SPECIFICATIONS

Item No.：DCM220B
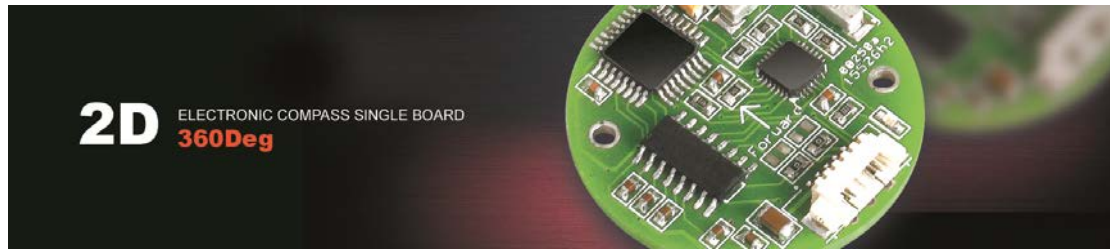
Description：High Accuracy 2D Digital Compass(Single Board)

Version：Ver.05

Production implementation standard reference

● Enterprise quality system standards: ISO9001: 2008 standard (certification number: 128101)

● Tilt sensor production standards: GB / T 191 SJ 20873-2003 inclinometer general specification of Level

● Gyro accelerometer test standard: QJ 2318-92 Gyro accelerometer test methods

● Software development reference standard: GJB 2786A-2009 military software development General requirements

● Product environmental testing standards: GJB150

● Electromagnetic anti-interference test standards: GB / T 17626

General Description

The DCM220B is a 2D electronic compass single board, measuring heading 0 ° to 360 ° , using our patented technology of hard magnetic and soft magnetic calibration algorithm, make the compass get the best results through the plane rotation of calibration method in the magnetic interference environment ,because it is a plane compass , this product with excellent performance when to be used in the plane working environment , e.g the heading data will occur error if the tilt angle bigger than ± 5 ° this environment .

DCM220B use RS232 or TTL level output interface, output baud rate is 9600bps, small size, low power consumption, strong practical applications and diversity application occasions, can accept customized based on any customer request.

Features:

- ●Heading accuracy: 1°
- ●Wide temperature working: -20℃～+70℃
- ●With hard magnetic ,soft magnetic and inclination compensation
- ●Standard RS232/RS485/TTL output interface

- ●Heading measuring range :360°
- ●Size: L30×W30×H6mm
- ●DC 5V power supply
- ● Can accept other functions customized

Application:

- ●Satellite antenna search satellite
- ●GPS integrated navigation
- ●Vehicle-mounted rearview mirror
- ● Geomancy compass

- ●Various robots
- ●Antenna servo control
- ●Tower crane control
- ● Various positioning integrated

Ordering information:
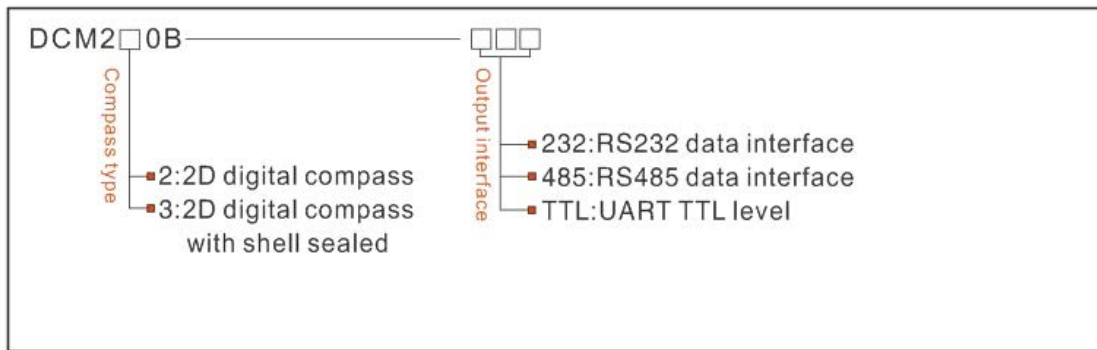
E.g：DCM2**2**0B-**232**：2D without enclosure sealed /RS232 output

