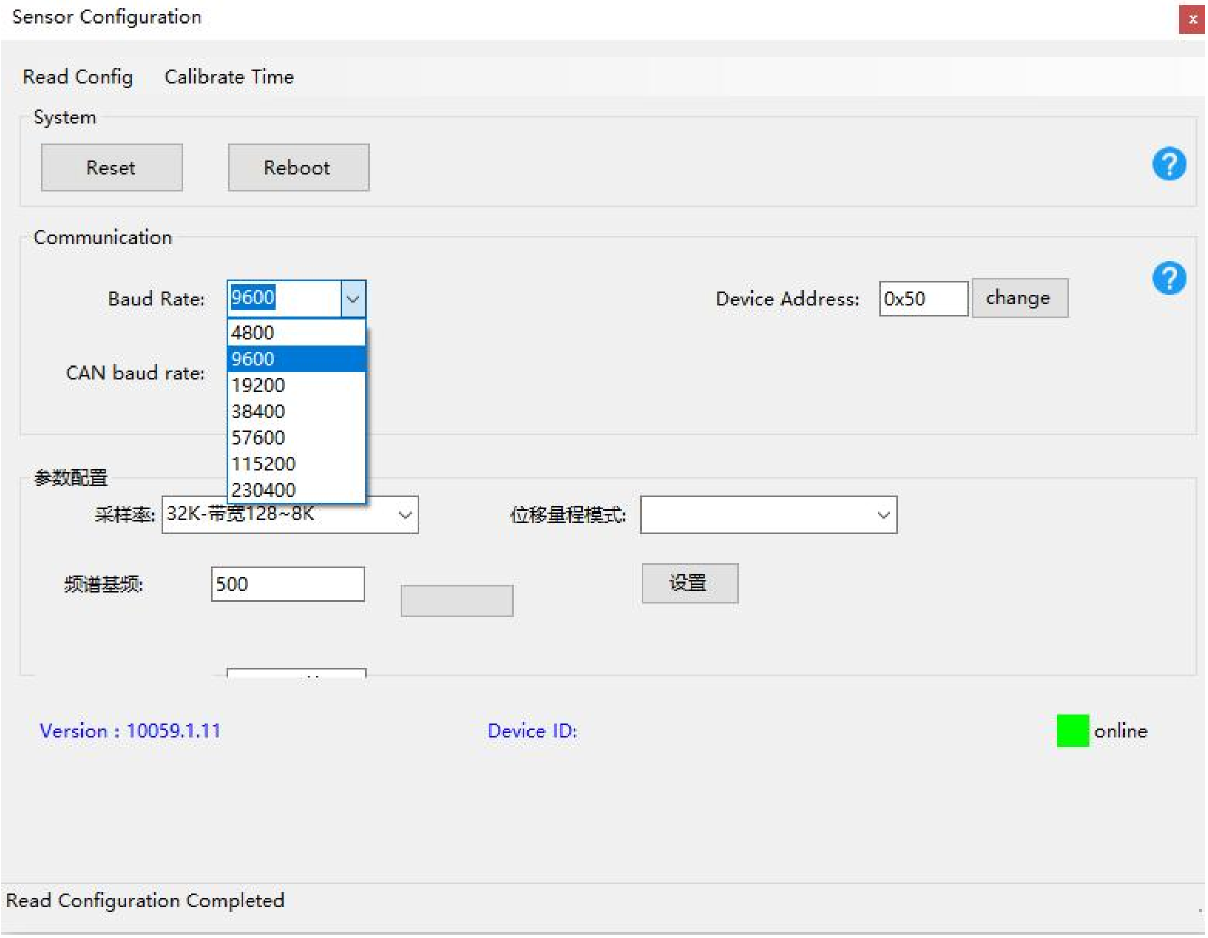
5.2. Reboot

Click "Config" and then click "Reboot" in the sensor configuration interface to Reboot the sensor, as shown below:



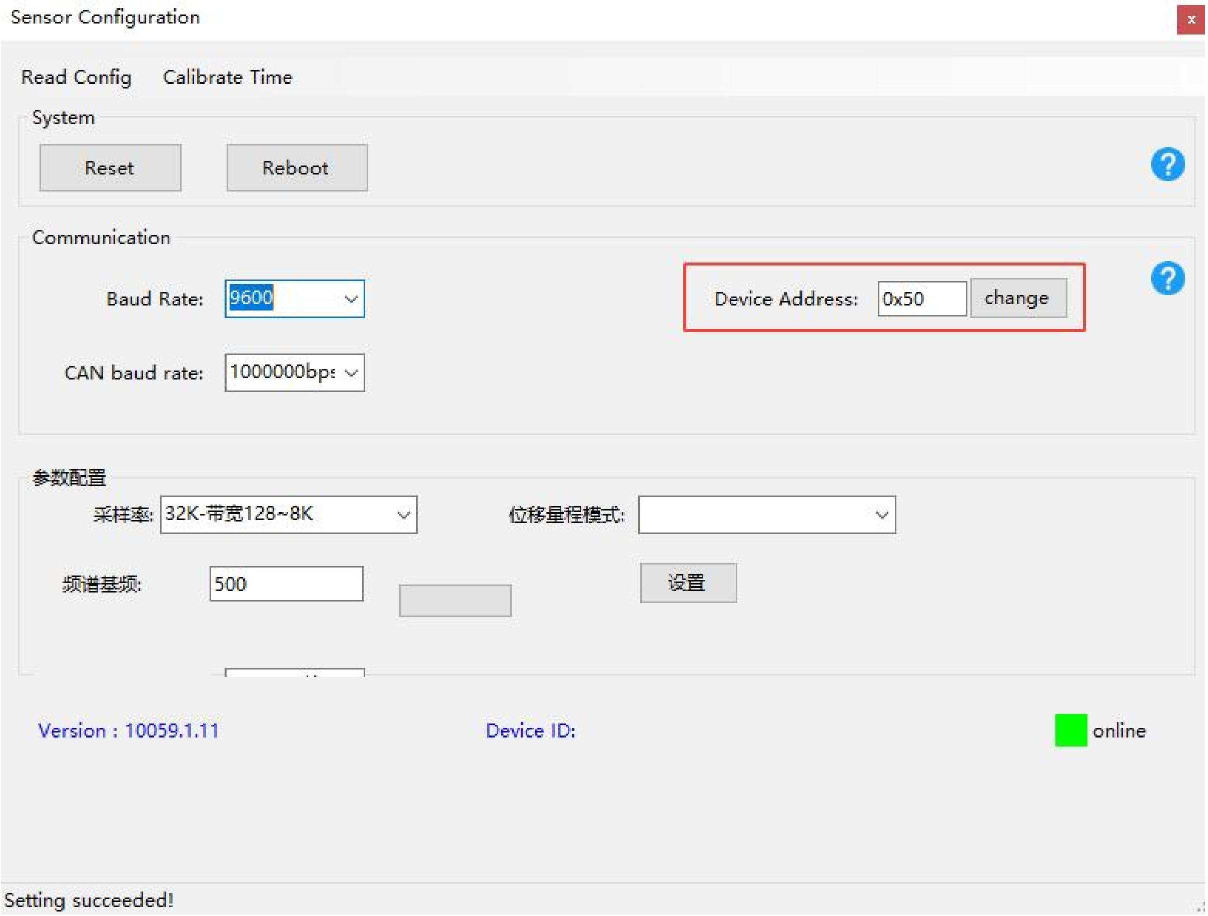
5.3. Communication rate

Open "Config" and click the "Baud Rate" drop-down menu in the sensor configuration interface. Select the serial port baud rate to be modified to change the current serial port baud rate (the default serial port baud rate is 9600). The serial port baud rate can be 4800, 9600, 19200, 38400, 57600, 115200, and 230400, as shown in the figure below:



