E-BAR

INSTALLATION/USER MANUAL

The following installation/user manual should be completed and retained on board the vessel once the E-BAR has been installed and commissioned.

The E-BAR has been developed and produced by FourthCape, it combines a lightweight carbon fibre tube with precision engineering and advanced electronics to allow smooth toe in/out adjustment of twin rudders whilst sailing.

Optimal adjustment minimises windward rudder drag and maximises control, delivering improved handling, and reduced drag - all elements that increase average speeds.

A proven design with race success onboard Jeanneau Sun Fasts, Beneteau First 36, JPK Composites twin rudder ranges, as well as custom builds.

SAFETY

This equipment must be installed in accordance with the instructions provided in this manual. Failure to do so will seriously affect its performance and reliability. It is strongly recommended that a trained technician installs and configures this product.

Do not attempt to dis-assemble this equipment as doing so may cause fire, electric shock or malfunction and will invalidate the warranty. If any malfunctions are detected contact your supplier or service agent.

GETTING STARTED

With the existing, installed rudder link bar(s) in place, set the rudders to your base settings. Typically trailing edges of the rudder blades aligned with the manufacturer's engravings on the transom/hull, from your own experience, or acknowledged class settings.

In the above conditions, measure the rudder link bar to be replaced.

The ease of taking measurements varies from boat to boat, often it's easier to measure from the inside bearing surface of the rose joint to the same on the other end. This will give you an overall active bar length, [**BASE**] which you can record in the table on Page 8.

BAR INSTALLATION

Once the existing bar has been measured, it can be removed. Move the rose joints from the existing link bar to the E-BAR (unless supplied) **DO NOT ROTATE THE ACTIVE END** - [graduated blue part of the E-BAR] when screwing in the rose joint. Set up the rose joints to give the **BASE** measurement, with 35mm of 'Active End' (extendable blue bar) showing. Once fitted ensure the rose joint locking nut and all connecting bolts are securely fastened.

Lead the E-BAR cable to the Control Box. From cable exit on the bar, back to the rudder stock and up to the deck-head, then routed to the Control Box, this limits the amount of movement the cable makes as the steering system articulates.

CONTROL BOX & KEYPAD INSTALLATION

Choose a location on the cockpit side where you will operate the bar from (each side on a two Keypad installation), typically this is either close to the helm position. The Keypad is IP68 rated, however, it's best to avoid areas subject to direct pressurised water!

Ensure that the mounting location of the Keypad is accessible below decks.

For a single Keypad installation, the Keypad is plugged directly into the control box, or can be extended using a standard N2k drop cable (max 6m).

For a double Keypad installation the N2k style T-piece should be installed with the short cable connected to the control box and the Keypads connected to the T-piece. A typical installation would see 1 Keypad connected to the T-Piece directly, and 2nd connected via a N2k drop cables(max 6m) to the T-Piece

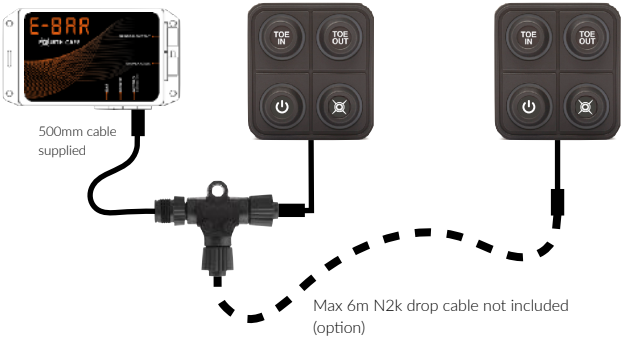
Once the location is decided, drill the holes for the Keypad connector, and securing bolts (Drill template guide is provided), Tighten the Keypad panel up against the cockpit side. The Keypad will seal against a smooth, flat cockpit side.

