T AND D

Wireless Thermo Recorder User's Manual

RTR-501/RTR-502/RTR-503

T&D Corporation

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2011.08 16504590015 (4th Edition)

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1. Part Names

RTR-501   **RTR-502 / 503**

- Antenna
- LCD Display
- Optical Communication Area
- Sensor Jack

LCD Display

When being used in very cold or hot environments the display may become difficult to read. This is not a malfunction.

① **Recording Status (REC)**
ON: Displayed during recording or when FULL of data.
BLINKING :Waiting for programmed start.
Not ON: Recording has been stopped.
② **Battery Life Warning (BAT)**
Displayed when time to change the battery.
③ **Measurement and Message Display Area**
Current measurements or operational messages will appear here.
④ **Unit of Measurement**

(For details about the message area, see the back of this manual)

What is a Wireless Thermo Recorder?

These products are data loggers designed to measure and record temperature and humidity with built-in wireless communication capability.
No longer it is necessary to manually gather the data loggers. Rather via our special radio communication function, data download, settings, analysis and the saving of data can all be done via a wireless Base Unit connected to your PC.
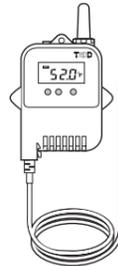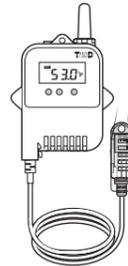
RTR-501
With Internal Temperature Sensor

RTR-502
With External Temperature Sensor TR-5106 Included

RTR-503
With External Temperature / Humidity Sensor TR-3310 Included
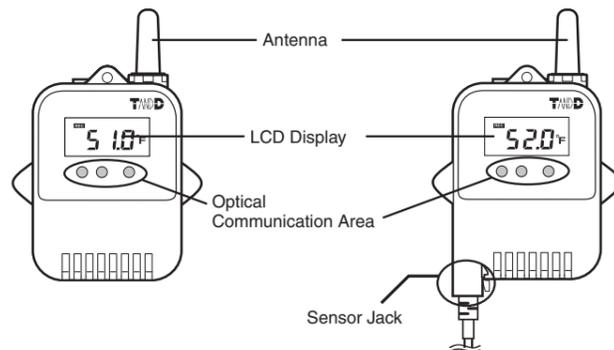
Common Items Included
Lithium Battery (LS14250) x 1 (inserted into a tube)
Strap x 1
User's Manual (Warranty) x 1

> We have prepared an array of Remote Units to meet your needs: RTR-501/502/503. These Remote Units cannot be used without a Base Unit. Base Units must be purchased separately.
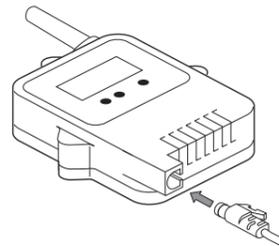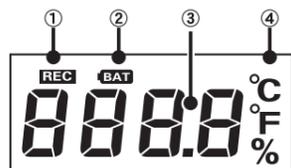
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2. Connecting a Sensor

Make sure that the sensor or sensor adaptor is inserted until you hear a "click" sound.

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3. Installing the Battery

When a battery is installed, temperature measurement will start at the factory default settings or the previously set ones.
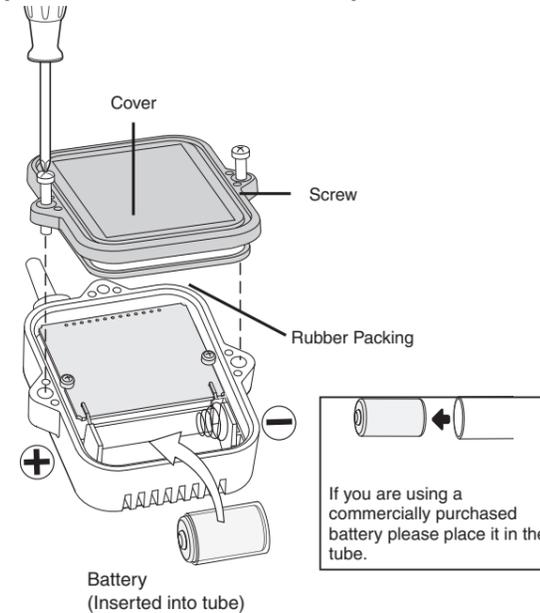
Factory Default Settings
Recording Mode: Endless
Recording Interval: 10 minutes
Recording Start: Immediate Start

1. Remove the screws and open the case.
2. Insert the tubed battery into the case as shown in the diagram below.
3. Check the rubber packing for any cuts or scratches and replace the cover as it was when opened.

