

NMEA2000 STARTER KIT

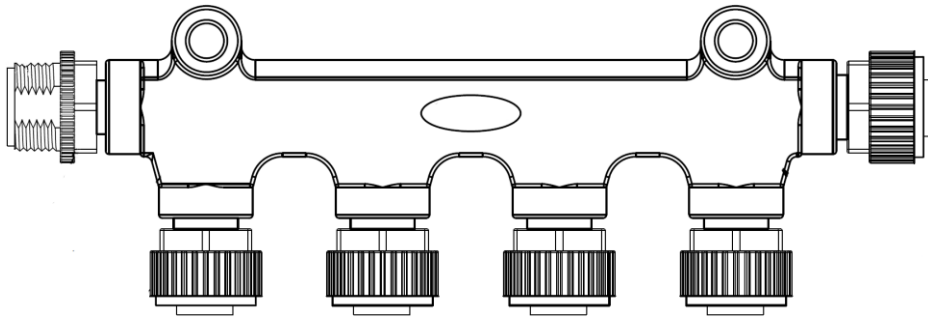
Installation and instruction Manual



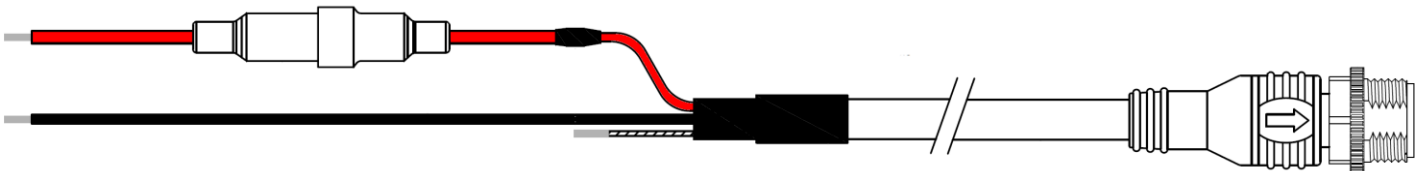
1. What's in the box ?



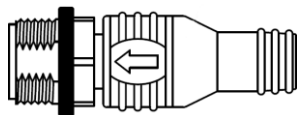
1m Drop Cable



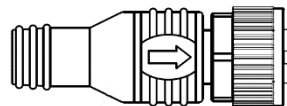
4-Way T-Piece Backbone



1m Power Cable with in-line fuse



Male Terminator



Female Terminator



2. Introduction

Congratulations on the purchase of your NMEA2000 Starter Kit. This manual assumes that you have no experience of NMEA2000 networks and aims to provide you with enough information to safely install a simple, but effective NMEA2000 network that will allow three devices to communicate with each other. It is not intended as a definitive guide to all things NMEA2000 and for more information on NMEA2000 please visit the NMEA website at <http://nmea.org>

i The Supply voltage for the NMEA2000 network must be 12v ONLY

3. Before you start

You will need the following items and tools to complete the installation:

- Access to 12V DC power supply where the Starter Kit is to be installed
- Crimps, terminal block or other connectors suitable for connecting DC low voltage wiring
- M4.5 (#9) or M5 (#10) screws or other fixings appropriate to the mounting location

If you are connecting non-standard devices to the Starter Kit such as Raymarine "SeaTalkNG" or Navico "Simnet" then you will need adaptor cables produced by these manufacturers:

- Raymarine DeviceNet Male Adaptor Cable (P/No A06078)
- Navico Micro-C Male to Simnet Adaptor Cable (P/No 24005729)

Other optional items you may wish to have with you during installation include;

- Additional NMEA2000 drop cables for the devices you will be connecting to the starter kit (one cable is supplied)
- An electrical multimeter

