Preface

Thank you for purchasing Hytera RD98X DMR Repeater. Combination of ergonomic design, versatile digital functions and remarkable quality would refresh your experience and enable you to be responsive to emergent situations.

To derive optimum performance from your product, please read this manual and the supplied Safety Information Booklet carefully before use.

Instructional Icons

The following icons are available through this manual:

Alert Icons

 **Caution:** indicates situations that could cause damage to your product.

 **Note:** indicates tips that can help you make better use of your product.

*: indicates functions available in later version.

Copyright Information

disassemble the Object Code or in any other way convert the Object Code into a human readable form.

U.S. Patent Numbers: #6,912,495 B2, #6,199,037 B1, #5,870,405, #5,826,222, #5,754,974, #5,701,390, #5,715,365, #5,649,050, #5,630,011, #5,581,656, #5,517,511, #5,491,772, #5,247,579, #5,226,084 and #5,195,166.

Disclaimer

Hytera endeavors to achieve the accuracy and completeness of this manual, but no warranty of accuracy or reliability is given. All the specifications and designs are subject to change without notice due to continuous technology development. No part of this manual may be copied, modified, translated, or distributed in any manner without the express written permission of Hytera.

If you have any suggestions or would like to learn more details, please visit our website at: http://www.hytera.cn.

RF Radiation Information

RF Radiation Profile

Radio Frequency (RF) is a frequency of electromagnetic radiation in the range at which radio signals are transmitted. RF technology is widely used in communication, medicine, food processing and other fields. It may generate radiation during use.

RF Radiation Safety

In order to ensure user health, experts from relevant industries including science, engineering, medicine and health work with international organizations to develop standards for safe exposure to RF radiation. These standards consist of:

- United States Federal Communications Commission, Code of Federal Regulations; 47CFR part 2 sub-part J;
- American National Standards Institute (ANSI)/Institute of Electrical and Electronic Engineers (IEEE) C95. 1-1992;
- Institute of Electrical and Electronic Engineers (IEEE) C95. 1 – 1999;
- International Commission on Non-Ionizing Radiation Protection (ICNIRP) 1998;

FCC Regulations

Federal Communication Commission (FCC) requires that all radio communication products should meet the requirements set forth in the above standards before they can be marketed in the U.S, and the manufacturer shall post a RF label on the product to inform users of operational instructions, so as to enhance their occupational health against exposure to RF energy.

As a conscientious company centering on users, Hytera strictly complies with the forgoing requirements from design, production and test.

EU Regulatory Conformance

As certified by the qualified laboratory, the product is in compliance with the essential requirements and other relevant provisions of the Directive 1999/5/EC. Please note that the above information is applicable to EU countries only.

CE0678①

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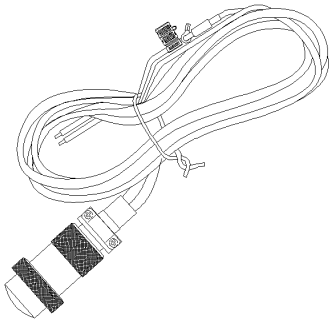
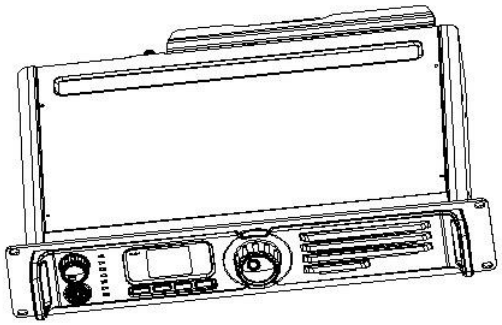
Checking Items in the Package

Please unpack carefully and check that all items listed below are received. If any item is missing or damaged, please contact your dealer.



