



## SPECIFICATIONS

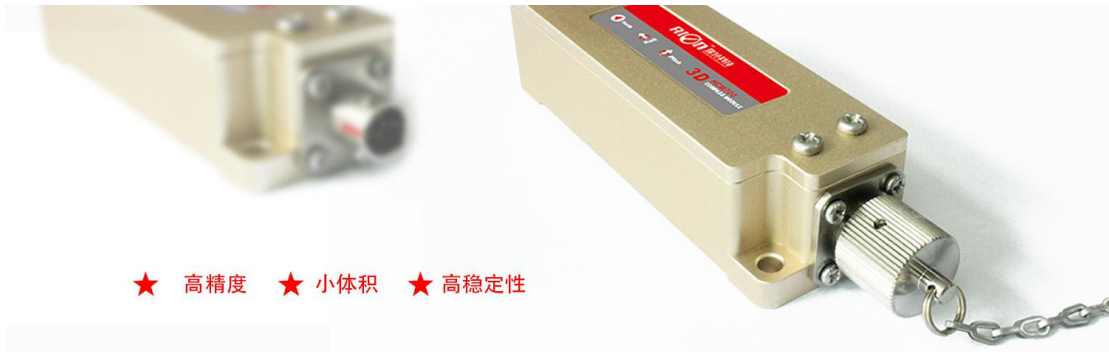
Item No.: HCM705B

Desc.: High Accuracy Gyro Compass

### 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
- Version: Ver.01
- Date: Jul.22nd,2015

## HCM705B- High Accuracy Gyro Compass



★ 高精度 ★ 小体积 ★ 高稳定性

### General Description

HCM705B is a high accuracy triaxial electronic compass, using the the US patent technology of hard magnetic and soft magnetic calibration algorithm, to make sure the compass in a magnetic field interference environments has best effect through 3D calibration method , HCM705B integrated three-axis flux-gate sensor, through the CPU real-time calculating heading , and use triaxial accelerometer to compensate the heading Angle of large scope inclination. Electronic compass integrates high precision MCU control, output way various, in which the standard interface including RS232 / RS485 / TTL interface...etc, also can accept other communication interface customization.

HCM705B with small volume, low power consumption, can be applied in antenna stable, vehicles, systems integration, and many other fields, high shock resistance and high reliability make compass work normally under the extremely harsh environment, more suitable for the miniaturization of today's military precision measuring integrated control system.

### Features

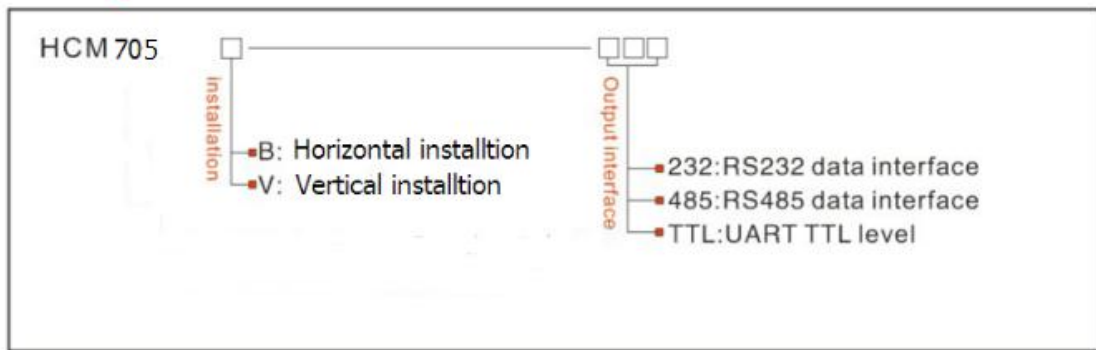
- Heading accuracy:  $0.3^{\circ} \sim 0.5^{\circ}$
- Tilt angle resolution:  $0.1^{\circ}$
- With hard magnetic ,soft magnetic and angle compensation
- Standard RS232/RS485/TTL output interface
- Roll angle measuring range :  $\pm 180^{\circ}$
- Tilt angle accuracy:  $0.2^{\circ}$
- Size: L94×W31×H24mm
- Wide temperature :  $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$

### Application

- Satellite antenna search satellite
- GPS integrated navigation
- Gun emission system
- Laser range finder
- ROV underwater robot navigation
- Special occasion robot
- Marine navigation surveying and mapping
- Antenna servo control
- Infrared imager
- Map for plotter
- Oceanography measurement instruments
- Unmanned aircraft

