



***DTM-6000 Data Transmission Modem
User Manual***



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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.

FCC Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates and can radiate radio frequency energy. If not installed and used in accordance with the instructions, it may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. Verification of harmful interference by this equipment to radio or television reception can be determined by turning it off and then on. The user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna. Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a different circuit to that of the receiver's outlet.
- Consult the dealer or an experienced radio/TV technician for help.

Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

Note: Any changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Compliance with RF Exposure Standards

- Antenna gain must not exceed 3.5dBi(DMR) and 2.5dBi(Wifi).
- The antenna must be installed complying with the requirements of manufacturer or supplier, and it must be at least 6 0cm away from human body.

Hytera's radio complies with the following RF energy exposure standards and guidelines:

- Unit ed States Federal Communications Commission, Code of Federal Regulations; 47 CFR § 1.1307, 1.1310 and 2.1091

- American National Standards Institute (ANSI) / Institute of Electrical and Electronic Engineers (IEEE) C95.1:2005; Canada RSS102 Issue 5 March 2015 Institute of Electrical and Electronic Engineers (IEEE) C95.1:2005 Edition

Documentation Information






Intended Audience

This document is intended to be read by:

- Sales engineers
- Installation engineers
- Technical support engineers
- Common users

Documentation Conventions

Icon Conventions

Icon	Meaning
 Tip	Indicates information that can help you make better use of your product.
 Note	Indicates references that can further describe the related topics.
 Caution	Indicates situations that could cause data loss or equipment damage.
 Warning	Indicates situations that could cause minor personal injury.
 Danger	Indicates situations that could cause major personal injury or even death.

Notational Conventions

Item	Meaning
" "	The quotation marks enclose the name of a software interface element. For example, click "OK".
Bold	The text in boldface denotes the name of a hardware button. For example, press the PTT key.
>	The symbol directs you to access a multi-level menu. For example, to select "New" from the "File" menu, we will described it as follows: "File > New".

Revision History

Document Version	Product Version	Release Date	Description
00	V1.0	September 2018	Initial release.

1. Packing List

Item	Quantity	Item	Quantity
DTM-6000 Main Unit	1	Wi-Fi Antenna	1
DC Power Cord	1	GPS Antenna	1
RF Antenna Base	1	RF Antenna	1



Note

- Items in the packing list are standard equipment. Optional accessories such as the M3 and M4 screws, latch and bracket for the DIN rail installation need to be purchased separately.
- Pictures listed in this document are for reference only.