Power Cord



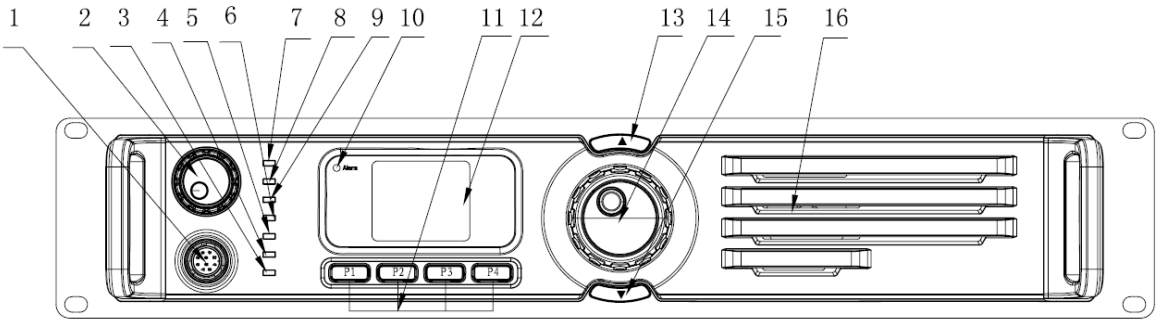
Repeater

Owner’s Manual

Safety Information Booklet

Product Overview

Front Panel

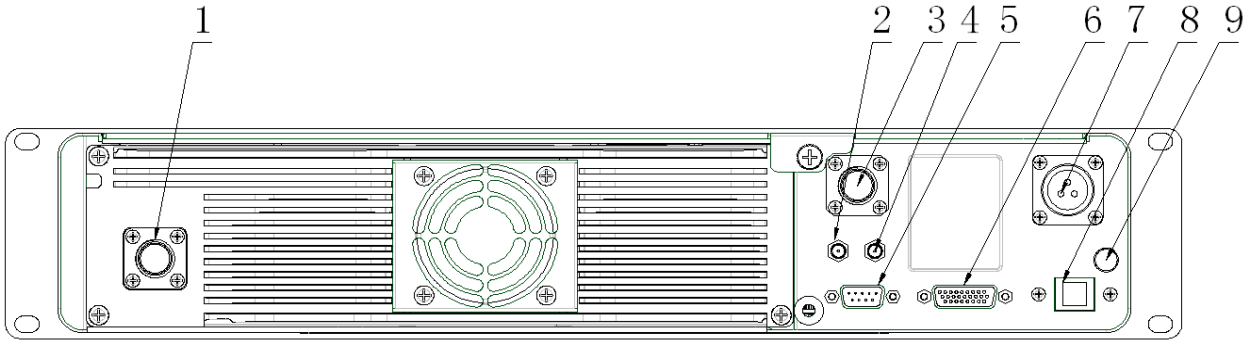


No.	Part Name	No.	Part Name
①	Accessory Jack	②	Volume Control Knob / Power Indicator
③	Repeater Mode Indicator	④	Analog Mode Indicator
⑤	Slot 2 RX Indicator	⑥	Slot 2 TX Indicator
⑦	Digital Mode Indicator	⑧	Slot 1 TX Indicator
⑨	Slot 1 RX Indicator	⑩	Alarm Indicator
⑪	Programmable Key *	⑫	LCD Display
⑬	Channel Up (CH+) *	⑭	Navigation Knob
⑮	Channel Down (CH-) *	⑯	Speaker