- Cover
- Screw
- Rubber Packing
- Battery (Inserted into tube)

If you are using a commercially purchased battery please place it in the tube.

* Make sure to use the proper size and type of screwdriver. A Phillips #1 head screwdriver is best.
* If using a CR2 lithium battery the tube is not necessary.
* If dirt or scratches are present on the rubber packing, water resistance will be reduced.
* Be sure to completely close the cover. Make sure not to over tighten the screws.
  Appropriate torque: 20N*cm ~ 30N*cm [2Kgf*cm ~ 3Kgf*cm]

> ⚠ **Notes about Battery Installation**
> • If a new battery has been installed and recording does not immediately start, nothing appears in the display or any other such malfunction, please remove the battery, check to make sure plus and minus are correct and re-insert the battery.
> • After inserting the battery for the first time, nothing may appear or occur for about 10 seconds; this is not a malfunction.
> • If + (plus) and – (minus) are mistaken, or if the battery terminals + and – are shorted, the recorded data that is stored in the logger will be lost.
> • Make sure no water or foreign objects get inside the case.
> • To maintain water resistibility when changing batteries we suggest also changing the rubber packing and the drying agent.

> ⚠ **About Lithium Batteries**
> • Lithium batteries (CR2) sold in stores may also be used, but if you are using in an environment below -20 ℃, above 60 ℃, or in a situation such as transportation where continued vibration is likely to occur, we strongly suggest the purchase and use of the our lithium battery LS14250. (Please purchase optional part 11P2)
> • When using an LS14250 type lithium battery, even though a new battery has been inserted the BAT indicator may remain on for a short time.This is due to a special characteristic of the battery. Note that the longer the battery has been in storage the longer the amount of time, from 10 minutes to about 1 hour, the BAT indicator will remain on. If during that time the Base Unit is used to get the Current Status of the Remote Unit, the remaining battery level will show that the battery level is low.
> • Please store the Lithium Battery LS14250 in a place that is 20 ℃ or less.

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4. Battery Replacement Mark

When the replacement mark [BAT] appears, try to replace the battery with a new one as soon as possible.

1. **When it is time for the battery to be replaced, the [BAT] mark will appear.**
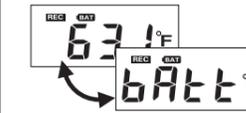
2. **If you do not change the battery and continue using the unit, the temperature display will intermittently display [bAtt].**

- After this point the downloading of data can no longer be done via wireless communication.

- Without changing the battery and attempting to use optical communication to download data, the communication may be broken and if so all recorded data may be lost.

- If the battery is changed at this point, recording will continue after it has been changed.

3. **If the battery is further left unchanged, the display will automatically shut off. If, at this time, the battery is changed, [CHEC] will appear in the display after which recording will begin again using the previously set recording conditions.**

 * All of the recorded data up until that point will be erased.

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5. Communicating with a PC

To register a data logger as a Remote Unit connect the data logger to the computer. For details about how to connect the unit, see the Introductory Guide that comes with the Base Unit or see the application's Help.

- Base Unit
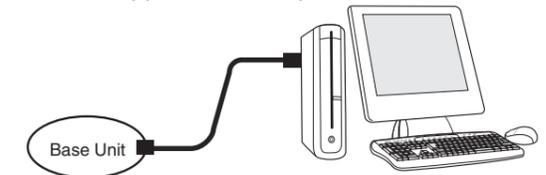
- Communication errors may occur in environments where temperatures are very high or very low.
- If the battery level of the data logger is very low, communication may be broken or may not be possible.

> ⚠ **Estimating Lithium Battery Life**
> A new battery should last about one year if it is used in an environment of 25 °C (77 °F) and recorded data is downloaded at a rate of once a day or Warning Monitoring occurs at a rate of once every 10 minutes.
>
> **About using in Low and High Temperature environments**
> **Use in Low temperature environments will result in a shortening of the battery life.**
> -20 ℃ (- 4 °F) --- one half of life compared to normal temperatures
> -30 ℃ (- 22 °F) --- one third of life compared to normal temperatures
> In normal temperature environments the [BAT] mark may not appear, but under low temperatures this mark may appear and communication may be impossible.
>
> **Use in High temperature environments will also causer battery life to be shortened.**
> 60 ℃ (140 °F) ----- one half of life compared to normal temperatures
> In environments of 60C or higher, not only will battery life be shortened but the unit itself and its parts will deteriorate more rapidly. Please do not use in such environments for prolonged periods of time.

