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› [Matsutec](#) /

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Matsutec HA-102 Marine AIS Transponder User Manual

Model: HA-102

1. INTRODUCTION

The Matsutec HA-102 is a Class B Automatic Identification System (AIS) transponder designed for marine use. It functions as both a receiver and transmitter, enhancing navigational safety by allowing vessels to transmit their position, speed, course, and other data, while also receiving similar information from other AIS-equipped vessels and shore stations. This manual provides detailed instructions for the installation, operation, and maintenance of your HA-102 unit.



Figure 1.1: Matsutec HA-102 AIS Transponder and Accessories

This image displays the Matsutec HA-102 AIS Transponder unit along with its essential accessories. The main transponder unit is black with "AIS TRANSPONDER" printed on it, featuring a red safety alarm button. Accompanying it are a data/power cable, a software CD, and small installation components, providing a complete overview of the product package.

2. KEY FEATURES

- **Dual Channel Function:** Two TDMA receivers simultaneously receive data on two independent channels, while one TDMA transmitter alternates transmission on two independent channels.
- **CSTDMA Function:** Utilizes Carrier-Sense Time Division Multiple Access to prevent and resolve communication conflicts, ensuring reliable data exchange.
- **External Serial Data Interface:** Equipped with RS-422 and RS-232 ports for versatile connectivity with other marine electronics.
- **Safety Message Capability:** Transmits and receives safety messages, including an integrated "SOS" safety button for emergency situations.
- **Multiple Operation Modes:** Supports Carrier-sense mode, assigned mode, and polled mode for flexible operation.
- **Internal GPS Receiver:** Provides accurate position, Course Over Ground (COG), and Speed Over Ground (SOG) data.
- **Compatibility:** Can be connected to various devices compatible with GPS and PC, PDA, ECDIS, RADAR, etc.
- **DSC Reception Support:** Supports Digital Selective Calling (DSC) reception based on the TDMA channel.
- **Status Indicators:** Features LED indicators for power, error, time-out, and operational status.

3. SETUP AND INSTALLATION

Proper installation is crucial for the optimal performance of your HA-102 transponder. Ensure all connections are secure and follow the guidelines below.

3.1 Physical Installation

The HA-102 unit is designed for panel mounting. Consider a location that is protected from direct exposure to harsh weather conditions and allows for proper cable routing.



Figure 3.1: HA-102 Dimensions

This image illustrates the physical dimensions of the HA-102 unit, showing a width of 234mm, a height of 40mm, and a depth of 167mm. These measurements are essential for planning the mounting location.



Figure 3.2: HA-102 Rear Panel Connections

This image provides a detailed view of the rear panel of the HA-102, highlighting the various connection ports: Power & Data (DC12V-24V), RS232 (DB9), GPS Antenna (TNC connector), and VHF Antenna (Type M connector). Proper identification of these ports is critical for correct wiring.

3.2 Power and Data Connections

The HA-102 operates on a 12V DC power supply (10V-20V). Connect the power and data cable to the designated port on the unit. The unit features external serial data interfaces (RS-422, RS-232) for integration with other marine navigation

systems.

DB9 port is used for static information configuration and NMEA data output(RS232).

Aviation header is used for power input and NMEA data output(RS232).

Pin	Color	Descr.
1	Red	Power +
2	Black	Power -
3	Green	TXD
4	Yellow	NC
5	Blue	GND

Figure 3.3: Power and Data Pinout

This diagram illustrates the pin assignments for the power and data cable. Pin 1 (Red) is Power +, Pin 2 (Black) is Power -, Pin 3 (Green) is TXD, Pin 4 (Yellow) is NC (No Connection), and Pin 5 (Blue) is GND. This information is vital for correct electrical wiring.

The DB9 port is used for static information configuration and NMEA data output (RS232). The aviation header is used for power input and NMEA data output (RS422).

3.3 Antenna Connections

- **GPS Antenna:** Connect the GPS antenna (optional, Female TNC Connector) to the dedicated GPS port. The internal GPS receiver requires an external antenna for optimal signal reception.
- **VHF Antenna:** Connect the VHF antenna (optional, Female Type M Connector) to the dedicated VHF port. This antenna is essential for AIS signal transmission and reception.

4. OPERATING INSTRUCTIONS

Once installed and powered on, the HA-102 will begin operating. Familiarize yourself with its indicators and functions.

