ZCC330L-232 Digital Compass

Description:

ZCC330L-232 is a three axis digital compass. Its working theory is get the Earth's magnetic field component through the magnet sensor, so as to get the azimuth angle. Its output interface is RS232.This product with high accuracy and stable performance, with calibration and tilt compensation function. The output baud rate is adjustable, continuous output and inquiry output modes optional. It has magnetic declination compensation function, can adapt to different working environments.

Feature

- High cost performance
- High accuracy
- Tilt compensation
- Can be set relative angle

Application

- ·Handheld instruments and meters.
- ·Robots navigation and position.
- ·Navigation system.
- ·Auto helm rudder.
- ·Aerial position.
- ·Automobile GPS navigation.
- ·Aero model position.

Specifications:

Parameter	Value	Unit	Remark
Heading measuring range	0°～ 360°	（°）degree	
Heading resolution	0.1	（°）degree	
Azimuth accuracy	0.5	（°）degree	RMS
Tilt measuring range	±80	（°）degree	
Tilt accuracy	＜ 1	（°）degree	
Tilt resolution	0.1	（°）degree	
Response frequency	7	Hz	
Operating voltage[(1]	5	V	±0.1V
	或 7-15V	V	
Operating current	＜ 70	mA	In 5V power supply
Working temperature	-40 ～ 85	℃	
Housing size	52*52*30	mm	

Two optional power supply（5V or 7—15V）

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Communication Protocol: (output via ASC11; Baud rate is 9600bp/s):

1、ASCII:

One set of data has 27 bytes.

Byte1: $(0x24)

Byte2: H(0x48)

Byte3: ,(0x2C)

Byte4: hundreds digit of heading angle

Byte5: tens digit of heading angle

Byte6: units digit of heading angle

Byte7: .(0x2E)

Byte8: decimal digit of angle value.

Byte9: ,(0x2C)

Byte10: P（0x50）Sign place of pitch angle

Byte11: +/- Positive/Negative sign of pitch angle

Byte12: tens digit of pitch angle

Byte13: units digit of pitch angle

Byte14: . (0x2E)

Byte15: decimal digit of pitch angle

Byte16: ,(0x2C)

Byte17: R（0x52）Sign place of roll angle

Byte18: (+/-)Positive/Negative sign of roll angle

Byte19: tens digit of roll angle

Byte20: units digit of roll angle

Byte21: .(0x2E)

Byte22: decimal digit of angle value

Byte23: *（0x2A）

Byte24: First bit calibration

Byte25: Second bit calibration

Byte26: 0x0D（enter）

Byte27: 0x0A（space）

Note: Serial communication output data, each byte of the transmission format include: a start bit, 8 data bits, an end bit.

2、Related command: (Please distinguish lower case and capitalization)

Output version of software first after powered on: ZCC330L-V1.0

1.“*Bau=4800” ——Set baud rate 4800。

2.“*Bau=9600” —— Set baud rate 9600。

3.“*Bau=19200” —— Set baud rate 19200。

4.“*P”—— Single output. When it sends once system will output a set of data.

5.“*n”—— Continuous output.

6.“*z”—— Set zero. Sets zero degree as datum mark and angle output based on the datum mark.

7.“d”——come back to output absolute angle.

8.“p”——calibrate X and Y,XY, send p command, then compass output XYXYXY…,when it output XY, it means compass has detected new magnetic field value. Please notice that when calibrating X and Y axis, please keep the angle value of pitch and roll less than 1 degree.

9.“Z” —— Z axis calibration, send Z command, when compass output ZZZZ…it means compass has detected new magnetic field value.

10. “r”—— Terminate calibration for X,Y and Z axis.

11. “b????”—— Set declination angle. It will wait after system has accepted it and PC will output declination angle among 000-360 degrees. Eg: Send b0012, means declination angle

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is 1.2 degree.

12. “c”—— Read declination angle.

Note：related command，except “P”， other commands proposed to modify in the continuous output mode.

4 Parity bit arithmetic

Byte4^ Byte5^ Byte6^ Byte8^Byte12^Byte13^Byte15^Byte19^Byte20^Byte12^0x32

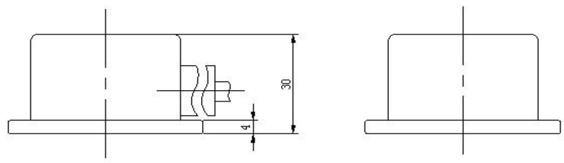
The value of the high 4 digits is the first parity bit and the latter 4 digits is the second parity bit.