Electrical Characteristics

DCM220B Technical Data		
Compass Heading Parameters	Heading accuracy	±1°
Heading	Navigation tilt angle range	±5°
	Heading accuracy	1°
	Resolution	1°
Calibration	Hard iron calibration	Yes
	Soft iron calibration	No
	Magnetic field interference calibration method	Plane rotation a circle (2D calibration)
Physical features	Dimension	L30×W30×H6mm
	Weight	20g
	RS-232/RS485/TTL interface connector	Direct Lead Line
Interface features	Start delay	<50MS
	Maximum sample rate	10Hz/s
	Communication rate	2400 to 19200samp0baud
	Output format	Hexadecimal communication protocol
Power	Power supply voltage	（Default）DC+5V
	Current(Maximum)	40mA
	Ideal mode	20mA
	Sleep Mode	TBD
Enviroment	Operating range	-20℃～+70℃
	Storage temperature	-25℃～+85℃
	Resistance shock performance	2500g

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Electrical Connection

| Line color function	RED	N/C	BLACK	GREEN	YELLOW
	Vcc 5V Power supply Positive		GND Power Negative	RS232(TXD) Or RS485(D-)	RS232(RXD) Or RS485(D+)
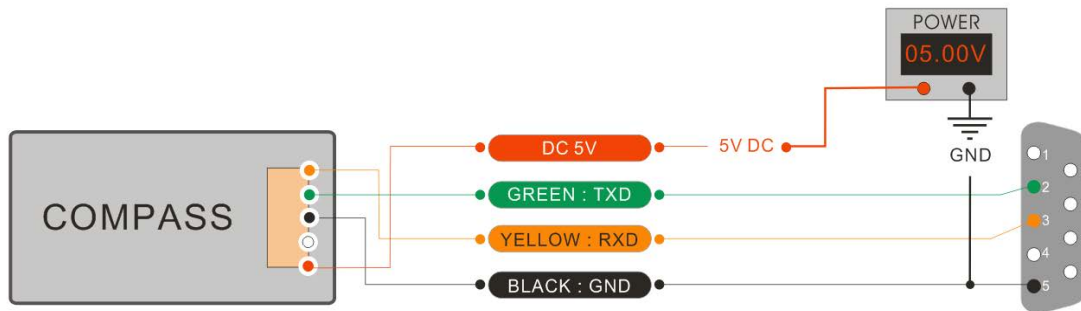
## DCM220B Measuring Directions&Fix

The DCM220B 2D electronic compass azimuth is using geomagnetic principle, so it is very important to select a minimum magnetic interference environment for installation positon. Please place and install the DCM220B away from the iron, magnets, engines and other magnetic objects as much possible as you can. Need control over 40CM distance(different magnetic interfere with the compass in different distance) at least even there are these magnetic medium around . In order to ensure optimal measurement environment please must use the **M3 stainless steel screws for installation .**

Although DCM220B can compensate the moderate deviation in the stable magnetic environment, but it can not compensate the changed magnetic interference. Please pay much attention to the wire with DC will generates a magnetic field , because if the DC change then the magnetic field will also change in size . The battery also is another interference source of changing . Each installation is different, and the user must evaluate the feasibility of installation under all possible operating environment.