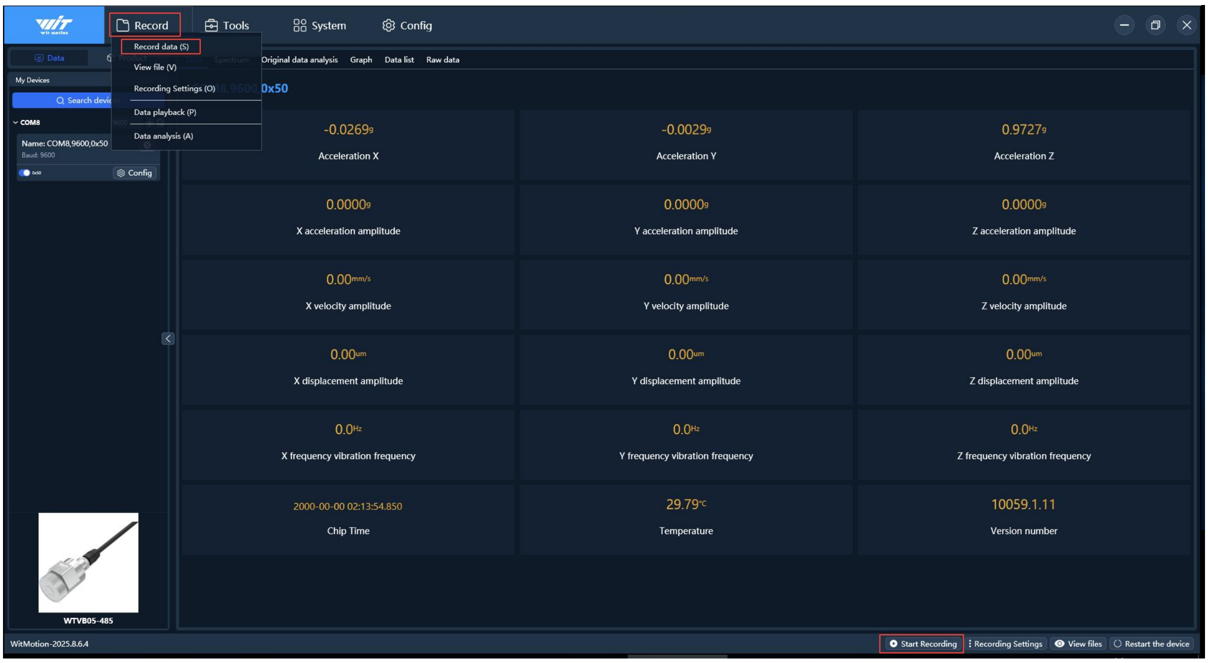
5.4. Device Address

Open "Configuration" and click the "Modbus Address" input box in the sensor configuration interface. Enter the Modbus address and click Set to change the Modbus address (the default Modbus address is 0x50). The Modbus address ranges from 0x00 to 0x7F, as shown in the figure:



5.5. Recording Data

Open "Record" and click "Start Recording" to record the output data of the sensor.



6. Communication Protocol

6.1. MODBUS protocol

6.1.1. Read register format

- The data is sent in hexadecimal format, not ASCII.
- Each register address, register count, and data read are represented by two bytes. The high and low bits of the register address are represented by ADDRH and ADDRL, the high and low bits of the register count are represented by LENH and LENL, and the high and low bits of the data read are represented by DATA1H and DATA1L.
- The last two digits of the read instruction are standard CRC check digits. You can use a CRC check digit calculation tool.

Command sending

Modbus Address	Function code	Register high 8 bits	Register lower 8 bits	Read the high 8 bits of the length	Read length lower 8 bits	Check digit high 8 bits	Check digit lower 8 bits
ID	0x03 (Read)	ADDRH[15:8]	ADDRL[7:0]	LENH[3:08 PM]	LENL[7:0]	CRCH[15:8]	CRCL[7:0]

Data return

Modbus Address	Function code	Read length	High 8 bits of data	Data lower 8 bits	High 8 bits of data	Data lower 8 bits	High 8 bits of data	Data lower 8 bits	Check digit high 8 bits	Check digit lower 8 bits
ID	0x03 (Read)	LEN[7:0]	DATA1H[15:8]	DATA1L[7:0]	…	…	DATAnH	DATAnL	CRCH[15:8]	CRCL[7:0]

6.1.2. Write register format

- The data is sent in hexadecimal format, not ASCII.
- Each register address and write data are represented by two bytes. The high and low bits of the register address are represented by ADDRH and ADDRL, and the high and low bits of the write data are represented by DATAH and DATAL.

Command sending

Modbus Address	Function code	Register high 8 bits	Register lower 8 bits	High 8 bits of data	Data lower 8 bits	Check digit high 8 bits	Check digit lower 8 bits
ID	0x06 (Write)	ADDRH[15:8]	ADDRL[7:0]	DATAH[15:8]	DATAL[7:0]	CRCH[15:8]	CRCL[7:0]

Data return

Modbus Address	Function code	Register high 8 bits	Register lower 8 bits	High 8 bits of data	Data lower 8 bits	Check digit high 8 bits	Check digit lower 8 bits
ID	0x06 (Write)	ADDRH[15:8]	ADDRL[7:0]	DATAH[15:8]	DATAL[7:0]	CRCH[15:8]	CRCL[7:0]

Note:

The instruction writing operation needs to be performed in three steps.

The first step is to unlock 0x50 0x06 0x00 0x69 0xB5 0x88 0x22 0xA1. The unlocking will take effect within ten seconds.

The second step is to send the instructions that need to be modified.

The third step is to save the instruction 0x50 0X06 0X00 0X00 0X00 0X84 0X4B.

6.1.3. Register Address Table

Reg addr	Symbol	Meaning	Units and Explanations
0x00	SAVE	Save/Reboot/Reset to Factory	
0x03	RRATE	Return rate	
0x04	BAUD	Serial port baud rate	
0x05	CANBAUD	CAN baud rate	
0x07	MODE	Algorithm Mode	
0x08	STATIC DETECTION	Static detection coefficient	
0x1A	IICADDR	Device Address	
0x30	YYMM	Month Year	
0x31	DDHH	Time	

0x32	MMSS	Seconds and minutes	
0x33	MS	millisecond	
0x34	AX	X-axis acceleration	g
0x35	AY	Y-axis acceleration	g
0x36	AZ	Z- axis acceleration	g
0x37	AXF	X-axis acceleration amplitude	g
0x38	AYF	Y-axis acceleration amplitude	g
0x39	AZF	Z-axis acceleration amplitude	g
0x3A	VX	X-axis vibration speed	mm/s
0x3B	VY	Y-axis vibration speed	mm/s
0x3C	VZ	Z-axis vibration speed	mm/s
0x40	TEMP	Product temperature	°C
0x41	DX	X-axis vibration displacement	mm
0x42	DY	Y-axis vibration displacement	mm
0x43	DZ	Z-axis vibration displacement	mm
0x44	HZX	X-axis vibration frequency	Hz
0x45	HZY	Y-axis vibration frequency	Hz
0x46	HZZ	Z-axis vibration frequency	Hz
0x47	CFX	X-axis acceleration peak factor	Peak value to RMS ratio, measuring the degree of signal abrupt change g
0x48	KX	X-axis acceleration kurtosis value	Detecting impact components or abnormal vibrations g
0x49	AAVGX	The absolute average of X-axis acceleration	The average of the absolute values of vibration, measuring overall intensity

			g
0x4A	VARX	X-axis acceleration variance	Reflects the magnitude of signal fluctuations g
0x4B	RRAX	X-axis acceleration root square magnitude (RMS)	The standard index of energy intensity g
0x4C	WIX	X-axis acceleration waveform index	The ratio of RMS to the absolute mean reflects the waveform shape g
0x4D	PIX	Peak X-axis acceleration	The ratio of peak value to absolute average value g
0x4E	PCX	X-axis acceleration pulse coefficient	
0x4F	SKX	X-axis acceleration skewness	The measure of signal symmetry (positive or negative bias) g
0x50	VRMSX	X-axis velocity RMS value	Velocity signal energy intensity (mm/s)
0x51	VKX	X-axis velocity kurtosis value	Speed signal impact detection g
0x52	DRMSX	X-axis displacement RMS value	Measurement of displacement change intensity (mm)
0x53	CFY	Y-axis acceleration peak factor	The peak value to RMS ratio measures the degree of signal abrupt change g
0x54	KY	Y-axis acceleration kurtosis value	Detection of impact components or abnormal vibrations g
0x55	AAVGY	Absolute average Y-axis acceleration	The average of the absolute values of vibrations measures the overall intensity g
0x56	VARY	Y-axis acceleration variance	Reflects the magnitude of the signal fluctuation range

			g
0x57	RRAY	Y-axis acceleration root square magnitude (RMS)	The standard index of energy intensity g
0x58	WIY	Y-axis acceleration waveform index	The ratio of RMS to the absolute mean reflects the waveform shape
0x59	PIY	Y-axis acceleration peak index	The ratio of peak value to absolute average value g
0x5A	PCY	Y-axis acceleration pulse coefficient	The ratio of peak value to average amplitude
0x5B	SKY	Y-axis acceleration skewness	Measuring signal symmetry (positive or negative bias) g
0x5C	VRMSY	Y-axis velocity RMS value	Velocity signal energy intensity mm/s
0x5D	VKY	Y-axis velocity kurtosis value	Speed signal impact detection g
0x5E	DRMSY	Y-axis displacement RMS value	Measurement of displacement change intensity mm
0x5F	CFZ	Z-axis acceleration peak factor	The peak value to RMS ratio measures the degree of signal abrupt change g
0x60	KZ	Z-axis acceleration kurtosis value	Detection of impact components or abnormal vibrations g
0x61	AAVGZ	Absolute average Z-axis acceleration	The average of the absolute values of vibrations measures the overall intensity g
0x62	VARZ	Z-axis acceleration variance	g reflects the magnitude of the signal fluctuation range
0x63	RRAZ	Z-axis acceleration root square magnitude (RMS)	The standard index of energy intensity g

