

# User Manual

VHF Transceiver  
**MD-100D**

UHF Transceiver  
**MD-400D**





Version #1 (2017-08-01)

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## **MD-400D User Manual**

### **1. MD-420D Digital RF Modem Specification**

The MD-Series standardized the specifications of the instrument exterior and connectors so that the digital RF modem can maintain compatibility with existing analog modems.

When using the digital mode, it is very efficient with the existing analog problems such as data error, clean sound quality and volume, call distance, usage time

MD-Series Specification is as follows:

- Usage frequency VHF : 136~174MHz, UHF : 400~470MHz
- 1 Zones 32 channels selectable (1zone = Max 32 channels)
- Total 32 channels can be configured
- 5/1 Watt RF Power
- Encryption is available as option (AES128, 256)
- 5 level S.Q selectable (Supports Analog).
- Remote Radio Stun / Kill / Revive
- Available to connect speaker of 1Watt
- Data rate in wireless section : 9,600bps
- RS-232C communication rate : Standard 115,200bps(Change available according to program setting)
- Add AT Command for user convenience
- User friendly for enabling PC based modem Control GUI Software
- Aluminum metal Frame Body
- Service connector : DE-15 pin Female Connector
- Power supply : DC +9.0~DC+24V

## 2. Specification

### 2.1 MD-Series Specification

#### General

Frequency Range	MD-100D : 136~174 MHz MD-400D : 400 ~470 MHz
Frequency Stability	±1.5ppm (-30 to +60°C)
Programmable Channels	1 Zones / 32 Channels
Channel Spacing	12.5KHz
Digital Vocoder	AMBE++
Dimensions	103mm(H) x 52mm(W) x 32mm(D)
Weight	280g
Power Source	DC +9.0 ~ +24V
Current Drain (maximum)	Receive mode, rated audio out – 420 (Audio Max) Transmit mode – 1,200mA Standby mode – 110mA

#### Receiver

Sensitivity	0.25uV 12 dB SINAD
Squelch Sensitivity	0.22uV 10dB SINAD
Selectivity	65dB (12.5KHz)
Spurious and Harmonic Rejection	75dB
FM Hum and Noise	40dB (12.5KHz)
Audio Output Power	1 Watt across an 16-ohm load
Audio Distortion	Less than 3% at rated output
Audio Response	+1, -3 dB from 6dB per octave de-emphasis Characteristic from 300 ~ 3000Hz
Input Impedance	50 ohms

#### Transmitter

RF Power Output	5/1Watt
Spurious and Harmonic	70dB
FM Hum and Noise	40dB (12.5KHz)
Audio Distortion	3% maximum with 1KHz modulation
Audio Frequency Response	+1, -3dB from 6dB per octave pre-emphasis Characteristic from 300 ~ 3000Hz
Output Impedance	50ohms

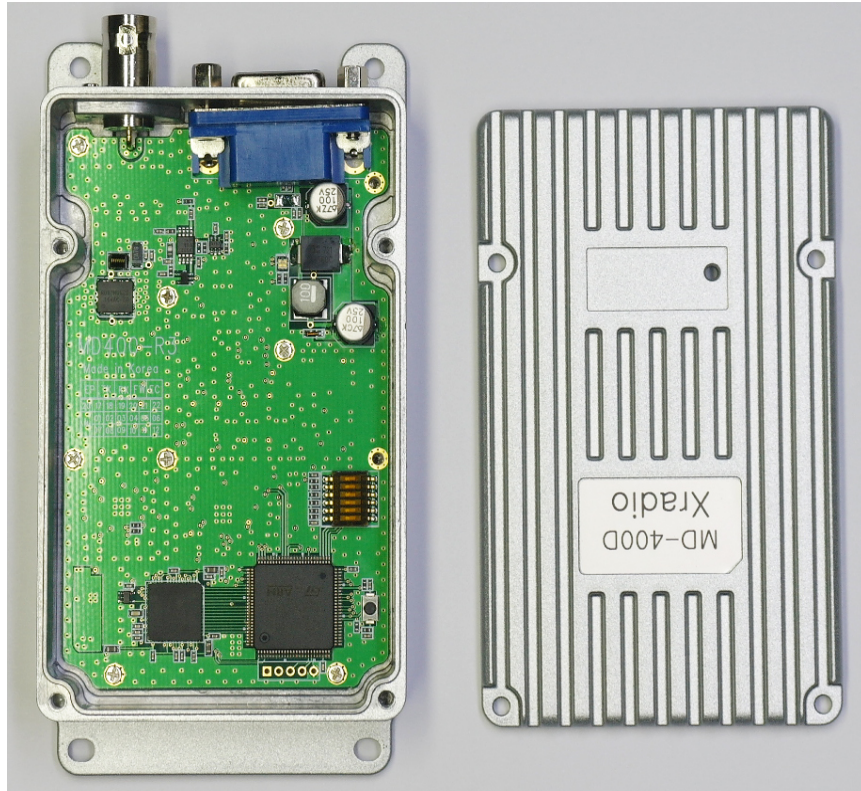
### 3. MD Series Components

#### 3.1 Equipment name

\* Components may differ according to the request of buyers.