# HCM705B- High Accuracy Gyro Compass

## Ordering information



E.g: HCM705B-232: 360tilt 3D sealed with enclosure /RS232 output

## Electrical Characteristics

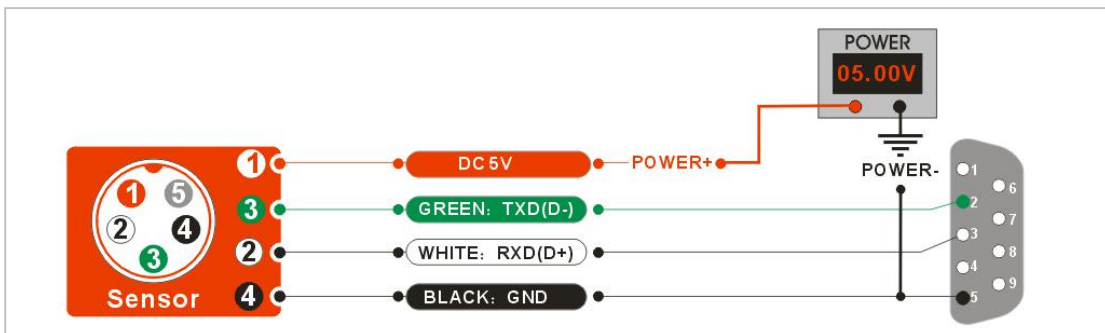
HCM705B Technical Data		
Compass heading parameter	The best heading accuracy	0.3° tilt <10°
		1.0° tilt <180°
	Resolution	0.1°
Compass tilt parameter	Pitch accuracy	0.1°<15° (Measuring range)
		0.1°<30° (Measuring range)
		0.1°<60° (Measuring range)
		0.2°<90° (Measuring range)
	Pitch tilt range	±85°
	Roll accuracy	0.1°<15° (Measuring range)
		0.1°<30° (Measuring range)
		0.1°<60° (Measuring range)
		0.2°<180° (Measuring range)
	Roll tilt range	±180°
	Resolution	0.1°
Calibration	Hard iron calibration	Yes
	Soft iron calibration	Yes
	Magnetic field interference calibration	24 points(3D calibration)
Physical features	Dimension	L94×W31×H24mm
	Weight	20g
	RS-232/RS485/TTL interface connector	5PIN connector
Interface features	Start delay	<50MS
	Maximum output rate	20Hz/s
	Communication rate	2400 to 19200baud
	Output format	Binary high performance protocol
Power	Power supply	(Default) DC+5V
		(Customized) DC9~36V
	Current(Maximum)	20mA

## HCM705B- High Accuracy Gyro Compass

	Ideal mode	18mA
	Sleep Mode	TBD
Enviroment	Operating range	-40℃~+85℃
	Storage temperature	-40℃~+100℃
	Resistance shock performance	2500g
Electromagnetic	According to EN61000 and GBT17626	
MTBF	≥40000 hours/times	
Insulation	≥100M	
Shock	100g@11ms、3Times/Axis(half sinusoid)	
Anti-vibration	10grms、10~1000Hz	
Weight	80g(without cable)	

### Electrical Connection

Line color function	BLACK	WHITE	GREEN	RED	GRAY
GND		RS232(RXD)	RS232(TXD)	Vcc 5V	FACTORY
Power		Or RS485(D+)	Or RS485(D-)	Power supply positive	Use only
Negative					



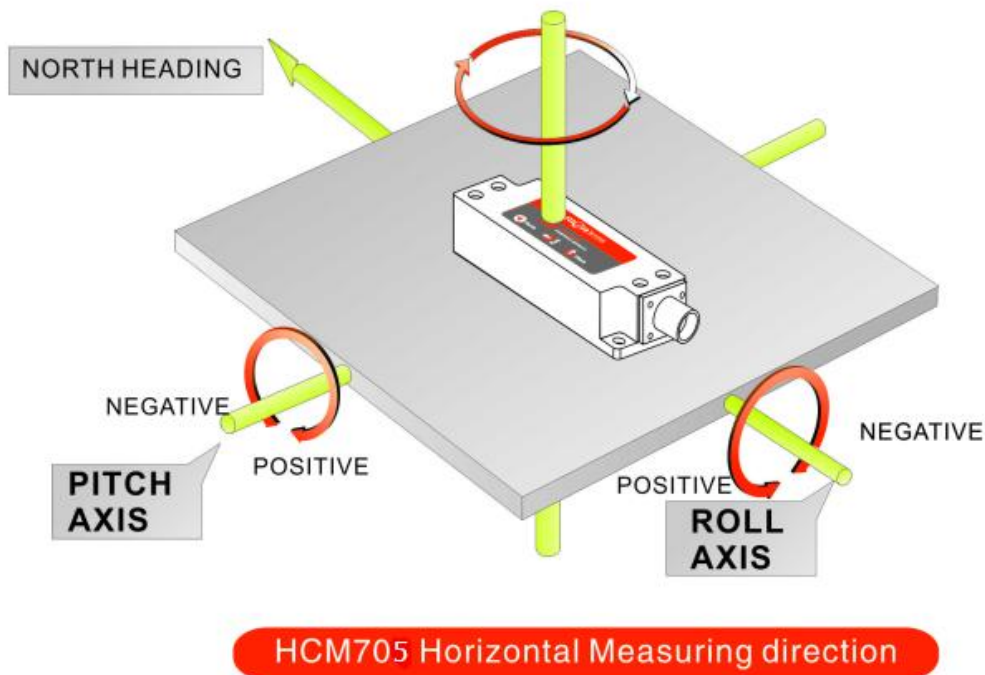
### HCM705B Measuring Directions&Fix

The azimuth of HCM705B 3D electronic compass is using geomagnetic principle, so it is very important to select a minimum magnetic interference environment for installation . Please install the HCM505B away from the iron, magnets, engines and other magnetic objects as much possible as you can. Need control over 30CM distance(different magnetic interfere the compass in different distance ) at least even there are these magnetic medium around . In order to ensure best measurement environment please must use the **M3 anti-interference screws** for installation .