0x64	WIZ	Z-axis acceleration waveform index	The ratio of RMS to the absolute mean reflects the waveform shape
0x65	PIZ	Z-axis acceleration peak index	The ratio of peak value to absolute average value g
0x66	PCZ	Z-axis acceleration pulse coefficient	The ratio of peak value to average amplitude
0x67	SKZ	Z-axis acceleration skewness	The measure of signal symmetry (positive or negative bias) g
0x68	VRMSZ	Z-axis speed RMS value	Velocity signal energy intensity mm/s
0x69	VKZ	Z-axis velocity kurtosis value	Speed signal impact detection g
0x6A	DRMSZ	Z-axis displacement RMS value	Measurement of displacement change intensity mm
0x6B	ERRX	X-axis fault diagnosis	
0x6C	ERRY	Y-axis fault diagnosis	
0x6D	ERRZ	Z-axis fault diagnosis	
0x6E	AX_ENERGY_POINT1	X-axis focus 1: Acceleration spectrum energy	Energy analysis of key frequency points of acceleration signals at quarter harmonics
0x6F	AX_ENERGY_POINT2	X-axis focus point 2: Acceleration spectrum energy	Energy analysis of key frequency points of acceleration signals using half harmonics
0x70	AX_ENERGY_POINT3	X-axis focus point 3: Acceleration spectrum energy	Energy analysis of key frequency points of acceleration signals (first harmonic)
0x71	AX_ENERGY_POINT4	X-axis focus point 4: Acceleration spectrum energy	Energy analysis of key frequency points of acceleration signals (second harmonics)
0x72	AX_ENERGY_POINT5	X-axis focus point 5: Acceleration spectrum energy	Energy analysis of key frequency points of acceleration signals (third harmonic)
0x73	AX_ENERGY_POINT6	X-axis focus point 6: Acceleration spectrum energy	Energy analysis of key frequency points of acceleration signals (fourth harmonic)
0x74	AX_ENERGY_POINT7	X-axis focus point 7: Acceleration spectrum energy	Energy analysis of key frequency points of acceleration signals (fifth harmonic)

0x75	AX_ENERGY_POINT8	X-axis focus point 8: Acceleration spectrum energy	Energy analysis of key frequency points of acceleration signals (sixth harmonic)
0x76	AX_ENERGY_AREA1	X-axis focus band 1 acceleration spectrum energy	Energy monitoring of acceleration signals in the frequency band from 0 to 1/2 octave.
0x77	AX_ENERGY_AREA2	X-axis focus band 2 acceleration spectrum energy	Energy monitoring of acceleration signals in the frequency band from 1/2 to 1 harmonic.
0x78	AX_ENERGY_AREA3	X-axis focus on the acceleration spectrum energy of band 3	Energy monitoring of acceleration signals in the frequency band (1st to 2nd harmonic)
0x79	AX_ENERGY_AREA4	X-axis focus on band 4 acceleration spectrum energy	Energy monitoring of acceleration signals in the frequency band at 2-3 harmonics
0x7A	AX_ENERGY_AREA5	X-axis focus on the acceleration spectrum energy of band 5	Energy monitoring of acceleration signals in the frequency band at 3-4 harmonics
0x7B	AX_ENERGY_AREA6	X-axis focus on the acceleration spectrum energy of band 6	Energy monitoring of acceleration signals in the frequency band at 4-5 harmonics
0x7C	AX_ENERGY	Total energy of X-acceleration spectrum	The sum of acceleration energy across all frequency ranges
0x7D	AY_ENERGY_POINT 1	Y-axis focus point 1: Acceleration spectrum energy	Energy analysis of key frequency points of acceleration signals at quarter harmonics
0x7E	AY_ENERGY_POINT 2	Y-axis focus point 2: Acceleration spectrum energy	Energy analysis of key frequency points of acceleration signals using half harmonics
0x7F	AY_ENERGY_POINT 3	Y-axis focus point 3: Acceleration spectrum energy	Energy analysis of key frequency points of acceleration signals (first harmonic)
0x80	AY_ENERGY_POINT 4	Y-axis focus point 4: Acceleration spectrum energy	Energy analysis of key frequency points of acceleration signals (second harmonics)
0x81	AY_ENERGY_POINT 5	Y-axis focus point 5: Acceleration spectrum energy	Energy analysis of key frequency points of acceleration signals (third harmonic)
0x82	AY_ENERGY_POINT 6	Y-axis focus point 6: Acceleration spectrum energy	Energy analysis of key frequency points of acceleration signals (fourth harmonic)
0x83	AY_ENERGY_POINT 7	Y-axis focus point 7: Acceleration spectrum energy	Energy analysis of key frequency points of acceleration signals (fifth harmonic)
0x84	AY_ENERGY_POINT 8	Y-axis focus point 8: Acceleration spectrum energy	Energy analysis of key frequency points of acceleration signals (sixth harmonic)
0x85	AY_ENERGY_AREA1	Y-axis focus band 1 acceleration spectrum energy	Energy monitoring of acceleration signals in the frequency band from 0 to 1/2 harmonic.
0x86	AY_ENERGY_AREA2	Y-axis focus band 2 acceleration spectrum energy	Energy monitoring of acceleration signals in the frequency band from 1/2 to 1 harmonic.

0x87	AY_ENERGY_AREA3	Y-axis focus band 3 acceleration spectrum energy	Energy monitoring of acceleration signals in the frequency band (1st to 2nd harmonic)
0x88	AY_ENERGY_AREA4	Y-axis focus band 4 acceleration spectrum energy	Energy monitoring of acceleration signals in the frequency band at 2-3 harmonics
0x89	AY_ENERGY_AREA5	Y-axis focus on the acceleration spectrum energy of band 5	Energy monitoring of acceleration signals in the frequency band at 3-4 harmonics
0x8A	AY_ENERGY_AREA6	Y-axis focus on the acceleration spectrum energy of band 6	Energy monitoring of acceleration signals in the frequency band at 4-5 harmonics
0x8B	AY_ENERGY	Total energy of Y acceleration spectrum	The sum of acceleration energy across all frequency ranges
0x8C	AZ_ENERGY_POINT 1	Z-axis focus point 1: Acceleration spectrum energy	Energy analysis of key frequency points of acceleration signals at quarter harmonics
0x8D	AZ_ENERGY_POINT 2	Z-axis focus point 2: Acceleration spectrum energy	Energy analysis of key frequency points of acceleration signals using half harmonics
0x8E	AZ_ENERGY_POINT 3	Z-axis focus point 3: Acceleration spectrum energy	Energy analysis of key frequency points of acceleration signals (first harmonic)
0x8F	AZ_ENERGY_POINT 4	Z-axis focus point 4: Acceleration spectrum energy	Energy analysis of key frequency points of acceleration signals (second harmonics)
0x90	AZ_ENERGY_POINT 5	Z-axis focus point 5: Acceleration spectrum energy	Energy analysis of key frequency points of acceleration signals (third harmonic)
0x91	AZ_ENERGY_POINT 6	Z-axis focus point 6: Acceleration spectrum energy	Energy analysis of key frequency points of acceleration signals (fourth harmonic)
0x92	AZ_ENERGY_POINT 7	Z-axis focus point 7: Acceleration spectrum energy	Energy analysis of key frequency points of acceleration signals (fifth harmonic)
0x93	AZ_ENERGY_POINT 8	Z-axis focus point 8: Acceleration spectrum energy	Energy analysis of key frequency points of acceleration signals (sixth harmonic)
0x94	AZ_ENERGY_AREA1	Z-axis focus band 1 acceleration spectrum energy	Energy monitoring of acceleration signals in the frequency band from 0 to 1/2 harmonic.
0x95	AZ_ENERGY_AREA2	Z-axis focus band 2 acceleration spectrum energy	Energy monitoring of acceleration signals in the frequency band from 1/2 to 1 harmonic.
0x96	AZ_ENERGY_AREA3	Z-axis focus on the acceleration spectrum energy of band 3	Energy monitoring of acceleration signals in the frequency band (1st to 2nd harmonic)

0x97	AZ_ENERGY_AREA4	Z-axis focus on the acceleration spectrum energy of band 4	Energy monitoring of acceleration signals in the frequency band at 2-3 harmonics
0x98	AZ_ENERGY_AREA5	Z-axis focus zone 5 acceleration spectrum energy	Energy monitoring of acceleration signals in the frequency band at 3-4 harmonics
0x99	AZ_ENERGY_AREA6	Z-axis focus on acceleration spectrum energy (band 6)	Energy monitoring of acceleration signals in the frequency band at 4-5 harmonics
0x9A	AZ_ENERGY	Total energy of the Z-acceleration spectrum	The sum of acceleration energy across all frequency ranges

6.1.4. Register Description

All the following examples are instructions for when the Modbus address is 0x50 (default). If you change the Modbus address, you need to change the address and CRC check bit in the instruction accordingly.