Figure 3-1) MD-400D Series Component



### 3.2 Status Display LED

This is LED which displays the equipment status.

The main status display is as follows:

- ① Red color when normal transmission
- ② Green color when normal receive

## 4. How to use MD-400D Series

### 4.1 Message transmission and receive tools

You can send and receive messages through the AT Command, but the PC tool is provided to make it easier to use.

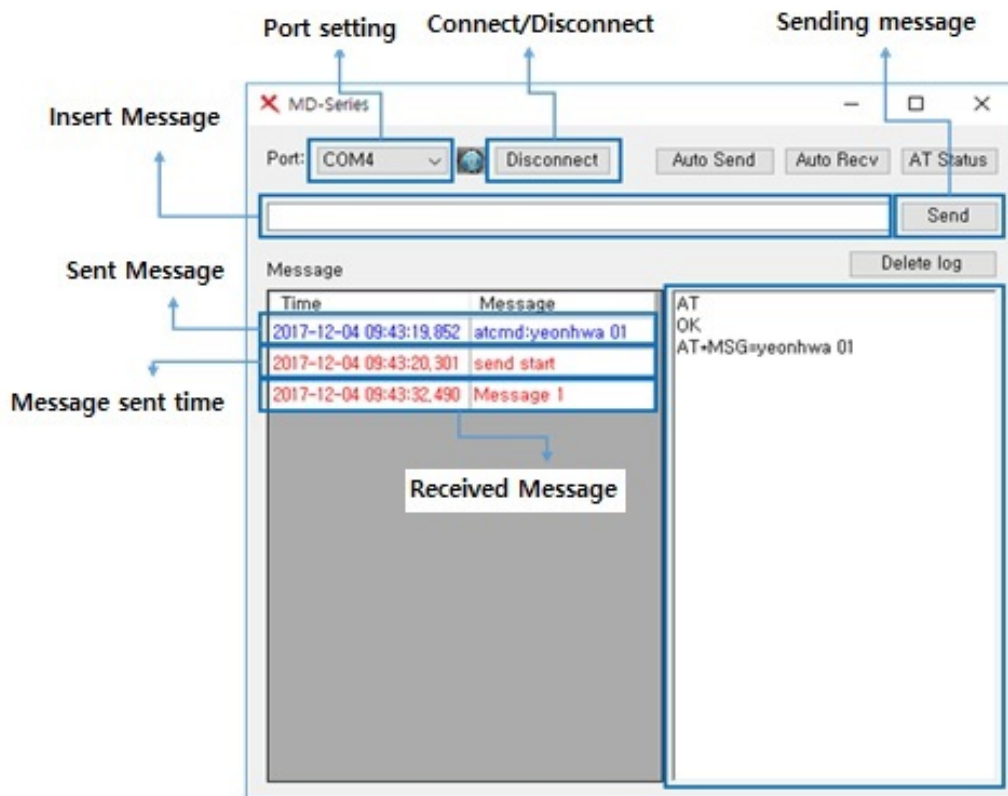


Figure 4-1) Message tool

#### 4.1.1 Messages

It is possible to send and receive messages between the modem and the modem, and between the modem and the terminal. By providing the PC interface as above, convenient configuration is possible. You can configure the file or database connection to store additional messages.

Since it is based on PC, it can be saved as much as the capacity of the PC can be allocated, so it can be seen that the capacity is not limited.

#### 4.1.2 Basic Protocol

Supports an ACK message to determine whether the opponent terminal has received. When a message is sent, the receiving terminal automatically sends an ACK message. When the message is received, the other terminal informs the receiving terminal that the message has been received normally.

