

INC100M

0.1 Degree Single / Dual Axis RS485 ModBus Inclinometer with Temperature Compensation



Main Features

- Single/Dual Axis Measurement, Range from ± 5 to $\pm 15^\circ$
- Accuracy: $\pm 0.1^\circ$ (room temperature)
- Temperature Coefficient (-20~50 °C): $\pm 0.001^\circ/\text{C}$
- Output interface: RS485, ModBus Protocol
- Wide Voltage Input: 11~36V, IP67 Sealed
- Compact and Lightweight: 93.8x55.5x26 mm, 250grams
- Wide Working Temperature: $-40^\circ\text{C} \sim +85^\circ\text{C}$
- OEM, ODM Supported

INC100M inclinometer is high performance single / dual axis RS485 ModBus inclinometer sensor with temperature compensation, the temperature coefficient (-20~50 °C) is as low as $\pm 0.001^\circ/\text{C}$, it enjoys high accuracy: $\pm 0.1^\circ$ (room temperature) and the measurement range is from $\pm 5^\circ$ to $\pm 15^\circ$, and the inclinometer adopts big brand components and material, and the cable are qualified for continuous outdoor use, and it is manufactured and calibrated in our own factory to guarantee performance and the real accuracy to the stated specification.

Adopting SkyMEMS proprietary algorithms, which reduce the non-linearity, cross errors, quadrantal error and installation error, the inclinometer enjoys high reliability and survivability in harsh environment and the working temperature is $-40 \sim 85^\circ\text{C}$. It has been widely used in heavy engineering machinery, track gauge instrument, high building monitoring, bridge and dam monitoring, laser platform, etc.

- ✓ 12-Step Quality Control, Super Reliability, More Functions
- ✓ Adopting Original Big Brand Component, High-class Material, Competitive Price

- ✓ Real Actual Precise after Calibration, Perfect Performance
- ✓ Successful Applications in Tens of Fields, More than 1000 Customers are Using

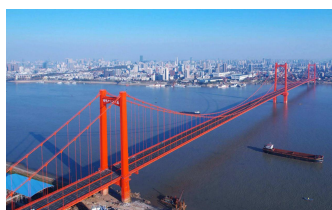
Typical Applications



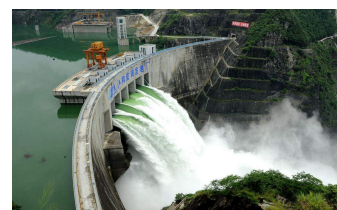
Heavy Engineering Machinery



Track Gauge Instrument



Bridge Monitoring



Dam Monitoring

Super Reliability & Performance

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Focus on MEMS Measurement & Control Technologies, Products include:

MEMS Acc	MEMS Gyro	IMU	Vertical Gyro	AHRS
INS	GNSS/INS	E-compass	Inclinometer	FOG

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Technical Specifications

Technical Specs		
Parameter	Value	Comments
Range	$\pm 5^\circ, \pm 10^\circ, \pm 15^\circ$	Optional
Measurement axis	X-Y or X	
Accuracy	$\pm 0.1^\circ$	room temperature
Temperature Coefficient	$\leq \pm 0.001^\circ$	-20~50 °C
Resolution	0.001°	room temperature
Output data frequency	5~100Hz	Adjustable
Baud Rate	2400~115200 bps	
Electrical and Environment Specs		
Voltage	11-36VDCs	
Current	<34mA@24V	
Startup Time	1.5s	
Working Temperature	-40~+85°C	
Storage Temperature	-50~+125°C	
Protection Level	IP67	
Physical Specs		
Dimension	93.8×55.5×26 mm	
Weight	250 grams	not include cable
Cable Length	1 meter	default