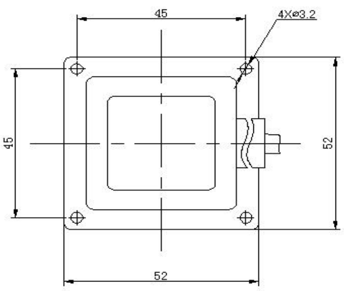
For example: $H,151.3,P+02.5,R-16.8*3C

1^5=4,4^1=5, 5^3=6, 6^0=6, 6^2=4, 4^5=1, 1^1=0, 0^6=6, 6^8=E, E^0x32=0x3C;

First parity bit:0x33.Second parity bit:0x43.

Installing Size: （Unit :mm）





Connect definition：(Wire color)

1：Red: Power+5V

2：Black: GND

3：Blue: RXD

4：Green: TXD

5：White: 7—15V

Notes and Calibration method:

1. Please make the side with label up when installing
2. **Calibrating X, Y:** Send “p” command, then slowly rotate the device at least one complete rotation for at least 30 plus seconds. Note : the device should be kept as level as possible to calibrate the X, Y magnetic sensing elements. Terminate the calibration after you send “ r” command
3. **(Calibrating X, Y): Check that the platform is level,** observe Pitch and Roll data and confirm they are less than 1 degree. Next, fully rotate the platform to make sure it will remain level during the calibration process. The area should be

clear of soft and hard iron objects that could disrupt the earths magnetic field, cars, motors, wires with current, magnets, etc.

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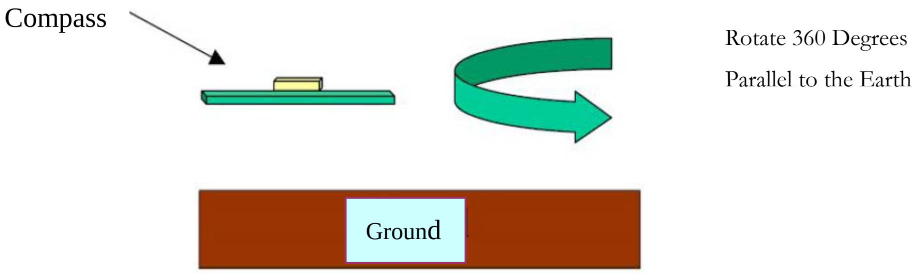
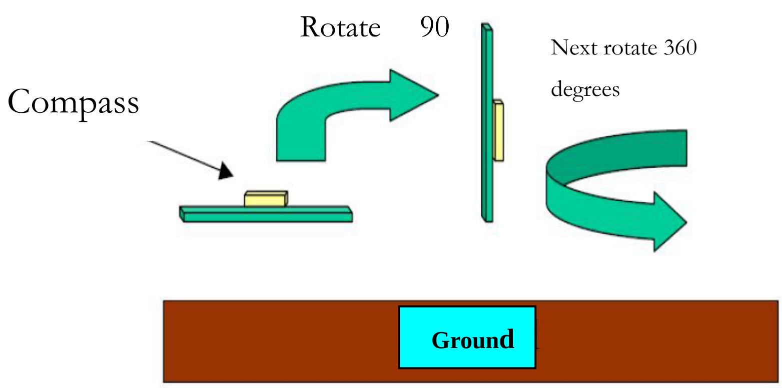


X ,Y calibration

4. **(Z Calibration)**: Rotate device (90 degrees) so it is turned on its side **Roll the platform 90 degrees,** The area should be clear of soft and hard iron objects that could disrupt the earths magnetic field, cars, motors, wires with current, magnets, etc. You want the calibration to be done in the same place as the "C" calibration as it needs to see the same earth's magnetic field.
Send "Z" to calibrate, then slowly rotate 360 degrees (at least one complete rotation) for at least 30 plus seconds. Terminate the sequence send " r" command.The "Z" command should be done in the same location to calibrate and align the Z axis sensor to the X, Y. This is important for tilt compensation.Errors in heading, when the device is tilted, will result from no Z axis calibration



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 navigating, 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°=35°)

2. Calibration

It's also called hard iron compensation. All digital compasses must be calibrated

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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.

3. Calibrating methods and functions

When magnetic field changes angle information counted by compass will be in accurate. This time it is necessary to calibrate the compass to remove the influence.

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