Programmable Keys *

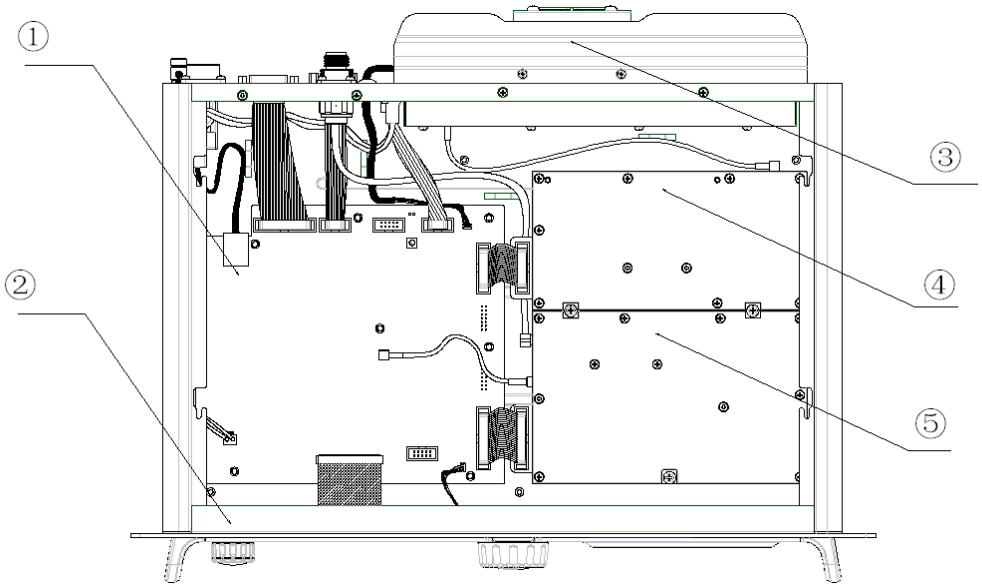
For enhanced convenience, you can request your dealer to program the keys **P1**, **P2**, **P3** and **P4** as shortcuts to appropriate functions.

Rear Panel



No.	Part Name	No.	Part Name
①	TX Antenna Interface	②	Optional Interface 1
③	RX/Duplex Antenna Interface	④	Optional Interface 2
⑤	Monitor/Tuning Interface	⑥	Accessory Jack
⑦	DC Power Interface	⑧	Ethernet Port *
⑨	Ground Screw		

Internal Layout



No.	Part Name	No.	Part Name
①	Baseband Module	②	Front Panel
③	PA Module	④	Excitor Module
⑤	RX Module		

Installation Guide

Proper installation can ensure optimum performance and reliability of the repeater. Therefore, be sure to read the following instructions before installation.

Installation Requirements

1. Installation Environment

The repeater must be installed in a dry and well-ventilated place with ambient temperature of -30℃~+60℃ and relative humidity of less than 95%.

2. Installation Location

The repeater can be installed in a rack, bracket and cabinet or on a desk.

3. Installation Tool

Tools required for installing the repeater include a cross head screwdriver, a torx screwdriver and a spanner.

Note: please refer to ***Safety Information Booklet*** for more information.

Before Installation

1. Voltage Check

Please check whether the voltage of DC power or battery meets the repeater specifications.

2. Product Check

Please check whether the repeater works properly by observing the 8 LEDs located on the front panel.

3. Parameter Configuration

When the repeater proves to work normally, configure appropriate parameters according to your actual requirements. And then you can proceed with on-site installation.

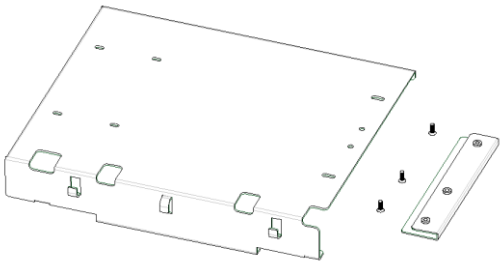
Installation Steps

Install the repeater as follows:

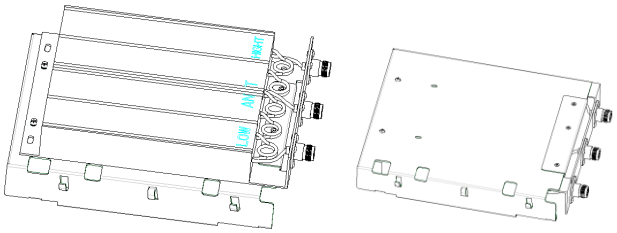
1. Install the repeater at a proper location;
2. Attach all necessary accessories;
3. Ground the repeater through the Ground Screw located on the rear panel.

Note: if the repeater needs to work with a duplexer, you should implement the following operations before installation.

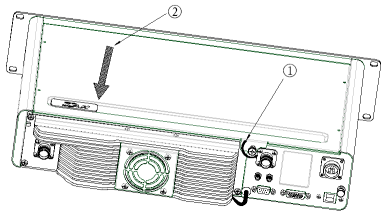
1. Loosen the three screws on the bracket with a cross head screwdriver.