4.1 Powering On/Off

Locate the ON/OFF switcher on the unit's front panel. Toggle it to the 'ON' position to power up the device. The 'Power' LED indicator will illuminate.



Figure 4.1: HA-102 Front Panel

This image shows the front panel of the HA-102, featuring the ON/OFF switch, a prominent red safety alarm button, and four LED indicators: Power, RX CHA (Receive Channel A), RX CHB (Receive Channel B), and TX (Transmit). These indicators provide real-time operational status.

4.2 LED Indicators

- **Power:** Indicates the unit is receiving power.
- **RX CHA:** Illuminates when receiving data on Channel A.
- **RX CHB:** Illuminates when receiving data on Channel B.
- **TX:** Illuminates when transmitting data.
- **Error/Alarm:** An additional LED (often red) indicates system errors or alarms, such as GPS signal loss or internal malfunction.

4.3 Dual Channel and CSTDMA Functionality

The HA-102's dual-channel capability allows it to monitor two AIS frequencies simultaneously, improving situational awareness. The CSTDMA function automatically manages transmission slots to avoid interference with other AIS units, ensuring efficient and reliable communication.

4.4 Safety Message and SOS Button

The unit is equipped with a dedicated "SOS" safety button. In an emergency, pressing this button will transmit a safety message, alerting other vessels and shore stations to your distress. Ensure your MMSI (Maritime Mobile Service Identity) is correctly programmed for this feature to function.

4.5 Operation Modes

- **Carrier-sense mode:** Standard operation where the unit listens for available transmission slots.
- **Assigned mode:** For specific applications where transmission slots are pre-assigned.
- **Polled mode:** The unit transmits only when requested by a base station.

Configuration of these modes and other static information typically requires connection to a PC with the provided software. Refer to the software manual for detailed instructions on programming your unit.

5. SPECIFICATIONS

Detailed technical specifications for the Matsutec HA-102 AIS Transponder.

STANDARDS		POWER	
	IEC 62297-1	Supply Voltage	12V DC (10V - 20V)
	IEC 61162-1	Power Consumption	Less than 10W
	IEC 60945-2002	MAIN UNIT	
VHF RECEIVER			4 LED Indicator Working Status
Frequency Range	156.025 MHz - 162.025 MHz		1 ON/OFF Switcher
Channel Bandwidth	25 KHz	INTERFACE	
Number of AIS Receivers	2 Receiver (one time share between AIS / DSC) 1 Transmitter	Ports	NMEA 0183 / RS-422 / RS-232
CH-1	default CH 87B (161.975 MHz)	GPS Antenna (Optional)	Female TNC Connector
CH-2	default CH 88B (162.025 MHz)	VHF Antenna (Optional)	Female Type M Connector
Number of DSC Receiver	1 (CH 70)	ENVIRONMENT	
RX DSC	156.525 MHz	Operating Temperature	Antenna: -25 C - 70 C
Max. Usable Sensitivity	PER ≤ 20% at -107dBm		Others: -15 C - 55 C
VHF TRANSMITTER		Storage Temperature	-25 C - 70 C
Power Output	2 Watt (33dBm ±1.5 dB)	Humidity	Operating: 0 - 95 RH at 40 C
Modulation	GMSK / FM		GPS Antenna Operating: 100% sealed
Data Rate	9600 bps / per channel	Vibration	VHF Antenna Operating: 100% sealed
Modulation Spectrum	IEC 62287	Waterproof	IEC 60945
DSC RECEIVER			IPX 5
Modulation	1300 Hz / 2100 Hz FSK	PHYSICAL	
Data Rate	1200 bps ± 30 ppm	Size in mm (W)	234 mm
Spurious Response Rejection	≥ 70 dB for signal@-104 dBm; BER≤1%	Size in mm (H)	40 mm
Blocking	≥ 70 dB for signal@-104 dBm; BER≤1%	Size in mm (D)	167 mm
GPS RECEIVER		Weight	< 1 kg
Receiving Channels	12 Channels		
Acquisition Sensitivity	-140 dBm		
Tracking Sensitivity	-150 dBm		

Figure 5.1: Detailed Specifications

This image presents a comprehensive table of technical specifications for the HA-102, covering various aspects such as compliance standards (IEC 62297-1, IEC 61162-1, IEC 60945-2002), VHF receiver and transmitter parameters, DSC receiver details, GPS receiver performance, power requirements, main unit features, interface types, environmental operating conditions, and physical dimensions and weight. This table is crucial for understanding the device's capabilities and limitations.