6.1.4.1. SAVE (Save/Reboot/Reset to Factory)

Register Name: SAVE

Register address: 0 (0x00)

Read/write direction: R/W

Default value: 0x0000

Bit	NAME	FUNCTION
15:0	SAVE[15:0]	Save: 0x0000 Reboot: 0x00FF Factory Reset: 0x0001

Example:

Send: 50 06 00 69 B5 88 22 A1 (valid within 10 seconds of unlocking)

Return: 50 06 00 69 B5 88 22 A1

Send: 50 06 00 00 00 FF C4 0B (Reboot)

Return: 50 06 00 00 00 FF C4 0B

6.1.4.2. BAUD (serial port baud rate)

Register Name: BAUD

Register address: 4 (0x04)

Read/write direction: R/W

Default value: 0x0002

Bit	NAME	FUNCTION
15:4		
3:0	BAUD[3:0]	Set the serial port baud rate: 0001(0x01) 4800bps 0010(0x02): 9600bps 0011(0x03): 19200bps 0100(0x04): 38400bps 0101(0x05): 57600bps 0110(0x06): 115200bps 0111(0x07): 230400bps

Example:

Send: 50 06 00 69 B5 88 22 A1 (valid within 10 seconds of unlocking)

Return: 50 06 00 69 B5 88 22 A1

Send: 50 06 00 04 00 06 45 88 (set the serial port baud rate to 115200)

Send: 50 06 00 00 00 00 84 4B (saved at 115200 baud)

Return: 50 06 00 00 00 00 84 4B

6.1.4.3. CANBAUD (CAN baud rate)

Register Name: CANBAUD

Register address: 5 (0x05)

Read/write direction: R/W

Default value: 0x0004		
Bit	NAME	FUNCTION
15:4		
3:0	CANBAUD[3:0]	Set the CAN baud rate: 0000(0x00): 1000000bps 0001(0x01): 800000bps 0010(0x02): 500000bps 0011(0x03): 400000bps 0100(0x04): 250000bps 0101(0x05): 200000bps 0110(0x06): 125000bps 0111(0x07): 100000bps 1000(0x08): 80000bps 1001(0x09): 50000bps 1010(0x0A): 40000bps 1011(0x0B): 20000bps 1100(0x0C): 10000bps 1101(0x0D): 5000bps 1110(0x0E): 3000bps
Example: Send: 50 06 00 69 B5 88 22 A1 (valid within 10 seconds of unlocking) Return: 50 06 00 69 B5 88 22 A1 Send: 50 06 00 05 00 02 15 8B (set CAN baud rate to 500K) Send: 50 06 00 00 00 00 84 4B (saved at 500Kbaud) Return: 50 06 00 00 00 00 84 4B		

6.1.4.4. MODE (algorithm mode)

Register Name: MODE

Register address: 7 (0x07)

Read/write direction: R/W

Default value: 0x0000

Bit	NAME	FUNCTION
15:4		
3:0	MODE[1:0]	Set the algorithm mode: 0000(0x00): Time domain low frequency algorithm(10~200Hz) 0001(0x01): Time domain high frequency algorithm 0010(0x02): Frequency domain algorithm

Example:

Send: 50 06 00 69 B5 88 22 A1 (valid within 10 seconds of unlocking)

Return: 50 06 00 69 B5 88 22 A1

Send: 50 06 00 07 00 01 F4 4A (set time domain high frequency algorithm)

Send: 50 06 00 00 00 00 84 4B

Return: 50 06 00 00 00 00 84 4B

6.1.4.5. STATICDETECTION (static detection coefficient)

Meaning: After the device is stationary, there is still vibration data. The speed at which the data is cleared has no unit meaning and is a coefficient.

Register Name: STATICDETECTION

Register address: 8 (0x08)

Read/write direction: R/W

Default value: 0x0064		
Bit	NAME	FUNCTION
15:4		
3:0	MODE[3:0]	Set the static detection coefficient: Range: 80~120 100 / 100 = 1.00, default coefficient 1.00

Example:

Send: 50 06 00 69 B5 88 22 A1 (valid within 10 seconds of unlocking)

Return: 50 06 00 69 B5 88 22 A1

Send: 50 06 00 08 00 65 C5 A2 (set static detection coefficient to 1.01, write 101)

Send: 50 06 00 00 00 00 84 4B

Return: 50 06 00 00 00 00 84 4B

6.1.4.6. IICADDR (device address)

Register Name: IICADDR

Register Address: 26 (0x1A)

Read/write direction: R/W

Default value: 0x0050

Bit	NAME	FUNCTION
15:8		
7:0	IICADDR[7:0]	Set the device address, used for I2C and Modbus communication, use 0x01~0x7F

Example:

Send: 50 06 00 69 B5 88 22 A1 (valid within 10 seconds of unlocking)

Return: 50 06 00 69 B5 88 22 A1

Send: 50 06 00 1A **00 02** 24 4D (set device address to **0x02**)

Return: 50 06 00 1A 00 02 24 4D

Send: **02** 06 00 69 B5 88 2F 13 (valid within 10 seconds after unlocking)

Return: 02 06 00 69 B5 88 2F 13

Send: **02** 06 00 00 00 00 89 F9 (Save)

Return: 02 06 00 00 00 00 89 F9

6.1.4.7. YYMM~MS (on-chip time)

Register name: YYMM~MS

Register address: 48~51 (0x30~0x33)

Read/write direction: R/W

Default time: (2015, 1, 1, 00, 00, 59, 00)

Bit	NAME	FUNCTION
15:8	YYMM[15:8]	moon
7:0	YYMM[7:0]	Year
15:8	DDHH[15:8]	hour
7:0	DDHH[7:0]	day
15:8	MMSS[15:8]	Second
7:0	MMSS[7:0]	point
15:0	MS[15:0]	millisecond

Example:

Send: 50 06 00 69 B5 88 22 A1 (valid within 10 seconds of unlocking)

Return: 50 06 00 69 B5 88 22 A1

Send: 50 06 00 30 03 16 **05 7A** (set year and month 22-03)

Return: 50 06 00 30 03 16 **05 7A**

Send: 50 06 00 31 09 0C **D3 D1** (set date and time 12-09)

Return: 50 06 00 31 09 0C **D3 D1**

Send: 50 06 00 32 3A 1E **B7 2C** (set minutes and seconds to 30:58)

Return: 50 06 00 32 3A 1E **B7 2C**

Send: 50 06 00 33 01 F4 **74 53** (set milliseconds to 500)

Return: 50 06 00 33 01 F4 **74 53**

Send: 50 06 00 00 00 00 84 4B (save)

Return: 50 06 00 00 00 00 84 4B

6.1.4.8. AX~AZ (acceleration)

Register name: **AX~AZ**

Register address: 52~54 (0x34~0x36)

Read/write direction: R

Default value: 0x0000

Bit	NAME	FUNCTION
15:0	**AX[15:0]**	**Acceleration X = AX[15:0]/32768*16g (g is the acceleration due to gravity, which can be 9.8m/s2)**
15:0	**AY[15:0]**	**Acceleration Y = AY[15:0]/32768*16g (g is the acceleration due to gravity, which can be 9.8m/s2)**
15:0	**AZ[15:0]**	**Acceleration Z = AZ[15:0]/32768*16g (g is the acceleration due to gravity, which can be 9.8m/s2)**

Example:

Send: 50 03 00 34 00 03 49 84 (read three-axis acceleration)

Return: 50 03 06 AXH AXL AYH AYL AZH AZL CRCH CRCL

AX[15:0]=((short)AXH <<8)|AXL;

AY[15:0]=((short)AYH <<8)|AYL;
AZ[15:0]=((short)AZH <<8)|AZL;

6.1.4.9. VX~VZ (vibration speed)

10141.1.7 (including 1.7) and earlier versions, the vibration speed does not need to be divided by 100

Register name: VX~VZ

Register address: 58~60 (0x3A~0x3C)

Read/write direction: R

Default value: 0x0000

Bit	NAME	FUNCTION
15:0	VX[15:0]	Vibration speed VX (mm/s) = ((VXH << 8) | VXL)/100
15:0	VY[15:0]	Vibration velocity VY (mm/S) = ((VYH << 8) | VYL)/100
15:0	VZ[15:0]	Vibration velocity VZ (mm/s) =((VZH << 8)| VZL)/100

Example:

Send: 50 03 00 3A 00 03 28 47 (read the three-axis vibration speed)

Return: 50 03 06 VXH VXL VYH VYL VZH VZL CRCH CRCL

VX[15:0]=(((short)VXH <<8)|VXL)/100;

VY[15:0]=(((short)VYH <<8)|VYL)/100;

VZ[15:0]=(((short)VZH <<8)|VZL)/100;

6.1.4.10. Reserve

Register Name: Reserved

Register address: 61~63 (0x3D~0x3F)

Read/write direction: R

Default value: 0x0000

6.1.4.11. TEMP (temperature)

Register Name: TEMP

Register address: 64 (0x40)

Read/write direction: R

Default value: 0x0000

Bit	NAME	FUNCTION
15:0	TEMP[15:0]	Temperature = TEMP[15:0]/100°C

Example:

Send: 50 03 00 40 00 01 88 5F (read chip temperature)

Return: 50 03 02 TEMPH TEMPL CRCH CRCL

TEMP[15:0]=(((short)TEMPH <<8)|TEMPL);

6.1.4.12. DX~DZ (vibration displacement)

Register name: DX~DZ

Register address: 65~67 (0x41~0x43)

Read/write direction: R

Default value: 0x0000

Bit	NAME	FUNCTION
15:0	DX[15:0]	Vibration displacement DX (um) = ((DXH << 8) | DXL)
15:0	DY[15:0]	Vibration displacement DY (um) = ((DYH << 8) | DYL)
15:0	DZ[15:0]	Vibration displacement DZ (um) = ((DZH << 8| DZL)

Example:

Send: 50 03 00 41 00 03 58 5E (read triaxial vibration displacement)

Return: 50 03 06 DXH DXL DYH DYL DZH DZL CRCH CRCL

DX[15:0]=(((short)DXH <<8)|DXL);

DY[15:0]=(((short)DYH <<8)|DYL);

DZ[15:0]=(((short)DZH <<8)|DZL);

6.1.4.13. HZX~HZZ (vibration frequency)

Register name: HZX~HZZ

Register address: 68~70 (0x44~0x46)

Read/write direction: R

Default value: 0x0000

Bit	NAME	FUNCTION
15:0	HZX[15:0]	Vibration frequency HZX(Hz)=((HZXH << 8)| HZXL)/10
15:0	HZY[15:0]	Vibration frequency HZY(Hz)=((HZYH << 8)| HZYL)/10
15:0	HZZ[15:0]	Vibration frequency HZZ (Hz) = ((HZZH << 8| HZZL)/10

Example:

Send: 50 03 00 44 00 03 48 5F (read the three-axis vibration frequency)

Return: 50 03 06 HZXH HZXL HZYH HZYL HZZH HZZL CRCH CRCL

HZX[15:0]=(((short)HZXH <<8)|HZXL)/10;

HZY[15:0]=(((short)HZYH <<8)|HZYL)/10;

HZZ[15:0]=(((short)HZZH <<8)|HZZL)/10;

6.1.4.14. Displacement range mode

Register name: DRM

Register address: 43 (0x2B)

Read/write direction: R/W

Default value: 0x0000

Bit	NAME	FUNCTION
15:4		
3:0	DRM[1:0]	Set displacement range mode: 0001(0x01): 60000um-1um resolution 0010(0x02): 600um-0.01um resolution

Example:

Send: 50 06 00 69 B5 88 22 A1 (Useful within 10 seconds of unlocking)

Return: 50 06 00 69 B5 88 22 A1

Send: 50 06 00 2B 00 02 75 82 (Sets resolution from 600um to 0.01um)

Return: 50 06 00 2B 00 02 75 82

Send: 50 06 00 00 00 00 84 4B

Return: 50 06 00 00 00 00 84 4B

6.1.4.15. Sampling rate

Register name: SR

Register address: 41 (0x29)

Read/write direction: R/W

Default value: 0x0000

Bit	NAME	FUNCTION
15:4		

3:0	SR[1:0]	Set sampling rate: 0000(0x00): 32K - Measurable frequency 128~16KHz 0001(0x01): 16K - Measurable frequency 64~8KHz 0010(0x02): 8K - Measurable frequency 32~4KHz 0011(0x03): 4K - Measurable frequency 16~2KHz 0100(0x04): 2K - Measurable frequency 8~1KHz 0101(0x05): 1K - Measurable frequency 4~512Hz 0110(0x06): 512Hz - Measurable frequency 2~256Hz 0111(0x07): 256Hz - Measurable frequency 1~128Hz 1000(0x08): 128Hz - Measurable frequency 1~64Hz 1001(0x09): 64Hz - Measurable frequencies 0.1~32Hz

Example:

Send: 50 06 00 69 B5 88 22 A1 (Useful within 10 seconds of unlocking)

Return: 50 06 00 69 B5 88 22 A1

Send: 50 06 00 29 00 07 14 41 (Setting to 256Hz - Measurable frequency 1~128Hz)

Return: 50 06 00 29 00 07 14 41

Send: 50 06 00 00 00 00 84 4B

Return: 50 06 00 00 00 00 84 4B

6.1.4.16. Original Acceleration FIFO

Register name: RAWFIFO

Register address: 414(0x2C)

Read/write direction: R/W

Default value: 0x0000

Bit	NAME	FUNCTION

15:4		
3:0	RAWFIFO[1:0]	

Example:

Send: 50 03 00 2C 00 01 48 42

Return: Returns raw accelerometer data, buffering 1024 packets.

Note: After sending the command to read the raw acceleration FIFO, the sensor first reads 1024 data entries.

The acceleration XYZ data consists of 6 bytes in total, with a data size of 6144 bytes (excluding header and checksum).

If the sensor has not yet read 1024 data entries, it will return 50 03 01 XX XX CRCH CRCL, where XX XX represents the current data size.

If the sensor has already read 1024 data entries, it will return 50 03 00 AXH AXL AYH AYL AZH AZL AXH AXL AYH AYL AZH AZL .... AXH AXL AYH AYL AZH AZL CRCH CRCL. The acceleration XYZ data is converted to g, as described in section **6.4.1.6**, acceleration data calculation.

6.1.4.17. X-axis vibration simulation quantity

Register name: CFX~DRMSX

Register address: 71~82 (0x47~0x52)

Read/write direction: R

Default value: 0x0000

Bit	NAME	FUNCTION
15:0	CFX[15:0]	X-axis acceleration peak factor CFX(g) = ((CFXH << 8) | CFXL)/1000
15:0	KX[15:0]	X-axis acceleration kurtosis value KX(g) = ((KXH << 8) | KXL)/1000
15:0	AAVGX[15:0]	The absolute average value of the X-axis acceleration, AAVGX(g), is calculated as follows: AAVGXH << 8 | AAVGXL)/1000
15:0	VARX[15:0]	variance of X-axis acceleration, VARX(g), is calculated as: VARXH << 8 | VARXL)/1000.
15:0	RRAX[15:0]	X-axis acceleration root mean (RMS) RRAX(g) = ((RRAXH << 8 | RRAXL)/1000)

15:0	WIX[15:0]	X-axis acceleration waveform index WIX = ((WIXH << 8 | WIXL)/1000)
15:0	PIX[15:0]	X-axis acceleration peak index PIX(g) = ((PIXH << 8 | PIXL)/1000)
15:0	PCX[15:0]	X-axis acceleration impulse coefficient PCX = ((PCXH << 8 | PCXL)/1000)
15:0	SKX[15:0]	X-axis acceleration skew SKX(g) = ((SKXH << 8 | SKXL)/1000)
15:0	VRMSX[15:0]	X-axis velocity RMS value VRMSX(mm/s)=((VRMSXH<< 8|VRMSXL)/1000
15:0	VKX[15:0]	X-axis velocity kurtosis value VKX (g) = ((VKXH << 8 | VKXL) / 1000
15:0	DRMSX[15:0]	X-axis displacement RMS value DRMSX (mm) = ((DRMSXH << 8 | DRMSXL) / 1000

Example:

Send: 50 03 00 NAME 00 01 CRCH CRCL

Return: 50 03 06 NAMEH NAMEL CRCH CRCL

NAME[15:0]=(((short)NAMEH <<8)|NAMEL)/1000;

Example:

Send: 50 03 00 47 00 01 39 9E (X-axis acceleration peak factor)

Return: 50 03 06 CFXH CFXL CRCH CRCL

CFX[15:0]=(((short)CFXH <<8)|CFXL)/1000;

6.1.4.18. Y-axis vibration simulation quantity

Register name: CFY~DRMSY

Register address: 83~94 (0x53~0x5E)

Read/write direction: R

Default value: 0x0000

Bit	NAME	FUNCTION
15:0	CFY[15:0]	Y-axis acceleration peak factor CFY(g) = ((CFYH << 8) | CFYL)/1000
15:0	KY[15:0]	Y-axis acceleration kurtosis value KY(g) = ((KYH << 8) | KYL)/1000

