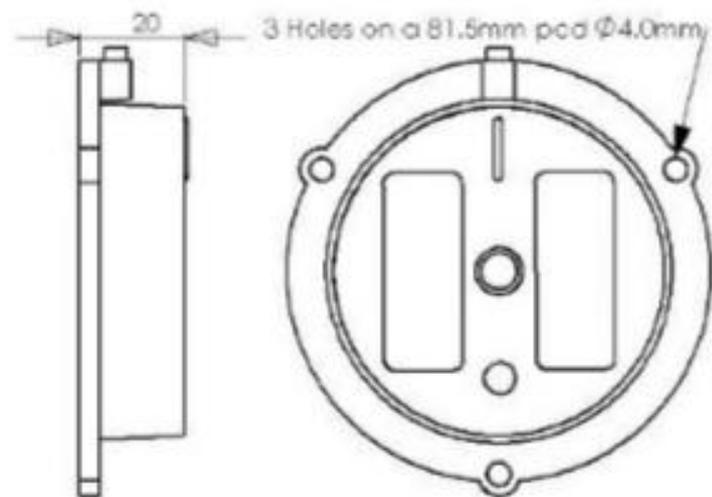


# AUTONNIC

## A4032 COMPASS PICK-UP USER MANUAL



November 2017  
A4032 manual 04.doc  
Hardware version 2  
PCB 7319-2  
PCB 7320-4  
Software version 6033\_v004

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### **1. Description**

The Autonnic A4032 is a complete sensing and processing sub-system for a compass indicating system which gets its heading information from a main or 'master' compass. It derives its output from the position of the powerful permanent magnet inside the main compass.

The A4032 contains a dual-axis fluxgate magnetometer surrounded by high-precision interface circuits which, together with the special clockwise/anticlockwise and a sequence to null offsets allow a microprocessor to acquire a binary value from the two orthogonal sensors of the direction of the field created by the main compass. The processor calculates the vector from these values and then presents the data in a manner which has been requested. Such requests alter the frequency of the data, the degree of filtering and the offset value. Calibration sequences can also be commanded.

The embedded software can be uploaded by command so that special or updated versions releases can be put into the A4032 to replace the previous software. These data files may be sent from Autonnic by email or downloaded from our website.

## **2 Installation**

### **2.1 Mounting**

The A4032 is fixed to the base of the ship's compass using the fixing holes shown in the data sheet. The cable hangs down directly from the labelled side of the housing.

It does not matter which way it faces as the azimuth can be set to North at any time. But some installers prefer to align the internal sensor to

magnetic North and to facilitate this the A4032 is provided with an alignment mark and a rotatable housing assembly.

## 2.2 Power supply

The compass is compatible with any DC power supply of between 8 and 30 Vdc. Typical supply current during operation is approx. 25mA. The compass is protected against reversed polarity.

Care should be taken to make sure the compass is not situated too close to the power supply, as it's accuracy may be affected by either the iron in the mains transformer, or by magnetic field 'noise' from a switching power supply. But this is unlikely as the A4032 will be mounted on a fixed compass which should have been sited correctly.

Note that the output from the A4032 takes several seconds to stabilize after power is applied; the time taken depends on the damping settings. There is a command - see section 5 - which can be used to suppress the output after power-up.

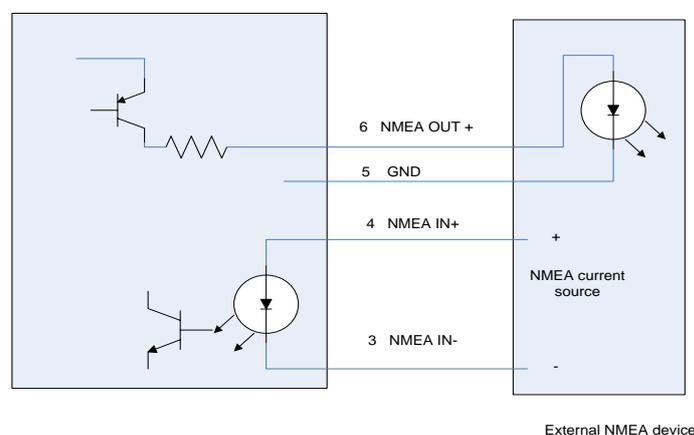
## 2.3 Connection

*Check the datasheet that this table is valid for your version.*

Wire	Colour	Type	Function
1	Red	Power	+8 to +30V
2	Blue	Signal	NMEA OUT+
3	Green	Signal	NMEA IN+
4	Yellow	Signal	NMEA IN-
5	Screen	Power and Signal	GROUND 0V

### 2.3.1 Compass to a NMEA-0183 instrument

The hardware on which the NMEA-0183 standard is based on is a balanced serial protocol called RS422. This means that two wires are need for send and two for receive.