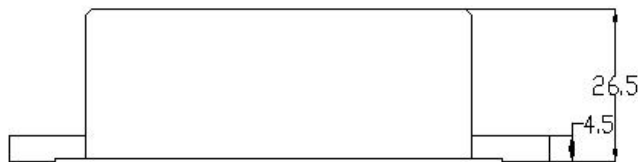
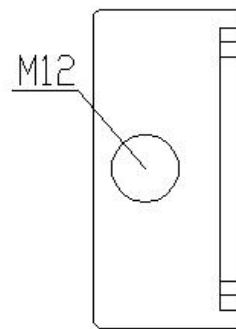
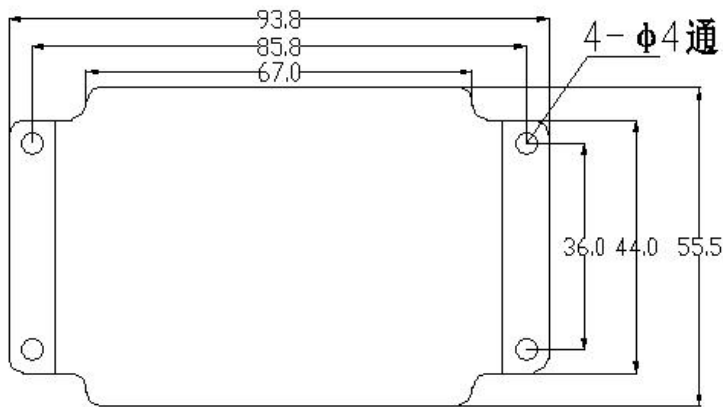
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Pins Definition

Pins Definition	
Cable color	RS485 output
Red	VCC_Voltage +
Black	GND_Voltage -
Blue	485A
Yellow	485B
Grown	NC
Green	NC
White	NC

Dimension & Package



(Unit: mm)

three-view drawing

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Communication Protocol

You may get direct access to the product through communication protocol, with which the product can be easily integrated into your system

1 Data Frame Format: (default rate 115200)

Address Code (1byte)	Function Code (1byte)	High address of the first register (1byte)	Low address of the first register (1byte)	Register's high number (1byte)	Register's low number (1byte)	CRC Checksum (2byte)
01	03(read) 06(write)	xx	xx	xx	xx	xxxx

Data format: Hexadecimal System

Address code: Default 01 (note: it should not exceed 255)

Function Code: 03 represents reading register, 06 represents presetting register.

Register Address: the beginning address of the register need to be operated

Register number: the number of the register that need to operate

Checksum: CRC16 (modbus RTU) it is calculated by the host, the low parity bit is in front, and the high parity bit is in back (CRCL CRCH).

2 Command Format

2.1 Read angle of X-axis

Command: 01 03 00 01 00 02 95 CB

Address Code (1byte)	Function Code (1byte)	High address of the first register (1byte)	Low address of the first register (1byte)	Register's high number (1byte)	Register's low number (1byte)	CRC Checksum (2byte)
01	03	00	01	00	02	95CB

Command response:

Address code (1byte)	Function code (1byte)	Number of bytes (1byte)	High number (2byte)	Low number (2byte)	CRC checksum (2byte)
01	03	04	XXXX	XXXX	XXXX

Remarks: the data field is 4 byte angle value, it is FLOAT value. Data fields are hexadecimal numbers.

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Communication Protocol

2.2 Read angle of Y-axis

Command: 01 03 00 03 00 02 34 0B

Address Code (1byte)	Function Code (1byte)	High address of the first register (1byte)	Low address of the first register (1byte)	Register's high number (1byte)	Register's low number (1byte)	CRC Checksum (2byte)
01	03	00	03	00	02	340B

Command response:

Address code (1byte)	Function code (1byte)	Number of bytes (1byte)	High number (2byte)	Low number (2byte)	CRC checksum (2byte)
01	03	04	XXXX	XXXX	XXXX

Remarks: the data field is 4 byte angle value, it is FLOAT value.

