



V1.6

HIGH ACCURACY 3D DIGITAL COMPASS

RION HCM508B

Technical Manual

HCM508B HIGH ACCURACY 3D DIGITAL COMPASS



RION QUALIFICATION CERTIFICATION

- Enterprise quality system standard: ISO9001:2015 standard (Certification No.: 128101)
- High-tech Enterprise (Certification No.: GR201844204379)
- Revision time: 2021-12-22
- Product functions, parameters, appearance, etc. will be adjusted as technology upgrades. Please contact our pre-sales business to confirm when purchasing.

HCM508B HIGH ACCURACY 3D DIGITAL COMPASS



► GENERAL DESCRIPTION

HCM508B is a high-precision 3D compass independently developed by Rion Technology Co., Ltd. it is integrated with digital signal RS232 output and analog 4-20mA output. IP67 waterproof rating, more suitable for drilling measurement. It uses hard iron and soft iron calibration algorithms, so that any tool surface with a roll angle of 360° can still provide high-precision heading information. It has the characteristics of small size and low power consumption, suitable for miniaturized sensitive measurement systems.

HCM508B integrates three-axis magnetic sensing technology, calculates heading data in real time through the central processing unit, and uses a three-axis accelerometer to compensate for a wide range of tilt angles. It is a high-performance and high-stability product. HCM508B is small, low power consumption and is widely used in many fields such as antenna stability, vehicles, and system integration.

► FEATURES

- ★ Heading accuracy: $0.3^\circ\sim 0.5^\circ$
- ★ Tilt angle resolution: 0.1°
- ★ Wide Temperature : $-40^\circ\text{C}\sim +85^\circ\text{C}$
- ★ Standard RS232/RS485/TTL output interface
- ★ With hard magnetic ,soft magnetic and angle compensation
- ★ Roll angle measuring range : $\pm 180^\circ$
- ★ Tilt angle accuracy: 0.2°
- ★ Size: L:125×W:22×H:24 mm
- ★ Analog 4-20mA output

► 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



○Inclinometer ○3D compass ○Digital inclinometer ○Accelerometer ○Gyro ○North finder ○INS&IMU

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HCM508B HIGH ACCURACY 3D DIGITAL COMPASS

► ELECTRICAL CHARACTERISTICS

HCA508B

PERFORMANCE PARAMETER

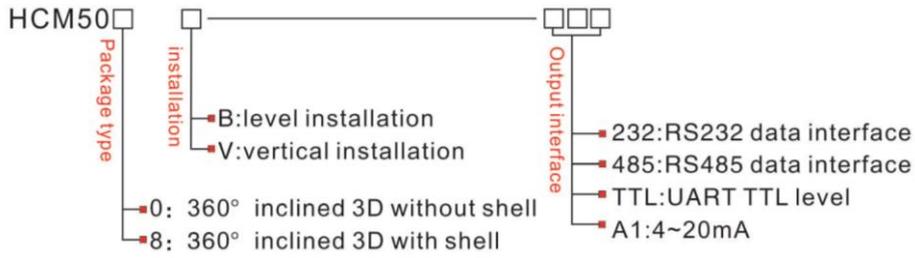
Compass heading parameter	The best heading accuracy	0.3° tilt <10°
		1.0° tilt <180°
	Resolution	0.1°
Compass tilt parameter	Pitch accuracy	0.1°<15° (Measure range)
		0.1°<30° (Measure range)
		0.1°<60° (Measure range)
		0.2°<85° (Measure range)
	Pitch tilt range	±85°
	Roll accuracy	0.1°<15° (Measure range)
		0.1°<30° (Measure range)
		0.1°<60° (Measure range)
		0.2°<180° (Measure range)
	Roll tilt range	±180°
Resolution	0.1°	
Calibration	Hard iron calibration	Yes
	Soft iron calibration	Yes
	Magnetic field interference calibration method	24 points(3D calibration)
Physical features	Dimension	L125*W22*H24mm
	Weight	90g
	RS232/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
Analog output	4-20mA FS(0-360deg)	Only for heading 4-20mA output
Power	Power supply	Default DC 12 V; 18~36v optional
	Current(Maximum)	40mA
	Ideal mode	28mA
	Sleep Mode	TBD
Environment	Operating range	-40°C~+85°C
	Storage temperature	-40°C~+85°C
	Resistance shock performance	2500g
Electromagnetic compatibility	According to EN61000 and GBT17626	
MTBF	≥40000 hours/times	
Insulation resistance	≥100M	
Shock resistance	100g@11ms、3 Axial Direction (Half Sinusoid)	
Anti-vibration	10grms、10~1000Hz	

○Inclinometer ○3D compass ○Digital inclinometer ○Accelerometer ○Gyro ○North finder ○INS&IMU

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► ORDERING INFORMATION



E.g: HCM508B-232: 360° inclined 3D with shell / level installation / RS232 output.