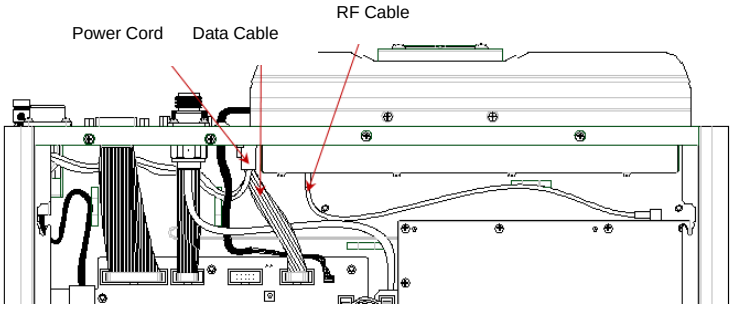
2. Install the duplexer onto the bracket. Be sure to observe the specifications of two antenna interfaces on the duplexer, to determine which one should be connected to the transmitter. The interface connecting the transmitter should be close to PA module to reduce RF loss, as shown below:



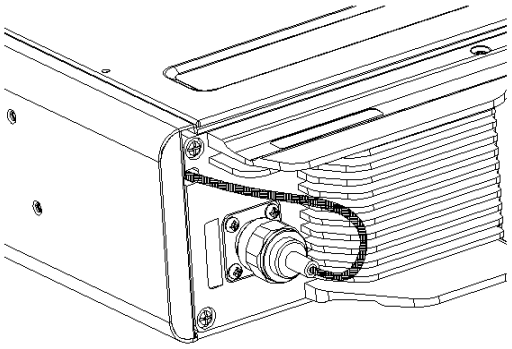
3. Loosen the screw at the back of the top cover, and then pull the top cover to remove it.



4. Loosen the 6 screws locking the PA heat sink, disconnect all power, data and RF cables, and finally remove the heat sink.

