



SEE, BE SEEN
BE SAFE AT SEA



USER MANUAL R400NG

AIS Receiver with GPS, Ethernet & USB

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ENGLISH

CONTENTS

1 R400NG AIS RECEIVER WITH GPS, ETHERNET & USB	5
2 DOCUMENT	6
2.1 About This Manual	6
3 NOTICE	7
3.1 Copyright	7
4 GENERAL NOTICES	8
5 INTRODUCTION	9
5.1 Background to AIS	9
5.2 The R400NG	9
6 PARTS LIST	10
7 INSTALLATION	10
7.1 Mounting.....	10
7.2 Power Connection.....	10
7.3 Antenna Installation.....	10
8 CONFIGURATION	11
8.1 Connection to a Network.....	11
8.2 Configuring the Network	11
9 DISCOVERY TROUBLESHOOTING TIPS	12
9.1 Firewalls.....	12
9.2 Trouble discovering a Digi device using Windows XP	12
9.3 Routers or Switches	12
9.4 Cabling.....	13
9.5 Ethernet LED	13
9.6 Network Adapters.....	13

R400NG

10 CONFIGURING THE NETWORK SETTINGS	14
11 GPS RECEIVER	15
11.1 GPS Receiver Technical Specification.....	15
12 OPERATION	16
12.1 Range of AIS.....	16
13 TROUBLESHOOTING	17
13.1 No power LED is displayed	17
13.2 Channel 1 and Channel 2 LEDs do not flash.....	17
13.3 Channel 1 and Channel 2 lights flash, but no data is received	17
13.4 I can receive ships on my display, but no names are shown	17
14 SPECIFICATION	18
14.1 Electrical.....	18
14.2 Receiver	18
14.3 Physical	18
15 TRANSMISSION SPECIFICATION	19
15.1 Class A Units.....	19
15.1.1 Table of Class A Shipborne Mobile Equipment Reporting Intervals .	19
15.2 Class B Units.....	19
16 COPYRIGHT	20
17 LIMITED WARRANTY	20

R400NG

1 R400NG AIS RECEIVER WITH GPS, ETHERNET & USB



R400NG

2 DOCUMENT

2.1 About This Manual

This Manual provides installation, operating Instructions and fault-finding procedures for the equipment to which it relates.

After installation, this manual should remain with the vessel to which it relates.

This manual may also be made available in electronic Portable Document Format (PDF). In PDF format, the following categories are all enabled as active hyperlink references: (1) The titles of each section; (2) document cross-references; (3) the table of contents.

This document may therefore be navigated quickly and effectively by using a mouse or other pointing device to activate each of these hyperlinks. This is a printer friendly document, designed to be printed 2-sided as a booklet with A5 pages on A4 stock paper.

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R400NG

4 GENERAL NOTICES



SAFETY: Make sure the power supply is switched off before you make any electrical connections to the unit.



INSTALLATION: This equipment must be installed in accordance with the instructions provided in this manual. Failure to do so could result in poor performance, personal injury and/or damage to your vessel and/or connected equipment.



CABLES: The supplied cables should only be cut, shortened or lengthened by an appropriate supplier.



COMPASS: The compass safe distance of this unit is 0.5 m or greater for 0.3° deviation.

In accordance with a policy of continual development and product improvement, hardware and software may be upgraded from time to time, and future versions of equipment may therefore not correspond exactly with this manual.

When necessary, upgrades to the product will be accompanied by updates or addenda to this manual. Information contained in this manual is liable to change without notice.

Comar Systems Ltd. disclaims any liability for consequences arising from omissions or inaccuracies in this manual and any other documentation provided with this product.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

5 INTRODUCTION

5.1 Background to AIS

AIS is an Automatic Identification System. For improved safety and specifically for collision avoidance reasons, vessels need to know the position, details and navigational intentions of other vessels within VHF range.

IMO regulations covering most commercial vessels worldwide have been passed requiring that AIS transponders are fitted to all commercial vessels over 300 grt on international voyages.

The transponders use VHF frequencies to:

Transmit details of their own vessel

Receive details from other vessels or navigation aids within VHF range

5.2 The R400NG

The R400NG is an AIS receiver unit with built in GPS Receiver, Ethernet interface and USB port, designed specifically for coastal monitoring of AIS equipped vessels.

