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QK-AS08 Manual

3-Axis Compass & Attitude Sensor

with NMEA 0183 and USB output

Designed in UK

CE RoHS

QK-AS08 Features

- Three-axis solid-state compass
- Providing heading, rate of turn, roll and pitch data in NMEA 0183 and USB port
- Displays the heading data on the panel
- Up to 10Hz update rate for heading
- Super electromagnetic compatibility
- Enables 0.4° compass heading accuracy and 0.6° pitch and roll accuracy
- Calibratable to compensate for magnetic deviation caused by ferrous metals and other electro-magnetic fields (very rarely required, we only provide this function to our authorised distributors)
- Low (<100mA) power consumption at 12V DC

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1. Introduction

The QK-AS08 is a compact, high-performance gyro electronic compass and attitude sensor. It has an integrated 3-axis magnetometer, 3-axis rate gyro and together with the 3-axis accelerometer uses advanced stabilization algorithms to deliver precise, reliable heading and vessel attitude including rate of turn, pitch and roll readings in real time.

With solid state electronic technology and additional software, the AS08 provides better than 0.4° heading accuracy through ±45° of pitch and roll angle and also better than 0.6° pitch and roll accuracy in static conditions.

The AS08 has been pre-calibrated for maximum accuracy and super electromagnetic compatibility. It can be used out of the box. Simply connect it with a 12VDC power source and it will immediately start calculating the heading, pitch and roll data of the boat and outputting this information. You can filter out this message type if not required (using the Windows configuration tool with AS08).

The AS08 outputs the NMEA 0183 format data via USB and RS422 port. Users can easily connect it to their computer or NMEA 0183 listeners to share information with navigational software, chart plotters, autopilots, vessel data recorder, and dedicated instrument displays.

2. Installation

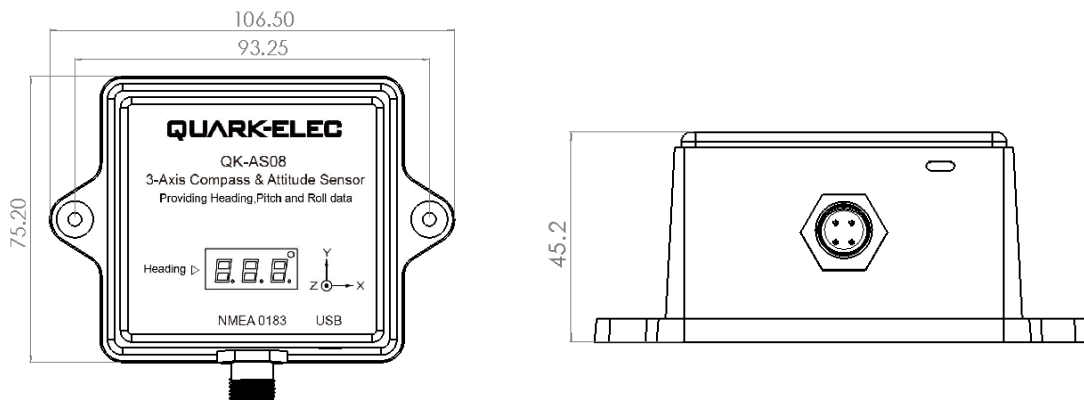### 2.1. Dimensions, mounting and location

Figure 1 Dimensions

AS08 is designed to be securely positioned in an indoor environment. The AS08 should be mounted to a dry, sturdy, horizontal surface. The cable can be routed either through the side of the sensor housing, or through the mounting surface under the sensor.

For best performance, mount the AS08:

- **As close to the vehicle/boat's centre of gravity as possible.**

- **To accommodate the maximum pitch and roll motions, mount the sensor as near to horizontal as possible.**

- **Avoid mounting the sensor high above the water line because doing so also increases pitch and roll acceleration**

- **AS08 does not require a clear view of the sky.**

- **Do NOT install near ferrous metals** or anything that can create a magnetic field such as: magnetized materials, electric motors, electronic equipment, engines, generators, power/ignition cables, and batteries. If you believe your AS08 isn't accurate please contact your distributor to re-calibrate your device.

3. Connections

The AS08 sensor has the following connections.

- **NMEA 0183 port and power**. A four-core M12 connector can be connected with the provided 2-meter cable. This can be connected to the NMEA 0183 listeners and the power supply. The user can use the configuration tool to setup NMEA 0183 output data type, baud rate and data frequency.

  12V DC needs to be connected to power up the AS08.