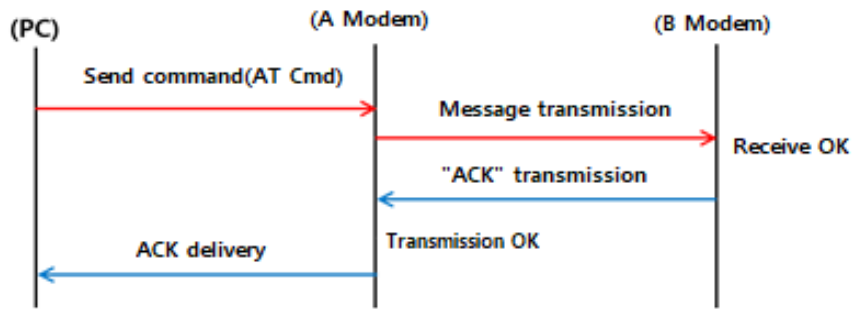


Figure 4-2) Normal Message Transmission and Receive Method

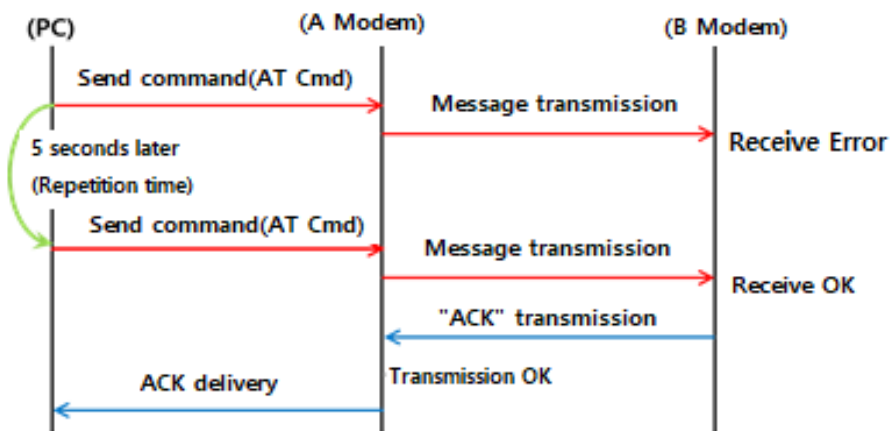


Figure 4-3) Action on Message Transmission Error

If an error occurs in the delivery of the message, the specified number of retries will be retransmitted after 5 seconds.

Finally, there is no format restriction of characters, and it supports messages of up to 80 characters.

### 4.1.3 AT Command

Use AT Command to set the status of the transceiver(radio) or to use the function.

After connecting the serial port, use the terminal program. The basic speed is 115,200 bps.

- 1) Modem version information verify command (VERSION)

Description	
Command to verify the modem version information	
Query	<b>1. AT*VERSION</b>
Answer	<b>*VERSION:&lt;value1&gt;</b>

Parameters	<value1> S/W Version
Example	AT*VERSION *VERSION:YEONHWA Modem v1.0 OK

2) Modem Status verify command (CHKSTAT)

Description	
Command to verify modem status	
Query	<b>2. AT*CHKSTAT</b>
Answer	<b>*CHKSTAT:&lt;value1&gt;</b>
Parameters	<value1> STAT OK – Normal status STAT ERROR – Error status
Example	AT*CHKSTAT *CHKSTAT:STAT OK OK

3) Modem information verify command (MINFO)

Description	
Command to verify modem information	
Query	<b>3. AT*MINFO</b>
Answer	<b>*MINFO:&lt;value1&gt;,&lt;value2&gt;,&lt;value3&gt;,&lt;value4&gt;</b>
Parameters	<value1> Channel number <value2> Frequency <value3> Call ID <value4> Group ID



Example	AT*MINFO *MINFO:1,440.000,1,1 OK
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#### 4) Modem Reset (RESET)

Description	
Command to reset modem	
Query Answer	<b>AT*RESET</b> <b>RESET</b>
Parameters	<value> Reset the modem
Example	AT*RESET RESET Going down terminal...

#### 5) Sending Message (MSG)

Description	
Command use when sending message	
Query Answer	<b>AT*MSG=&lt;value&gt;</b> <b>MSG OK</b>
Parameters	<value> Message to be sent
Example	AT*MSG=TEST MSG OK

#### 6) Receiving Message (RMSG)

Description

Command use when receiving message	
Answer	<b>RMSG=&lt;value&gt;</b>
Parameters	<value> Receive message
Example	RMSG=TEST

7) Check channel list (CHLIST?)