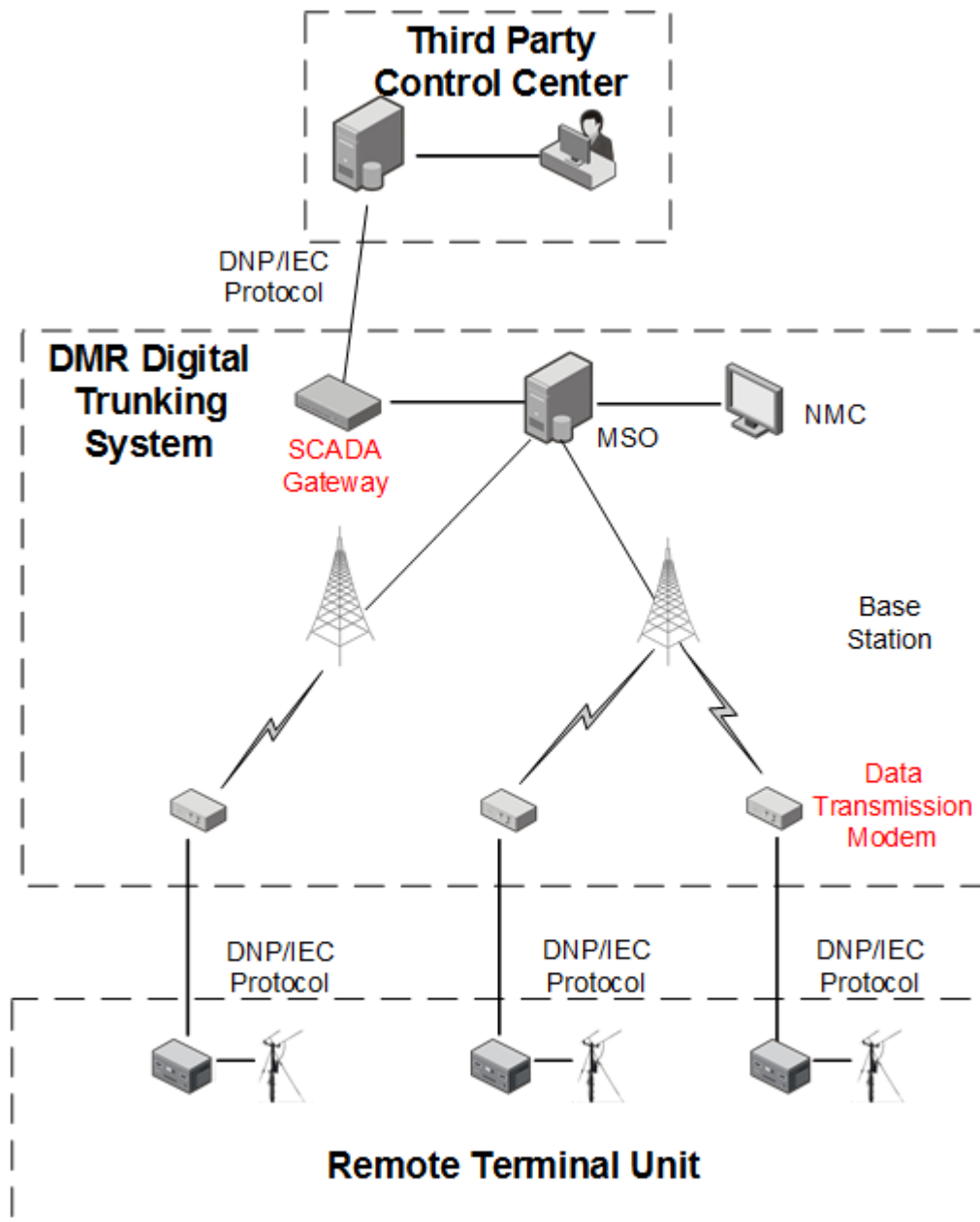
2. Product Overview

2.1 Introduction

The Supervisory Control and Data Acquisition (SCADA) system, a distributed control system (DCS) and power automation monitoring system on the basis of computers, provides services such as data collecting, data monitoring and process control, and is also widely used in industries including:

- Electricity
- Metallurgy
- Petroleum
- Chemical industry
- Gas
- Railway

The SCADA data transmission scheme is tailored to transmit data between the third party control center and the remote terminal unit (RTU) by the SCADA gateway and the data transmission modem, which adopts DTM-6000.



DTM-6000 is designed to obtain the original data after parsing the DNP/IEC protocol, then encapsulate the data on the basis of the DMR protocol, and finally deliver the data to the third party control center through the PDT/DMR digital trunking network for the administrators to browse.

DTM-6000 has the following advantages:

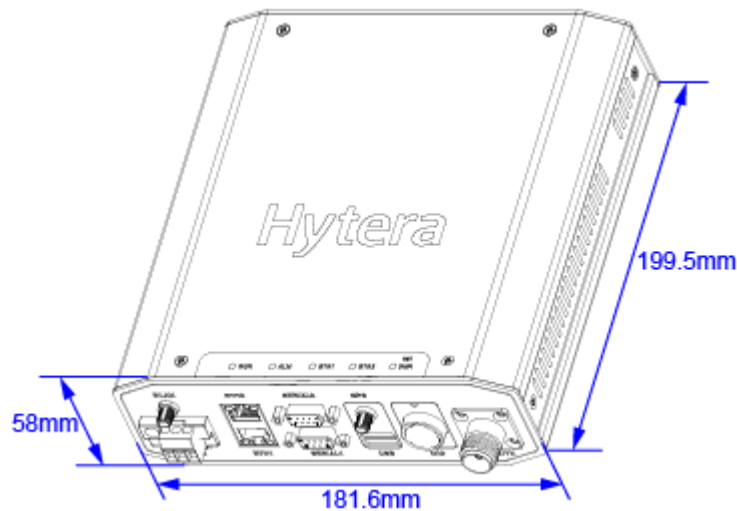
- Supports end-to-end encryption (E2EE), assuring safety and reliability.
- Supports data transmission in the private mobile radio (PMR) networks.
- It can be deployed in remote and unfrequented areas or in areas with harsh conditions for automatic data transmission, lowering the labor cost.
- Supports multiple frequencies including UHF1, UHF2 and VHF.