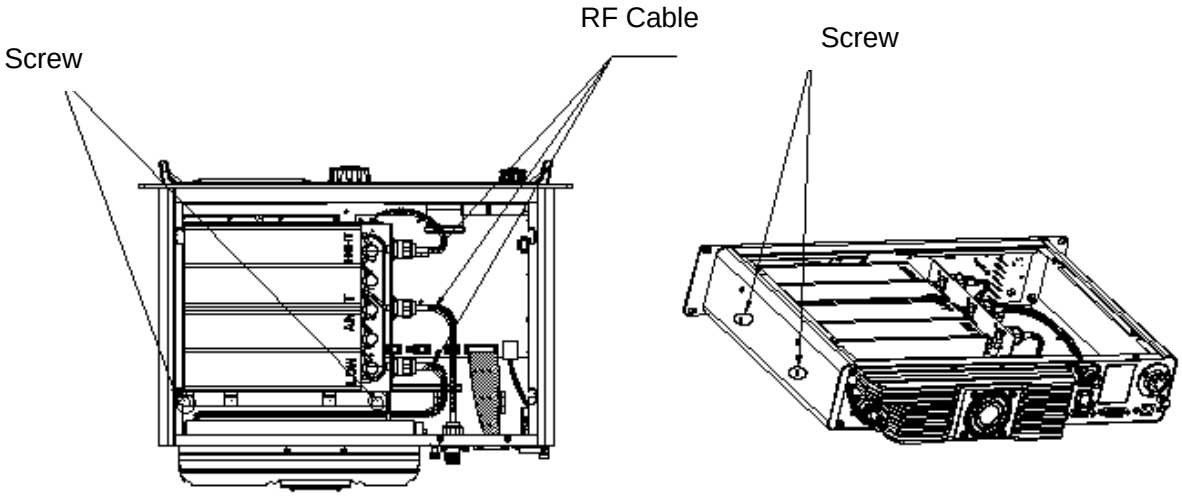


5. Connect the RF cable, as shown below.

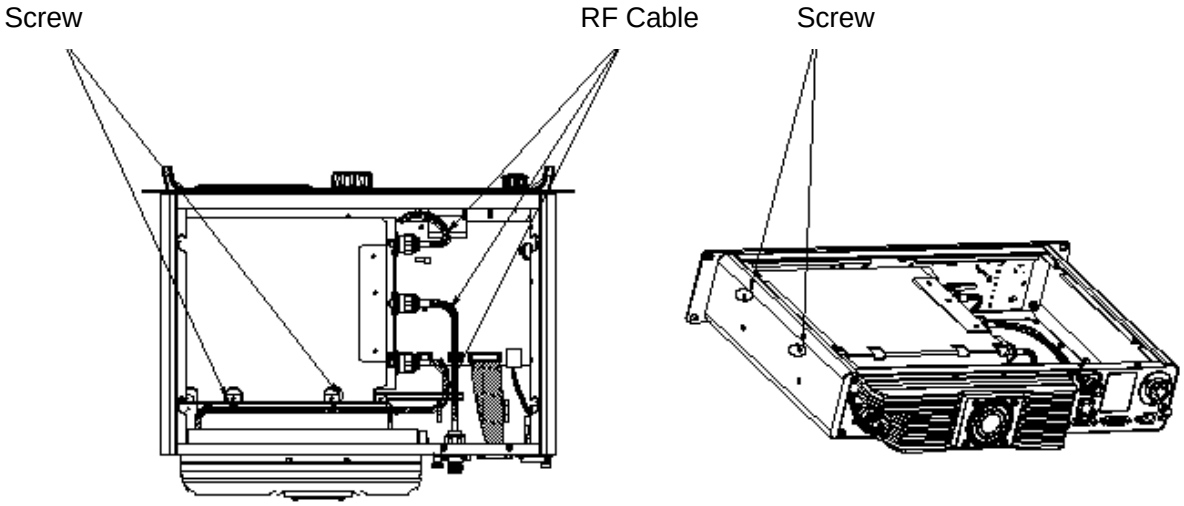


6. After the duplexer is mounted properly, fasten it with the 2 screws inside the housing and on the side respectively. Then attach the PA heat sink and connect all cables.

Installation Diagram



Duplexer with Front Side Facing Upwards



Duplexer with Front Side Facing Downwards

After-installation Verification

After installation is completed, power it on and verify whether it works properly by observing the 8 LEDs located on the front panel.

Status Indication

LCD Icon

These icons may appear on LCD. They can help you easily identify the repeater status.

Icon Name	Icon	Repeater Status
RSSI Indicator		More bars indicate better signal strength; *
TX Power Indicator		Low TX power for the current channel;
		High TX power for the current channel;
Scan Indicator		Scan is in progress; *
Monitor Indicator		The feature “Monitor” is active; *

Speaker Indicator		The speaker is unmuted; *
Alarm Indicator		An alarm message appears; *
Operation Mode Indicator	DM	The repeater is operating in DMO mode; *
	TM	The repeater is operating in TMO mode; *
	RM	The repeater is operating in Repeat mode; *

LED Indicator

LED Indicator	**Repeater Status**
Power indicator (②) glows green.	Normal power-on
Alarm indicator (⑩) glows red.	The repeater works abnormally
Repeater mode indicator (③) glows green	The repeater is operating in Repeat mode
Repeater mode indicator (③) goes out.	The repeater is operating in Base mode
Slot 1 TX indicator (⑧) glows red.	Repeater is transmitting on an analog channel or on slot 1
Slot 1 TX indicator (⑧) flashes red.	Busy channel lockout * / transmission time-out *
Slot 2 TX indicator (⑥) glows red.	Repeater is transmitting on slot 2
Slot 2 TX indicator (⑥) flashes red.	Busy channel lockout * / transmission time-out *
Slot 1 RX Indicator (⑨) glows green.	Repeater is receiving on an analog channel or on slot 1
Slot 1 RX indicator (⑨) flashes green.	The feature “Monitor” is enabled *
Slot 2 RX Indicator (⑤) glows green.	Repeater is receiving on slot 2
Analog mode indicator (④) glows yellow.	The repeater is operating in Analog mode
Digital mode indicator (⑦) glows blue.	The repeater is operating in Digital mode

Basic Operations

Turning the Repeater On/Off

ON: turn on the repeater by connecting a DC power supply to it. During power-up process, the Power indicator glows green and the LCD shows animation.