Connected to an Ethernet Network and directly or via a Router to a PC running compatible software, AIS data transmitted from ships within range can be displayed on the screen giving a visual interpretation of the traffic within VHF range. The unit can also be mounted at a remote location and AIS data sent over the Internet to a fixed IP address for use on a dedicated server.

Information transmitted from vessels fitted with AIS transponders includes:

- Name of Vessel
- Speed (SOG)
- Position
- MMSI Number
- Rate of Turn
- Destination
- Call Sign
- Course (COG)
- Navigational Status
- IMO Number
- Size of Vessel
- ETA
- Type of Vessel
- Heading
- Vessel Dimensions
- Draft
- Status
- Cargo

Note: Not all the above information is necessarily transmitted by each vessel.

R400NG

6 PARTS LIST

Before proceeding with the installation of the R400NG, check the contents of the box which should include:

- The R400NG AIS Receiver Unit
- Universal 100-250VAC/12VDC Power Supply
- Antenna Connector Adaptor
- USB Cable
- Network Cable
- R400NG Installation CD
- This Manual

7 INSTALLATION

7.1 Mounting

The R400NG Receiver can be mounted to a suitable bulkhead or shelf.

Hint: Select a location away from excessive heat sources, avoid high levels of vibration and shock.

7.2 Power Connection

Fit the universal power supply with the correct adaptor for your local power. Plug the 2.1 mm jack into the rear of the R400NG and switch on the power

Hint: Alternatively the unit will accept 9-30 V dc from an alternative source capable of supplying 1 Amp. The centre pin is Positive.

7.3 Antenna Installation

A VHF antenna is not supplied as the type of antenna and cable requirements differ for each installation. An antenna can be acquired from a local marine electronics outlet.

Shore based reception is governed by local terrain, however an open view to the sea with an antenna mounted in the clear at a height of approximately 20 metres will achieve 25 miles plus, higher gain antenna can be used on shore to further increase the range.

Hint: The antenna connector type is BNC, 50Ω

Hint: The higher the antenna is located, the greater the range

Hint: Mount the antenna with a relatively clear view of the horizon. Large obstructions that might shade the antenna should be avoided.

Hint: A higher gain antenna will increase reception range.

Hint: Normally an omni-directional antenna is recommended; however a directional antenna such as a 3 element Yagi can be used to increase range in one particular direction.

8 CONFIGURATION

8.1 Connection to a Network

The R400NG can be connected to a standard PC, Network Router or Switch. Note if connecting directly to a PC you will need a crossover cable.

When connected to a network the yellow LED on the network connection should be on. If no yellow LED is shown then the unit has not detected a link. The green LED will blink when data is transmitted or received.

The CD included with the product contains the program **Digi Device Discovery** utility program for setting up and configuring the unit.

8.2 Configuring the Network

To install the Digi Device Discovery program on your PC run the "Device Discovery" installation executable file in the "Device Discovery" folder on the CD, and follow the set up wizard.

When the Device Discovery software is installed, select "Device Discovery" from the installed applications.

If you have installed the R400NG on your local network, the device will be displayed as a Connected ME device.

R400NG

IP Address	MAC Address	Name	Device
10.8.16.10	00:04:F3:01:D8:CF		ConnectPort X5 R 2B GPRS
10.8.16.14	00:40:9D:3C:1E:0F		ConnectPort X4
10.8.16.35	00:40:9D:23:87:8B		PortServer TS 16
10.8.16.40	00:40:9D:3C:52:EC		ConnectPort X2
10.8.16.46	00:40:9D:29:78:E6	TravisX8	ConnectPort X8
10.8.16.55	00:40:9D:29:8D:33		Digi Connect ES 8 SB
10.8.16.57	00:40:9D:3B:98:AC		ConnectPort X2
10.8.16.65	00:04:F3:01:F9:A2		ConnectPort X5 F 2B GPRS
10.8.16.66	00:40:9D:3B:98:AF		ConnectPort X2
10.8.16.67	00:40:9D:32:E1:F7		ConnectPort X8
10.8.16.76	00:40:9D:3B:98:82		ConnectPort X2
10.8.16.80	00:40:9D:27:33:63		Digi Connect ME
10.8.110.32	00:04:F3:01:D8:C3		ConnectPort X5 F 2B GPRS
10.8.110.33	00:04:F3:01:D8:8B		ConnectPort X5 R 2B GPRS
10.8.115.11	00:40:9D:29:8D:4A		ConnectPort X4 NEMA
10.8.115.242	00:40:9D:28:55:02		PortServer TS 16 Rack
10.8.117.8	00:40:9D:23:25:A7		PortServer TS 2 H
10.8.127.34	00:40:9D:23:0D:5C		PortServer TS 4 MEI
10.8.128.5	00:40:9D:28:ED:AD		PortServer TS 16 Rack

9 DISCOVERY TROUBLESHOOTING TIPS

9.1 Firewalls

Check to make sure that any software firewalls (common examples are Windows Firewall and most popular Anti-Virus software) are disabled. These can block the discovery process, also any physical firewall will almost certainly block the discovery process as well.