- Provides data transmission services for networks with different coverage scales (including small, medium and large) on the basis of DMR digital trunking network.

2.2 Appearance

DTM-6000 needs to be placed on the cabinet horizontally, or hung on the cabinet through ears; it cannot be wall-mounted.

Its appearance and dimensions are shown in the figure below.



It is recommended to install DTM-6000 at places where children cannot reach.

The Waste Electrical and Electronic Equipment (WEEE) logo shown below appears on the product to indicate that this product must not be disposed off or dumped with your other household wastes. You are liable to dispose of all your electronic or electrical waste equipment by relocating over to the specified collection point for recycling. of such hazardous waste.

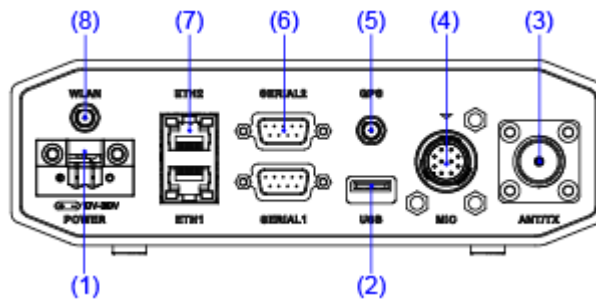
Recycle your device



SAVE THESE INSTRUCTIONS

2.3 Interfaces

The interfaces of DTM-6000 locate on the top panel.