Mount the Control Box below decks planning the cable runs from the Keypad and the end of the E-BAR, together with Power, Sensor Output and AUX

SINGLE KEYPAD INSTALLATION

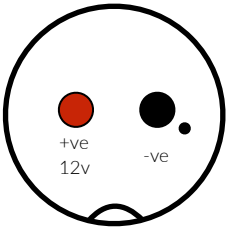
400mm direct connection
Can be extended with N2k drop cable (not included)

DOUBLE KEYPAD INSTALLATION



POWER CONNECTION (Optional supplied cable))

Make up a power supply lead, with the provided connector, a 12v supply with 5A fuse is required, the included connector will need to be soldered. Please **note carefully** the +ve / -ve in the diagram below.



Solder buckets from cable side connector

SENSOR TO INSTRUMENT CONNECTION (Optional supplied cable)

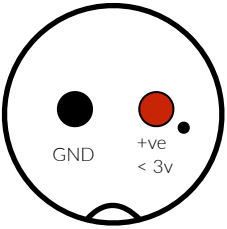
The sensor output provides a feed of 0-3v depending on the extension of the bar. The connector is supplied and should be wired as per the below diagram.

NOTE THE POLARITY & TEST BEFORE CONNECTING TO INSTRUMENT SYSTEM.

Max IN will be low voltage, Max OUT the higher voltage. The output is analogue and linear. MAX and MIN values for calibration can be read on your instrument system or a voltmeter. This can be calibrated to show desired numbers within instrument display systems.

Setting 0.3v (or measured minimum) to be **7** and 3v (or measured maximum i.e. 2.97v) to be **-3** gives a Zero value at **BASE** (if bar is set up at **BASE** with 35mm showing).

The bias towards greater Toe In values is because it's less likely to use high values of Toe Out.



Solder buckets from cable side connector

Values		Typical Instrument set up
Bar	Volts	
IN	0.3v	7
OUT +50mm	3.0v (2.97v)	-3

OPERATION

KEYPAD USE

With the control box powered (12v 5A fused supply) press Standby to power the system on

> Press and hold Standby will dim the back lights of the keypad, long hold will switch the system off

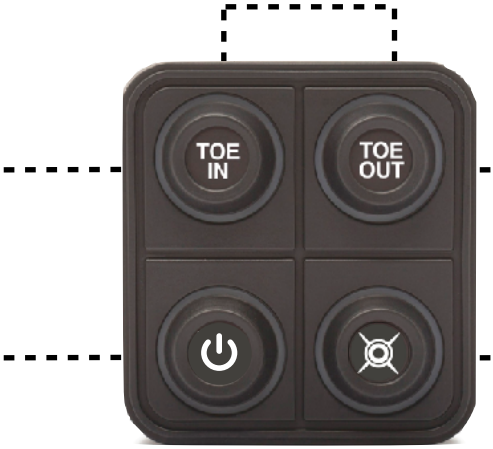
> Press and hold TOE IN to shorten the E-BAR, press and hold TOE OUT to lengthen the E-BAR

> Press and hold TOE IN and TOE OUT together (long press) E-BAR will return to 'BASE'

> Press Aux/Display (option dependant) to power that output, press and hold to switch off

> 5 sec Press Aux/Display (option dependant) to temporarily set new 'BASE'

Long simultaneous press to return to saved BASE Setting



TOE IN

Press & hold for Toe In, release to stop

TOE OUT

Press & hold for Toe Out, release to stop

STANDBY

Press to Power On, Long Press to Power Off

Press to dim button backlight

DISPLAY/AUX

Press once to turn on Aux
Long Press to turn off Aux

Extra Long press to save new programmed BASE Setting

Button	Illumination	Status
All	'Hello' Blink Multiple Colours Show	Power to Control Box
TOE IN/OUT	Amber Flash	Control Box powered system not on - power on with standby button
Standby	Red	System on and ready to adjust
TOE IN/OUT	Red	E-BAR is moving
TOE IN & OUT	Green	E-BAR is returning to BASE value
Symbol/Display	Red	Aux on
All	Red Rotation / Green Rotation	New BASE value set
All	Goodbye' Blink Rotation of Blue	E-BAR System is switching off

OPERATION

SETTING THE BASE VALUE

The intelligence built into the control box allows for the saving of a new BASE value which enables the user to quickly return to this preset adjustment. To set a new BASE adjust the E-BAR to the desired position. Press and long hold the FourthCape Compass/Display button on the Keypad - the system will store your setting and display a rotation of Red and Green lights signalling success.