Figure 2 QK-AS08

Wire	Function
Red	12V
Black	GND
Green	NMEA output+
Yellow	NMEA output –

- USB port. The AS08 is supplied with a type C USB connector. This connector is used to connect the AS08 directly to a PC which allows for data transfer to the PC. This port is also used to configure and calibrate the AS08 (The calibration function is only provided to authorised distributors).

  The USB port can also be used to observe the target attitude with the configuration tool. The configuration tool provides vessel, aircraft and vehicle 3D models (dedicated GPU is needed for this function). If the 3D module is set as 'None', the NMEA 0183 format
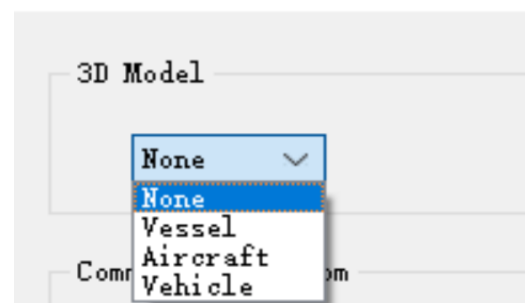

Figure 3: 3D Model

data will be sent out through USB and NMEA 0183 port simultaneously. The user can use any USB port monitor software (e.g. OpenCPN) to observe or record the data on PC or OTG (the baud rate should be set to 115200bps for this function).

3.1. Connecting AS08 via USB for Windows configuration

3.1.1. Will you need a driver to connect via USB?

In order to enable the USB data connection of the AS08, related hardware drivers may be needed dependent on your system requirements.

For Windows versions 7 and 8, a driver will be needed for configuration but for Windows 10, the driver usually installs automatically. A new COM port will automatically show up in the device manager once powered and connected via USB.

The AS08 registers itself to the computer as a virtual serial COM port.
If the driver does not install automatically, it can be found on the included CD and downloaded from www.quark-elec.com.

3.1.2. Checking the USB COM port (Windows)

After the driver is installed (if needed), run the Device Manager and check the **COM (port) number**. The port number is the number assigned to an input device. These can be generated randomly by your computer.
The configuration software will require a COM port number in order to access the data.

The port number can be found in Windows 'Control Panel>System>Device Manager' under 'Ports (COM & LPT)'. Find something similar to 'USB-SERIAL CH340' in the list for the USB port. If the port number needs to be changed for some reason, double click the icon in the list and select the 'Port Settings' tab. Click the 'Advanced' button and change the port number to the one required.
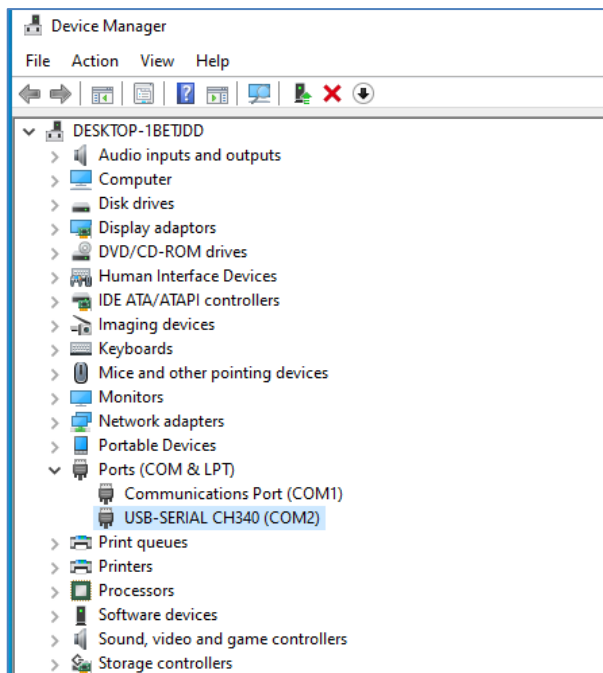

Figure 4: View of COM port in Device Manager

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4. Configuration (via USB on Windows PC)