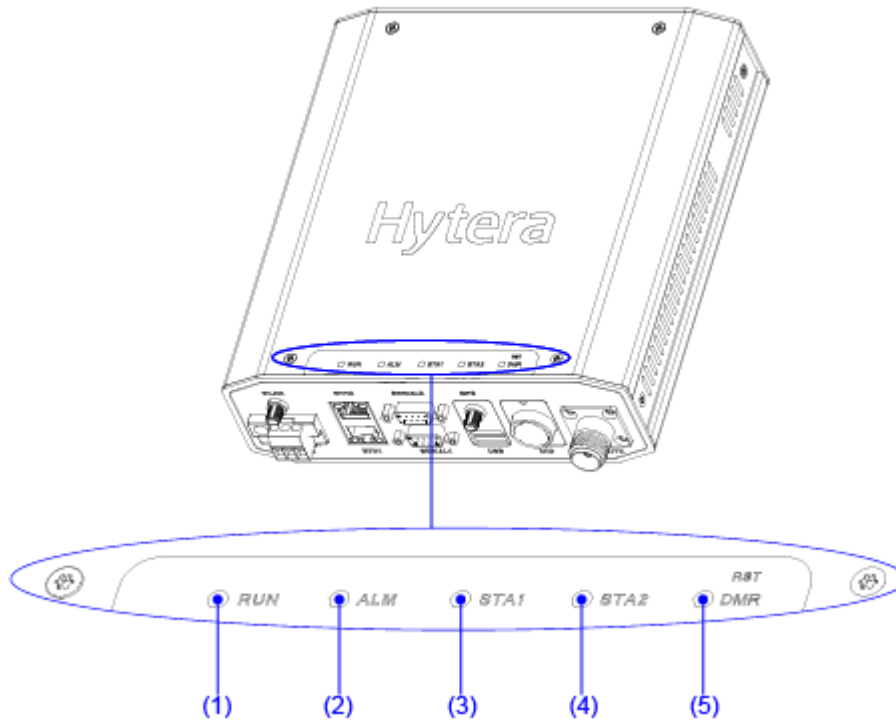


No.	Identifier	Name	Connector	Description
1	POWER	Power inlet	/	Connects to the DC power supply, with DC voltage range of 12 V to 30 V.
2	USB	USB interface	USB-Type A	Connects to USB memory. The upgrade program of DTM-6000 is stored in a USB memory.
3	ANT/TX	Antenna feeder interface	BNC	Connects to the antenna feed system. <ul style="list-style-type: none"> ● Receiving and transmitting wireless signal from the base stations of DMR Trunking System in trunking mode. ● Receiving and transmitting wireless signal from other DTM-6000 in standard mode.
4	MIC	Aviation connector	DB26	Connects to the PC through a programming cable, allowing parameter configuration of DTM-6000.
5	GPS	GPS antenna feeder interface	SMA-F	Connects to the GPS antenna feeder, allowing GPS positioning of DTM-6000.
6	SERIAL	Serial port	DB9	DTM-6000 has two serial ports, enabling connection of two RTUs with serial ports at the same time. DTM-6000 receives data from RTU through the serial port, and transmits data to the third party control center.
7	ETH	Ethernet port	RJ-45	DTM-6000 has two Ethernet ports, enabling connection of two RTUs with Ethernet ports at the same time. DTM-6000 receives data from RTU through the Ethernet port, and transmits data to the third party control center.
8	WLAN	Wi-Fi antenna interface	SMA-F	Connects to the Wi-Fi antenna, providing access point for interconnection of Wi-Fi

No.	Identifier	Name	Connector	Description
				devices.

2.4 LED Indicators

The five indicators of DTM-6000 are described in the table below.



No.	Identifier	Color	Status	Description
1	RUN	Green	Glowing	DTM-6000 is loading the kernel through uboot.
			Off	DTM-6000 is booting.
			Flashing	DTM-6000 completes booting, and is running normally.
2	ALM	Green/Red	Glowing green	DTM-6000 is being upgraded through USB memory.
			Off	DTM-6000 is communicating with the DMR Trunking System normally.
			Glowing red	DTM-6000 fails to register to the DMR Trunking System, or the DTM-6000 fails to communicate with the DMR Trunking System.
3	STA1	Green/Orange	Flashing green	Serial port 1 is transferring data through RS-232.

No.	Identifier	Color	Status	Description
			Flashing orange	Serial port 1 is transferring data through RS-485.
			Glowing green	Serial port 1 is working at RS-232 data transmitting mode.
			Glowing orange	Serial port 2 is working at RS-485 data transmitting mode.
4	STA2	Status indicator for serial port 2. Its Color, Status and Description are the same as the STA1 indicator.		
5	DMR	Green/Red	Flashing green	DTM-6000 is transmitting data to the DMR Trunking System.
			Flashing red	DTM-6000 is receiving data from the DMR Trunking System.
			Off	The link between DTM-6000 and the DMR Trunking System is idle.

3. Installing DTM-6000

3.1 Procedures

Note

This device requires controlled installation location by professional installers.

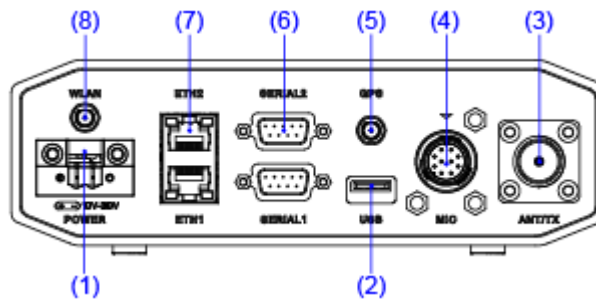
The installer shall install the authorized antenna, and unauthorized antenna shall not be installed on this product.

Install DTM-6000 to the cabinet, with a bracket to fix it during installation. For the installation of the bracket and DTM-6000, contact a technical support engineer.

3.2 Connecting the Cables

As the downlink device of DTM-6000, RTU can be connected to DTM-6000 in two ways:

- If serial port is supported, the RTU can be connected to DTM-6000 through RS-232 or RS-485 by a serial cable.
- If Ethernet port is supported, the RTU can be connected to DTM-6000 through RJ-45 by a net cable.



1. Connect Wi-Fi antenna to the Wi-Fi antenna interface (Interface 8) and tighten the joint.
2. Connect the GPS antenna feeder to the GPS antenna feeder interface (Interface 8) and tighten the joint.
3. Connect the antenna feeder to the antenna feeder interface (Interface 3), and tighten the joint.
4. (Optional) Connect the RTU with data cable type of RJ-45 to the Ethernet port (Interface 7) of DTM-6000 through a net cable.
5. (Optional) Connect the RTU with data cable type of RS-232 or RS-485 to the serial port (Interface 6) of DTM-6000 through a serial cable, and fasten the screws on both sides of the joint.
6. Connect the power cord to the power inlet (Interface 1), and fasten the screws on the joint.