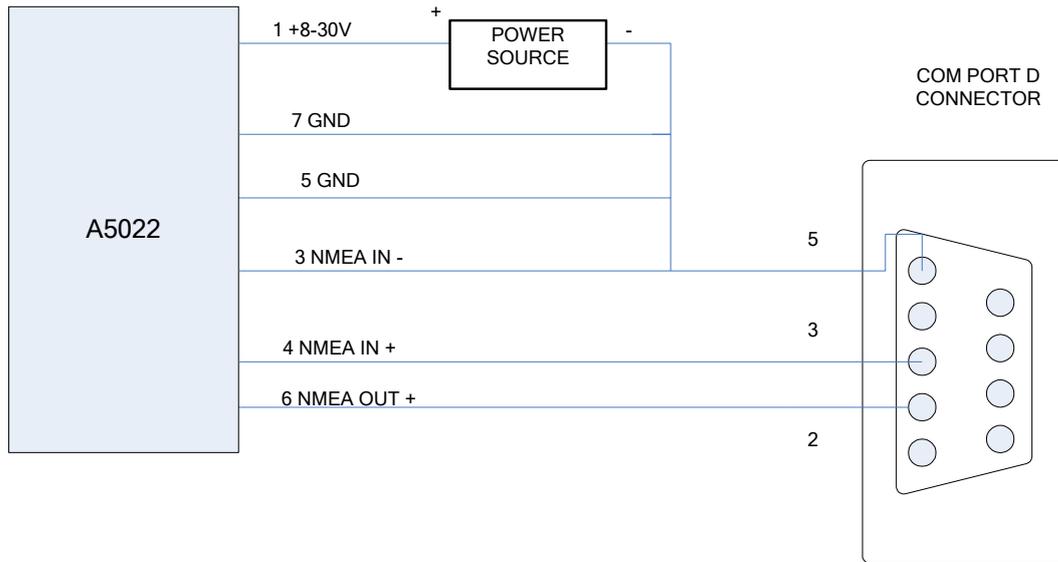


**Fig 1**

Note that the GND wire is used for the current return path. This might be shared with the NMEA- wire in some installations.

### 2.3.2 Compass to a PC serial port

In many cases the wires can be joined directly as shown in Fig 2. Alternatively use the Autonnic A3036 serial interface unit.



**Fig 2**

## 2.4 Calibration

Description of operation of Autonnic A4032 Calibration Tool

The tool has been designed so that the button most likely to be pressed has the focus. After setting up the serial port it should be a simple matter of pressing the ENTER or RETURN key on the keyboard.

Select the required serial port and connect to a A4032 compass.

Section colour code:

Light blue: not yet calibrated.

Yellow: ready for calibration.

Hot pink: connection with the compass failed or an expected reply was received from it when calibration was attempted. Calibration was unsuccessful. Recalibration of this segment is now possible.

Red: the compass returned NO\_ACK when calibrate command was sent to it.

Calibration was unsuccessful. Recalibration of this segment is now possible.

Light green. The compass return ACK when calibrate command was sent to it.

Calibration was successful

Select START and 0° section is highlighted in yellow.  
On calibrating 0° section it changes to 360° but remains light blue. All other sections would turn light green to show successful calibration and then move on to the next section which turns yellow. 0° section changes to 360° section because this section is calibrated twice, once at the start and once at the end.  
At the end of the whole calibration process the entire windows turns dark green for success or bright red for failure (i.e. one or more sections calibrated unsuccessfully).

### **3 NMEA-0183 Serial data**

The serial output format is: 4800 Baud, 8 data bits, 1 stop bit, no parity but note that it is not NMEA-0183 at the physical level – solely in the meaning of the data.