You can then continue using the E-BAR as normal, to then return to the new BASE setting, Long Press the TOE IN and TOE OUT buttons simultaneously - the TOE IN/OUT buttons will illuminate green until the BASE setting is reached.

EXAMPLE INSTRUMENT INTEGRATION B&G H5000

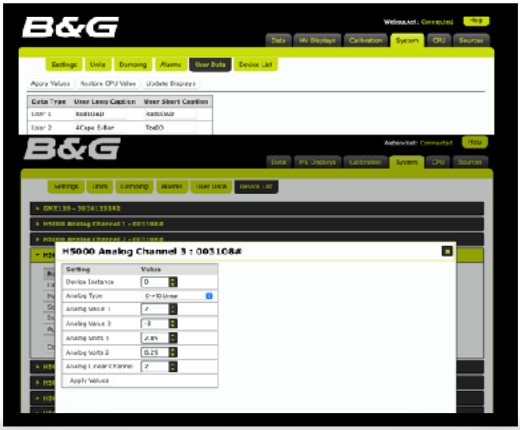
The E-BAR system can be integrated into a B&G H5000 instrument system. By connecting the E-BAR to an analogue channel (in this case C3) of the H5000 processor it can be identified by the B&G system and shown on displays.

Example of Analogue Channel configured in the B&G System Interface.

'User 2' Channel with a Long Caption [RudderTOE] and a Short Caption [TOE]

In the 'Device List' tab the 'H5000 Analog Channel 3' can be calibrated with the sensor outputs (max and mins)

[See page 3, Sensor To Instrument Connection.]



Web Socket Example

NKE INTEGRATION

Integration with the NKE instrument system is possible via an NKE Analogue Box which can be purchased directly from NKE Marine Electronics.

GARMIN INTEGRATION

Integration with a Garmin instrument system is possible via an analogue interface supplied by Fourth Cape. Once connected 'Toe Angle' is available in the 'custom data' menu.

TYPICAL RANGES OF ADJUSTMENT

Current experience has shown that although the full range of adjustment available is 50mm a likely maximum range is 24mm, with only a few mm of Toe Out from BASE used, and the main balance used to Toe In. The way you trim the sails, and other factors will change how you set up the Toe In/Out. Rather than trying to 'hit a number', with experience, the feel on the helm will help guide you to have a bit more or less Toe In, if you are tired, or do not have enough boat speed or heel to feel the correct setting, then returning to BASE setting is a safe setting. The output values are good to add to your instrument log files so that you can analyse numbers later.

PRODUCT CARE

The E-BAR, its Control Box and Connectors should not be submerged in water. Whilst the button panel and optional dedicated Display is IP68 rated, it's best to avoid areas subject to direct pressurised water.
When adjusting the rose joint on the active end of the E-BAR, care should be taken to hold the blue 'active end' to prevent it from turning.

The E-BAR and Control Box do not require any specific maintenance, however, we would advise that you clean and dry lubricate the active end of the bar once a season.

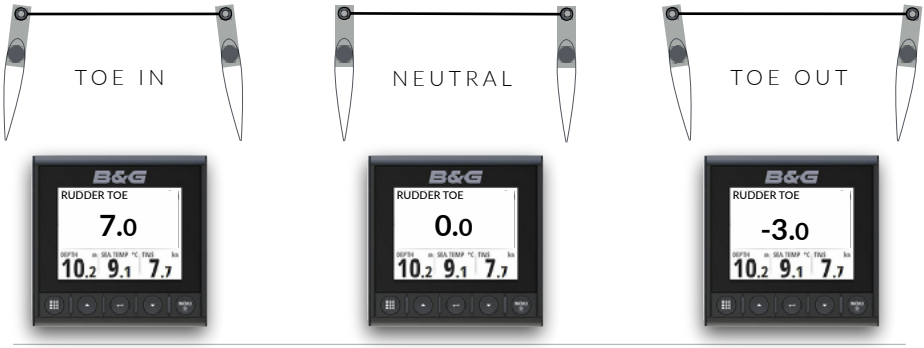
To do this, adjust the bar to maximum Toe Out which will expose the greatest amount of blue active end - clean this with a small amount of solvent [white spirit, brake cleaner or acetone] Once cleaned spray some dry PTFE lubricant or silicon spray and motor bar fully in and out a few times to disperse the lubricant.