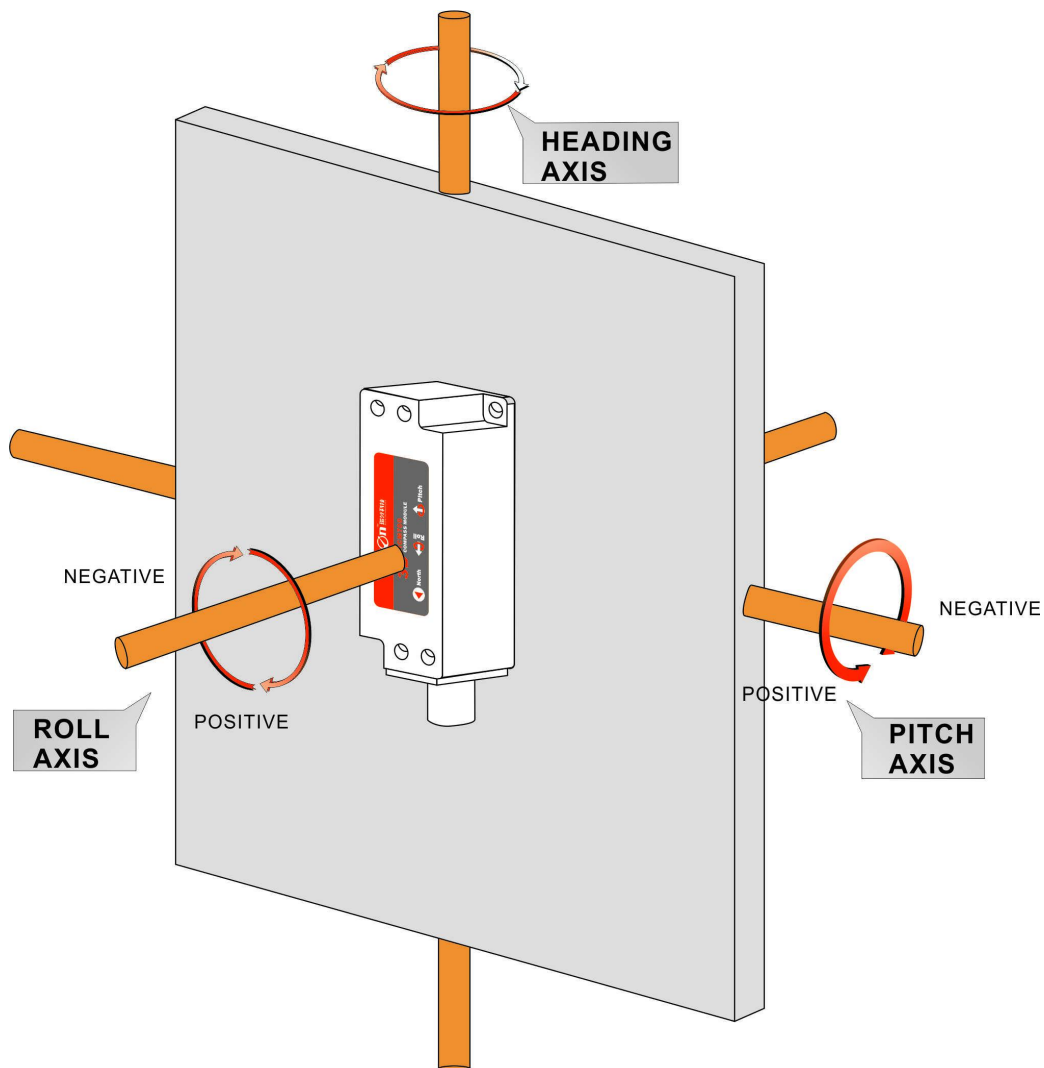
HCM705B electronic compass with 1 meter cable, RION company optional cable can be 10 meters.The sensor cable as short as possible to get minimum noise. Although HCM705 to compensate the moderate deviation in the stable magnetic environment, but it CAN NOT compensate the changeable magnetic interference. Please special pay much more attention to the wire carry with a direct current to create the magnetic field , because if the direct current change, size of the magnetic field will also change. Battery is also another change of interference sources. Every installation is different and the user must evaluate the installation feasibility of all possible operating conditions.

## HCM705B- High Accuracy Gyro Compass

The best heading accuracy of HCM705B can reach  $0.3^{\circ} \sim 0.5^{\circ}$ , this undergo a rigorous validation indisputable, the most scientific test method is equally crucial. The test method we recommend is: Please install the HCM705B 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. E.g: is mounted in the car, HCM705B should do its installation in the perpendicular to the movement direction.

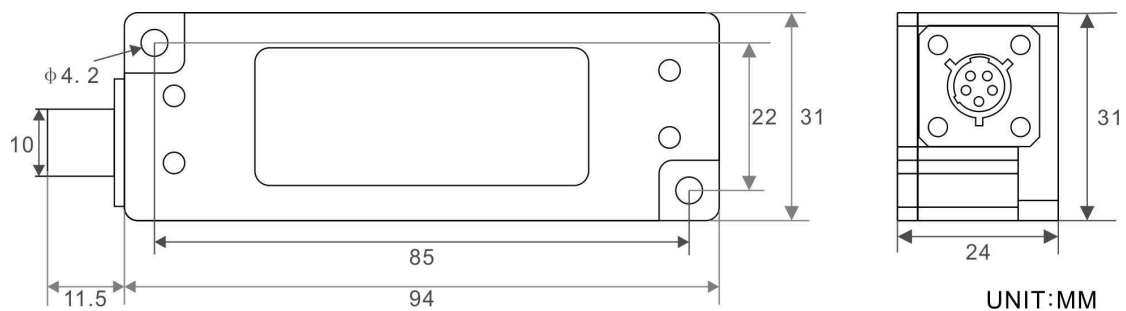


## HCM705B- High Accuracy Gyro Compass



HCM700 Vertical Measuring direction

### Dimension



Size: L\*W\*H:94\*31\*24MM

### HCM705B 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 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 over 30cm).

1) Correctly connect the HCM compass to the RS232 communication port , turn on the power.Correctly  
2) **Select automatic calibration mode or manual calibration mode; Automatic calibration MODE:** send commands "6804 004448" (or click on the software A - MODE)

**Manual calibration MODE:** send commands ", 6804, 004347 "(or click on the software M - MODE) using hexadecimal format send *calibration START command: " 68 00 04 08 0C "(or click RION' s 3D debugging software" CALI - START ")*

3) HCM compass will return the response command, at the same time the compass take each point will return a response, please refer to the communication protocol.

4) With the following rotation rules after minimum taking the 12 calibration points, then send **the stop calibration command: 68 04 00 09 0D (or click the RION 3D debugging software "CALI-STOP" button)** , the compass will pause about 2 seconds, the internal CPU automatically calculate just sampling data, after the calculation will return a set of data, is the percentage value of the data just gain.