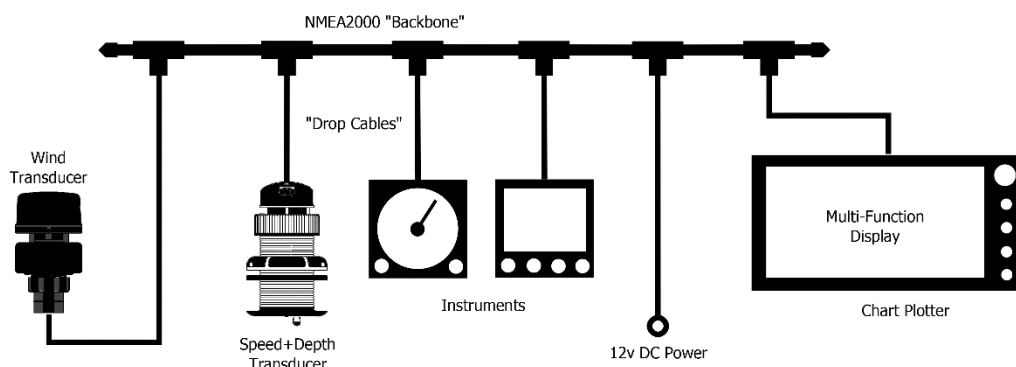
4. NMEA2000 – A Layman's Overview

NMEA2000 is the name of the standard method of connecting marine electronic equipment together. Developed by the National Marine Electronics Association (<http://nmea.org>) to replace the previous standard NMEA0183, it is a five wire, single cable interface that allows bi-directional, medium speed data transfer (up to 250Kb/sec). Ideal for sensors, instruments, engine, navigation and control data, NMEA2000 is a robust and reliable networking protocol, that guarantees data transmission between critical devices.

NMEA2000 is based on the well proven CAN Bus technology used in cars to monitor the engine, control the ABS breaking, etc. but modified and optimised for use on boats. Featuring a standard set of waterproof connectors and cabling, that most manufacturers have adopted, NMEA2000 really is a simple "plug and play" system. However, there are some key features and limitations that you need to be aware of...

- 1) **Physical Network Structure** – the NMEA2000 network consists of a trunk (commonly called "backbone") with lots of branches coming off (commonly called "drop cables") on to which the equipment connects...

Typical NMEA2000 Network



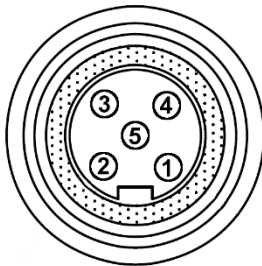


You cannot simply connect one NMEA2000 device to another device, by connecting them directly together using a single cable. For proper communication to take place, both devices must be connected to a basic NMEA2000 powered network and this is what our NMEA2000 Starter Kit provides.

- 2) **Network Cabling** – the maximum total cable length of the network; including the “backbone” and all “drop cables” must be less than 78m (256ft). A single “drop cable” i.e. distance between the equipment and the “backbone” must be less than 6m (20ft).
- 3) **Network Power** – The network must be connected to a 12v DC power source. All devices will take some power from the network. In some cases this will be just a few milliamps for their NMEA2000 interface circuit, but some smaller devices might be completely powered from the network. As a rule, if the device just has an NMEA2000 cable then it is powered from the network, while if it has a separate power cable then only its NMEA2000 interface will take power from the network.
- 4) **Device Current Draw** – Every NMEA2000 device should have a label that states a “LEN” value (Load Equivalency Number). One LEN = 50mA, so if a device is quoted as having a LEN of 4, it basically means that it will draw 50mA x 4 = 200mA.
- 5) **Total Network Current** – The device LEN values are very important. Overloading an NMEA2000 network can lead to “voltage drops” that reduce the network voltage that a device receives, ultimately causing the device to not communicate correctly. Even more serious is the risk of cables melting or even catching fire, if too much current flows through the network.

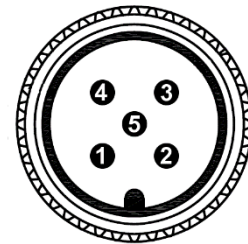
The NMEA2000 “Micro C” connectors and cabling most commonly found on pleasure and small commercial craft are rated to 3 Amps. When installing an NMEA2000 network, even a small one, it is important that you check and add up the LEN values of all the devices on the network and make sure that the **total LEN value is < 60**.

- 6) **Cable Wiring** – Every NMEA2000 network has five wires; two for Power, two for Data and a Shield. Normally the wires are hidden from view within the cabling, except the network Power cable which usually has bare ended wires for connection to the boat’s 12v DC supply. However, sometimes it is necessary to cut and join an NMEA2000 cable, fit a connector or test the wiring and the standard NMEA2000 wiring colours and connector pin outs are shown below;



Female View From Front

- | | | |
|-----------|---|-------------------|
| 1) SHIELD | = | Shield (Ground) |
| 2) RED | = | +12V Power Supply |
| 3) BLACK | = | -0v Power Supply |
| 4) WHITE | = | + Data |
| 5) BLUE | = | - Data |



Male View From Front

- 7) **Network Termination** – NMEA2000 uses a balanced, two wire, differential voltage, connection that allows any device on the network to receive and transmit data packets to any other device on the network. This type of connection must be correctly terminated for optimum signal transmission and minimum interference. Termination basically means fitting a 120 Ohm resistor at each end of the “backbone”. The NMEA2000 Starter Kit includes these two terminator resistors (one male and one female) and they must be fitted for reliable data transfer.