Matsutec HA-102 Technical Specifications

Category	Specification
Electrical Function	IEC 62297-1 compliant
Dual Channel Function	Two TDMA receivers, one TDMA transmitter (alternating)
CSTDMA Function	Avoids and solves communication conflicts
External Serial Data Interface	RS-422, RS-232
Safety Message	Transmit and receive, equipped with "SOS" button
Operation Modes	Carrier-sense, assigned, polled
Internal GPS Receiver	Data source for position, COG, SOG

Category	Specification
Compatibility	GPS, PC, PDA, ECDIS, RADAR, etc.
DSC Reception	Based on TDMA channel
Alarm & Indication	LED for power, error, time-out, status
GPS Receiving Channels	12 Channels
GPS Acquisition Sensitivity	-140 dBm
GPS Tracking Sensitivity	-150 dBm
GPS Position Accuracy	<2.5m CEP (GPS) without SA
GPS Output Rate	1 Hz
Supply Voltage	12V DC (10V-20V)
Power Consumption	Less than 10W
LED Indicators	4 (Working Status)
Switcher	1 ON/OFF Switcher
Ports	NMEA 0183/RS-422/RS-232
GPS Antenna (Optional)	Female TNC Connector
VHF Antenna (Optional)	Female Type M Connector
Dimensions (W x H x D)	234 mm x 40 mm x 167 mm
Weight	<1kg

6. MAINTENANCE

The Matsutec HA-102 is designed for reliable operation with minimal maintenance. However, regular checks can ensure its longevity and performance.

- **Cleaning:** Periodically wipe the unit with a soft, damp cloth. Do not use abrasive cleaners or solvents. Ensure the unit is powered off before cleaning.
- **Connections:** Regularly inspect all cable connections (power, data, antennas) for corrosion, wear, or looseness. Secure any loose connections.
- **Antennas:** Ensure GPS and VHF antennas are clear of obstructions and securely mounted. Check antenna cables for damage.
- **Software Updates:** Check the Matsutec website periodically for firmware or software updates for the HA-102. Updates can improve performance and add new features.
- **Environmental Protection:** While the unit has some water resistance (IPX5), protect it from excessive moisture, extreme temperatures, and direct sunlight when possible.

7. TROUBLESHOOTING

If you encounter issues with your HA-102, refer to the following common troubleshooting steps before contacting support.

Problem	Possible Cause	Solution
Unit does not power on.	No power supply; incorrect wiring; blown fuse.	Verify power source (10V-20V DC). Check power cable connections (Red for +, Black for -). Inspect inline fuse if present.
No GPS signal / GPS error.	GPS antenna not connected; antenna obstructed; faulty antenna.	Ensure GPS antenna is securely connected to the TNC port. Relocate antenna to an unobstructed view of the sky. Test with a known good GPS antenna if available.
No AIS targets displayed on plotter.	VHF antenna issue; incorrect data connection; software configuration.	Check VHF antenna connection (Type M port) and cable integrity. Verify NMEA 0183/RS-422/RS-232 data connections to your plotter/PC. Ensure correct baud rates and data protocols are configured in the connected device and the HA-102 software.
Unit shows "Error" or "Alarm" LED.	Internal fault; GPS signal loss; MMSI not programmed.	Check GPS signal. If the error persists, it may indicate an internal fault. Ensure your MMSI is correctly programmed using the configuration software.
Cannot connect to PC for configuration.	Incorrect serial port settings; driver issues; incompatible OS.	Verify COM port settings and baud rate (typically 38400 for AIS). Install correct USB-to-serial drivers. Note that some older configuration software may require specific operating systems (e.g., Windows 7).

8. WARRANTY AND SUPPORT

Matsutec products are manufactured to high quality standards. For specific warranty terms and conditions, please refer to the documentation provided at the time of purchase or contact your local Matsutec dealer or distributor. For technical support, software downloads, or further assistance, please visit the official Matsutec website or contact their customer service department.

Manufacturer: ShenZhen JINLAILAI Technology Limited.