OFF: Disconnect the DC power supply.

Adjusting Volume

In analog mode: rotate the **Volume Control** knob clockwise to increase the volume or counter-clockwise to decrease the volume.

In digital mode: the speaker is muted, so this knob does not work.

Adjusting Power Level

You may request your dealer to set the TX power to High or Low. High power can extend repeater coverage, enabling you to communicate with farther terminals. The TX power is represented by the icon  and  respectively on the LCD.

Backlight

Under insufficient light conditions, activating the backlight can illuminate the LCD and all the front panel keys, facilitating your operation.

You dealer can set the backlight to operate in any of the following modes:

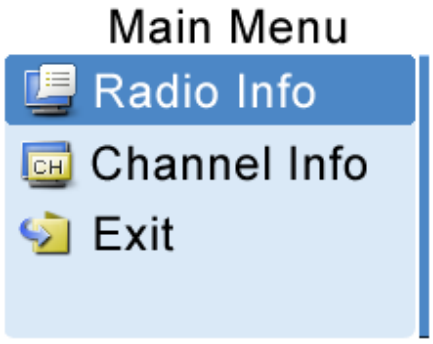
- Timed: either key press or RX of signals can activate the backlight. If no foregoing event occurs within the specified time period, the backlight will go out automatically.
- Enable: the backlight remains activated all the time.

Note: When an alarm event occurs, the backlight will remain activated until the alarm disappears.

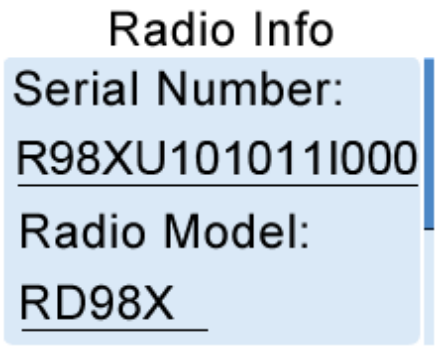
Locking/Unlocking the Repeater

You can request your dealer to lock the knob and all keys on the front panel to prevent accidental operation. To unlock, the repeater must be re-programmed by your dealer.

Menu Navigation



Radio Info



Under this menu, you can rotate the **Navigation** knob to view product information, including Serial Number, Radio Model, Freq Range and Firmware Ver.

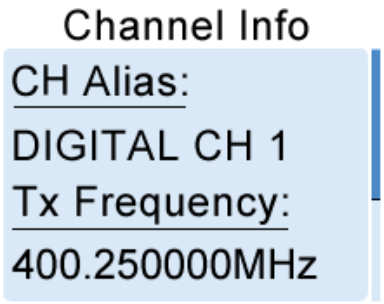
◆To access this menu:

1. In the home screen, press the **Navigation** knob to enter the main menu.
2. Rotate the knob to select the "Radio Info" option.
3. Press the knob again to view basic information of the repeater.

◆To exit this menu:

Just press the knob again.

Channel Info



Under this menu, you can rotate the **Navigation** knob to view channel information, including CH Alias, Tx Frequency, and so on.

◆To access this menu:

1. In the home screen, press the **Navigation** knob to enter the main menu.
2. Rotate the knob to select the "Channel Info" option.
3. Press the knob again to view information of the current channel.

◆To exit this menu:

Just press the knob again.

Exit

To exit from the main menu, rotate the **Navigation** knob to select the "Exit" option, and then press the knob.

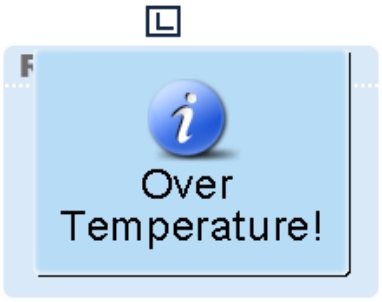
Alarm Information

The repeater can automatically detect its operation status in real time. When an abnormality occurs, the LCD will give you a prompt message, and the Alarm Indicator will glow red.