9.2 Trouble discovering a Digi device using Windows XP

Trouble discovering a Digi device using Windows XP with Service Pack 2: You will need to make sure that the Windows Firewall is disabled. By default it is enabled and will block the port that the discovery software uses to discover Digi. To disable the firewall go to Start> Settings> Control Panel> Windows Firewall; then click the off button to disable it.

9.3 Routers or Switches

Is there a router between the computer running the discovery utility and the Digi device itself? Normally, routers will block the discovery process. If possible remove them and use a hub instead. If there is a switch in between this may or may not be a problem. Occasionally they are configured to block the discovery traffic. If unsure use a hub or a direct Ethernet cable connection, also in case the port on your Router/Switch/Hub is at fault, try an alternative port as well.

9.4 Cabling

If nothing else works try using a direct crossover Ethernet cable directly between the computer and the Digi device. Another option is to try another Ethernet cable.

9.5 Ethernet LED

Check the Ethernet Link LED on the Digi device. Is it lit solid? If not, there is not a valid network connection and it will not be possible to discover the device.

9.6 Network Adapters

Make sure the proper network adapter is enabled, also ensure all other network adapters are disabled. If more than one network adapter is enabled, this can cause the discovery process to fail.

R400NG

10 CONFIGURING THE NETWORK SETTINGS

Device Discovery has the facility to quickly configure the unit to your own network, select **Configure Network Settings**, this brings up a new window which will give you the choice of letting Windows assign an IP address, or alternatively you can give the unit a fixed IP address.

Alternatively you can select **Open Web Interface**, which will open a login dialog box, the default username is **root** and the default password is **dbps**. Once entered it will connect you directly to the internal web browser, and open it on its home page as below:

The screenshot shows the Digi Connect ME Configuration and Management web interface. The page has a header with the Digi logo and the title "Digi Connect ME Configuration and Management". A navigation menu on the left includes sections for Home, Configuration (Network, Serial Port, GPIO, Alarms, Security, System), Management (Serial Ports, Connections), Administration (File Management, Backup/Restore, Update Firmware, Factory Default Settings, System Information, Reboot), and Logout. The main content area is titled "Home" and contains a "Getting Started" section, a "Tutorial" section with the text "Not sure what to do next? This Tutorial can help.", a "System Summary" section displaying the following information:

Model:	Digi Connect ME
IP Address:	143.191.1.53
MAC Address:	00:40:9D:23:17:F7
Description:	
Contact:	
Location:	

Below the system summary is a "User Interfaces" section with the following options:

- Web Interface (Default)
- Custom Interface:

However if you wish to use your favourite browser then simply navigate to the IP address that has been assigned to the unit, for example <http://192.168.1.200>.

Configure the device to your requirements. Use the help function F1, for assistance.

11 GPS RECEIVER

The R400NG contains an integral GPS receiver allowing positional data and AIS data to be output together from the receiver.

A standard active 5 volts dc GPS antenna with a gain between 10 and 30 dB needs to be connected to the TNC connector on the rear of the R400NG for the GPS receiver to work.

By default the GPS receiver will output the following NMEA messages:

GPGGA, GPGSA, GPGSV, GPRMC

11.1 GPS Receiver Technical Specification

Channels: 12 Parallel Channels

Frequency: 1575.42 MHz

WAAS: Yes

Datum: Default WGS84

Update Rate: 1 sec

Hot Start: 6 sec

Warm Start: 35 sec

Cold Start: 45 sec

R400NG

12 OPERATION

Operation of the R400NG unit is fully automatic and only requires power, VHF, GPS and data cable connection.

On powering up the unit:

The green LED marked ON should illuminate

The Channel LEDs should come on briefly then go off

The Channel A and B LEDs should flash momentarily when information from nearby transceivers is received

Data is then output for visual or textual viewing on compatible electronic charting systems or other systems or devices.