The optimal heading accuracy of DCM220B can reach 1 ° , this undergo a rigorous validation indisputable, the most scientific test method is equally crucial. The test method we recommend is: Please install the DCM220B electronic compass to a vertical and erect aluminum pole (non-magnetic material), then proceed with heading accuracy measurement (of course the rotating rod perpendicular to the rotating platform, as much as possible to avoid large external magnetic field interference). Doing so can reduce the compass turning radius, to scientifically improve the measurement accuracy. This is just to provide the installation of the laboratory, must be flexible to deal with the specific situation.
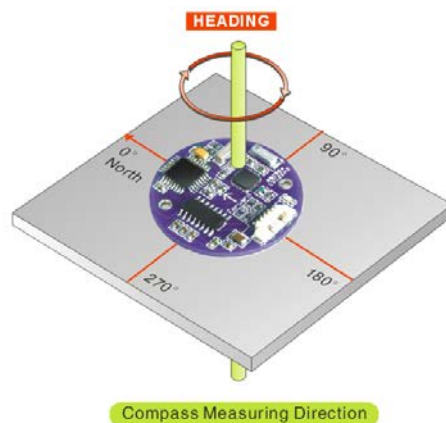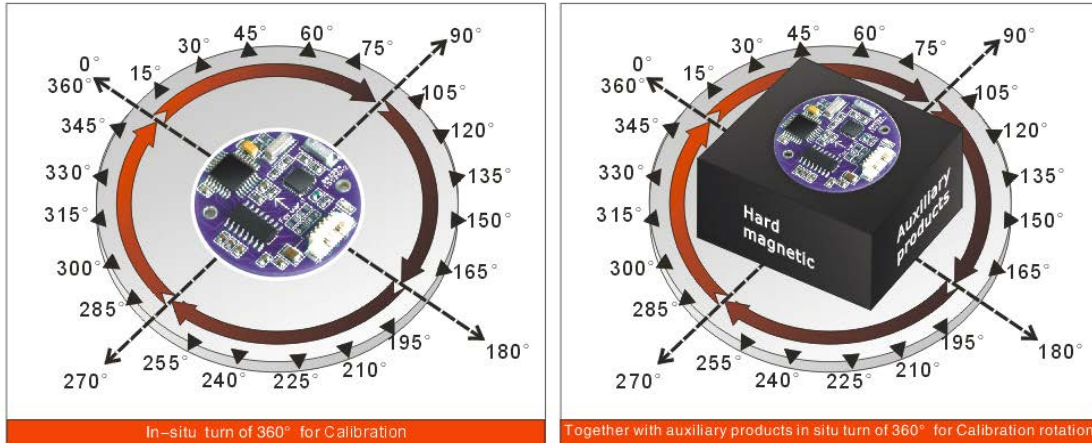
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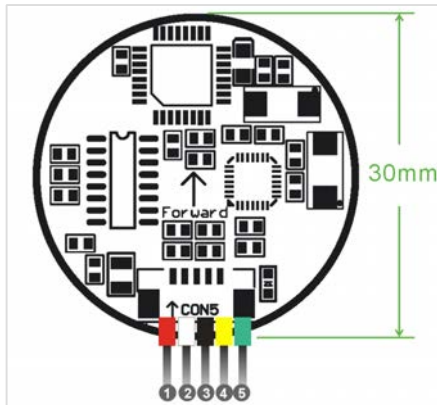
DCM220B Calibration methods:

Calibration lemmas:

1) The accuracy of testing compass can not reach the requirements;

2) compass installation environment have magnetic interference, the interference is fixed, and the interference magnetic field and compass installation will not happen again in distance changes (example: compass to be installed above an iron material, because the iron will have magnetic interference, at this time then need to rotate and calibrate the iron and compass, and the iron and compass will not be separated when using , once they are separated then need to recalibrate. If the iron size is not fixed, or with a compass distance change is not fixed, the interference can not be calibrated,only can install it in a very far away , safe distance control in above 40cm).

1) Please horizontally place the compass to a flat surface away from the interference, and correctly connected to the RS232 communication port, turn on the power.

2) Send the calibration start command: 68 04 00 08 0C in hexadecimal format. **(Or click the Rion's 3D debugging software "CALI-START" button)**

3) DCM compass will return the response command.

4) Rotate the compass from 0 ° to 360 ° in a circle at original position , then proceed the magnetic field data acquisition surround the compass(rotational speed should not too fast , control more than 40 seconds / turn.)

