RS-485 Vibration Sensor Manual

V1.2

XZ-Z3TD

1.Product Overview

RS-485 vibration sensor is a high-performance, low-power, anti-interference, and composite vibration sensor developed and produced using high-performance MEMS chips, embedded technology, temperature sensing technology, and vibration sensing technology.

1.1 Technical Parameters

Main indicators	Technical Parameters
Model Number	XZ-Z3TD three-axis temperature vibration
Vibration measurement range (mm/s)	0-50
Vibration accuracy(mm/s)	±1.5%
Vibration measurement direction	Single axis, three axes
Frequency range (Hz)	10~1600
Temperature measurement range (℃)	-40~150
Temperature accuracy (℃)	±0.5
Signal output	RS-485
detection period	Real-time
Sending conditions	Real-time
Power supply	External power supply
voltage	DC12-24V
protection grade	IP67
Dimension(mm)	∮24mm×60mm
Bottom nut opposite side	27mm
Height	60mm

1.2 Application

RS-485 vibration sensors are widely used for online temperature and vibration measurement of rotating equipment such as motors, reducers, fans, generators, air compressors, centrifuges, and water pumps in industries such as coal mining, chemical engineering, metallurgy, and power generation.

2. Product Installation

(1) Open box inspection.
Remove the sensor from the packaging box and check if the sensor has a good appearance and if the leads are intact.
(2) Read and modify sensor addresses.
The default address of the device in factory is "1". The device address can be modified using a serial port assistant or specialized configuration software. Device address: 1-240.
(3) Sensor installation.
Magnetic suction: Directly attach the sensor to the vibration measurement position of the device.
Bolt: Tighten the bolts at the bottom of the sensor with a diameter of 8 × 10mm to the vibration measurement position of the equipment.
(4) Access the system.
Connect the power and communication cables correctly. The wire sequence is printed on the equipment housing, and it’s based on the housing
Remember: Do not connect the 485 wires of the power supply in reverse, otherwise it will damage the equipment.
(5) Record the installation location and device address.
Record the area, equipment, and location where the sensor is installed, along with the corresponding ID number of the sensor. This information is convenient for software personnel to develop monitoring software and equipment management personnel to maintain and use in the later stage.

3.RS-485 ModBus Communicataion

The sensor adopts the ModBus RTU protocol for communication. This protocol is a master-slave mode of communication, where a host can connect multiple slaves, each with a unique address to identify identity, and achieve the content to be read/written through different function codes. As a simple application, it mainly involves the reading and holding register function code of 0x03 and the preset single register function code of 0x06.

3.1 Read Holding Register Function Code 0x03

When the host sends the 03 function code, it indicates that it mainly wants to obtain the content of a register from the slave. A complete command includes the data sent by the host and the data replied by the slave. The specific detailed analysis is as follows:

Device address: 1-240

Host request data message format: Use 03 function code to read data, address can be found in the following register list. For example: 01 03 00 00 04 44 09 Read temperature and three-axis vibration data.

Host sending	Bytes	Sending information	Remark	Instruction Description
Slave address	1	XX	Asking the slave for data with address XX	01 Slave address
Function code	1	03	read register	03
Start address	2	0000	Start address is 0000	0000 Data start address
Data Length	2	0004	Read XX data (2XX bytes in total)	0004 Read 4 data
CRC code	2	XXXX	CRC code calculated by the host	44 09 CRC Check Code

Sensor response command message format:

Example：01 03 08 00 1A 00 02 00 03 00 04 A6 15

Slave response	Bytes	Returned information	Remark	Instruction Description
Slave address	1	XX	From slave with address XX	01 Slave number
Function Code	1	03	read register	03 function code
Data Length	1	08	XX Bytes (twice the number of data)	08，8-byte data
Register data 1	2	DAT1	Sensor parameter 1 data content	00 1A temperature value 26
…	…	…	…	…
Register data N	2	DATN	Sensor parameter N data content	00 0N Y-axis vibration value N
CRC code	2	XXXX	Getting CRC code from slave computer calculation	A6 15 CRC of returned data

When the CRC verification code received by the slave from the host is inconsistent with the CRC verification code calculated by the slave, the host will not respond.

3.2 Preset single register function code 0x06

The 06 function code is used by the host to write data to a certain register of the slave, and can only operate on one register at a time. The example of data sent by the host is as follows:

Host sending：01 06 00 06 00 04 68 08

Response data：01 06 00 06 00 04 68 08

The meaning of data and bytes sent by the host: 01 06 refers to the host number and function code, 00 06 refers to the register to be written, and 00 04 refers to the numerical value to be written. 68 08 is the calculated CRC verification code. This instruction modifies the host number to 4.

Instructions for modifying the use of baud rate, such as:

Host sending：01 06 00 07 00 0A B8 0C

Response data：01 06 00 07 00 0A B8 0C, modify the baud rate bit of the host to 115200

The meaning of data and bytes sent by the host: 01 06 refers to the host number and function code, 00 07 refers to the register to be written, and 00 0A refers to the numerical value to be written. B8 0C is the calculated CRC verification code, and the baud rate of the modified host is 115200.

The function code, the data replied by the slave and the data sent by the host are consistent.

Data transmission method:

Asynchronous 10 bits -1 start bit (0), 8 data bits, 1 stop bit (1), no parity bit.

Data transfer rate:

The default baud rate at the factory is 9600BPS, with host number 1 and special host number 250 (not supported for normal use). The default temperature change rate is 0.3 ℃, and the setting range is 0.3-10.0 ℃. Data outside the range is 0.3 ℃. The temperature value read, vibration value, and temperature change rate are all 10 times the normal data. In actual display, the temperature needs to be divided by 10 to display.

The register list used by this sensor is as follows:

Address	Description	Data Type	Attribute
0x0000	Temperature value	short	read only
0x0001	X-axis data	short	read only
0x0002	Y-axis data	short	read only
0x0003	Z-axis data	short	read only
0x0004	Not use at the moment	short	Read only
0x0005	Not use at the moment	short	Read only
0x0006	Host number	Unsigned short	Read and write
0x0007	COM Baud rate	Unsigned short	Read and write
0x0008	Temperature change rate	Unsigned short	Read and write

The comparison table of the com baud rate and written values of this sensor is as follows:

Value	Baud rate
1	1200
2	2400
3	4800
4	9600
5	14400
6	19200
7	38400
8	56000
9	57600
10	115200

Note: When the device address is forgotten, the device address can be read using the following command:
FA 03 00 06 00 01 71 80

4.Sensor Size

Outer diameter: cylinder diameter less than 25mm, bottom nut 27mm across the edge
Height: 91mm=81mm (shell)+10mm (screw or magnet)