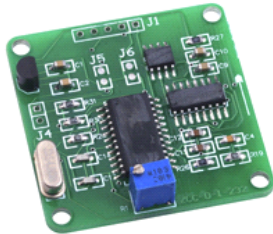


ZCC210N-232 Electronic Compass

General Description



ZCC210N-232 is a low cost 2-axis electronic compass module with low voltage input and power consumption. It communicates with PC via RS232 interface by HEX. It features stable performance, high precision and dynamic balance adjustment as well as calibration , confines alarm function and optional Baud rate according to client's request (4800, 9600, 19200bp/s optional)(default 9600).It has continuous /single sampling mode and continuous/inquiry output mode. Also it has compensatory function of deviation angle and declination angle; It supports different operating voltage (voltage range : 6 VDC-9VDC:5VDC can be input direct) to suit different operational environment.

Features

- Small size:40*40*12mm.
- Cost-effective.
- 2bytes output format and small system bandwidth.
- Support both mode of power and voltage, DC 6-9V or 5V optional.
- System with high precision and stabilization.

Applications

- Automobile electron compass.
- Handheld electron instrument.
- Telescope position.
- Navigation system.
- Auto helm rudder.
- Aerial position.
- Automobile GPS navigation.
- Aero model position.
- Automobile orientation system.
- Robot orientation and position.

Ordering Information ZCC210N-232

Specifications

| Parameter | Value | Unit | Remark |
|------------------------------|------------|------|-----------------------------|
| Measuring Range | 0° ~360° | ° | Compass placed horizontally |
| Display Resolution | 1 | ° | |
| Precision | <3 | ° | |
| Response Frequency | <5 | Hz | |
| Non-linear | ±1% | | |
| Repeatability | <1 | ° | |
| Voltage | 5v | Vdc | Or 6~9Vdc |
| Operating Current | <30 | mA | 5V Continuous output mode |
| Operating Temperature | -40 ~+ 85 | °C | |
| Storage Temperature | -45 ~+ 125 | °C | |
| Size | 40*40*12 | mm | |

Baud Rate Setting

J5 and J6 are jumpers for choice and there are three kinds of baud rate:

| Baud Rate | Mode |
|-----------|-------------------------------|
| 2400 | J6 switch on, J5 switch off. |
| 4800 | J6 switch off, J5 switch on. |
| 9600 | J5 switch off, J6 switch off. |

Communication Protocol

Compass uses half-duplex communication mode and the communication style is an answer to an ask mode.

Command Operation as Follows:

Caution:

Both writing in and reading out are first MSB and then LSB. Time lag is 2Ms between orders or order and operation.

1 Write in declination angle (command 60H)

60(H) MSB LSB

60H is command word. MSB is high byte data and LSB is lower byte.

If input +6° declination angle: Send 60 send 00 06. If inputting negative declination angle is needed, please use positive declination angle to substitute.

For example: input -3° declination angle, you can use positive 357° to replace it (computing method: 360-3) and convert into Hex, that is you can input 01 65 to replace it (means 357°).

Note: The clockwise is positive and the counter clockwise is negative.

2 Read out declination angle (command 61H)

61(H)

Compass will return double byte binary data.

PC first accepts high byte data then lower byte data.

3 Write in deviation angle (command 64H)

60(H) MSB LSB

Compass will return double byte data in binary.

PC first accepts high byte data then lower byte data.

Note: The clockwise is positive and the counter clockwise is negative.

4 Read out deviation angle (command 65H)

65(H)

Compass will return double byte binary data.

PC first accepts high byte data then lower byte data.

5 Enter into calibration mode (command 70H)**70(H)**

Host computer send single byte command in hex to compass. Then compass enter into calibration mode and execute data sampling/ processing per 0.1s.

6 Quit calibration mode (command 72H)**72(H)**

Host computer sends single byte command in hex to compass. Then compass quit the calibration mode and displays normal direction data.

7 Single sampling (command 74H)**74(H)**

Compass will execute data sampling and processing once and store this data up to the next sampling command. During this period the angle output by compass will remains the same.

8 Consecutive sampling (command 76H)**76(H)**

Compass will execute data sampling and processing per second. Angle information also will refresh per one second.