5. Installation

Before starting installation select a suitable location for the NMEA2000 Starter Kit to be mounted. Although all connectors are water proof when plugged together, it is recommended that the 4-way T-Piece Backbone is mounted in a dry location to avoid contact with water or excessive moisture. When locating the unit you should consider:

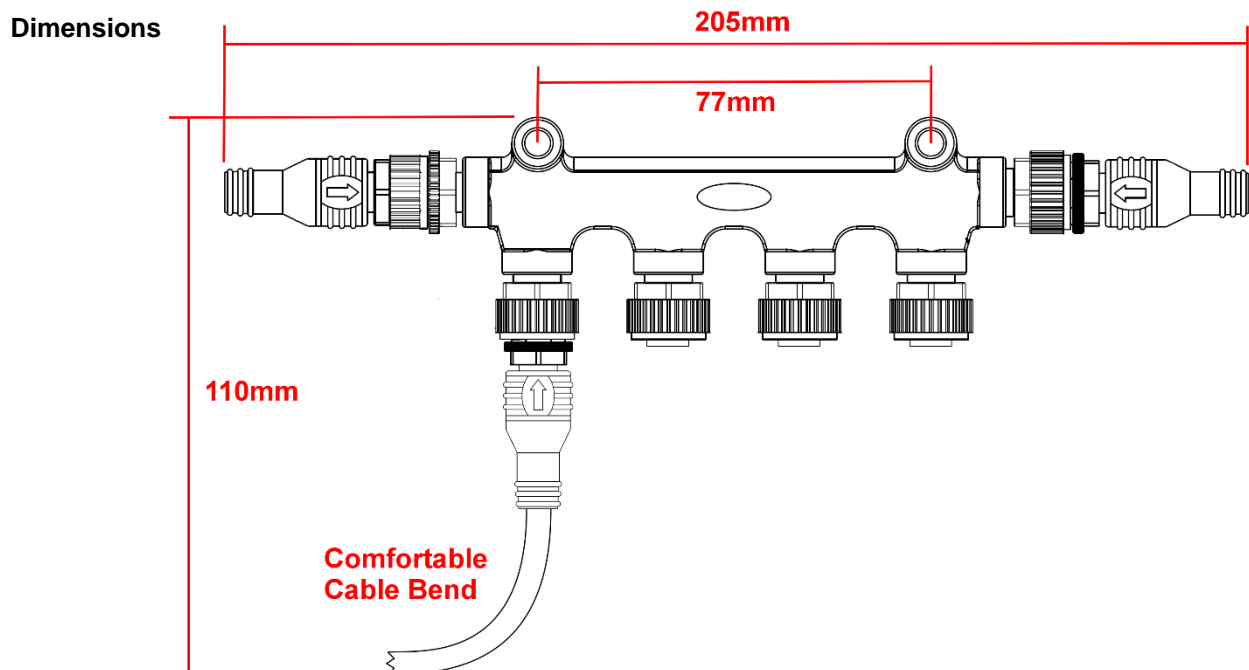
- Routing of 12v power to the Starter Kit power cable.
- Routing of drop cables from the NMEA2000 devices to the Starter Kit – drop cable length must not exceed 6m.
- There is enough space and access to the Starter Kit to easily expand the NMEA2000 network in the future.
- Maintaining the compass safe distance of 0.5m

Installation Step 1

- Decide which 12v DC electrical circuit the NMEA2000 network will be powered from and ensure that this circuit has enough capacity to provide the additional 3 Amps of current that the NMEA2000 Starter Kit can draw.
- Connect the NMEA2000 Starter Kit's Power cable to the electrical circuit. If you need to extend this power cable, ensure that you use suitable cabling whose current rating is equal or higher to the fuse/circuit breaker fitted to this circuit.
- The NMEA2000 Starter Kit's power cable includes an in-line 3A fuse (20mm), which protects its NMEA2000 connectors and cabling. Connect the Red (+) and Black (-) wires in the Power cable to the 12v DC electrical circuit you have chosen.