5)Then send the **save calibration command: 68 04 00 0A 0E "(or click RION 3D debugging software" CALI-SAVE "Save button)**, the compass will return the answer reply command, you can work properly if successfully saved, if return unsuccessful information, the user can repeat the above calibration steps also can return to the compass factory default calibration data work.

6) **Following 2)** Send a calibration start command to begin calibration, keep the stability of the module posture, waiting for the first point is sampled.

7) after the first point sampling, rotate module around 90 degrees horizontally,to keep the module stability, wait for the next point is sampled. (Refer to the below diagram calibration steps)

8) Repeat the above steps until the sample to 18 points, and then send the calibration stop button.

9) Send calibration save command to end the calibration .

**When calibrate, if the distance of the magnetic interference source with the compass occur change , the percentage of the calibration will be lower, the precision will be weaker.**

**Note:** When you start the calibration and take points, move the compass to the following location, please note that these points are not absolute heading orientation, but with reference to the first point sampling heading orientation relative orientation change value. That is, you do not need to know which position the real North Pole is in.Further for example, the 90degree rotation and 15 degrees pitch only one reference value, to allow a certain sampling angle value error, unnecessarily strictly require very precise. Take at least below12 points calibration, it is recommended that 24 points ,the user can sample more points in

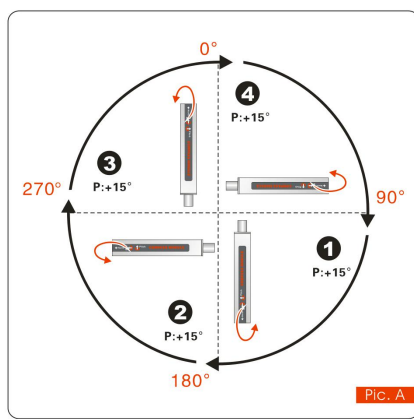


## HCM705B- High Accuracy Gyro Compass

order to improve the accuracy, up to 50 points at most, the same sampling principle with the following methods, just a sampling of the pitch angle and roll angle point will increase.

**Note:** When you start the calibration and take points, move the compass to the following location, please note that these points are not absolute heading orientation, but with reference to the first point sampling heading orientation relative orientation change value. That is, you do not need to know which position the real North Pole is in. Further for example, the 90degree rotation and 15 degrees pitch only one reference value, to allow a certain sampling angle value error, unnecessarily strictly require very precise. Take at least below 12 points calibration, it is recommended that 24 points, the user can sample more points in order to improve the accuracy, up to 50 points at most, the same sampling principle with the following methods, just a sampling of the pitch angle and roll angle point will increase.

The calibration steps are as follows:



The standard starting point can be anyone azimuth of  $360^\circ$ , as long as each change angle to keep the basic level about  $90^\circ$  to change (do not require too precise).

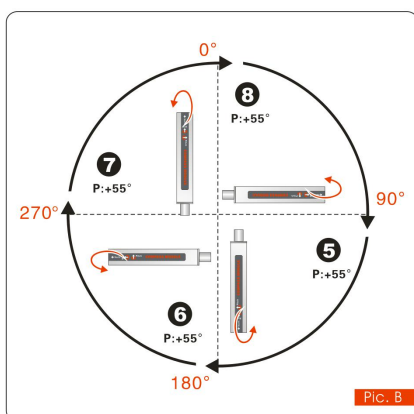
Example as left Pic.A: starting point for  $H = 0^\circ$ ,  $R = 0^\circ$ ,  $P = +15^\circ$  (firstly calibrate the pitch value P) please keep this posture for 2 to 3 seconds don't move, the system will take the first point.

After took the first point, again rotate  $90^\circ$  horizontally, please keep this posture for 2 to 3 seconds don't move, the system will take the second point.

After took the second point, again rotate

$90^\circ$  horizontally, please keep this posture for 2 to 3 seconds don't move, the system will take the third point.

After took the third point, again rotate  $90^\circ$  horizontally, please keep this posture for 2 to 3 seconds don't move, the system will take the fourth point.



After took the fourth point, H and R are the same, and then increase + P angle value.

Refer to the left Pic.B: starting point  $H = 0^\circ$ ,  $R = 0^\circ$ ,  $P = +55^\circ$ , please keep this posture for 2-3 seconds don't move, the system will take the fifth point.

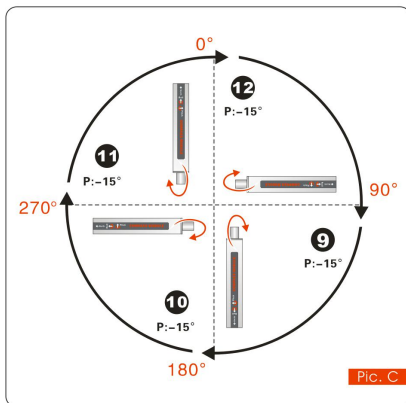
After took the fifth point, again rotate  $90^\circ$  horizontally, please keep this posture for 2 to 3 seconds don't move, the system will take the sixth point.

After took the sixth point, again rotate  $90^\circ$  horizontally, please keep this posture for 2 to 3 seconds don't move, the system will take the seventh point.

After took the seventh point, again rotate  $90^\circ$  horizontally, please keep this posture for 2 to 3 seconds don't move, the system will take the eighth point.



## HCM705B- High Accuracy Gyro Compass



After took the eighth point, H and R are the same , then calibrate -P angle .

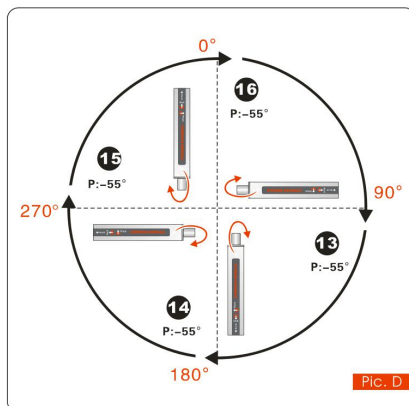
Refer to the left Pic.C: starting point  $H=0^\circ$ ,  $R=0^\circ$ ,  $P=-15^\circ$ , please keep this posture for 2-3 seconds don't move, the system will take the ninth point.

