KVH Industries, Inc.
AutoComp 1000 Heading Sensor Only
Wiring Data

Color	Function	Description
Red	+12V	power input, 12VDC nominal
Black	PGround	power ground input from ship's ground
Green	NMEA 0183 Out (+)	sensor's NMEA 0183 output
Orange	NMEA 0183 Out (-)	reference ground for NMEA 0183 output
White	Damping 0	input for damping control
Brown	Damping 1	input for damping control
Blue	AutoComp	ground to disable autocompensation
Drain	not used	clipped back

Damping Options

Level	Averaging Period	Connect to Ground:
1	≈4.5 seconds	Damping 0 & Damping 1
2	≈6.0 seconds	Damping 1
3	≈9.0 seconds	Damping 0
4	≈14.0 seconds	No Connection

Note:
Blue Wire is Grounded to Disable AutoCompensation;
If AutoCompensation is disabled, AutoComp 1000 Heading Sensor will use last autocompensation completed.

54-0030 rev B 10/90

KVH

KVH Industries, Inc. 110 Enterprise Center, Middletown, RI 02840 U.S.A. (401) 847-3327 Fax: (401) 849-0045

KVH AutoComp 1000 Heading Sensor Only with MARINE Universal Interface Card

Output Cable Wire Color[1]	Function
Red	+12V; power input, 12VDC nominal [2]
White/Red[3]	AutoCompensation; Ground to disable autocompensation[4]
Violet	NMEA 0183 Out (+); sensor's output
White/Violet	NMEA 0183 Out (-); reference ground for output
Black	PGround; power ground input from ship's ground [2]
Black/White	TxD; RS-232 transmit data output (no HW handshaking)
Green	DGround; reference ground for N+1 or TxD output
White/Green	N+1; output line for N+1 signal
Blue	Sin 2; sine output for 2nd sin/cos channel [5]
White/Blue	Cos 2; cosine output for 2nd sin/cos channel [5]
Yellow	Sin1(+); sine output for 1st sin/cos channel [6]
White/Yellow	Sin1(-); inverted sine output for 1st sin/cos channel [6]
White	VRef 1; voltage reference output for 1st sin/cos channel [6]
White/Black	VRef 2; voltage reference output for 2nd sin/cos channel [5]
Brown	Cos 1(+); cosine output for 1st sin/cos channel [6]
White/Brown	Cos 1(-); inverted cosine output for 1st sin/cos channel [6]
Orange	Damp Out 0; control input; Ground to reduce damping [7]
White/Orange	Damp Out 1; control input; Ground to reduce damping [7]
Drain	Shield; Connect to Platform's Ground [2]

Notes

1 *Only strip wires that are being utilized*
2 *When interfacing to a Robertson Autopilot, connect at autopilot*
3 *White/Red refers to white insulation with a red stripe*
4 *If autocompensation is disabled, sensor will use last auto-compensation completed*
5 *2nd Sin/Cos channel's factory setting is* ***Robertson*** *(2.5 ref., 1.67 swing);setting is adjustable - contact KVH*
6 *1st Sin/Cos channel's factory setting is* ***B&G*** *(3.5 ref., 2.00 swing);setting is adjustable - contact KVH*
7 *See Damping Chart Below*

Interface Damping Chart *

Damping Level:	Averaging Period:	Ground:
Damping 1	4.5 seconds	Ground **Damp Out 0** & **Damp Out 1**
Damping 2	6 seconds	Ground **Damp Out 1** only
Damping 3	9 seconds	Ground **Damp Out 0** only
Damping 4	14 seconds	**Do not ground** either wire

**Default (Robertson) Sin 2/Cos 2 interface damping is fixed & cannot be changed by damping wires*

Universal Interface Cabling Data

Important Note when Extending Interface Signals:
Make sure to run analog and digital signals in ***separate,*** *shielded twisted pair extension cables.*
Extension cables will cause voltage drop on analog interfaces; contact your dealer or KVH.