6. Message Area

[Memory FULL]

FULL °F (LCD display, REC)

If recording under the ONE-TIME MODE, when the number of data readings reaches the specified capacity, recording will stop and [FULL] will be displayed intermittently with the current temperature.

Data Capacity (Estimate of time until FULL is displayed)

Recording Interval	1 second	30 second	15 minutes	60 minutes
RTR-501 RTR-502	about 4 hours and 26 minutes	about 5 days and 13 hours	about 166 days and 16 hours	about 1 year and 10 months
RTR-503	about 2 hours and 13 minutes	about 2 days and 18 hours	about 83 days and 8 hours	about 11 months

RTR-501 / RTR-502 (16,000 data readings x 1ch.)
EX: Recording Interval of 30 seconds x Data readings of 16,000 = 480,000 seconds (about 5 days and 13 hours)

RTR-503 (8,000 data readings x 2 ch)
EX: Recording Interval of 30 seconds x Data readings of 8000 = 240,000 seconds (about 2 days and 18 hours)

[Check]

CHEC (LCD display)

If this appears, all data that was stored in the Logger will have been erased. This will be displayed under the following conditions:

- The first time a battery was inserted after purchase
- If the battery is replaced after having been taken out for a long period

[Wireless Communication]

SEnd °F (LCD display, REC)

This will appear when data is being sent via wireless communication to the Base Unit.

[Measurement Range Exceeded] (for RTR-502)

RTR-502 (Celsius)

155.0 ℃ (LCD display, REC)

The temperature display blinks when the temperature goes below -60 °C or above 155 °C (-76 °F or +311 °F) .

[No Sensor]

- - - - . °F (LCD display, REC)
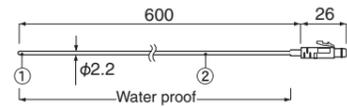
Displayed when a sensor has not been connected or the wire has been broken. Measurement and recording will continue and battery power consumed.

Products Specifications

Unit type	RTR-501 / RTR-501L	RTR-502 / RTR-502L	RTR-503 / RTR-503L	
Measurement Channel	1 Temperature Channel	1 Temperature Channel	1 Temperature Channel	1 Humidity Channel
Sensor	Internal Temp. Sensor	External Temp. Sensor (TR-5106)	External Temp. and Humidity Sensor (TR-3310)	
Thermal Time Constant	15 minutes L Type: 25 minutes	Approx. 30 Sec. (in air) Approx. 4 Sec. (in agitated water)	-	
Sensor Response Time	-	-	About 7 min. (90% response)	
Measurement Range	- 40 to 80 °C	- 60 to 155 °C	0 to 55 °C	10 to 95%RH
Measurement Accuracy	Avg. +/- 0.5˚C	Avg. +/- 0.3˚C (at -20 to 80˚C) Avg. +/-0.5˚C (at - 40 to -20˚C / 80 to 110˚C) Avg. +/- 1.0˚C (at - 60 to -40˚C / 110 to 155˚C)	Avg. +/- 0.3˚C (at 25 °C and 50%RH)	+/-5%RH
Measurement Display Resolution	0.1˚C	0.1˚C	0.1 ˚C	1%RH
Recording Interval	1, 2, 5, 10, 15, 20, 30 seconds / 1, 2, 5, 10, 15, 20, 30, 60 minutes (Total of 15 choices)			
Recording Capacity	16,000 Readings x 1 Channel	16,000 Readings x 1 Channel	8,000 Readings x 2 Channels	
Recording Mode (*4)	Endless (Overwrite oldest data when capacity is full) / One-time (Stop recording when capacity is full)			
LCD Display Items	Current Readings, Recording Status, Battery Life Warning, Messages, Unit of Measurement			
Power	Lithium Battery (LS14250 (SAFT)) x 1 for L Type: Large Capacity Battery Adaptor Kit (RTR-500B1) x 1 (*1) External Power Adaptor Kit (RTR-500A1) (sold separately)			
Battery Life (*2)	Approx. 10 months / L type: Approx 4 years			
Wireless Specifications	FCC Part15 Section247 / IC RSS-210 (Frequency Range: 902 to 928MHz)			
Transmission Range	Approx. 150m (500ft) : May vary with conditions			
Interface	Wireless Communication / Optical Communication			
Communication Speed	Collection of a full unit of data: Wireless communication = about 2 minutes Optical communication = about 160 seconds			
Water Resistance	IP67 (immersion proof)	IP64 (rated for use in daily life) (*3)		
Dimensions	H62mm x W 47mm x D19mm L Type: with Large Capacity Battery Pack: D 50mm (excluding protrusions / antenna length 23mm)			
Weight	Approx. 56g (including 1 lithium battery) L Type: with Large Capacity Battery Pack: Approx. 109g			
Unit Temp. Resistance	Resistance -30 to 80˚C Unit temp resistance and measurement range is -40 to 80 ˚C but wireless communication cannot occur in an environment of less than -30 ˚C			
Others	In order to download data via wireless communication, it is necessary to purchase Base Unit.			