After took the ninth point, again rotate  $90^\circ$  horizontally, please keep this posture for 2 to 3 seconds don't move, the system will take the tenth point.

After took the tenth point, again rotate  $90^\circ$  horizontally, please keep this posture for 2 to 3 seconds don't move,

the system will take the eleventh point.

After took the eleventh point, again rotate  $90^\circ$  horizontally, please keep this posture for 2 to 3 seconds don't move, the system will take the twelfth point.



After took the twelfth point, H and R are the same , then increase -P angle value .

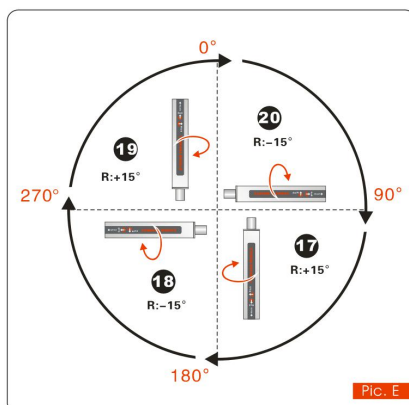
Refer to the left Pic.D: starting point  $H=0^\circ$ ,  $R=0^\circ$ ,  $P=-55^\circ$ , please keep this posture for 2-3 seconds don't move, the system will take the thirteenth point.

After took the thirteenth point, again rotate  $90^\circ$  horizontally, please keep this posture for 2 to 3 seconds don't move, the system will take fourteenth point.

After took the fourteenth point, again rotate

$90^\circ$  horizontally, please keep this posture for 2 to 3 seconds don't move, the system will take the fifteenth point.

After took the fifteenth point, again rotate  $90^\circ$  horizontally, please keep this posture for 2 to 3 seconds don't move, the system will take the sixteenth point.



After took the sixteenth point then finished P calibration, then calibrate R, R(Roll value) can calibrate alternately .

Refer to the left Pic.E: starting point  $H=0^\circ$ ,  $R=+15^\circ$ ,  $P=0^\circ$ , please keep this posture for 2-3 seconds don't move, the system will take the seventeenth point.

After took the seventeenth point, again rotate  $90^\circ$  horizontally, alternate the negative Roll value  $R=-15^\circ$  , please keep this posture for 2 to 3 seconds don't move, the system will take the eighteenth point.

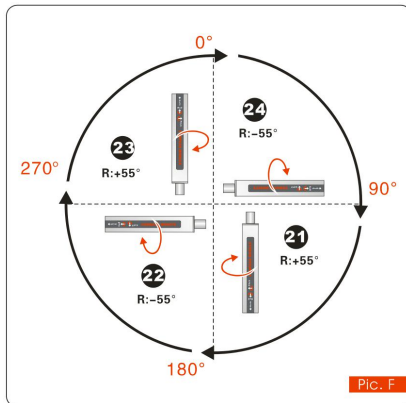
After took the eighteenth point, again rotate

$90^\circ$  horizontally, alternate the positive Roll value  $R=+15^\circ$  , please keep this posture for 2 to 3

## HCM705B- High Accuracy Gyro Compass

seconds don't move, the system will take the nineteenth point.

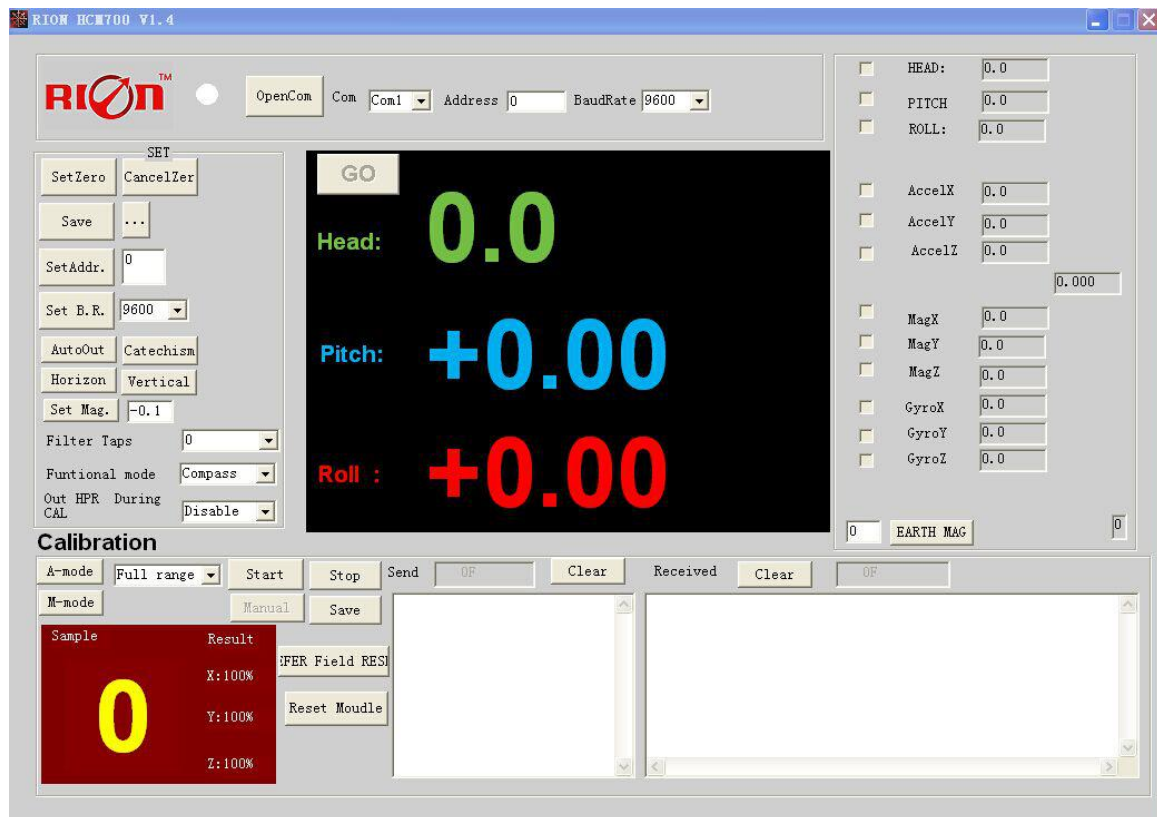
After took the nineteenth point, again rotate 90 °horizontally,alternate the negative Roll value  $R=-15^{\circ}$  , please keep this posture for 2 to 3 seconds don't move, the system will take the twentieth point.