9 Read out direction data (command 77H)**77(H)**

After finishing sampling mode setting (74H/76H), host computer sends a command 77H to compass, this time compass module will return a set of double byte data including heading, angle value and working condition.

Data Format as Follows**1 Declination Angle**

Declination angle is a binary data from 0° - 360° , the former seven bits is zero and the latter nine bits is data, ties up two bytes.

2 Deviation angle

Deviation angle is a binary data from 0° to 360° , the former seven bits is zero and the latter nine bits is data, ties up two bytes.

3 Direction Angle

It ties up two bytes.

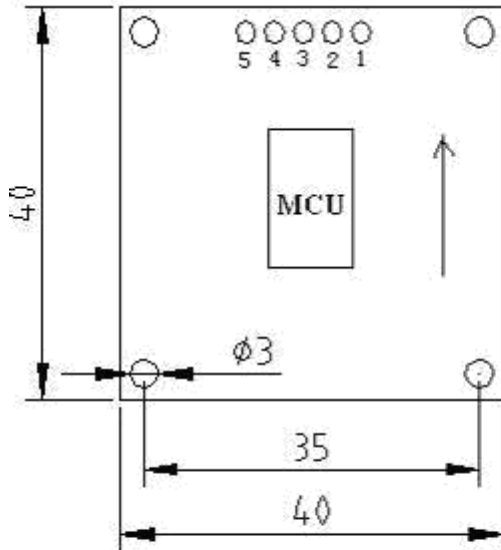
The fifteenth/fourteenth bit: mean working condition of compass. Definition: 01-query state, 10-normal state, 11-calibration state.

The thirteenth/twelfth bit: Undefined

The eleventh/tenth/ninth: mean direction of compass. Definition: 000-north, 001- northeast, 010-east, 011-southeast, 100-south, 101-southwest, 110-west, 111-northwest.

The eighth to the zero: mean angle of compass, binary data from 0° to 360° .

Installing Size and Definition of Connection



Definition of Connection:

- 1:GND connect pin5 of DB-9 and GND
- 2:VCC connect +5VDC
- 3:VDD connect 6-9VDC
- 4:RX connect pin3 of DB-9 (TX)
- 5:TX connect pin2 of DB-9 (RX)

Technical Terms

1 Declination Angle

It is the angle between magnetic north and true north. Declination angle of different place are different, even at the same place declination angle varies with the time. When we use compass to navigate, we get directions relative to magnetic north. So we can get directions relative to true north through declination angle compensation. For example, the current direction counted by compass is north by east 30 degrees and the declination angle is 5 degrees. So the direction relative to true north is 35 degrees ($30+5^{\circ} = 35^{\circ}$)

2 Deviation Angle

There is an arrowhead on the compass module meaning directions. When installed, it is requested that heading direction of the measured object is consistent with the arrowhead. So the direction counted by the compass is the

right direction. If installing direction is not consistent with the arrowhead, there is a included angle and it is the deviation angle. Only after compensation the compass outputs the true direction.

3 Calibration

It's also called hard iron compensation. All digital compasses must be calibrated before used. Once hard iron conditions change, the magnetic field conditions will be changed too. At this time angle information counted by the compass will be inaccurate. In order to remove the influence, it's necessary to calibrate the compass.

4 Methods and Effect

When ambient magnetic field is changed, angle information counted by compass will be inaccurate. This time it is necessary to calibrate the compass to remove the influence

Methods: Send "70H" command, and then rotate the compass two circles flatly. Then send "72H" command to finish calibration.

PC Demonstration Program

PC Demonstration program "project1.exe" can be run direct and no appendix is needed. You can choose RS232/RS485 protocol on the menu of program; also can choose com-port of serial communication and baud rate. There is a circular compass drawn on the Window's left, the data sent by PC or accept by module displayed in the middle and the command word communicated between PC and compass module on the right. The 77 button is some especial. Because module only executes once data sampling and processing under inquiry state, PC also reads data once only after 77 button pressed.; However, under state of calibration and normal state, PC would read the latest data per 0.3 seconds after 77 button pressed because compass executes data sampling and processing without stop. Under the Window, status bar can simultaneously display communication state and actual operating state of compass.

Information above is only for reference, we can amend the information without informing.