(*1) When using RTR-500B1 it is necessary to purchase Lithium Battery (LS26500). For details, contact your local authorized representative.
(*2) The stated battery life is for when it is used in an environment of 25˚C (77˚F) and recorded data is downloaded at a rate of once a day or "Monitoring Current Readings" occurs at a rate of once every 10 minutes. Battery life depends on measurement environment, recording interval and battery performance.
(*3) The stated water resistance rating is for when the sensor is connected to the unit. However, this does not include the sensor areas for the RTR-503/503L models. Not for continued immersion.
(*4) When using RTR-500GSM, RTR-500NW or RTR-500AW as a Base Unit, only "Endless" can be selected.

TR-5106 :
Fluoropolymer Coated Sensor for RTR-502

(diagram: 600, 26, φ2.2, ① Thermistor, ② Water proof)
[Unit:mm]

Cable Length: 0.6m
Thermal Time Constant:
  Approx. 30 Sec. (in air)
  Approx. 4 Sec. (in agitated water)
Possible Temperature Measurement Range: -60 to 155˚C
Sensor Temperature Resistance: -70 to 180˚C
Temp Measurement Accuracy:
  Avg. +/-0.3˚C (at -20 to 80˚C)
  Avg. +/-0.5˚C (at -40 to -20˚C / 80 to 110˚C)
  Avg. +/-1.0˚C (at -60 to -40˚C / 110 to 155˚C)
Water Resistance:
  The fluoropolymer-coated section is waterproof.
  Other sections are immersion proof (IPX4)
Materials: ① Thermistor
  ② Fluoropolymer-coated Electrical Wire

TR-3310 :
Temp / Humidity Sensor for RTR-503
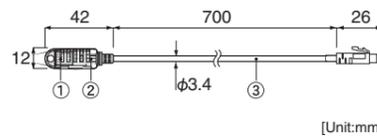
(diagram: 42, 700, 26, φ3.4, 12, ① ② ③)
[Unit:mm]

Cable Length: 0.7m
Possible Temperature Measurement Range: 0 to 55˚C
Possible Humidity Measurement Range: 10 to 95%RH
Sensor Temperature Resistance: -10 to 60˚C
Measurement Accuracy:
  Temperature Avg. +/- 0.3˚C (At 25˚C / 50%RH)
  Humidity Avg. +/-5%RH (At 25˚C / 50%RH)
Conditions for Use:
  Under conditions without condensation, water leakage or effects from corrosive gas or organic solvents
Water Resistance: None
Materials: ① Temperature / Humidity Sensor
  ② Polypropylene Resin
  ③ Vinyl Chloride Coated Electrical Wire

Notices about this User's Manual

In order to properly use this product, please carefully read this manual before using. T&D Corporation accepts no responsibility for any malfunction of and / or trouble with this product or with your computer that is caused by the improper handling of this product and will deem such trouble or malfunction as falling outside the conditions for free repair outlined in the attached warranty.

- All rights of this User's Manual belong to T&D Corporation. It is prohibited to use, duplicate and / or arrange a part or whole of this User's Manual without the permission of T&D Corporation.
- "TANDD", "T&D" and the logo of T&D Corporation are all registered property of T&D Corporation.
- Specifications, design and other contents outlined in this manual are subject to change without notice.
- We are not responsible for any malfunction or trouble caused by the use of our product or by any problem caused by the use of measurement results of our unit. Please be fully aware of this before using our product.
- On screen messages in this manual may vary slightly from the actual messages.
- Please notify the shop where you purchased this product or T&D Corporation of any mistakes, errors or unclear explanations in this manual.
- T&D Corporation accepts no responsibility for any damage or loss of income caused by the use of our product.
- This product has been designed for private or industrial use only. It is not for use in situations where strict safety precautions are necessary such as in connection with medical equipment, whether directly or indirectly.
- This User's Manual cannot be reissued, so please keep it in a safe place.
- Please carefully read this User's Manual and Warranty.

Safety Precautions and Instructions   * Please carefully observe the following safety measures when using our product.

To prevent any loss or damage to our customers, other people and/or property, and to ensure the proper use of our products we ask that before using our product you carefully read, understand and follow the safety rules and precautions for our products as outlined below.