Installation Step 2

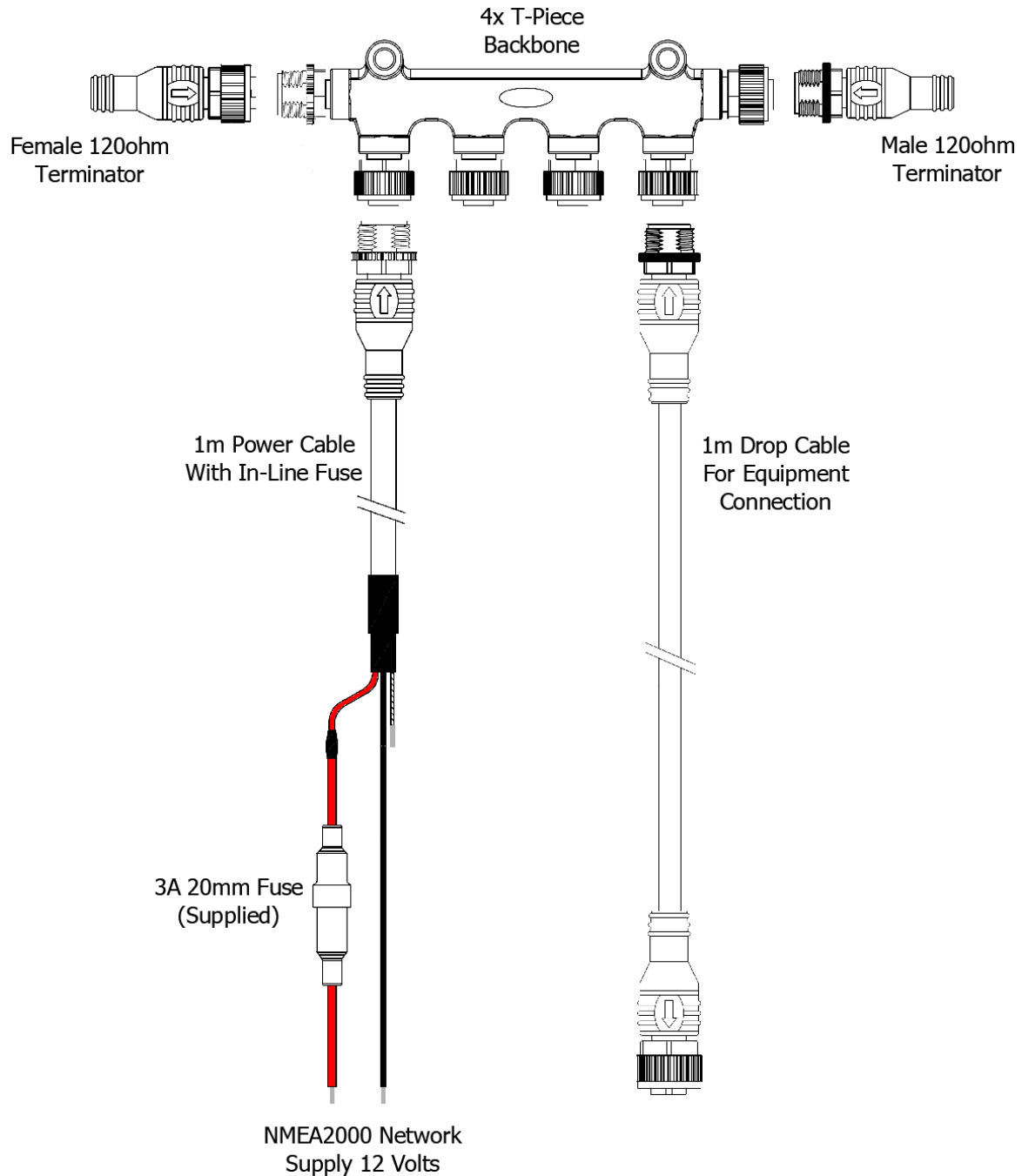
- Fix the 4-way T-Piece Backbone to a vertical bulkhead using suitable fixings (x2). The Backbone should be mounted vertically (as shown below) with the drop cables pointing down, ensuring that any moisture or water droplets drip away from the connectors. Vertical dimension shows required height for drop cables to be fitted without putting the cables under any stress.