4. Troubleshooting

Phenomena	Analysis	Solution
DTM-6000 fails to power on.	<ul style="list-style-type: none"> ● The power cord is not connected. ● The power cord is in poor contact. 	<ul style="list-style-type: none"> ● Connect the power cord. ● Reconnect the power cord.
The ALM indicator glows red.	<ul style="list-style-type: none"> ● DTM-6000 fails to register to the DMR Trunking System. ● DTM-6000 fails to communicate with the DMR Trunking System. 	<ul style="list-style-type: none"> ● Confirm whether DTM-6000 is added, and is distributed with data transmission permission on the DMR Trunking System. ● Confirm whether the antenna feeder is connected to the antenna feeder interface, and DTM-6000 is in the signal coverage of the DMR Trunking System.
DTM-6000 fails to receive data from RTU.	<ul style="list-style-type: none"> ● DTM-6000 is not connected to the RTU properly. ● The data cable is damaged. 	<ul style="list-style-type: none"> ● Reconnect DTM-6000 with RTU through the data cable. ● Replace the data cable.

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

5. Care and Cleaning

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

5.1 Product Care

- Do not pierce, strike, throw or scrape the product.
- Keep the product away from substances that can corrode the circuitry.
- Keep the product dry.
- Keep this product far away from overheating, which may shorten lifespan of the electronic parts, or even distort or melt the plastic parts.
- Keep this product far away from extreme cold. Otherwise, the circuit board may be damaged by vapor generated when the product temperature rises to normal degrees.

5.2 Product Cleaning

 **Caution**

Before cleaning, disconnect the DTM-6000 from power supply.

- Clean up the dust and fine particles on the product surface and charging piece with a clean and dry lint-free cloth or a brush regularly.
- Use a non-woven cloth with neutral cleanser to clean the device after long-time use. Do not use chemical preparations such as stain removers, alcohol, sprays or oil preparations, so as to avoid potential damage on the surface. Make sure the product is completely dry before use.

6. Specifications

Item	Value
Operating Frequency	<ul style="list-style-type: none"> ● UHF: 400–470 MHz
Operating Bandwidth	12.5 KHz
Channel Spacing	Adjustable in the following three channel spacings. <ul style="list-style-type: none"> ● 12.5 kHz
TX Power	Adjustable between 1–25 W.
Power Input	DC 12–30 V
Maximum Power	≤ 95 W
Sensitivity	0.3 μV/BER5%
Conducted/Radiated Emission	<ul style="list-style-type: none"> ● –36 dBm < 1 GHz ● –30 dBm > 1 GHz
Adjacent Channel Power	<ul style="list-style-type: none"> ● 60 dB@12.5 KHz
Modulation Limiting	<ul style="list-style-type: none"> ● ±2.5 KHz@12.5 KHz
Ingress Protection Rating	IP20
Dimensions (H×W×D)	58 mm×186 mm×199.5 mm (excluding the foot pad)
Weight	≤ 2.5 kg
Operating Temperature	–30°C to +60°C

Item	Value
Storage Temperature	−40°C to +70°C
Operating Humidity	<95% (non-condensing)
MTBF	≥30,000 h
ESD	IEC 61000-4-2 (level 4) <ul style="list-style-type: none">● Contact discharge: ±8 kV● Air discharge: ±15 kV

7. Abbreviations

Abbreviation	Full Name
ALM	Alarm
ANT	Antenna
BER	Bit Error Rate
BNC	Bayonet Nut Connector
DB	Data Bus
DC	Direct Current
DMR	Digital Mobile Radio
DNP	Distributed Network Protocol
DTM	Data Transmission Modem
ETH	Ethernet
GPS	Global Positioning System
IEC	International Electrotechnical Commission
IP	Ingress Protection
MIC	Microphone
MTBF	Mean Time Between Failures
PC	Personal Computer
PDT	Professional Digital Trunking
PTT	Push-to-Talk
RS	Recommended Standard
RTU	Remote Terminal Unit
SCADA	Supervisory Control And Data Acquisition
SMA	Sub Miniature A
STA	Status
TX	Transit
UHF	Ultra High Frequency
USB	Universal Serial Bus
VHF	Very High Frequency
WLAN	Wireless Local Area Network



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