15:0	AAVGY[15:0]	The absolute average value of the Y-axis acceleration, AAVGY(g), is calculated as follows: AAVGYH << 8 | AAVGYL)/1000
15:0	VARY[15:0]	variance of Y-axis acceleration, VARY(g), is calculated as: VARYH << 8 | VARYL)/1000.
15:0	RRAY[15:0]	Y-axis acceleration root mean (RMS) RRAY(g) = ((RRAYH << 8 | RRAYL)/1000)
15:0	WIY[15:0]	Y-axis acceleration waveform index WIY = ((WIYH << 8 | WIYL)/1000)
15:0	PIY[15:0]	Y-axis acceleration peak index PIY(g) = ((PIYH << 8 | PIYL)/1000)
15:0	PCY[15:0]	Y-axis acceleration impulse coefficient PCY = ((PCYH << 8 | PCYL)/1000)
15:0	SKY[15:0]	Y-axis acceleration skew SKY(g) = ((SKYH << 8 | SKYL)/1000)
15:0	VRMSY[15:0]	Y-axis velocity RMS value VRMSY(mm/s)=((VRMSYH<< 8|VRMSYL)/1000
15:0	VKY[15:0]	Y-axis velocity kurtosis value VKY (g) = ((VKYH << 8 | VKYL) / 1000
15:0	DRMSY[15:0]	Y-axis displacement RMS value DRMSY (mm) = ((DRMSYH << 8 | DRMSYL) / 1000

Example:

Send: 50 03 00 NAME 00 01 CRCH CRCL

Return: 50 03 06 NAMEH NAMEL CRCH CRCL

NAME[15:0]=(((short)NAMEH <<8)|NAMEL)/1000;

Example:

Send: 50 03 00 47 00 01 39 9E (Y-axis acceleration peak factor)

Return: 50 03 06 CFYH CFYL CRCH CRCL

CFY[15:0]=(((short)CFYH <<8)|CFYL)/1000;

6.1.4.19. Z-axis vibration simulation quantity

Register name: CFZ~DRMSZ

Register address: 95~106 (0x5F~0x6A)

Read/write direction: R

Default value: 0x0000

Bit	NAME	FUNCTION
15:0	CFZ[15:0]	Z-axis acceleration peak factor CFZ(g) = ((CFZH << 8) | CFZL)/1000
15:0	KZ[15:0]	Z-axis acceleration kurtosis value KZ(g) = ((KZH << 8) | KZL)/1000
15:0	AAVGZ[15:0]	The absolute average value of the Z-axis acceleration, AAVGZ(g), is calculated as follows: AAVGZH << 8 | AAVGZL)/1000
15:0	VARZ[15:0]	variance of Z-axis acceleration, VARZ(g), is calculated as: VARZH << 8 | VARZL)/1000.
15:0	RRAZ[15:0]	Z-axis acceleration root mean (RMS) RRAZ(g) = ((RRAZH << 8 | RRAZL)/1000)
15:0	WIZ[15:0]	Z-axis acceleration waveform index WIZ = ((WIZH << 8 | WIZL)/1000)
15:0	PIZ[15:0]	Z-axis acceleration peak index PIZ(g) = ((PIZH << 8 | PIZL)/1000)
15:0	PCZ[15:0]	Z-axis acceleration impulse coefficient PCZ = ((PCZH << 8 | PCZL)/1000)
15:0	SKZ[15:0]	Z-axis acceleration skew SKZ(g) = ((SKZH << 8 | SKZL)/1000)
15:0	VRMSZ[15:0]	Z-axis velocity RMS value VRMSZ(mm/s)=((VRMSZH<< 8|VRMSZL)/1000
15:0	VKZ[15:0]	Z-axis velocity kurtosis value VKZ (g) = ((VKZH << 8 | VKZL) / 1000
15:0	DRMSZ[15:0]	Z-axis displacement RMS value DRMSZ (mm) = ((DRMSZH << 8 | DRMSZL) / 1000

Example:

Send: 50 03 00 NAME 00 01 CRCH CRCL

Return: 50 03 06 NAMEH NAMEL CRCH CRCL

NAME[15:0]=(((short)NAMEH <<8)|NAMEL)/1000;

Example:

Send: 50 03 00 47 00 01 39 9E (Z-axis acceleration peak factor)

Return: 50 03 06 CFZH CFZL CRCH CRCL

CFZ[15:0]=(((short)CFZH <<8)|CFZL)/1000;

6.1.4.20. XYZ axis fault diagnosis

Register name: ERRXERRZ

Register address: 107~109 (0x6B~0x6D)

Read/write direction: R

Default value: 0x0000

Bit	NAME	FUNCTION
15:0	ERRX	
15:0	ERRY	
15:0	ERRZ	

Example:

Send: 50 03 00 NAME 00 01 CRCH CRCL

Return: 50 03 06 NAMEH NAMEL CRCH CRCL

NAME[15:0]=(((short)NAMEH <<8)|NAMEL);

Example:

Send: 50 03 00 6B 00 01 F8 57

Return: 50 03 06 ERRXH ERRXL CRCH CRCL

ERRX[15:0]=(((short)ERRXH <<8)|ERRXL);

6.1.4.21. X-axis focus and acc spectrum energy

Register name: AX_ENERGY_POINT1~AX_ENERGY

Register address: 110~124 (0x6E~0x7C)

Read/write direction: R

Default value: 0x0000

Bit	NAME	FUNCTION

15:0	AX_ENERGY_POINT1[15:0]	X-axis focus point 1: Acceleration spectrum energy AX_ENERGY_POINT1 = ((AX_ENERGY_POINT1H << 8) | AX_ENERGY_POINT1L)
15:0	AX_ENERGY_POINT2[15:0]	X-axis focus point 2: Acceleration spectrum energy AX_ENERGY_POINT2 = ((AX_ENERGY_POINT2H << 8) | AX_ENERGY_POINT2L)
15:0	AX_ENERGY_POINT3[15:0]	X-axis focus point 3: Acceleration spectrum energy AX_ENERGY_POINT3 = ((AX_ENERGY_POINT3H << 8) | AX_ENERGY_POINT3L)
15:0	AX_ENERGY_POINT4[15:0]	X-axis focus point 4: Acceleration spectrum energy AX_ENERGY_POINT4 = ((AX_ENERGY_POINT4H << 8) | AX_ENERGY_POINT4L)
15:0	AX_ENERGY_POINT5[15:0]	X-axis focus point 5: Acceleration spectrum energy AX_ENERGY_POINT5 = ((AX_ENERGY_POINT5H << 8) | AX_ENERGY_POINT5L)
15:0	AX_ENERGY_POINT6[15:0]	X-axis focus point 6: Acceleration spectrum energy AX_ENERGY_POINT6 = ((AX_ENERGY_POINT6H << 8) | AX_ENERGY_POINT6L)
15:0	AX_ENERGY_POINT7[15:0]	X-axis focus point 7: Acceleration spectrum energy AX_ENERGY_POINT7 = ((AX_ENERGY_POINT7H << 8) | AX_ENERGY_POINT7L)
15:0	AX_ENERGY_POINT8[15:0]	X-axis focus point 8: Acceleration spectrum energy AX_ENERGY_POINT8 = ((AX_ENERGY_POINT8H << 8) | AX_ENERGY_POINT8L)
15:0	AX_ENERGY_AREA1[15:0]	X-axis focus band 1 acceleration spectrum energy AX_ENERGY_AREA1=((AX_ENERGY_AREA1H<< 8| AX_ENERGY_AREA1L)
15:0	AX_ENERGY_AREA2[15:0]	X-axis focus band 2 acceleration spectrum energy AX_ENERGY_AREA2=((AX_ENERGY_AREA2H<< 8| AX_ENERGY_AREA2L)
15:0	AX_ENERGY_AREA3[15:0]	X-axis focus band 3 acceleration spectrum energy AX_ENERGY_AREA3=((AX_ENERGY_AREA3H<< 8| AX_ENERGY_AREA3L)
15:0	AX_ENERGY_AREA4[15:0]	X-axis focus band 4 acceleration spectrum energy AX_ENERGY_AREA4=((AX_ENERGY_AREA4H<< 8| AX_ENERGY_AREA4L)
15:0	AX_ENERGY_AREA5[15:0]	X-axis focus band 5 acceleration spectrum energy AX_ENERGY_AREA5=((AX_ENERGY_AREA5H<< 8| AX_ENERGY_AREA5L)
15:0	AX_ENERGY_AREA6[15:0]	X-axis focus band 6 acceleration spectrum energy AX_ENERGY_AREA6=((AX_ENERGY_AREA6H<< 8| AX_ENERGY_AREA6L)
15:0	AX_ENERGY[15:0]	Total energy of the X-axis acceleration spectrum AX_ENERGY = ((AX_ENERGYH << 8 | AX_ENERGYL)