⚠DANGER

Do not take apart, repair or modify the main unit.
It may cause fire, electrocution or damage. Ask the shop where you purchased the products or T&D Corporation to carry out any repairs.

If any smoke or strange smells are emitted from the unit, immediately cease using it.
Continued use may cause fire, electrocution or damage.

Do not use any batteries other than those that are recommended.
It may cause fire or damage.

If water or a foreign object enters the case, immediately cease using it.

Store all batteries, sensors and Thermo Recorder units out of the reach of children.
It is dangerous to swallow batteries.

Please be careful when using in overly hot or cold environments, touching the units may cause burns or frostbite.

The RTR-501/502 are devices to measure temperature. The RTR-503 is a device to measure temperature and humidity.
Do not use these units for any other purpose.

⚠CAUTION

We are not responsible for any malfunction or trouble caused by the use of our product or by any problem caused by the malfunction of our unit. Please be fully aware of this before using our product.

This product has been designed for private or industrial use only.
It is not for use in situations where strict safety precautions are necessary such as in connection with medical equipment whether directly or indirectly.

Do not drop or expose the unit to strong impact.

Do not put your fingers or foreign matter into the sensor connection.

Battery terminals may provide insufficient contact due to age or vibration.
Please be careful not to lose data due to insufficient contact.

Battery life depends on the measurement environment, communication frequency, recording interval and battery quality.

Avoid using the lithium batteries, LS 14250 for long periods at temperatures over 60 °C.
The battery life may be signifi cantly decreased.

Operate the units with the latest version of Software.
The latest version software can be downloaded from our home page.

Cracks may develop in the unit casing if it comes into contact with hazardous substances such as oil products.
If the unit is being used in an environment where there is a possibility of oil spraying or splashing, T&D advises protecting the unit by placing it in a polyethylene bag.

Pay attention to water leakage or foreign objects entering into the unit case as in the following cases.
- The case was closed with dust, hair, etc., on the rubber packing or in the groove for the packing.
- The rubber packing was damaged. (In this case, please purchase the optional maintenance set.)
- The unit suffered from significant temperature change while wet. especially if the temperature change was from high to low.

Do not use or store the unit in places such as listed below:
It may cause electrocution, fire or damage to the unit or to your computer.
- Areas exposed to direct sunlight
- Areas exposed to water or high-pressure water flow.
- Areas exposed to organic solvents and corrosive gas.
- Areas exposed to strong magnetic fields
- Areas exposed to static electricity.
- Areas exposed to fire or overheating.
- Areas exposed to excessive dust or smoke.

⚠ Notes about Sensors

TR-5106, the standard Sensor for RTR-502.
-Do no fold the sensor (tip section) or expose it to a strong impact. This may cause trouble or break the wire.
-The sensor and the cable are shielded by Teflon . If the shield has a defect or tear, the waterproof capacity is lost as the shield is very thin. Inspect it before operation.
-Insert the sensor tip of least 5cm or more to obtain on accurate tempertre measurement.
-Only use the sensor within the sensor heat-durability range.

TR-3310, the standard temperature and humidity sensor for RTR-503.
-Use the sensor only within the measurable temperature and humidity range (Temperature: 0 °C to 55 °C and , Humidity: 10% to 95% RH)
-The Temperature/Humidity sensor cable cannot be extended.
-When the sensor is not used, put it in the attached plastic bag with a drying agent and keep it in cool, dark place at 5 °C to 25 °C and 30% RH or less.
-The service life of humidity sensors can vary greatly depending on operating environment.Periodic calibration may be required.

⚠ Compliance Information

FCC Statement
This device complies with Part 15 of the Federal Communications Commission (FCC) rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.
Caution:
Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
Note about Antenna Usage
This device has been designed to operate with the supplied antenna only. Use of any other antenna is strictly prohibited.
IC Statement
This device complies with RSS-210 of the Industry Canada (IC). Operation is subject to the following two conditions: (1) This device may not cause harmful interference; and (2) This device must accept any interference received, including interference that may cause undesired operation.
Ce dispositif est conforme à la norme RSS 210 d'Industrie Canada.
L'utilisation de ce dispositif est autorisée seulement aux conditions suivantes : (1) il ne doit pas produire de brouillage et (2) l'utilisateur du dispositif doit être prêt à accepter tout brouillage radioélectrique reçu, même si ce brouillage est susceptible de compromettre le fonctionnement du dispositif.

⚠ Important Notice

Wireless products cannot be used in countries other than where those products have been approved for use, according to that country's wireless regulations.
T&D Corporation shall in no manner whatsoever take responsibility for the usage of these products, nor be liable in any manner for legal consequences stemming from the usage of these wireless products in unapproved areas.