Over Temperature Alarm

When the temperature of PA module exceeds the normal range, the Alarm Indicator will

glow red and the LCD will display the prompt message below:



Then the repeater will stop transmitting, and you need to:

1. Check whether the temperature of heat sink surface is over 80℃. If yes, proceed with Step 2 and 3 to find out the cause.

   ⚠ Caution: DO NOT touch the heat sink surface to avoid burn. You can use a digital thermometer with thermocouple to measure the temperature value.
2. Check whether ambient temperature and ventilation conditions satisfy the foregoing installation requirements. If not, please make improvements as soon as possible.
3. Check if connection between the transmitter and RF cable or antenna feeder is loose or damaged. Poor connection between them could cause high TX power, which would make the temperature of heat sink rise quickly. If yes, secure or replace the cable or antenna feeder.
4. If the above measures fail to solve the problem, contact your local dealer for technical support.

When temperature falls into normal range, the prompt message will disappear, and the Alarm Indicator will go out.

Fan Failure Alarm

When the fan fails to work, the Alarm Indicator will glow red and the LCD will display the prompt message below:

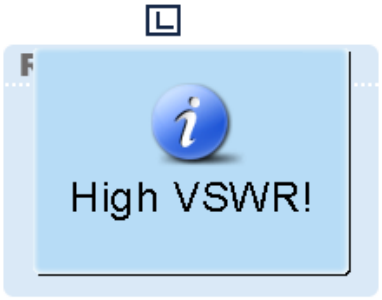
Then the repeater will automatically work at low TX power, to protect the transmitter from overheating. You need to:

1. Check whether the fan is blocked by an object. If yes, remove it.
2. If you cannot solve the problem, contact your local dealer for technical support.

When the fan recovers normal operation, the prompt message will disappear, and the Alarm Indicator will go out.

VSWR Alarm

High VSWR (voltage standing wave ratio) of TX antenna connector could result in damage to the PA, and even failure of the transmitter. When the VSWR exceeds the normal range, the Alarm Indicator will glow red and the LCD will display the prompt message below:



Then the repeater will automatically works at low TX power. You need to:

1. Check if the TX frequency is within the frequency range of antenna. Improper antenna could result in poor transmitting performance and even damage to the transmitter. If not, please contact your local dealer to replace the antenna.
2. Check if the connection between the transmitter and RF cable or antenna feeder is

loose or damaged. If yes, secure or replace the cable or antenna feeder.

3. If you cannot solve the problem, contact your local dealer for technical support.

When the VSWR falls within the normal range, the prompt message will disappear, and the Alarm Indicator will go out.

Low Forward Power Alarm

When the forward power is below the preset value, the Alarm Indicator will glow red and the LCD will display the prompt message below:

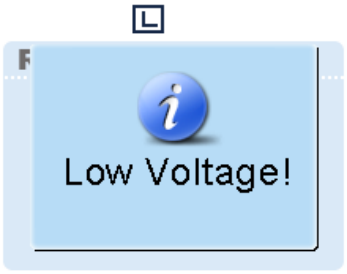
Then the repeater may continue transmission or terminate it, subject to the detection result. You need to:

1. Check if the connection between the transmitter and RF cable or antenna feeder is loose or damaged. If yes, secure or replace the cable or antenna feeder.
2. If you cannot solve the problem, contact your local dealer for technical support.

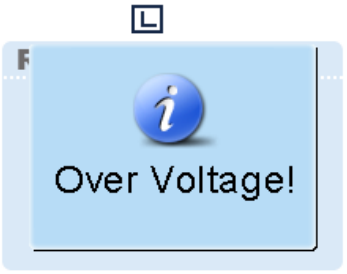
When the forward power is recovered to its normal value, the prompt message will disappear, and the Alarm Indicator will go out.