DO NOT USE: Any form of Grease or wet lubricant such as WD40 or Oil.

TUNING GUIDE

Hydrodynamic flow much like aerodynamic flow requires trimming, as you would trim a sail you can now also trim your rudders to the heel and speed of the boat. With time your feel and experience with the system will advance, to get you started below is a generic guide.

CONDITION	RUDDER TOE
Moderate Heel Reaching	Toe In
Fast Downwind	Toe In
VMG Downwind	BASE - small Toe In
Light Air/Boat Flat	Toe Out



LOAD CELL (option)

The Load Cell option allows the measurement of compression and tension loads in the steering system. Delivered via 0-5v signal, this can be wired into an analogue channel on your B&G H5000 processor.

INSTALLATION

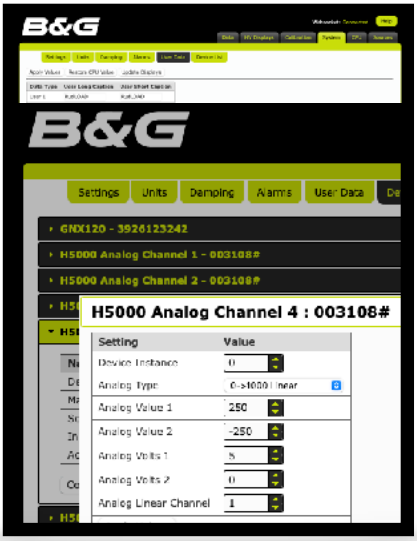
Screw the load cell into the static end of the E-BAR so both the E-BAR cable and load cell cable are at the same end of the bar. Screw supplied rose joint onto load cell. Find a suitable location to mount the small amplifier box which is supplied with mounting bases (Glue not supplied).

EXAMPLE INSTRUMENT INTEGRATION B&G H5000

Wire to an analogue channel in B&G H5000 processor, refer to the calibration certificate for wiring details. Once wired configure the analogue channel in the B&G Web Socket (In this case C4.) 'User 1' Channel with a long caption [RudLOAD] and a Short Caption [RudLOAD.]

In the 'Device List' tab the 'H5000 Analog Channel 4' can be calibrated with the sensor outputs (max & mins) refer to the calibration certificate for the Load Cell values.

For more information on configuring Analogue Channels refer to the B&G Manual.

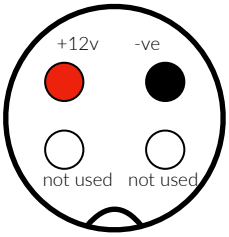


Web Socket Example

AUX BUTTON

The AUX is an additional button at the bottom right of the Keypad (FourthCape Compass symbol) that can be used for another function onboard. **It must be linked to a relay** but could be used to switch on/off a 12v function e.g deck light or navigation lights if correctly wired. The Control Box is supplied with a blanking cap but a connector can be purchased.

Wired as diagram below.



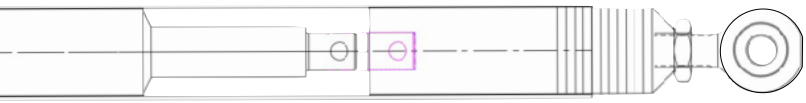
Solder buckets from cable side connector

AUX Button

INSTALLATION RECORD

The following installation record should be completed and retained on board the vessel once the E-BAR has been installed and commissioned.

Base Settings	Record Your Settings Here
Existing bar length (BASE)	
E-BAR Rose Joint centre to lock nut	
E-BAR exposed length at base setting	Default 35mm
E-BAR Serial Number:	



Thank you for purchasing this E-BAR. This product has been engineered for the highest level of performance and durability and will provide many years of reliable service. We constantly strive to achieve the highest possible quality standards, should you encounter any problems with this product, please contact the FourthCape team via the website.

FOURTH CAPE

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