2.3 Read angle of X Y-axis

Command: 01 03 00 01 00 04 15 C9

Address Code (1byte)	Function Code (1byte)	High address of the first register (1byte)	Low address of the first register (1byte)	Register's high number (1byte)	Register's low number (1byte)	CRC Checksum (2byte)
01	03	00	01	00	04	15C9

Command response:

Address code (1byte)	Function code (1byte)	Number of bytes (1byte)	X axis high number (2byte)	X axis low number (2byte)	Y axis high number (2byte)	Y axis low number (2byte)	CRC checksum (2byte)
01	03	08	XXXX	XXXX	XXXX	XXXX	XXXX

Remarks: the data field is 8 byte returned angle value, it is FLOAT value. the front 4 byte is X axis value, the back 4 byte is Y axis data.

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Communication Protocol

2.4 Read angle of X Y-axis and temperature

Command: 01 03 00 01 00 06 94 08

Address Code (1byte)	Function Code (1byte)	High address of the first register (1byte)	Low address of the first register (1byte)	Register's high number (1byte)	Register's low number (1byte)	CRC Checksum (2byte)
01	03	00	01	00	06	9408

Command response:

Address code (1byte)	Function code (1byte)	Number of bytes (1byte)	X axis high number (2byte)	X axis low number (2byte)	Y axis high number (2byte)	Y axis low number (2byte)	Temperature high number (2byte)	Temperature low number (2byte)	CRC checksum (2byte)
01	03	08	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX

Remarks: the data field is 12 byte angle value, it is FLOAT value.

2.5 Set relative/absolute zero point

Command: 01 06 00 0A 00 00 A9 C8 01 06 00 0A 00 01 68 08

Address Code (1byte)	Function Code (1byte)	High address of register (1byte)	Low address of register (1byte)	Data Field (1byte)	CRC Checksum (2byte)
01	06	00	0A	0000 absolute zero 0001 relative zero	A9C8 6808

Command response:

Address code (1byte)	Function code (1byte)	High address of register (1byte)	Low address of register (1byte)	Data Field (1byte)	CRC Checksum (2byte)
01	06	00	0A	0000 absolute zero 0001 relative zero	A9C8 6808

Remarks: if setting as absolute zero, then the measuring angle will base on chip's factory set.

If setting as relative zero, the measuring angle will base on the current location as zero base.

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Communication Protocol

2.6 Set communication rate

Command: 01 06 00 0B XX XX XX XX

Address Code (1byte)	Function Code (1byte)	The high address of register (1byte)	The low address of register (1byte)	Data field (2byte)	Checksum (2byte)
01	06	00	0B	XXXX	XXXX

Command response:

Address Code (1byte)	Function Code (1byte)	The high address of register (1byte)	The low address of register (1byte)	Data field (2byte)	Checksum (2byte)
01	06	00	0B	XXXX	XXXX

Note:0000 represents 2400, 0001 represents 4800, 0002 represents 9600, 0003 represents 19200, 0004 represent 115200. the default is 0004: 115200.

if needing high frequency output, the baud rate should be set as 115200.

Once this command is setting, it will be saved into Flash.

2.7 Set module address

Command: 01 06 00 0D XX XX XX XX

Address Code (1byte)	Function Code (1byte)	The high address of register (1byte)	The low address of register (1byte)	Data field (2byte)	Checksum (2byte)
01	06	00	0D	XXXX	XXXX

Command response:

Address Code (1byte)	Function Code (1byte)	The high address of register (1byte)	The low address of register (1byte)	Data field (2byte)	Checksum (2byte)
01	06	00	0D	XXXX	XXXX

2.8 Save settings (write to Flash)

Command: 01 06 00 0F 00 00 B9 C9

Address Code (1byte)	Function Code (1byte)	The high address of register (1byte)	The low address of register (1byte)	Data field (2byte)	Checksum (2byte)
01	06	00	0F	0000	B9C9