Over/Low Voltage Alarm

When power voltage is detected to be over or below the normal range (11V-15.6V) of repeater, the Alarm Indicator will glow red and the LCD will display the prompt message below:



Low Voltage Alarm



Over Voltage Alarm

Then the repeater will automatically stop working. You need to:

1. Check whether the power voltage is too low or too high. If yes, replace the DC power supply or backup battery.
2. Check whether the power cord is loose or damaged. If yes, secure or replace the cord.
3. If you cannot solve the problem, contact your local dealer for technical support.

When the voltage falls within the normal range, the prompt message will disappear, and the Alarm Indicator will go out.

⚠ Caution: If low voltage is detected when the repeater is powered by a backup battery, you need to charge it with an external charger. Remove the battery from the repeater before charging.

Troubleshooting

Phenomena	Analysis	Solution
The repeater cannot be	a. Power cord is not connected or is not securely connected	a. Properly connect the power cord and ensure secure connection.

powered on.	to the outlet. b. Power cord fuse is damaged.	b. Check if the fuse has blown. If yes, replace it with a new one.
Group members cannot talk to each other, or the repeater cannot communicate with a subscriber radio.	**a.** TX/RX frequency of the repeater is inconsistent with that of portable/mobile terminals. b. **Failed to repeat useful signal due to strong interference signal.** c. **The group member is out of the coverage of the repeater.**	**a. Re-set frequencies.** **b. If you cannot remove or bypass the interference source, change to operate at other frequencies.** c. **Go within the coverage of the repeater.**
Group members cannot talk to each other, even though RX indication is given.	a. Your ID is inconsistent with that of other group members. b. Inconsistent CTCSS/CDCSS.	a. Set your ID to the same as that of other members. b. **Re-set CTCSS/CDCSS.**
Short communication range or poor audio	**a. Leakage of signal energy due to damaged connection cable.** **b. Loose connection between the antenna connector and the cable, or loss of connection** **c. Invisible damage of cable.** d. **Duplexer is not properly set (if the duplexer is**	**a. Replace the cable with a new one if necessary.** **b. Secure or replace the cable.** **c. Replace the cable with a new one.** d. **Contact the manufacturer or your dealer to re-set the duplexer.**

	mounted).	

If the above solutions can not fix your problems, or you may have some other queries, please contact us or your local dealer for more technical support.

Care and Cleaning

To guarantee optimal performance as well as a long service life of the product, please follow the tips below.

Product Care

- Keep the product at a place of good ventilation and heat dissipation to facilitate normal work.
- Do not place irrelevant articles on top of the product to ensure optimal heat dissipation.
- Do not pierce or scrape the product with any edged instruments or hard objects.
- Keep the product far away from substances that can corrode the circuit.
- Do not place the product in corrosive agents, solutions or water.

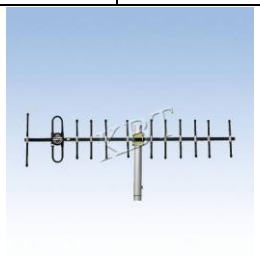
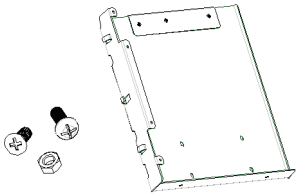
Product Cleaning

- Remove the dust and fine particles on the repeater surface with a clean and dry lint-free cloth or a brush regularly.
- Use a non-woven cloth with neutral cleanser to clean the keys, control knobs, LCD and jacks after long-time use. Never use chemical preparations such as stain removers, alcohol, sprays or oil preparations. Make sure the product is completely dry before use.

⚠**Caution:** Power off the repeater and remove the battery (if any) before cleaning.

Optional Accessories

The following items are the main optional accessories for the product, and please consult your local dealer for more information.

			
Palm Microphone SM16A1 *	Desktop Microphone SM10A1 *	External Power Supply (320W, backup battery applicable) PS22002	Programming Cable (USB Port) PC37
			
Omni-directional Antenna	Directional Antenna		Duplexer Bracket/Screws (for DT11/DT12 only)

⚠Caution: Use the accessories specified by Hytera only. If not, Hytera shall not be liable for any losses or damages arising out of use of unauthorized accessories.