After took the twenty second point, again rotate 90°horizontally, alternate the positive Roll value  $R=+55^{\circ}$  ,please keep this posture for 2 to 3 seconds don't move, the system will take the twenty third point. After took the twenty third point, again rotate 90 °horizontally,alternate the negative Roll value  $R=-55^{\circ}$  , please keep this posture for 2 to 3 seconds don't move, the system will take the twenty fourth point. Sending stop command---compass response---Re-sending save command---compass response save successfully.

### RION's 3D 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

## HCM705B- High Accuracy Gyro Compass

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

Stop: Stop the calibration (Click this button, keep the compass shaking state to avoid incorrect calibration of the acquisition)

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 Communication Protocol

HCM705B is based on TRAX, increase the communication protocol of RION.

MCU read TRAX azimuth, roll, pitch, magnetic field X, magnetic field Y, magnetic field Z, azimuth Status.

Through a serial port output azimuth, roll, pitch and azimuth state data of four parameters.Magnetic field is used to determine the coefficient of magnetic interference.

—、Data Frame Format : ( 8 bits of data bits, 1 stop bit,no check, the default rate 9600 )

Identifier (1byte)	Data Length (1byte)	Address code (1byte)	Command word (1byte)	Data Domains	Checksum (1byte)
68h					

Identifier: Fixed 68H

Data length: From data length to checksum (including checksum) 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.

# HCM705B- High Accuracy Gyro Compass

## 二、Command word analysis

Desc.	Meaning/Example	Description
<b>0X04</b>	<b>Meanwhile read Pitch、Roll、Heading、 Angle command 68 04 00 04 08</b>	Data domain (0byte) No Data domain command
<b>0X84</b>	Sensor answer reply E.g <b>68 0D 00 84 00 10 50 10 10 05 01 04 01 23</b>	Data domain (9byte) AA AB BB CC CD DD EE EF FF AA AB BB:3 Characters is Pitch Axis CC CD DD: 3 Characters is Roll Axis EE EF FF: 3 Characters is Heading angle Angle format with same analytic method as Pitch、Roll、Heading On the left example , the angle is : Pitch: +010.50°, Roll:-010.05°, Heading+104.01°
<b>0X06</b>	<b>Setting declination command 68 06 00 06 02 08 16</b>	Data domain(2byte) SA AB S is symbol 0 positive 1 negative AA: two digits integer, B: two digits decimals E.g: 02 08 is +20.8 deg
<b>0X86</b>	Sensor answer reply E.g: <b>68 08 00 86 00 8E</b>	Data domain (1byte) Data domain in the number means the sensor response result 00 Setting successfully FF Setting failure
<b>0X07</b>	<b>Read declination command 68 04 00 07 0b</b>	Data domain (0byte) No Data domain command
<b>0X87</b>	Sensor answer reply E.g: <b>68 06 00 87 02 08 97</b>	Data domine (2byte) Data domain in the number means the sensor response result
<b>0X08</b>	<b>Start calibration command 68 04 00 08 0C</b>	Data domain (0byte) No Data domain command
<b>0X88</b>	Sensor answer reply E.g: <b>68 05 00 88 00 8D</b>	Data domain (1byte) Data domain in the number means the sensor response result 00 Start success FF Start failure
Note: after each module take a point returns data at a time, until the stop calibration, format as below		
<b>0X88</b>	Sensor replay calibration points E.g: <b>68 05 00 88 07 94</b>	Data domain (1byte) The number in the data domain indicates the number sensor collects the calibration points (hexadecimal)
<b>0X09</b>	<b>top calibration command 68 04 00 09 0D</b>	Data domain (0byte) No Data domain command
<b>0X89</b>	Sensor answer reply command E.g: <b>68 05 00 89 XX CS</b>	Data domain (4byte) XX is 00 can receive, FF can not receive
<b>0X0A</b>	<b>Save calibration command 68 04 00 0A 0E</b>	Data domain (0byte) No Data domain command
<b>0X8A</b>	Sensor answer reply command	Data domain (1byte)