5) After back to 0 °,re-send stop calibration command: 68 04 00 0A 0E in hexadecimal format, calibration success **(or click Rion's 3D the debug software "CALI-SAVE" button)**

Note: If the compass is fixed install in other devices, the devices have magnetic interference, after compass to be installed, then rotate it with supporting devices together, to collect the interference source of the supporting products , to ensure the compass with a accurate measurement .

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In–situ turn of 360° for Calibration

Together with auxiliary products in situ turn of 360° for Calibration rotation

RION's 2D Software

You can download the RION angle debugging software from RION's official website for the preliminary angle debugging, also you Can download public version of the comassistant software on line for using .
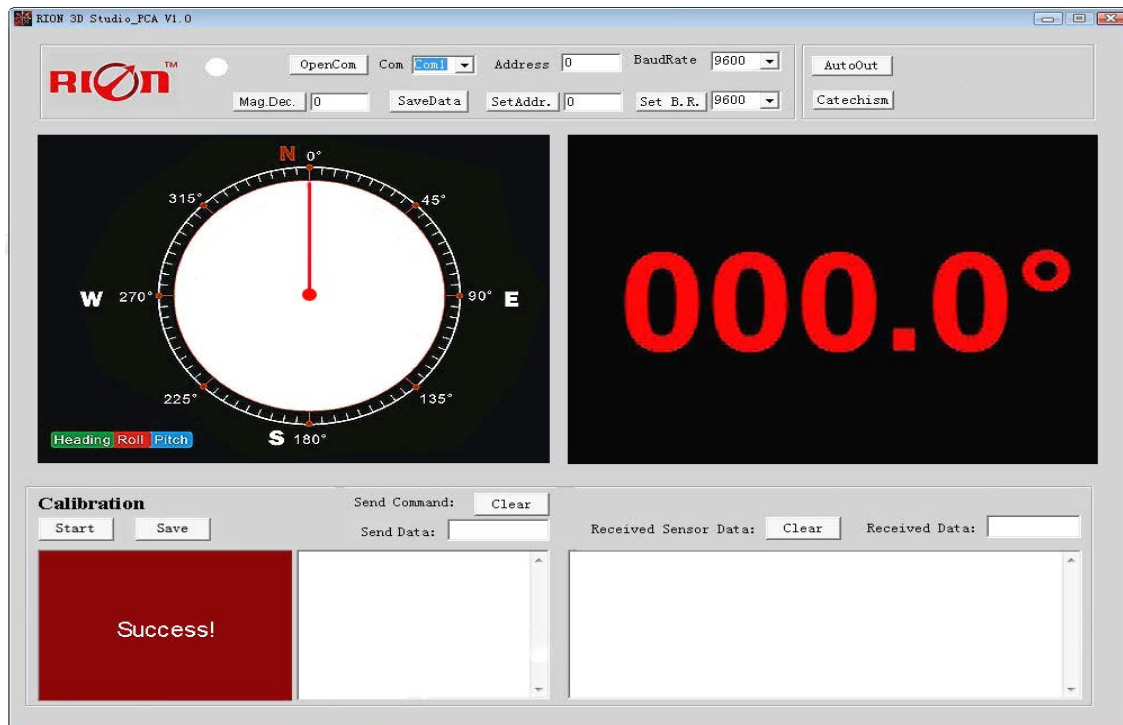
Open/Close：Open and close COM port;

Com: Select the the device corresponding to the COM port

Address: Fill in the sensor current address code, the factory default is 00

Set Address: Set the sensor address code input box on the right to enter the desired address code, click Set Addr button

Save Data: Save the data, click here data can be synchronized Save angle data, the file is stored by default in the C: ---- COMDATA file

Set Zero: Set relative zero, the sensor current angle is 00.00 degrees

Cancel Zero: Unset the relative zero, to restore the sensor to the factory absolute zero;

Baud Rate: Select the sense baud rate , the factory default is 9600;

Set Baud Rate: Set the sensor baud rate, on the right of the selection box to select corresponding baud

rate then click SetB.R. button;

Auto Output: Switch the sensor to automatically output mode, in the automatic output mode can be filled with different output frequency in Hz;

Catechism: The sensor switch to answer pattern, such as choosing the answer type, must input "send command "(command, please refer to the specification) on the left of "Send Command" input box, but also can fill in the transmit frequency in the Send Data, the unit Hz;

Mag. Dec.: Magnetic declination setting, in the right box directly enter the local magnetic declination, click "Mag.Dec." Button to confirm .