KVH

54-0031 rev. B 1/91

KVH Industries, Inc. 110 Enterprise Center, Middletown, RI 02840 (401) 847-3327 fax: (401) 849-0045

KVH AutoComp 1000 Heading Sensor Only with GOV/COMM Universal Interface Card

Output Cable Wire Color[1]	Function
Red	+12V; power input, 12VDC nominal
White/Red[2]	AutoCompensation; Ground to disable autocompensation[3]
Violet	NMEA 0183 Out (+); sensor's output
White/Violet	NMEA 0183 Out (-); reference ground for output
Black	PGround; power ground input from ship's ground
Black/White	VRef 2; voltage reference output for 2nd sin/cos channel
White/Green	N+1; output line for N+1 signal
Blue	Sin 2; sine output for sin/cos channel
White/Blue	Cos 2; cosine output for sin/cos channel
Yellow	Linear; output, 0.1 to 3.7V or 0.1 to 5.1V
White/Yellow	AGround; reference ground for linear output
White	TxD; RS232 transmit data output (HW handshaking)
White/Black	RTS; RS232 ready to send output
Brown	RxD; RS232 receive data input
White/Brown	CTS RS232 ready to send input
Orange	Damp Out 0; control input; Ground to reduce damping [4]
White/Orange	Damp Out 1; control input; Ground to reduce damping [4]
Drain	Shield; Connect to Platform's Ground

Notes

1 *Only strip wires that are being utilized*
2 *White/Red refers to white insulation with a red stripe*
3 *If autocompensation is disabled, sensor will use last auto-compensation completed*
4 *See Damping Chart Below*

Interface Damping Chart

Damping Level	Averaging Period:	Ground:
Damping 1	4.5 seconds	Ground Damp Out 0 & Damp Out 1
Damping 2	6 seconds	Ground Damp Out 1 only
Damping 3	9 seconds	Ground Damp Out 0 only
Damping 4	14 seconds	Do not ground either wire

Universal Interface Cabling Data

Important Note when Extending Interface Signals:
*Make sure to run analog and digital signals in **separate**, shielded twisted pair extension cables. Extension cables will cause voltage drop on analog interfaces; contact your dealer or KVH.*

KVH

54-0032 Rev B 2/92

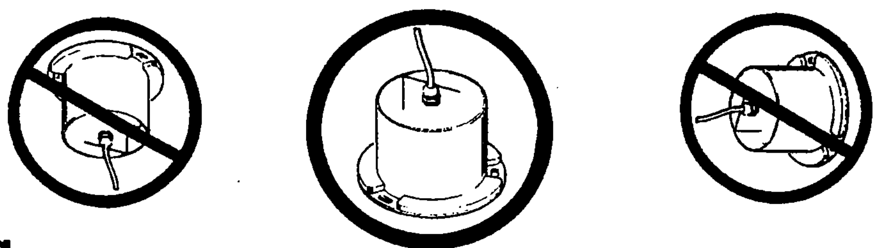
KVH Industries, Inc. 110 Enterprise Center, Middletown, RI 02840 (401) 847-3327 fax: (401) 849-0045

Installation Instructions-
KVH Heading Sensor

Choosing a Location

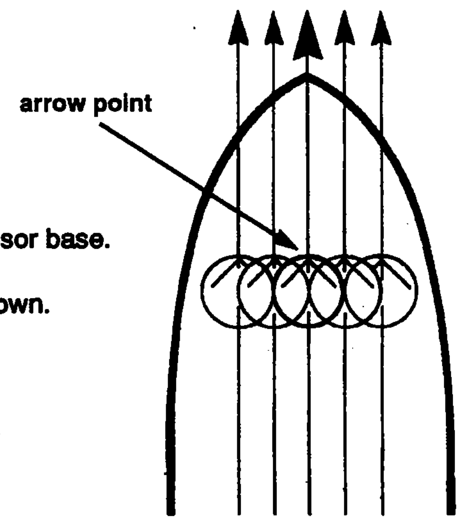
One of the many advantages of having an electronic compass is that the remote sensor unit can be located away from environments which adversely affect the earth's magnetic field (which you are trying to measure). To minimize error-causing effects, select a location for your KVH Heading Sensor that is as far away as possible from iron, steel or magnetic fields while still being close to the boat's center of gravity. Placing the sensor "center" fore and aft is more important than "center" athwartships. We also recommend placing the sensor on a level close to the waterline and not up on a flybridge.

Each compass is accurately compensated at the factory, so the more carefully you locate the sensor in your boat, the less compensation will be required for heading errors introduced by your boat. Eventhough the sensor is internally gimballed, it should be mounted as close to horizontal as possible. **The sensor must never be mounted on its side or upside down**; i.e., the face plate of the sensor should be facing upwards. After finding the best spot for the sensor, ensure that there is enough cable provided for your installation.



Mounting

Before mounting the sensor, carefully align the arrow point on the sensor's top on or parallel with the keel line of the boat. The arrow point must be facing forward.



After this is done:

1. Drill mounting holes through the center of the three slots in the sensor base.

2. Thread the enclosed mounting screws into the holes and tighten down.

Wiring

See attached sheet for Wiring Information.