## HCM705B- High Accuracy Gyro Compass

	E.g: <b>68 05 00 8A 00 8F</b>	Data domain in the number means the sensor response result 00 Success FF Failure
<b>0X0B</b>	<b>Setting communication baud rate command</b> <b>68 05 00 0B 02 12</b>	Data domain (1byte) Baud rate: default 02: 9600 00 means 9600 01 means 9600 02 means 9600 03 means 19200 04 means 38400 05 means 115200
<b>0X8B</b>	Sensor answer reply command E.g: <b>68 05 00 8B 00 90</b>	Data domain (1byte) Data domain in the number means the sensor response result 00 Success FF Failure
<b>0X0F</b>	<b>Setting module address command</b> <b>68 05 00 0F 01 15</b>	Data domain (1byte) XX module address, address from 00 to EF range Note: Our products have a unified address: <b>FF</b> , If forgot the set address when operating ,can use the <b>FF</b> address to operate the product, still normal response.
<b>0X8F</b>	Sensor answer reply command E.g: <b>68 05 00 8F 94</b>	Data domain (1byte) Data domain in the number means the sensor response result 00 Success FF Failure
<b>0X0C</b>	<b>Setting angle output mode</b> <b>68 05 00 0C 00 11</b>	Data domain (1byte) 00: answer reply mode 01: Auto output mode Default : answer reply mode
<b>0X8C</b>	Sensor answer reply command E.g: <b>68 05 00 8C 00 91</b>	Data domain (1byte) , Data domain in the number means the sensor response result 00 Success FF Failure
<b>0X2A</b>	<b>Setting angle output mode</b> <b>68 05 00 2A 00 2F</b>	Data domain (1byte) 00: Horizontal mounting measurement 01: Vertical mounting measurement (connector down) Factory default: Horizontal mounting measurement
	Horizontal mounting mode: mounting the compass horizontally, the roll and pitch angle output 0 Vertical mounting mode: mounting the compass vertically, the roll and pitch angle output 0	
<b>0XAA</b>	Sensor answer reply command E.g: <b>68 05 00 AA 00 AF</b>	Data domain (1byte) , Data domain in the number means the sensor response result 00 Success FF Failure
<b>0X41</b>	Query mounting mode command <b>68 04 00 41 45</b>	Data domain (0byte)
<b>0XC1</b>	Sensor answer reply command E.g: <b>68 05 00 C1 00 C6</b>	Data domain (1byte) Data domain in the number means the sensor response result 00 Horizontal mounting mode 01 Vertical mounting mode

## HCM705B- High Accuracy Gyro Compass

<b>0X42</b>	Query mounting mode command 68 04 00 42 46	Data domain (0byte)
<b>0XC2</b>	Sensor answer reply command E.g: 68 05 00 C2 00 C7	Data domain (1byte) Data domain in the number means the sensor response result 00: answer reply mode 01: Auto output mode
<b>0X43</b>	Set manual calibration mode command 68 04 00 43 47	Data domain (0byte)
<b>0XC3</b>	Sensor answer reply command E.g: 68 05 00 C3 00 C8	Data domain (1byte) , Data domain in the number means the sensor response result 00 Success FF Failure
<b>0X44</b>	Set auto calibration mode command 68 04 00 44 48	Data domain (0byte)
<b>0XC4</b>	Sensor answer reply command E.g: 68 05 00 C4 00 C9	Data domain (1byte) , Data domain in the number means the sensor response result 00 Success FF Failure
<b>0X45</b>	manual calibration mode command 68 04 00 45 49	Data domain (0byte) Each node must send one time
<b>0X88</b>	Sensor answer reply command 68 05 00 88 xx cs	Data domain (1byte) , Data domain in the number means the sensor response result xx=0~18 00: 0 point, 01: 1 point, 02: 2 points ... 0F: 15 points
<b>0X46</b>	Set auto calibration mode 68 05 00 46 00 4B	Data domain (1byte) 00: compass mode 01: AHRS mode 02: MIX Mixture mode
<b>0XC6</b>	Sensor answer reply command E.g:68 05 00 C6 00 CB	Data domain (1byte) , Data domain in the number means the sensor response result 00 Success FF Failure
<b>0X4F</b>	Set auto calibration mode command 68 04 00 4F 53	Data domain (1byte)
<b>0XCF</b>	Sensor answer reply command E.g: 68 05 00 CF 00 54	Data domain (1byte) , Data domain in the number means the sensor response result 00: compass mode 01: AHRS mode 02: MIX Mixture mode Default is compass mode When test has the magnetic interference automatically switch to the AHRS mode, non-magnetic interference is detected, then switch to the compass mode
<b>0X47</b>	When calibration if output HPR data command	Data domain (1byte) 00: Calibration no HPR data output

## HCM705B- High Accuracy Gyro Compass

	68 05 00 47 00 4C	01: Calibration has HPR data output
<b>0XC7</b>	Sensor answer reply command E.g: 68 05 00 C7 00 CC	Data domain (1byte) , Data domain in the number means the sensor response result 00 Success FF Failure
<b>0X48</b>	Choose specific parameters command (this command usually don't need customers operation ) E.g: 68 07 00 48 02 05 18 6E Choose HEADING and PITCH	Data domain (1-10byte) Byte4 : Choose the number of parameters, BYTE5~BYTE 14: Parameter ID, number optional. 05: heading 18H:PITCH 19H:ROLL 15H:AccelX 16H:AccelY 17H: AccelZ 1BH:MAGX 1CH:MAGY 1DH:MAGZ 4AH:GyroX 4BH:GyroY 4BH:GyroZ
<b>0XC8</b>	Sensor answer reply command E.g: 68 05 00 C8 00 CC	Data domain (1byte) , Data domain in the number means the sensor response result 00 Success FF Failure
<b>0X14</b>	Read specific parameter data command ( this command can be used after OX48 command be used ) 68 04 00 14 18	Data domain (0byte)
<b>0X94</b>	Sensor answer reply command E.g: 68 YY 00 94 XX ID1 DA1 DA2 DA3 DA4 ID2 DB1 DB2 DB3 DB4 .... CE	Data domain (5-46byte) , Data domain in the number means the sensor response result BYTE4: XX ; Read the number of parameter, BYTE5:corresponding the paramterID number. ParameterID number as below: 05: heading 18H:PITCH 19H:ROLL 15H:AccelX 16H:AccelY 17H: AccelZ 1BH:MAGX 1CH:MAGY 1DH:MAGZ 4AH:GyroX 4BH:GyroY 4BH:GyroZ DA1,DA2,DA3,DA4 is FLOAT 32 the big end of data storage mode 。 ParameterID (1BYTE) + Floating-point number data(4BYTES) indicate one group number.
<b>0X49</b>	The reference magnetic reset command 68 04 00 49 4D	Data domain (0byte)
<b>0XC9</b>	Sensor answer reply command E.g:68 05 00 C9 00 CE	Data domain (1byte) , Data domain in the number means the sensor response result 00 Success FF Failure
<b>0X4B</b>	Module reset command 68 04 00 4B 4F	Data domain (0byte) The module to reset
<b>0XCB</b>	Sensor answer reply command 例:68 05 00 CB 00 CE	Data domain (1byte) , Data domain in the number means the sensor response result 00 Success FF Failure