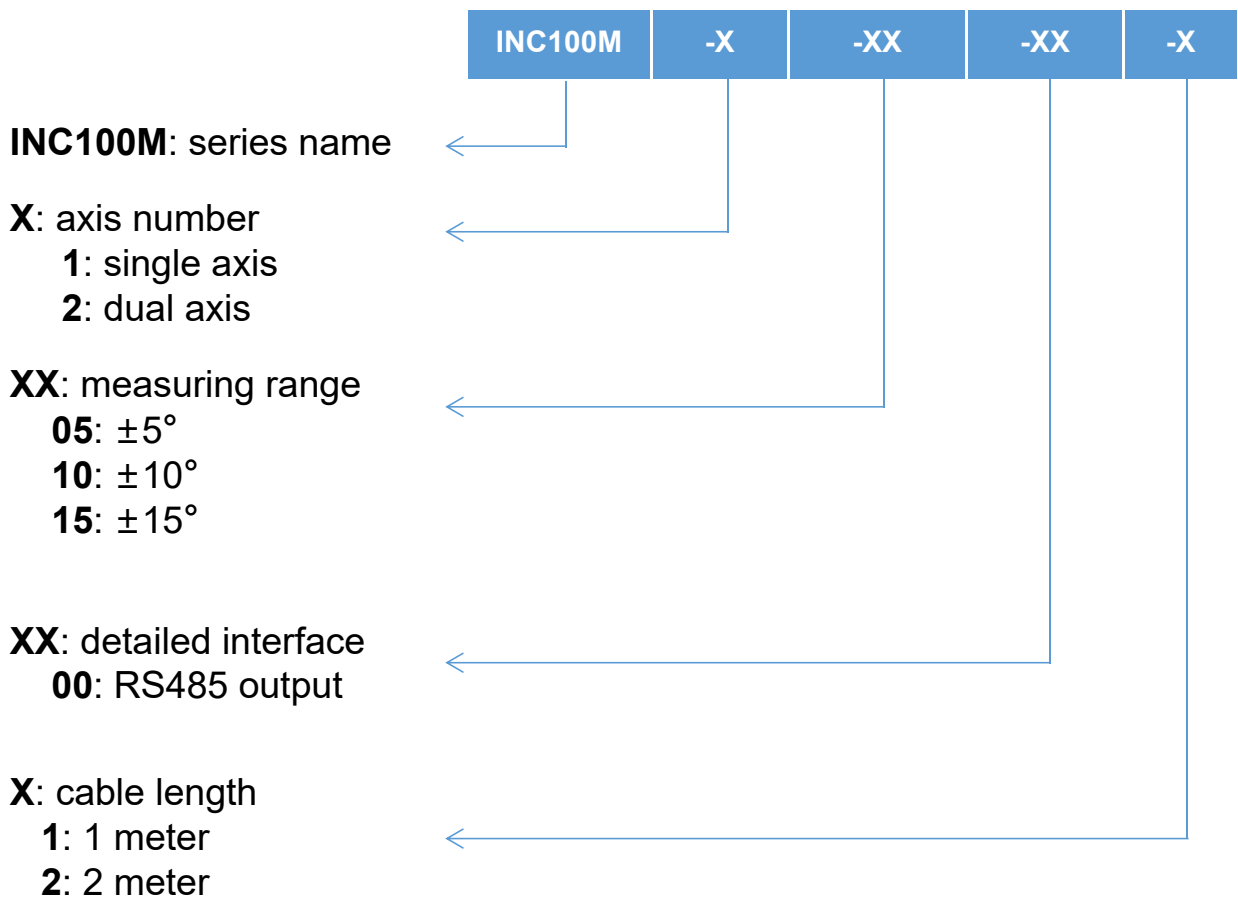
Command response:

Address Code (1byte)	Function Code (1byte)	The high address of register (1byte)	The low address of register (1byte)	Data field (2byte)	Checksum (2byte)
01	06	00	0F	0000	B9C9

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Order Information



For example, INC100M-2--010-00-1 it means that the inclinometer INC100M series, dual axis, measuring range: $\pm 10^\circ$, RS485 ModBus interface, 1meter cable length.