Description	
Command to verify when receiving message	
Answer	<b>AT*CHLIST?</b>
Parameters	CHNUM: <value> : Current channel number Whole channel number: Classified channel number, RX frequency, TX frequency ... <repeat>


Example	<pre> CHNUM:01 01:0:ANA,RX:441000000,TX:441000000 02:1:ANA,RX:423600000,TX:423600000 03:2:ANA,RX:423612500,TX:423612500 04:3:ANA,RX:423625000,TX:423625000 05:0:DMR,RX:440000000,01,TX:440000000,01 06:1:DMR,RX:423200000,01,TX:423200000,01 07:2:DMR,RX:423212500,02,TX:423212500,02 08:3:DMR,RX:423225000,03,TX:423225000,03 09:4:DMR,RX:423237500,04,TX:423237500,04 10:5:DMR,RX:423250000,05,TX:423250000,05 11:6:DMR,RX:423262500,06,TX:423262500,06 12:7:DMR,RX:423275000,07,TX:423275000,07 13:8:DMR,RX:117440512,07,TX:117440512,07 14:9:DMR,RX:117440512,07,TX:117440512,07 15:10:DMR,RX:117440512,07,TX:117440512,07 16:11:DMR,RX:117440512,07,TX:117440512,07 OK </pre>
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### 8) Channel setting (CHSET)

Description	
Command to verify when receiving message	
Answer	<b>AT*CHSET=&lt;value&gt;</b>
Parameters	<value> Channel number
Example	AT*CHSET=3 CH:03 OK

## 5. For Safe Operation

### 5.1 Precautions

	<p>Do not remove the antenna from the radio or do not transform the antenna or do not make any changes on the antenna. The strong electronic wave to be emitted from the radio can have an effect on the performance of the radio and can cause the radio to have a defect.</p>
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Do not use accessories (such as rechargeable battery, adaptor, external speaker microphone and earphone etc.) from the other makers, which can cause defect on battery and malfunction or a defect on the radio.



Do not disassemble or reorganize the radio. The disassembly or reorganization will cause a defect or malfunction on the radio. It will be impossible to repair afterwards. There will also be a punishment made by the Radio Waves Act.



Do not use other frequency except for the permitted frequency in order not to be punished by the Radio Waves Act.



- Do not give an excessive shock to the radio.
- Do not place the radio where the direct sunlight and/or the high temperature occurs..
- If the radio is placed for a long time in a car in summer, the hot temperature in the car may cause explosion of battery.
- Do not make a damage to the battery by a sharp substance and/or an excessive shock.

## 5.2 Influences on the Operations of Radio or Other Equipment

The radio emits a strong electronic wave, which may have an effect on the operation of other equipment and also can be influenced by the other devices.



Please turn off the radio before boarding on the airplane.

When using the radio in the airplane, please follow the rules or the instructions of the flight attendants.



In case of the area that medical equipment are being used, please use the radio after discussion with the equipment producer or the related doctor.



Please do not use the radio at the place where computer or other electric/electronic devices are being used. The strong electronic wave from the radio can have an effect on the equipment.

## 6. Safety Notes

Please make sure to read the followings above for safe and effective use of the radio.



- An indication of the maximum antenna gain permitted to ensure compliance. this would be 1.5 dBi.
- At the area where an electromagnetic force can be made, please make sure to turn off the power of the radio.
- The user should limit the operation to 50%.
- RF Safety Distance of 13.21 cm for Occupational/Controlled Exposure and 29.46 cm for General Population/Uncontrolled Exposure which met the FCC Limits.
- Be careful that if the outer surface of the antenna is peeled off, there is a danger of a topic.

## 7. Handling Caution

- Any changes or modifications not expressly approved by the party responsible for compliance with the FCC regulations could void the user's authority to operate the equipment.
- It is forbidden to install or operate the device other than the responsible person (licensed person).
- The user manual is included in the box.
- How to use and install the product is shown in the figure.

## 8. Usage



### Application

- Water/Waste Treatment
- Plants Oil and Gas Field, SCADA
- Security/Alarm System
- Gate Systems, Remote Controls
- Commercial Sign Control
- Automatic Vehicle Location
- Murphy/Kill Switches
- Weather Monitoring
- Irrigation Systems
- Emergency Call Boxes
- Low Power Repeaters

# Warranty Statement

Thank you for purchasing MD-100D/ MD-400D Series.

1. This product has passed strict quality control and testing process by YeonHwa M Tech.
2. Warranty is one year from the day of release.
  - When there is malfunction of the product under normal operating conditions during the warranty period, your authorized dealer and the service center will repair it free of charge.
3. Service fees will be charged for the following cases:
  - When performance failed, malfunction or damaged after the warranty period.
  - When the product is damaged due to user's mishandling or improper operation.
  - When the product is damaged due to fire, pollution, earthquakes and any other natural or unnatural conditions, accidents etc.
  - Malfunction by not keeping the notices written in the user manual.
  - Malfunction by not using the appointed adaptor.
  - When the product is damaged due to user's modification, attempts of repairing rather than the appointed service center.
4. Product Check List

Model Name		MD-Series
Serial No.		
Purchase Date		
Purchaser	Name	
	Address	

※ Please fill out this check list when purchasing the product.

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