## HCM705B- High Accuracy Gyro Compass

<b>0X05</b>	Set relative ZERO command 68 05 00 05 00 0A	Data domain (1byte) 00: Cancel relative ZERO enter absolute ZERO 01: Set relative ZERO
<b>0X85</b>	Sensor answer reply command E.:68 05 00 85 00 8A	Data domain (1byte) , Data domain in the number means the sensor response result 00 Success FF Failure
<b>0X50</b>	Set the geomagnetic threshold judgment command 68 06 00 50 24 16 CS	Data domain (2byte) MAX(BYTE4) : AB/100 ,E.g 24 , is 24/100=0.24 MIN(BYTE5) same as above 16/100=0.16
<b>0XD0</b>	Sensor answer reply command E.g: 68 05 00 D0 00 D5	Data domain (1byte) , Data domain in the number means the sensor response result 00 Success FF Failure

## (RION Compass data forma)

— Data format:

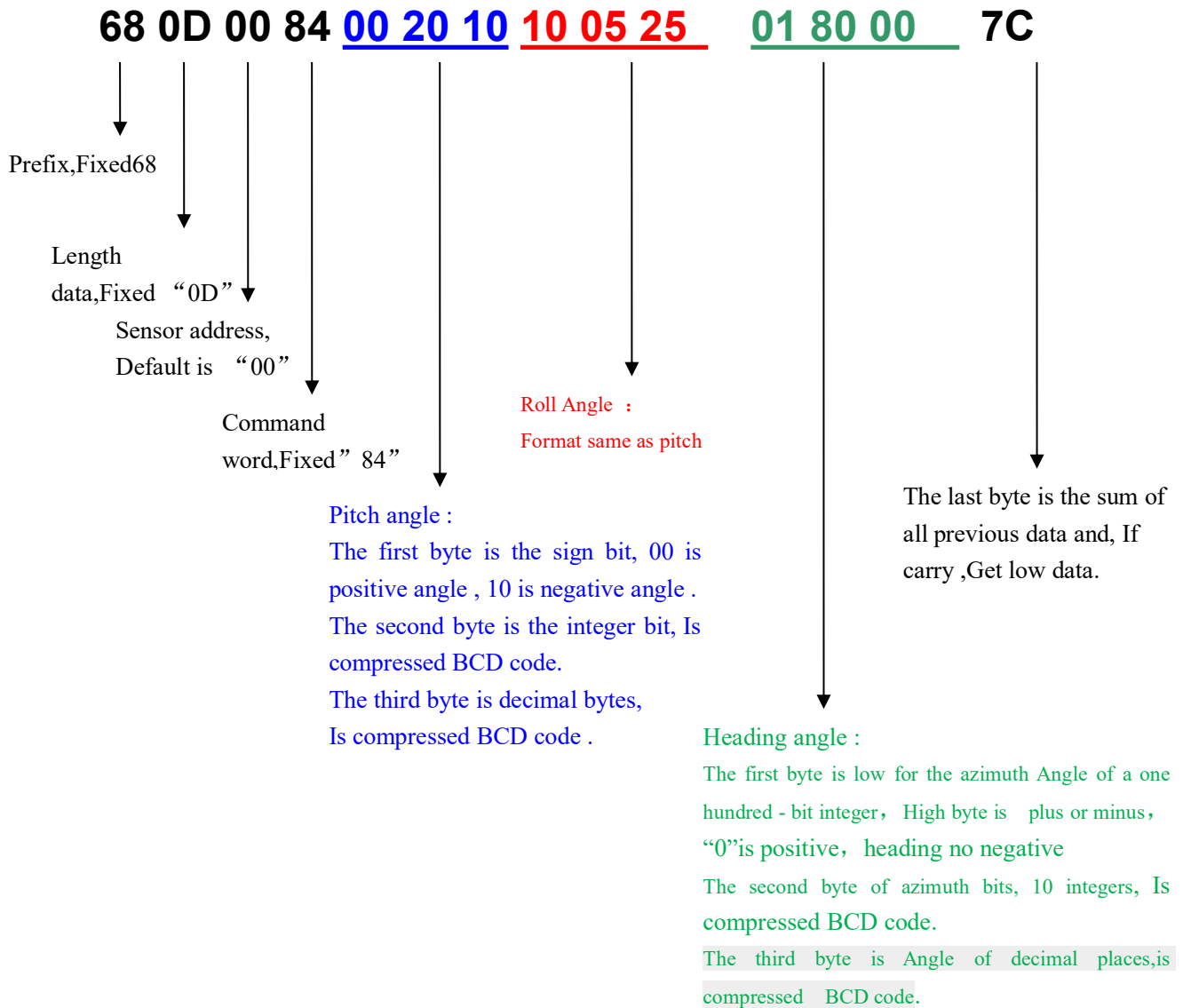
Baud rate: (9600 , 8 data bits, 1data top, No check)

二, Angle output format:

For example:

**Pitch: +020.10 ° Roll: -005.25°**

**Heading:180.00°**



More production information please visit RION's official website:

[www.hamburg-engineering.de](http://www.hamburg-engineering.de)

(All Products are subject to change or update without notice.)

---

# Hamburg Engineering

---