



SEE, BE SEEN
BE SAFE AT SEA



USER MANUAL R400NG

SKU 001-1044 AIS Receiver
with GPS and Ethernet

R400NG-MA-v06r01
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ENGLISH

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1 R400NG AIS RECEIVER WITH GPS AND ETHERNET



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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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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.

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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 and Ethernet interface, 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 | • Call Sign | • Type of Vessel |
| • Speed (SOG) | • Course (COG) | • Heading |
| • Position | • Navigational Status | • Vessel Dimensions |
| • MMSI Number | • IMO Number | • Draft |
| • Rate of Turn | • Size of Vessel | • Status |
| • Destination | • ETA | • Cargo |

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

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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
- Power Cable
- Antenna Connector Adaptor
- 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

Connect the power cable to the vessels 12V dc supply and plug the 2.1mm jack into the rear of the R400NG and switch on the power.

- Hint: The unit will accept 9-30V dc from a 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, 50 Ω
- 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.

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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.

The screenshot shows the Digi Device Discovery application window. On the left, there are three panels: 'Device Tasks' (Open web interface, Telnet to command line, Configure network settings, Restart device), 'Other Tasks' (Refresh view, Help and Support), and 'Details' for the selected 'Digi Connect ME' device. The 'Details' panel shows: IP address: 10.8.16.80, Subnet mask: 255.255.0.0, Default gateway: 10.8.1.1, Serial ports: 1, and Firmware: dck9 01/25/2010 ...

IP Address	MAC Address	Name	Device
10.8.16.10	00:04:F3:01:D6:CF		ConnectPort X5 R ZB 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:E2: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:9B:AC		ConnectPort X2
10.8.16.65	00:04:F3:01:F9:A2		ConnectPort X5 F ZB GPRS
10.8.16.66	00:40:9D:3B:9B:AF		ConnectPort X2
10.8.16.67	00:40:9D:32:E1:F7		ConnectPort X8
10.8.16.76	00:40:9D:3B:9B:82		ConnectPort X2
10.8.16.80	00:40:9D:27:33:63		Digi Connect ME
10.8.110.32	00:04:F3:01:D6:C3		ConnectPort X5 F ZB GPRS
10.8.110.33	00:04:F3:01:D6:8B		ConnectPort X5 R ZB 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:23:00:5C		PortServer TS 4 MEI
10.8.128.5	00:40:0D:28:ED:AD		PortServer TS 16 Rack

19 devices My Device Network

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.

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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 displays the Digi Connect ME Configuration and Management web interface. The page title is "Digi Connect ME Configuration and Management". The left sidebar contains a navigation menu with sections: 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 shows "Getting Started", a "Tutorial" link with the text "Not sure what to do next? This Tutorial can help.", a "System Summary" section with fields for Model (Digi Connect ME), IP Address (143.191.1.53), and MAC Address (00:40:9D:23:17:F7), and a "User Interfaces" section with "Web Interface (Default)" and "Custom Interface" options, each with a "Launch" button and a "Set as Default" button.

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

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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

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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
Output	
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:	L130 x W105 x H46 mm
Weight:	600 g
Mounting:	4 mounting holes in end plates
Connectors:	AIS Antenna BNC, GPS Antenna TNC
Ethernet Port:	RJ-45
Power:	2.1 mm Phono plug
Indicators:	On (Green), Channel A (Red), Channel B (Red)
Designed to Meet:	IEC 61993-2; CE Approval to EN 60945: EN 6100-6-1/2; FCC part 15

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.

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.

18 PRODUCT SUPPORT

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