The free configuration software is on the CD provided and is downloadable from www.quark-elec.com.
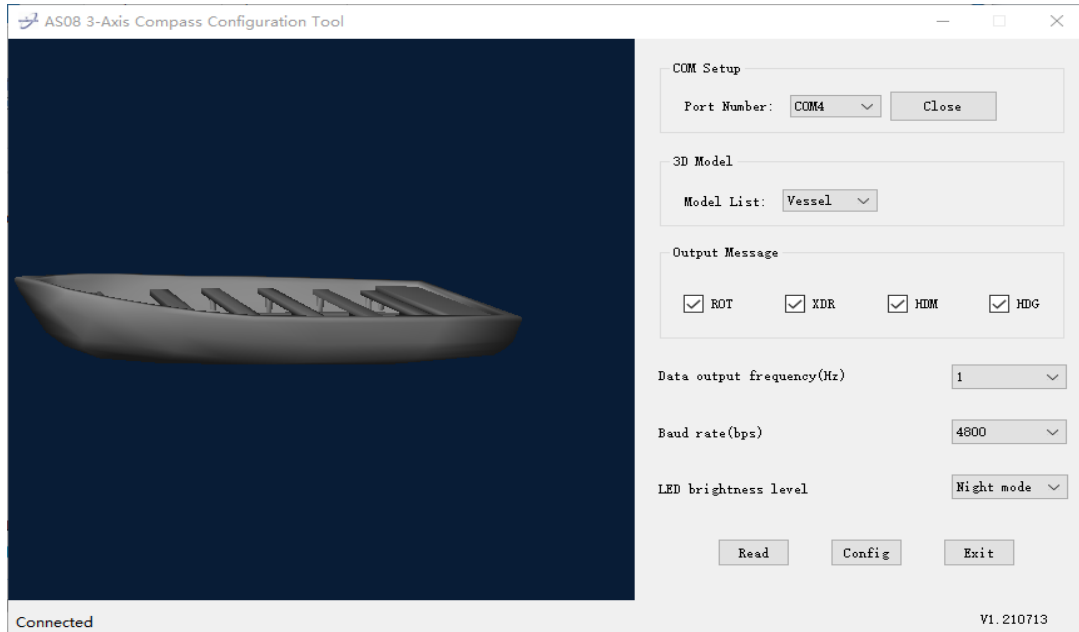

Figure 5: AS08 3-Axis Compass configuration Tool

1. Open the configuration tool

2. Select your **COM port number**

3. Click '**Open**'. Now, '**Connected**' will show on the bottom left side of the configuration tool and the configuration tool is ready to be used

4. Click '**Read**' to read the devices current settings

5. **Configure the settings as desired:**

   - **Select the 3D Model.** The configuration tool can be used to monitor the real time attitude of the object. The AS08 has been designed for the marine market, but it can be used on vehicle or aircraft models. Users can choose a proper 3D module for their application. The real time attitude will be shown on the left-hand side window. Please note, some computers without dedicated GPU (Graphics Processing Unit) can't support this function.
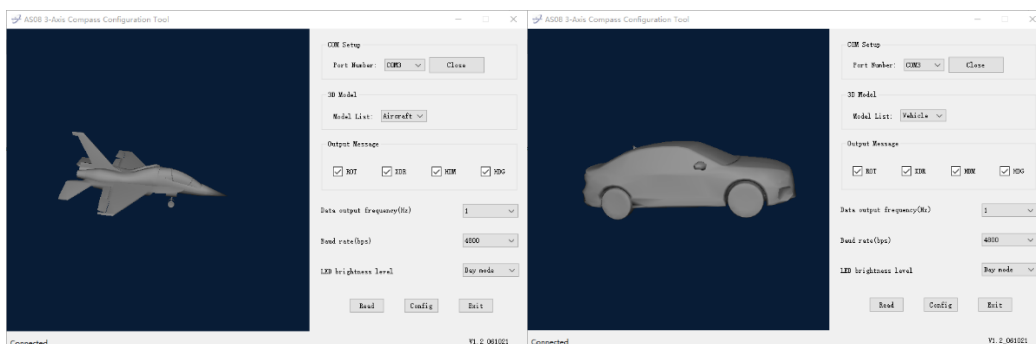
     If the NMEA 0183 format data needs to be output to any other third-party software/APP, 'None' should be selected here, the NMEA 0183 data will be sent out through the USB and NMEA 0183 ports simultaneously. The user can use any USB port monitor software to observe or record the data on PC or OTG (the baud rate should be set to 115200bps in this case).

   - **Output messages** are set to transmit all data types as a default setting. However, the AS08 has an internal filter, so the user can remove unwanted NMEA 0183 message types.

- **Data output frequency** is set to transmit at 1Hz (once per second) as default. Heading messages (HDM and HDG) can be set to 1/2/5/10 times per second. Rate of turn, roll and pitch can only be set at 1Hz.

- **NMEA 0183 baud rates**. 'Baud rates' refer to the data transfer speed. The AS08's output port default baud rate is 4800bps. However, the baud rate can be configured to 9600bps or 38400bps if required.

  When connecting two NMEA 0183 devices, both devices' baud rates, must be set to the same speed. Select the baud rate to match your chart plotter or connecting device.