Calibration: compass calibration forum

Start: Start calibration

Save: stop calibration and save data. (Specific calibration method please refer to this specification calibration description)

Note: after install the RION's debugging software, if can not open, please operate by the following steps (please appear to the administrator status to operate):

1） Copy these three files mscomm.srg、mscomm32.ocx、mscomm32.dep from the folder to C:/Windows/system32 path below。

2） Click "Start" –"run" --regsvr32 mscomm32.ocx，You are prompted to install successful dialog。

Product Protocol

一、DATA FRAME FORMAT：((8 bits date，1 bit stop，No check，Default baud rate 9600)

Identifier (1byte)	Date Length (1byte)	Address code (1byte)	Command word (1byte)	Date domain	Check sum (1byte)
68					

Identifier：Fixed68H

Data length：From data length to check sum（including check sum）length

Address code：Accumulating module address，Default :00

Date domain will be changed according to the content and length of command word

Check sum：Data length、Address code、Command word and data domain sum,No carry.

二、COMMAND word analysis

Desc.	Meaning/Example	Description
0X03	**Read heading command** *68 04 00 03 07*	Data domain（0byte） No Data domain command
0X53	Sensor answer reply E.g:*68 06 00 53 03 60 BC*	Data domain（2byte）**SA AA** Data domain is 2bytes return angle value，is compressed to BCD code，AAA is three-position integer value e.g 0360 means 360deg
0X06	**Setting declination command** *68 06 00 06 00 28 34*	Data domain（2byte） This command is used to set the intersection angle of the earth's magnetic pole and the geographical North pole, global different regional with different magnetic declination . After setting the data , the actual output direction data value add this setting value then get the dirrection data . S is symbol 0 positive 1 Negative XXX(0 ~360) is three-position integral number，e.g 0028 is +28deg.

0X56	Sensor answer reply E.g:**68 05 00 56 00 5B**	Data domain（1byte） Data domain in the number means the sensor response results 00 Setting successfully FF Setting failure
0X07	**Read the set declination command** **68 04 00 07 0B**	Data domain（0byte） No Data domain command
0X57	Sensor answer reply E.g: **68 06 00 57 00 28 85**	Data domain（2yte）<u>**SA AA**</u>Data domain is 2bytes return Angle value, is compressed to BCD code,S is symbol 0 positive 1 Negative XXX(0~360) is three-position integer, eg. 0028 is +28deg Data domain（2byte）<u>**SA AA**</u>Data domain is 2bytes return angle value，is compressed BCD code， AAA is three-position integer value e.g 0360 means 360deg
0X0F	**Setting address code command** **68 05 00 0F 01 15**	Data domain（1yte） Data domain in the number means the sensor response results AA module address
0X8F	Sensor answer reply E.g: **68 05 01 8F 00 95**	Data domain（1byte） Data domain in the number means the sensor response results 00 Setting successfully FF Setting failure
0X08	**Start calibration** **68 04 00 08 0C**	Data domain（0byte） This command is used to calibrate the start operation, successfully received, enter the calibration procedure, the user needs to rotate the module in a circle.
0X58	Sensor answer reply E.g: **68 05 00 58 00 5D**	Data domain（1byte） Data domain in the number means the sensor response results 00 Setting successfully
0X09	**Save calibration** **68 04 00 0A 0E**	Data domain（0byte） No data domain command This command will stop calibrating after finish the calibration and then save data function, return to measurement mode
0X59	Sensor answer reply E.g: **68 05 00 59 00 5E**	Data domain（1byte） Data domain in the number means the sensor response results 00 Setting successfully FF Setting failure

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