Thermo Recorder

TR-51*i* / TR-52*i* Introductory Manual

Thank you for purchasing this product.

Carefully read and fully understand these instructions before using this unit.

CE

T&D CORPORATION

Immersion proof

TR-51i

Internal Temperature Sensor Type

Package Contents：
Data Logger and Common Accessories for TR-51i and TR-52i
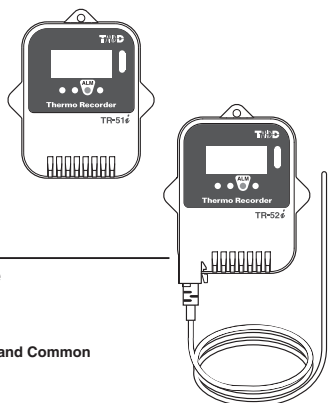
TR-51i

TR-52i

External Temperature Sensor Type
Splash proof

Package Contents：
Data Logger, Temperature Sensor TR-5106, and Common Accessories for TR-51i and TR-52i.

TR-52i

Common Accessories for TR-51i and TR-52i：
Lithium Battery LS14250 with Tube/Strap/Introductory Manual (including Warranty)

Specifications

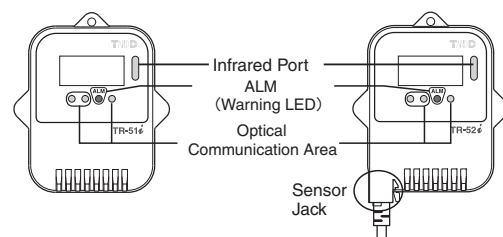| Device Name	TR-51i	TR-52i
Measurement Item	Temperature	Temperature
Number of Channels	1 Ch (Internal Sensor Type)	1 Ch (External Sensor Type)
Measurement Range	– 40 to 80℃	– 60 to 155℃
Response Time (in 90% still air)	About 35 minutes	-
Measuring Accuracy	Avg. ± 0.5℃	Avg. ± 0.3℃ :– 20 to 80℃ Avg. ± 0.5℃ :– 40 to - 20℃ 　　　　　　　80 to 110℃ Avg. ± 1.0℃ :– 60 to - 40℃ 　　　　　　　110 to 155℃
Measurement Display Resolution	0.1℃	
Recording Intervals	Select from 15 choices:1, 2, 5, 10, 15, 20 and 30 seconds / 1, 2, 5, 10, 15, 20, 30 and 60 minutes	
Storage Capacity	Up to 16,000 readings	
Recording Start Method	Immediate Start / Programmed Start	
Recording Modes	Endless / One Time	
LCD Displayed Items	Measured Temperature, Recording Status, Recording Mode Infrared Communication Status Battery Life Warning, Unit of Measurement, Full (Storage Capacity FULL), Unconnected Sensor Measurement Range Exceeded, Upper/Lower Limit Exceeded	
Communication Interfaces	Optical / Infrared Communication	
Infrared Communication	IrPHY 1.2 low power	
Communication Time	When downloading a Unit at full storage capacity: 　Optical Communication : about 25 seconds (TR-50U) / about 　150 seconds (other devices) 　Infrared Communication: about 55 seconds (TR-57DCi)	
Power（*1）	Lithium Battery (LS14250) / Lithium Battery (CR2)	
Battery Life（*2）	About 4 years (2 years if it's been selected to "Permit" infrared communication)	
Waterproof Capacity	Immersion proof	Splash proof
Dimensions	H62 × W47 × D19mm （excluding protrusions and sensor part)	
Weight	About 54g (including battery)	About 55g (including battery / excluding sensor)
Operating Environment	– 40 to 80℃ When using Lithium Batteries (CR2) sold in stores :-20 to 60℃	
Data Collection Devices	Communication Ports：TR-50U / TR-50C Data Collectors: TR-57DCi / TR-57U / RTR-57U / RTR-57C	

(*1) The included Lithium Battery (LS14250) is not sold in stores. Please purchase the "Optional Battery Set TR-11P2" for replacement.
(*2) Battery life varies depending upon measuring environment, frequency of communication, Unit settings, and battery performance.
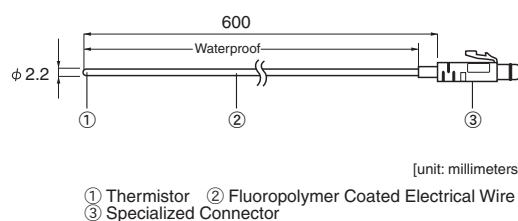
Temperature Sensor TR-5106

Sensor Temperature Durability	– 70 to 180℃
Thermal Time Constant	In air: about 30 sec. / In water: about 4 sec.

Appearance Diagram and Part Names

Infrared Port
ALM
(Warning LED)
Optical Communication Area
Sensor Jack

TR-51i
TR-52i

Temperature Sensor TR-5106 (Supplied with TR-52i)

600
Waterproof
φ 2.2
① ② ③

[unit: millimeters]
① Thermistor ② Fluoropolymer Coated Electrical Wire ③ Specialized Connector
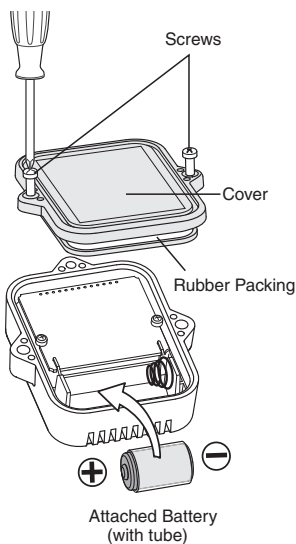
Make sure that the sensor is completely inserted until you hear a "click" sound. The TR-52i only becomes splash proof when the sensor has been connected.