- **LED brightness level.** Three-digit LED on the panel will show the real time heading information. The user can adjust the brightness for day or night use. It can also be turned off to save power.

6. Click **'Config'**. After a few seconds, your settings will now be saved and you can close the configuration tool.

7. Click **'Read'** to check that the settings have saved correctly before clicking '**Exit'**.

8. Remove the AS08 power supply.

9. Disconnect AS08 from PC.

10. **Re-power the AS08 to activate the new settings.**

4.1. NMEA 0183 wiring - RS422 or RS232?

AS08 uses the NMEA 0183-RS422 protocol (differential signal), however some chart plotters or devices may use the older NMEA 0183-RS232 protocol (single-ended signal).

For RS422 interface devices, these wires need to be connected.

	QK-AS08 wire	Connection needed on RS422 device
NMEA 0183	NMEA output+	NMEA Input+ *[1]
	NMEA output-	NMEA Input-
POWER	Black: GND	GND (for Power)
	Red: Power	12v—14.4v Power

*[1] Swap NMEA input + and NMEA input – wires if the AS08 does not work.

Although the AS08 sends out NMEA 0183 sentences via differential end RS422 interface, it also supports single end for RS232 interface devices, these wires need to be connected

	QK-AS08 wire	Connection needed on RS232 device
NMEA 0183	NMEA output+	GND *[2]
	NMEA output-	NMEA Input
POWER	Black: GND	GND (for Power)
	Red: Power	12v—14.4v Power

*[2] Swap NMEA input and GND wires if the AS08 does not work.

5. Data Output Protocols

	NMEA 0183 output
Wire connection	4 wires: 12V, GND, NMEA Out+, NMEA Out-
Signal type	RS-422

Supported messages	$IIHDG - Heading with deviation & variation.
	$IIHDM - Heading magnetic.
	$IIROT – Rate of turn(°/minute), '-' indicates bow turns to port.
	$IIXDR – Transducer measurements: Vessel attitude (pitch and roll).
	*XDR message example:
	$IIXDR,A,15.5,D,AS08_ROLL,A,11.3,D,AS08_PITCH,*3B
	where 'A' indicates transducer type, 'A' is for angle transducer.
	'15.5' is the roll value, '-' indicates roll to port.
	'D' indicates the unit of measurement, degree.
	AS08_ROLL is the name of transducer and the data type.
	'A' indicates transducer type, 'A' is for angle transducer.
	'11.3' is the pitch value, '-' indicates bow is below level horizon.
	'D' indicates the unit of measurement, degree.
	AS08_PITCH is the name of transducer and the data type.
	*3B is the check sum.

6. Specification

Item	Specification
Operating temperature	-5°C to +80°C
Storage temperature	-25°C to +85°C
AS08 Power supply	12 VDC (maximum 16V)
AS08 supply current	≤75mA (day light LED)
Compass accuracy (steady conditions)	+/- 0.2°
Compass accuracy (dynamic conditions)	+/- 0.4° (pitching and rolling up to 45°)
Roll and pitch accuracy (steady conditions)	+/- 0.3°
Roll and pitch accuracy (dynamic conditions)	+/- 0.6°
Rate of turn accuracy	+/- 0.3°/second

7. Limited warranty and notices

Quark-elec warrants this product to be free from defects in materials and manufacture for two years from the date of purchase. Quark-elec will, at its sole discretion, repair or replace any component that fails in normal use. Such repairs or replacement will be made at no charge to the customer for parts and labour. The customer is, however, responsible for any transportation costs incurred in returning the unit to Quark-elec. This warranty does not cover failures due to abuse, misuse, accident or unauthorised alteration or repairs. A returns number must be given before any unit is sent back for repair.

The above does not affect the statutory rights of the consumer.

8. Disclaimer

This product is designed to aid navigation and should be used to augment normal navigational procedures and practices. It is the user's responsibility to use this product prudently. Neither Quark-elec, nor their distributors nor dealers accept responsibility or liability either to the products user or their estate for any accident, loss, injury, or damage whatsoever arising out of the use of or liability to use this product.

Quark-elec products may be upgraded from time to time and future versions may therefore not correspond exactly with this manual. The manufacturer of this product disclaims any liability for consequences arising from omissions or inaccuracies in this manual and any other documentation provided with this product.

9. Document history

Issue	Date	Changes / Comments
1.0	21/07/2021	Initial release
	06/10/2021	Support pitch and roll data in XDR sentences

10. For more info…

For more technical information and other enquiries, please go to the Quark-elec forum at:
https://www.quark-elec.com/forum/
For sales and purchasing information, please email us: info@quark-elec.com

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