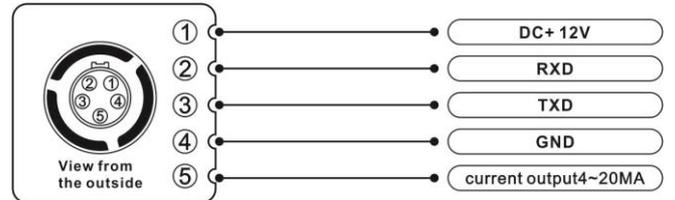
► ELECTRICAL CONNECTION

COLOR FUNCTI ON	RED	WHITE	GREEN	BLACK	GRAY
	DC12V Power supply positive	TTL(RXD) RS232(RXD) RS485(D+)	TTL(TXD) RS232(TXD) RS485(D-)	GND Power Negative	CURRENT OUTPUT

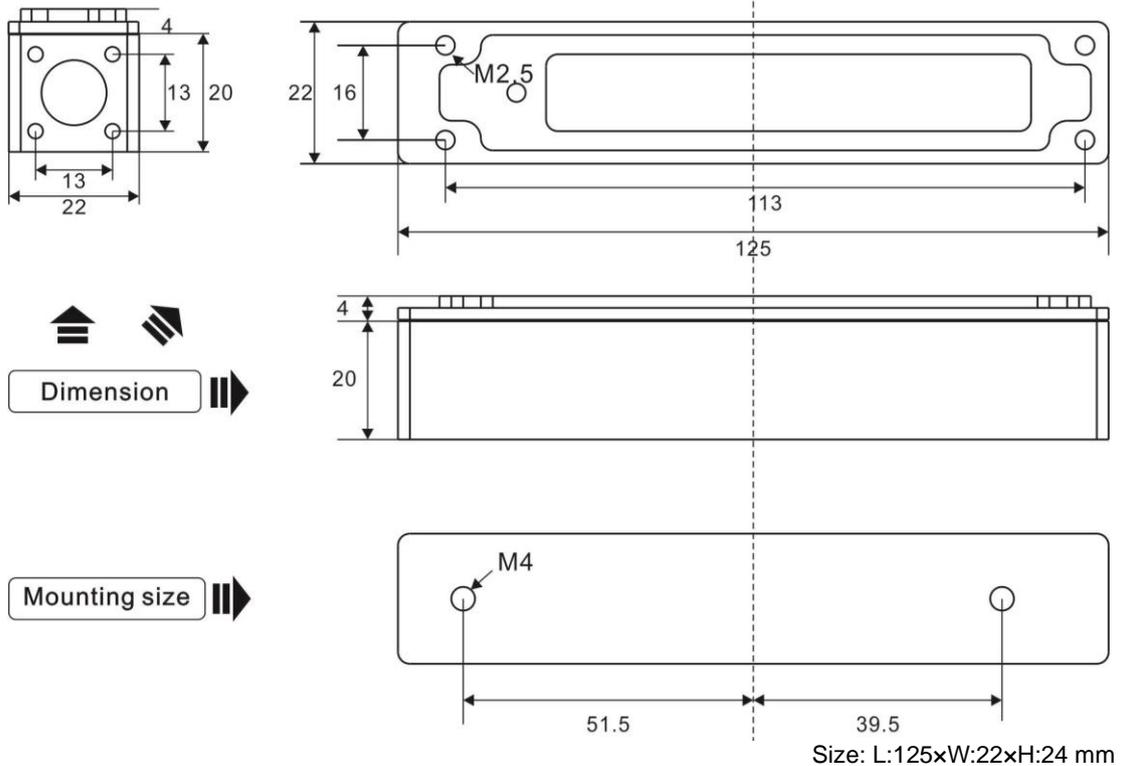
RS485 Cable Connection Definition



RS232 Cable Connection Definition



► SIZE



HCM508B HIGH ACCURACY 3D DIGITAL COMPASS

► HCM508B MEASURING DIRECTIONS&FIX

The HCM508B 3D electronic compass azimuth is using geomagnetic principle, so it is very important to select a minimum magnetic interference environment for installation position. Please place and install the HCM508B away from the iron, magnets, engines and other magnetic objects as much possible as you can. Need control over 30CM 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 **M4 anti-interference screws** for installation .

Although HCM508B 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 HCM508B 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 HCM508B 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, HCM508B should do its installation in the perpendicular to the movement direction.