Example:

Send: 50 03 00 NAME 00 01 CRCH CRCL

Return: 50 03 06 NAMEH NAMEL CRCH CRCL

NAME[15:0]=(((short)NAMEH <<8)|NAMEL);

Example:

Send: 50 03 00 6E 00 01 E8 56 (X-axis focus point 1: Acceleration spectrum energy)

Return: 50 03 06 AX_ENERGY_POINT1H AX_ENERGY_POINT1L CRCH CRCL

AX_ENERGY_POINT1[15:0]=(((short)AX_ENERGY_POINT1H <<8)|AX_ENERGY_POINT1L);

6.1.4.22. Y-axis focus and acc spectrum energy

Register name: AY_ENERGY_POINT1~AY_ENERGY

Register address: 125~139 (0x7D~0x8B)

Read/write direction: R

Default value: 0x0000

Bit	NAME	FUNCTION
15:0	AY_ENERGY_POINT1[15:0]	Y-axis focus point 1: Acceleration spectrum energy AY_ENERGY_POINT1 = ((AY_ENERGY_POINT1H << 8) | AY_ENERGY_POINT1L)
15:0	AY_ENERGY_POINT2[15:0]	Y-axis focus point 2: Acceleration spectrum energy AY_ENERGY_POINT2 = ((AY_ENERGY_POINT2H << 8) | AY_ENERGY_POINT2L)
15:0	AY_ENERGY_POINT3[15:0]	Y-axis focus point 3: Acceleration spectrum energy AY_ENERGY_POINT3 = ((AY_ENERGY_POINT3H << 8) | AY_ENERGY_POINT3L)
15:0	AY_ENERGY_POINT4[15:0]	Y-axis focus point 4: Acceleration spectrum energy AY_ENERGY_POINT4 = ((AY_ENERGY_POINT4H << 8) | AY_ENERGY_POINT4L)
15:0	AY_ENERGY_POINT5[15:0]	Y-axis focus point 5: Acceleration spectrum energy AY_ENERGY_POINT5 = ((AY_ENERGY_POINT5H << 8) | AY_ENERGY_POINT5L)
15:0	AY_ENERGY_POINT6[15:0]	Y-axis focus point 6: Acceleration spectrum energy AY_ENERGY_POINT6 = ((AY_ENERGY_POINT6H << 8) | AY_ENERGY_POINT6L)
15:0	AY_ENERGY_POINT7[15:0]	Y-axis focus point 7: Acceleration spectrum energy AY_ENERGY_POINT7 = ((AY_ENERGY_POINT7H << 8) | AY_ENERGY_POINT7L)

15:0	AY_ENERGY_POINT8[15:0]	Y-axis focus point 8: Acceleration spectrum energy AY_ENERGY_POINT8 = ((AY_ENERGY_POINT8H << 8) | AY_ENERGY_POINT8L)
15:0	AY_ENERGY_AREA1[15:0]	Y-axis focus band 1 acceleration spectrum energy AY_ENERGY_AREA1=((AY_ENERGY_AREA1H<< 8| AY_ENERGY_AREA1L)
15:0	AY_ENERGY_AREA2[15:0]	Y-axis focus band 2 acceleration spectrum energy AY_ENERGY_AREA2=((AY_ENERGY_AREA2H<< 8| AY_ENERGY_AREA2L)
15:0	AY_ENERGY_AREA3[15:0]	Y-axis focus band 3 acceleration spectrum energy AY_ENERGY_AREA3=((AY_ENERGY_AREA3H<< 8| AY_ENERGY_AREA3L)
15:0	AY_ENERGY_AREA4[15:0]	Y-axis focus band 4 acceleration spectrum energy AY_ENERGY_AREA4=((AY_ENERGY_AREA4H<< 8| AY_ENERGY_AREA4L)
15:0	AY_ENERGY_AREA5[15:0]	Y-axis focus band 5 acceleration spectrum energy AY_ENERGY_AREA5=((AY_ENERGY_AREA5H<< 8| AY_ENERGY_AREA5L)
15:0	AY_ENERGY_AREA6[15:0]	Y-axis focus band 6 acceleration spectrum energy AY_ENERGY_AREA6=((AY_ENERGY_AREA6H<< 8| AY_ENERGY_AREA6L)
15:0	AY_ENERGY[15:0]	Total energy of the Y-axis acceleration spectrum AY_ENERGY = ((AY_ENERGYH << 8 | AY_ENERGYL)

Example:

Send: 50 03 00 NAME 00 01 CRCH CRCL

Return: 50 03 06 NAMEH NAMEL CRCH CRCL

NAME[15:0]=(((short)NAMEH <<8)|NAMEL);

Example:

Send: 50 03 00 6E 00 01 E8 56 (Y-axis focus point 1: Acceleration spectrum energy)

Return: 50 03 06 AY_ENERGY_POINT1H AY_ENERGY_POINT1L CRCH CRCL

AY_ENERGY_POINT1[15:0]=(((short)AY_ENERGY_POINT1H <<8)|AY_ENERGY_POINT1L);

6.1.4.23. Z-axis focus and acc spectrum energy

Register name: AZ_ENERGY_POINT1~AZ_ENERGY

Register address: 140~154 (0x8C~0x9A)

Read/write direction: R

Default value: 0x0000

Bit	NAME	FUNCTION
15:0	AZ_ENERGY_POINT1[15:0]	Z-axis focus point 1: Acceleration spectrum energy AZ_ENERGY_POINT1 = ((AZ_ENERGY_POINT1H << 8) | AZ_ENERGY_POINT1L)
15:0	AZ_ENERGY_POINT2[15:0]	Z-axis focus point 2: Acceleration spectrum energy AZ_ENERGY_POINT2 = ((AZ_ENERGY_POINT2H << 8) | AZ_ENERGY_POINT2L)
15:0	AZ_ENERGY_POINT3[15:0]	Z-axis focus point 3: Acceleration spectrum energy AZ_ENERGY_POINT3 = ((AZ_ENERGY_POINT3H << 8) | AZ_ENERGY_POINT3L)
15:0	AZ_ENERGY_POINT4[15:0]	Z-axis focus point 4: Acceleration spectrum energy AZ_ENERGY_POINT4 = ((AZ_ENERGY_POINT4H << 8) | AZ_ENERGY_POINT4L)
15:0	AZ_ENERGY_POINT5[15:0]	Z-axis focus point 5: Acceleration spectrum energy AZ_ENERGY_POINT5 = ((AZ_ENERGY_POINT5H << 8) | AZ_ENERGY_POINT5L)
15:0	AZ_ENERGY_POINT6[15:0]	Z-axis focus point 6: Acceleration spectrum energy AZ_ENERGY_POINT6 = ((AZ_ENERGY_POINT6H << 8) | AZ_ENERGY_POINT6L)
15:0	AZ_ENERGY_POINT7[15:0]	Z-axis focus point 7: Acceleration spectrum energy AZ_ENERGY_POINT7 = ((AZ_ENERGY_POINT7H << 8) | AZ_ENERGY_POINT7L)
15:0	AZ_ENERGY_POINT8[15:0]	Z-axis focus point 8: Acceleration spectrum energy AZ_ENERGY_POINT8 = ((AZ_ENERGY_POINT8H << 8) | AZ_ENERGY_POINT8L)
15:0	AZ_ENERGY_AREA1[15:0]	Z-axis focus band 1 acceleration spectrum energy AZ_ENERGY_AREA1=((AZ_ENERGY_AREA1H<< 8| AZ_ENERGY_AREA1L)
15:0	AZ_ENERGY_AREA2[15:0]	Z-axis focus band 2 acceleration spectrum energy AZ_ENERGY_AREA2=((AZ_ENERGY_AREA2H<< 8| AZ_ENERGY_AREA2L)
15:0	AZ_ENERGY_AREA3[15:0]	Z-axis focus band 3 acceleration spectrum energy AZ_ENERGY_AREA3=((AZ_ENERGY_AREA3H<< 8| AZ_ENERGY_AREA3L)
15:0	AZ_ENERGY_AREA4[15:0]	Z-axis focus band 4 acceleration spectrum energy AZ_ENERGY_AREA4=((AZ_ENERGY_AREA4H<< 8| AZ_ENERGY_AREA4L)
15:0	AZ_ENERGY_AREA5[15:0]	Z-axis focus band 5 acceleration spectrum energy AZ_ENERGY_AREA5=((AZ_ENERGY_AREA5H<< 8| AZ_ENERGY_AREA5L)
15:0	AZ_ENERGY_AREA6[15:0]	Z-axis focus band 6 acceleration spectrum energy AZ_ENERGY_AREA6=((AZ_ENERGY_AREA6H<< 8| AZ_ENERGY_AREA6L)
15:0	AZ_ENERGY[15:0]	Total energy of the Z-axis acceleration spectrum AZ_ENERGY = ((AZ_ENERGYH << 8 | AZ_ENERGYL)