12.1 Range of AIS

The AIS reception range is similar to that normally associated with Marine VHF Radiotelephone. Range is dependent on height of antenna and also type of antenna, the higher and better antenna installed the greater the reception range.

Typically an antenna mounted on the rail of a yacht will achieve 15 miles, mounted on the masthead will increase this to 20 miles. Shore based reception is governed by local terrain, however an open view to the sea with an antenna mounted in the clear at a height of approximately 20 metres will achieve 25 miles plus, higher gain antenna can be used on shore to further increase the range.

13 TROUBLESHOOTING

13.1 No power LED is displayed

Check the power supply and that the unit is connected correctly to a 12 or 24V dc supply

Check the polarity of the supply is correct. The center pin of the 2.1mm jack is positive

13.2 Channel 1 and Channel 2 LEDs do not flash

Check that a VHF antenna is fitted and correctly connected

Check that the antenna is correctly positioned, i.e. at a suitable location to visibly 'see' vessels

13.3 Channel 1 and Channel 2 lights flash, but no data is received

If the red channel lights flash then data is being received from nearby vessels.

Check that the correct data cable is connected to the PC or NMEA device

Check on the PC application or device that the correct port is assigned and the correct baud rate is setup. The correct baud rate is 38,400

13.4 I can receive ships on my display, but no names are shown

Remember that the names of ships as well as other static information are only sent every 6 minutes or when requested by another station

R400NG

14 SPECIFICATION

R400NG is a compact dual channel synthesized VHF Receiver designed to receive and decode all transmissions from vessels fitted with Class A or B AIS transceivers, Aids to Navigation, and SARTS.

14.1 Electrical	
Power Supply Range:	9 - 30 Volts dc
Power Consumption:	300mA @ 12 V dc
Baud Rate:	38,400 Baud (38.4Kb)
Format:	ITU/ NMEA 0183
Output Message:	AIS: VDM. GPS: GGA,GSA,GSV,RMC
14.2 Receiver	
Frequency:	Channel A 161.975 MHz Channel B 162.025 MHz
Channel Spacing:	25 kHz
Sensitivity:	> -112 dBm @ 20% MER
Demodulation:	GMSK
Data Rate:	9600
Antenna Impedance:	50 Ω
14.3 Physical	
Dimensions:	L132 x W106 x H46 mm
Weight:	600 g
Mounting:	4 mounting holes in end plates
Connectors:	AIS Antenna BNC, GPS Antenna TNC
Ethernet Port:	RJ-45
USB Port:	USB 2.0 Type B (Cable Supplied)
Power:	2.1 mm Phono plug
Indicators:	On (Green), Channel A (Red), Channel B (Red)
Construction:	Aluminium, ABS End Caps
Finish:	Black Fine Texture Paint, Grey ABS

15 TRANSMISSION SPECIFICATION

15.1 Class A Units

Static information Every 6 minutes, or when data has been amended, or on request.

Dynamic information This is dependent on speed and course alteration.

15.1.1 Table of Class A Shipborne Mobile Equipment Reporting Intervals

Ship's Dynamic Conditions	Reporting Interval
Ship at anchor or moored and not moving faster than 3 knots	3 Minutes
Ship at anchor or moored and moving faster than 3 knots	10 Seconds
Ship 0-14 knots	10 Seconds
Ship 0-14 knots and changing course	3 1/3 Seconds
Ship 14-23 knots	6 Seconds
Ship 14-23 knots and changing course	2 Seconds
Ship >23 knots	2 Seconds
Ship >23 knots and changing course	2 Seconds

15.2 Class B Units

Static information Every 6 minutes

Dynamic information Every 3 minutes if speed is less than 2 knots Every 30 seconds if speed is greater than 2 knots

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17 LIMITED WARRANTY

Comar Systems Ltd warrants this product to be free from defects in materials and manufacture for one year from the date of purchase. Comar Systems Ltd will, at its sole option, repair or replace any components that fail 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 Comar Systems Ltd.

This warranty does not cover failures due to abuse, misuse, accident or unauthorised alteration or repairs.

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

Changes or modifications not made by Comar Systems or an authorised repairer will: (1) Void the warranty issued by Comar Systems (2) Void the user's authority to operate the equipment.

Note: Every effort has been made to ensure that all information contained in this manual is accurate at the time of going to press. We therefore cannot take any responsibility for the content of this manual and advise that you take normal steps to ensure that the information is at its most current when you are reading this manual.



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