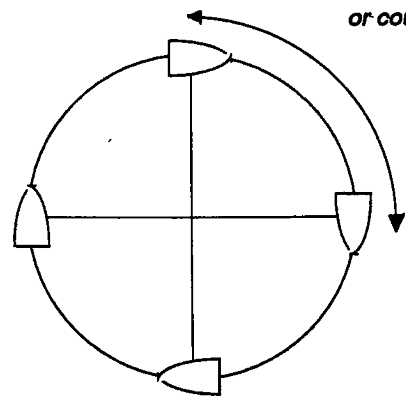
Automatic Compensation

Although each KVH Heading Sensor is calibrated at the factory, magnetic field distortions on your boat can introduce errors in the reported heading. These errors can be minimized by proper sensor placement and then removed by compensating the compass after it has been mounted. The KVH Heading Sensor is equipped with an auto-compensation capability in which it automatically measures the surrounding magnetic field distortion and compensates it out, thereby removing the resulting heading errors. Nevertheless, one should carefully locate the sensor as described in "Choosing a Location" and carefully align the sensor parallel with the keel line of the boat as described in "Mounting". Automatic compensation removes the need to manually adjust N/S and E/W compensation potentiometers because the system performs this continually and with greater accuracy.

The KVH Heading Sensor is always in "compensation mode" so there is no special procedure required to begin auto-compensation. Every time the vessel completes a 360° turn within the time constraints of the system, the sensor will check its accuracy and recompensate itself if required. Both "hard"(magnetic) and "soft" (iron) errors are automatically compensated by this procedure. This procedure will produce excellent accuracies (±1°) even on steel hulls. This procedure may happen during the normal use of your boat. When it does, the sensor will check the calibration and adjust itself if anything has changed.

Important - Read before Compensating for the first time! Compensating the KVH Heading Sensor at installation is very important to ensure its accuracy on your boat. The procedure involves turning your boat continuously through two large, lazy circles at a slow, steady speed (the circles may be slightly out of round or elliptical if necessary). During this procedure, it is critical that the boat remains level and slow enough so that the 2 circles take approximately 4 minutes to complete (≈2 minutes per circle). You cannot go too slowly, but if you go too quickly at any point while doing the circles, the sensor is programmed to ignore the data to ensure a perfect compensation. Figure out how big of a circle you need to make to keep at a slow, steady speed through 360°. Once you figure out the conditions for a 2 minute circle, keep on circling 2 more times in exactly the same manner. The KVH Heading Sensor will latch on to the first good data it gets and won't replace it unless it gets a better set of data. Remember, you cannot go too slowly, but you can go too fast!

To compensate the KVH Heading Sensor:



1. Select a calm day and a clear area without too much current or tide. Watch out for excessive pitching and rolling, as this can make your boat turn in surges faster than the KVH Heading Sensor will accept.

2. Turn the boat continuously through 720° (2 large, lazy circles) in a slow, smooth, and steady turn. Make each full circle take 2 minutes to complete (Try to time your turn so that it takes about 30 seconds or more to turn 90 degrees)

3. After completing two full circles according to the above parameters, compensation is now complete. However, you still need to check that your sensor is on or parallel with the boat's centerline. The slots in the sensor base allow you to turn the sensor slightly for fine tuning of its alignment along the boat's keel line.To check the sensor's alignment, take a known run between two reference points on a chart and compare the magnetic bearing on the chart with the heading readout on the display of the instrument to which you have interfaced the KVH Heading Sensor. If it is off by a few degrees, then every reading around the compass will be off by exactly that amount. If the heading is "low", loosen the screws around the sensor and turn the sensor clockwise until the heading readout on the interfaced instrument's display increases the correct amount of degrees. If the heading is "high", turn the sensor counter-clockwise until the display's readout decreases the correct amount of degrees.

4. Remember that all you are doing at this stage is aligning the forward arrow parallel with the boat's centerline. If you have to turn the sensor more than ±5 degrees when aligning the sensor to your boat, you have changed the sensor's location in relation to its surrounding environment enough so that you should make a smooth, slow turn as described above in #2 to recompensate your sensor in its new location.

5. Don't forget to retighten the sensor's mounting screws once you have checked the magnetic bearing on a chart with the heading readout on the interfaced instrument's display and are happy with the results.

Before being used for navigation, all compasses must be carefully checked against known heading references.

If you ever make changes on your boat which may affect the KVH Heading Sensor's accuracy, or if you are ever in doubt as to its accuracy, simply follow procedures #1-#2 to be assured it is accurate at all times.