Example:

Send: 50 03 00 NAME 00 01 CRCH CRCL

Return: 50 03 06 NAMEH NAMEL CRCH CRCL

NAME[15:0]=(((short)NAMEH <<8)|NAMEL);

Example:

Send: 50 03 00 6E 00 01 E8 56 (Z-axis focus point 1: Acceleration spectrum energy)

Return: 50 03 06 AZ_ENERGY_POINT1H AZ_ENERGY_POINT1L CRCH CRCL

AZ_ENERGY_POINT1[15:0]=(((short)AZ_ENERGY_POINT1H <<8)|AZ_ENERGY_POINT1L);

6.2. CAN protocol

6.2.1. Active output format

- The data is sent in hexadecimal format, not ASCII.
- Each data element is transmitted sequentially as a low-byte and a high-byte, which are combined to form a signed short. For example, in the case of data DATA1, DATA1L is the low-byte and DATA1H is the high-byte. The conversion method is as follows: Assuming DATA1 is the actual data, DATA1H is its high-byte portion, and DATA1L is its low-byte portion, then: DATA1 = (short)((short) DATA1H << 8 | DATA1L). It is important to note that DATA1H must first be converted to a signed short before shifting, and DATA1 must also be a signed short to represent negative numbers.

Protocol header	Data content	Data lower 8 bits	High 8 bits of data	Data lower 8 bits	High 8 bits of data	Data lower 8 bits	High 8 bits of data
0x55	TYPE【1】	DATA1L[7:0]	DATA1H[15:8]	DATA2L[7:0]	DATA2H[15:8]	DATA3L[7:0]	DATA3H[15:8]

【1】TYPE (data content):

TYPE	Remark
0x50	time
0x51	acceleration

0x55	temperature
0x5B	Vibration speed
0x5C	Vibration displacement
0x5D	Vibration frequency

6.2.2. Time output

0x55	0x50	YY	MM	DD	HH	MN	SS

name	describe	Remark
YY	Year	
MM	moon	
DD	day	
HH	hour	
MN	point	
SS	Second	

6.2.3. Acceleration output

0x55	0x51	AxL	Ax	AyL	AHr	AHr	AHr

name	describe	Remark
AxL	Acceleration AxL lower 8 bits	Acceleration X = ((AxH<<8)|AxL)/32768*16g (g is the acceleration due to gravity, which can be taken as 9.8m/s2)
Ax	Acceleration AxH high 8 bits	
AyL	Acceleration AyL lower 8 bits	Acceleration Y = ((AyH<<8)|AyL)/32768*16g

AHr	Acceleration AyH high 8 bits	(g is the acceleration due to gravity, which can be taken as 9.8m/s2)
AHr	Acceleration AzL low 8 bits	Acceleration Z = ((AzH<<8)|AzL)/32768*16g (g is the acceleration due to gravity, which can be taken as 9.8m/s2)
AHr	Acceleration AzH high 8 bits	

6.2.4. Temperature output

0x55	0x55	TempL	TempH				

name	describe	Remark
TempL	Acceleration TempL lower 8 bits	Temperature X = ((TempH << 8) | TempL) / 100 °C
TempH	Acceleration TempH high 8 bits	

6.2.5. Vibration velocity output

0x55	0x5B	VxD	VxD	VxD	Vx	V L	VxD

name	describe	Remark
VxD	Vibration velocity VxL lower 8 bits	Vibration velocity VX (mm/s) =((VxH <<8)| VxL) /100
VxD	Vibration speed VxH high 8 bits	
VxD	Vibration velocity VyL lower 8 bits	Vibration velocity VY (mm/S) =((VyH <<8)| VyL) /100
Vx	Vibration speed VyH high 8 bits	
V L	Vibration speed VzL lower 8 bits	

VxD	Vibration speed VzH high 8 bits	Vibration velocity VZ (mm/s) =((VzH <<8)| VzL) /100

6.2.6. Vibration displacement output

0x55	0x5C	DxL	DxD	DyL	HkDJ	DzL	HkDJ

name	describe	Remark
DxL	Vibration displacement DxL lower 8 bits	Vibration displacement DX (um) = ((DxH <<8) | DxL)
DxD	Vibration displacement DxH high 8 bits	
DyL	Vibration displacement DyL lower 8 bits	Vibration displacement DY (um) =((DyH <<8)| DyL
HkDJ	Vibration displacement DyH high 8 bits	
DzL	Vibration displacement DzL lower 8 bits	Vibration displacement DZ (um) =((DzH <<8)| DzL)
HkDJ	Vibration displacement DzH high 8 bits	

6.2.7. Vibration frequency output

0x55	0x5D	HkDJ	HkDJ	HkDJ	HkDJ	HkDJ	HZD

name	describe	Remark
HkDJ	Vibration frequency HZxL low 8 bits	Vibration frequency HZ X (Hz) =((HZxH <<8)| HZxL)/10
HkDJ	Vibration frequency HZxH high 8 bits	

HkDJ	Vibration frequency HZyL lower 8 bits	Vibration frequency HZ Y (Hz) =((HZyH <<8)| HZyL)/10
HkDJ	Vibration frequency HZyH high 8 bits	
HkDJ	Vibration frequency HZzL low 8 bits	Vibration frequency HZ Z (Hz) =((HZzH <<8)| HZzL)/10
HZD	Vibration frequency HZzH high 8 bits	

6.2.8. Write register format

- The data is sent in hexadecimal format, not ASCII.
- All settings require unlocking the register (KEY) first.
- Each register address and write data are represented by two bytes. The high and low bits of the register address are represented by ADDRH and ADDRL, and the high and low bits of the write data are represented by DATAH and DATAL.

Protocol header	Protocol header	register	Data lower 8 bits	High 8 bits of data
0xFF	0xAA	ADDR	DATAL[7:0]	DATAH[15:8]

6.2.9. KEY (unlock)

Register Name: KEY Register address: 105 (0x69) Read/write direction: R/W Default value: 0x0000		
Bit	**NAME**	**FUNCTION**
15:0	KEY[15:0]	Unlock register: When performing a write operation, you need to set this register first
Example: To unlock, write 0xB588 to this register (other values are invalid)		

FF AA 69 88 B5

6.2.10. SAVE (Save/Reboot/Reset to Factory)

Register Name: SAVE

Register address: 0 (0x00)

Read/write direction: R/W

Default value: 0x0000

Bit	NAME	FUNCTION
15:0	SAVE[15:0]	Save: 0x0000 Reboot: 0x00FF Factory Reset: 0x0001

Example: FF AA 00 FF 00 (Reboot)

6.2.11. BAUD-CAN (CAN baud rate)

Register Name: BAUD_CAN

Register address: 5 (0x05)

Read/write direction: R/W

Default value: 0x0004

Bit	NAME	FUNCTION
15:4		
3:0	BAUD_CAN[3:0]	Set the CAN baud rate: 0000(0x00): 1000000bps 0001(0x01): 800000bps 0010(0x02): 500000bps 0011(0x03): 400000bps

		0100(0x04): 250000bps 0101(0x05): 200000bps 0110(0x06): 125000bps 0111(0x07): 100000bps 1000(0x08): 80000bps 1001(0x09): 50000bps 1010(0x0A): 40000bps 1011(0x0B): 20000bps 1100(0x0C): 10000bps 1101(0x0D): 5000bps 1110(0x0E): 3000bps
Example: FF AA 05 02 00 (set the CAN baud rate to 500000)		

6.2.12. RRATE (output rate)

Register Name: RRATE

Register address: 3 (0x03)

Read/write direction: R/W

Default value: 0x0006

Bit	NAME	FUNCTION
15:4		
3:0	RRATE[3:0]	Set the output rate: 0001(0x01): 0.2Hz 0010(0x02): 0.5Hz 0011(0x03): 1Hz 0100(0x04): 2Hz

		0101(0x05): 5Hz 0110(0x06): 10Hz 0111(0x07): 20Hz 1000(0x08): 50Hz 1001(0x09): 100Hz 1011(0x0B): 200Hz
Example: FF AA 03 03 00 (set 1Hz output)		

6.2.13. IICADDR (device address)

Register Name: IICADDR

Register Address: 26 (0x1A)

Read/write direction: R/W

Default value: 0x0050

Bit	NAME	FUNCTION
15:8		
7:0	IICADDR [7:0]	Set the device address for I2C and Modbus communication 0x01~0x7F
Example: FF AA 1A 02 00 (set the device address to 0x02)		