The compass sends information using the standard NMEA-0183 sentence 'HDG': Magnetic Heading, Deviation, and Variation. But note that the information of Deviation and Variation is not sent and so blank fields are defined by consecutive commas. In the A4032 the sentence may have one of several forms typically of the general form:

*\$HCHDG, hhh.h, , , , \*ssss<CR><LF>*

### **4 Input Commands and Output Data**

The compass may be configured via several proprietary input sentences, and will reply with an 'Acknowledge' output sentence, except mentioned otherwise, \$PATC,HCHDG,ACK <CR> <LF> when any of the Proprietary Input Sentences\_listed below are received:

#### **4.1 \$PATC, IIHDG, AHD, x.x<CR><LF>**

Set reference heading (0 to 359.9 degrees)  
Where x.x is the wanted reference angle, 0 to 359.9 degrees.

#### **4.2 \$PATC, IIHDG, DHD, ddd<CR><LF>**

Set the internal filtering value or 'damping'.

The valid range for ddd is 0 to 100 and the larger the value the slower the response. It is intended to remove jitter if in a high-noise magnetic environment or at large latitudes where the horizontal component of the Earth's magnetic field is weaker.

#### **4.3 \$PATC,IIHDG,TXP,xxxx<CR><LF>**

Set NMEA-0183 output sentence repetition period in milliseconds. (Where xxxx must be in the range 100 to 3000 mSec- default is 100 mSec). For example, for 1 per second set a value of 1000

#### 4.4 \$PATC,IIHDG,PCV,aa0<CR><LF>

The PCV command has the following format:  
where angle is in degrees  $0 \leq aa0 \leq 360$  and must be a multiple of  $10^\circ$ .

To perform full calibration:

```
$PATC,IIHDG,PCV,0
$PATC,IIHDG,PCV,10
$PATC,IIHDG,PCV,20
...
...
$PATC,IIHDG,PCV,340
$PATC,IIHDG,PCV,350
$PATC,IIHDG,PCV,360
```

If the calibration is successful and within allowed limits ACK is sent back otherwise a NACK is sent back:

```
$PATC,IIHDG,PCV,340
$PATC,HCHDG,ACK           successful
```

or

```
$PATC,IIHDG,PCV,322
$PATC,HCHDG,NACK           not successful because angle not multiple
of  $10^\circ$ .
```

or

```
$PATC,IIHDG,PCV,320
$PATC,HCHDG,NACK           not successful because at  $320^\circ$  the P6033
thought it was at  $< 310^\circ$  or  $> 330^\circ$ . It must be within  $\pm 10^\circ$ 
```

There is no checking by the P6033 to make sure all 37 points have been manually calibrated. This must be done at a higher level by the PC utility sending the PCV commands. The points can be calibrated in any order and recalibration of any point can be done at any time provided the pickup thinks it is within  $\pm 10^\circ$  of the point.  
By implication an error of greater than  $\pm 10^\circ$  cannot be corrected.

#### 4.5 \$PATC,IIHDG,0CV<CR><LF>

Output rate                      u= 100 milliseconds (10 updates/second),  
output damping                    d= 50 percent



a=1 device mount inertly (i.e. top of fluxgate pointed downward)

The A4032 replies with the standard acknowledge sentence

#### **4.11 \$SR<CR><LF>**

Get the unit's application software release number.

The special proprietary reply sentence is:

**\$SRA4032.a.b<CR><LF>**

where a= major number & b=minor number

e.g. \$SRA4032.2.3 means product A4032 application software release number is 2.3.

#### **4.12 \$UPLOAD<CR><LF>**

Enter application software upload mode

The reply is:

**#M<CR><LF>**

if it successfully entered the software upload mode.

#### **4.13 \$PATC,IIHDG,DLY,xx.x<CR><LF>**

This sets the period after power up during which the heading field in the NMEA sentence will be omitted.

Where x.x is the period value in seconds, 0 to 25s (entering larger periods will result in truncated values)

Note : same applied after calibration process.

Default: period = 0 second.

Recommended period: 5s which can be entered as either 5 or 5.0

## **5 References**

A4032 data sheet

NMEA-0183 specification

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