Installation Step 3

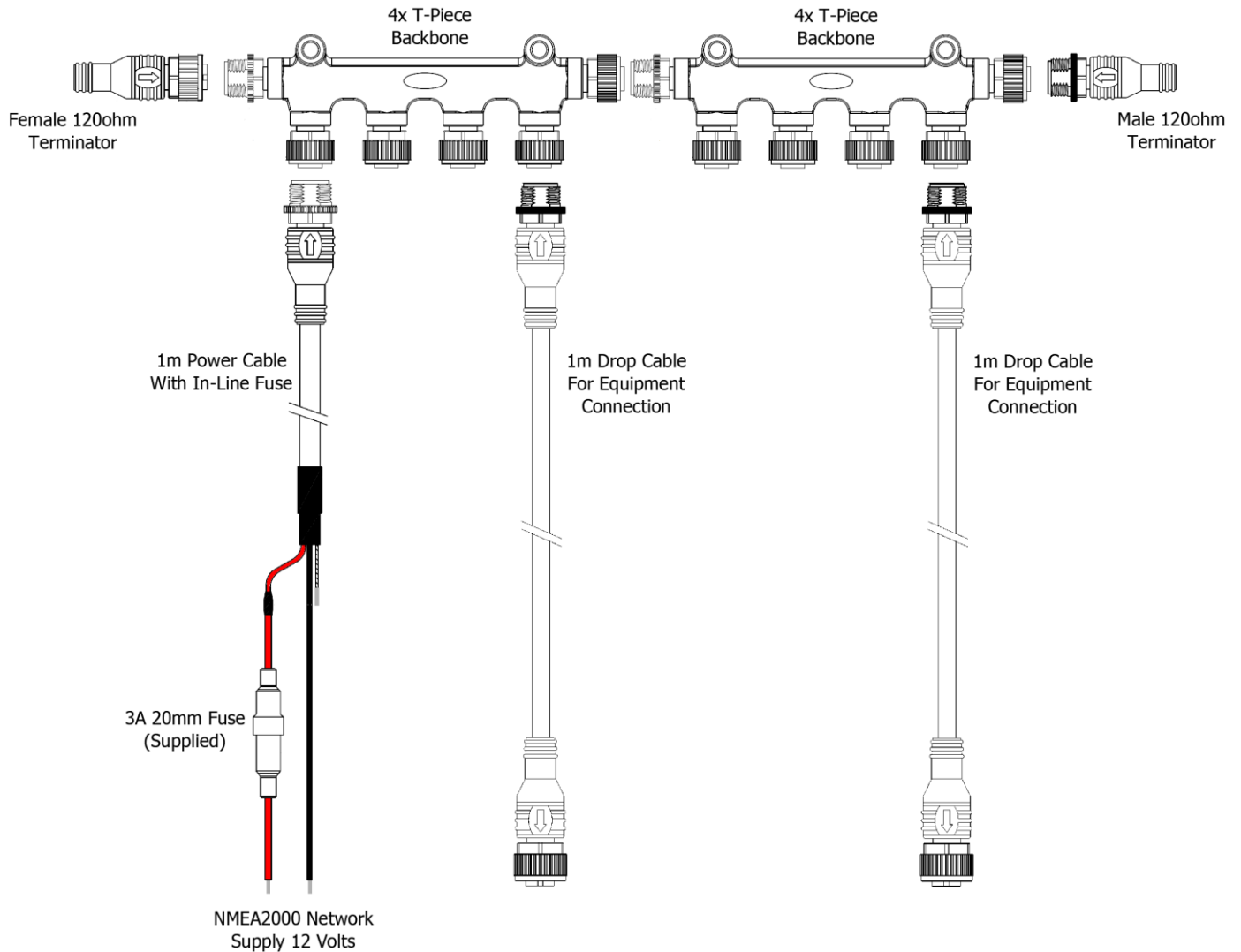
- Route and fit the drop cables to the NMEA2000 devices. The drop cables and power cable can be fitted to any of the four T-Piece Backbone sockets, they are all the same.
- Fit the Power cable and Terminators (as shown below).
- Ensure the cable connectors are fully screwed together, but avoid excessive over tightening, finger tight is fine.



Normal NMEA2000 Starter Kit Installation



- If you are installing a larger NMEA2000 network and wish to have multiple 4 way T-Piece Backbone, they can be joined together either directly or via a drop cable (as shown below). Always fit the terminators on the end of the backbone.



Extended NMEA2000 Installation

Installation Step 5

- Once all of the connections are made, you can apply power to the NMEA2000 Starter Kit and then power up all of the NMEA2000 devices connected to the network.
- If you have a graphical instrument display or MFD, that has the facility to discover and list the devices on the NMEA2000 Network, use this to confirm that all of the devices are correctly on the network.

Installation is now complete.