❶ Thermo Recorder TR-51i/52i will be referred to as the "Unit" in this manual.

Installing the Battery

Recording will start after the battery is inserted.

Screws
Cover
Rubber Packing
Attached Battery (with tube)

1. Remove the screws and open the cover.

Make sure to use the proper size and type of screwdriver.(Phillips head #1 screwdriver)

2. Insert the attached Battery.

Do not remove the battery from its tube casing.
-If using a CR2 lithium battery, the tube is not necessary.

3. Check the rubber packing condition and close the cover in the same manner as when you opened it.
-If dirt or scratches are present on the rubber packing, water resistance will be reduced. Please remove the dirt or replace the rubber packing if there're any cuts or scratches.
-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))

❶ Notes about Battery Installation

- After inserting the battery, it may occur that nothing appears in the display for about 10 seconds; this is not a malfunction.
- If a new battery has been installed and nothing appears in the display, please remove and re-insert the battery.
-When inserting a battery, make sure no water or foreign objects get inside the case.
- Make sure that + and – are in the correct direction.

❶ About Lithium Batteries: LS14250 and CR2

- Operating temperature range will vary depending on the battery. 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 suggest the use of the lithium battery LS14250.
- The lithium battery LS14250 is not sold in stores; please purchase the "Optional Battery Set TR-11P2" for replacement.
- Please store the LS14250 in a place that is 20℃ or less.
- When changing a CR2 battery, we strongly suggest changing the rubber packing and the drying agent. In this case, please purchase the "Optional Maintenance Set TR-00P1".

Notices about this Introductory 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 Introductory Manual belong to T&D Corporation.It is prohibited to use, duplicate and/or arrange a part or whole of the manual without the permission of T&D Corporation.
- All registered trademarks, company names, product names and logos mentioned herein or for products being used are the property of T&D Corporation or of their respective owners. "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 the manual are subject to change without notice due to continual improvements.
- Please follow the safety precautions outlined in the manual carefully. We cannot guarantee nor are we responsible for safety if this product is used in any manner other than was intended.
- On-screen messages in this manual may vary slightly from the actual messages.
- Please notify the distributor from which 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.
- We are not responsible for any malfunction or trouble caused by the use of our product or for any problem caused by the use of measurement results of our product. Please be fully aware of this before using our product.
- This Introductory Manual cannot be reissued, so please keep it in a safe place.
- Please read the warranty and provisions for free repair carefully.

Safety Precautions and Instructions

The following items should be strictly obeyed for the safe usage of this product, and for protecting yourself and other people from bodily harm and/or damage to property.
To ensure the proper use of this product, we ask that before using it you carefully read, understand and follow the safety rules and precautions as outlined below.

⚠ DANGER

Do not take apart, repair or modify the Unit.
It may result in malfunction or unexpected accidents.

Do not use any batteries other than those specified in this Introductory Manual.
Doing so may cause fire or malfunction.

If water or a foreign object enters into the Unit, immediately remove the battery and stop using.
It may result in malfunction or unexpected accidents.

Store the Unit and accessories out of the reach of children. Touching them may result in unexpected accidents.
Touching them may result in unexpected accidents.

If any smoke, strange smells or sounds are emitted from the Unit, immediately remove the battery and stop using.
Continued use may cause fire or electrocution.

Please be careful not to touch the Unit during or after use in overly hot or cold environments; it may cause burns or frostbite.

⚠ CAUTION

We are not responsible for any damage, malfunction or trouble, whether direct or indirect, caused by the use of the Unit.Please be fully aware of this before using our product.

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

Battery life varies depending upon measuring environment, frequency of communication, Unit settings, and battery performance.

The TR-52i becomes waterproof (splash proof) only after the temperature sensor has been connected.
Without the sensor connected, neither the sensor jack of the Unit nor the connector part of the temperature sensor is waterproof; make sure not to get wet.

Contact with oil may cause cracks to appear in the casing of the Unit.When using the Unit in such an environment, protect the Unit by placing it inside a polyethylene bag.

Do not use or store the Unit in such places as listed below; it may cause electrocution, fire or damage to the Unit or to your computer.
-Areas exposed to direct sunlight
-Areas exposed in 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 near fire or exposed to excessive heat
-Areas exposed to excessive dust and smoke

Do not put fingers or foreign objects into the sensor jack.

Do not drop or expose the Unit to a strong impact.
It may cause damage.

⚠ Cautions about the Temperature Sensor

When using the included Sensor TR-5106, please take note of the following:

Do not bend the sensor (tip section) or expose it to a strong impact.
This may cause trouble or break the wire.

If the fluoropolymer-coated section of the sensor and/or the cable has a defect or tear, the waterproof capacity will be lost.
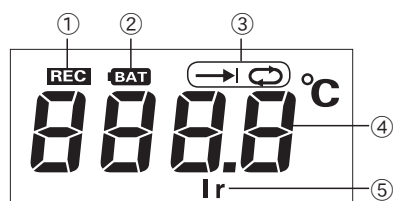Inspect it before operation.

Insert the sensor tip to about 5cm or more to obtain on accurate temperature measurement.

Only use the sensor within the sensor temperature durability range.

Radio, EMC and Safety Regulations

This device complies with Part 15 of the FCC Rules.
Operation is subject to 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.

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 the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and 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 circuit different from that to which the receiver is connected.
-- Consult the dealer or an experienced radio/TV technician for help.

To comply with the limits for the Class B digital device, pursuant to Part 15 of the FCC Rules, this device must be installed in computer equipment certified to comply with the Class B limits.
All cables used to connect the computer and peripherals must be shielded and grounded. Operation with non-certified computers or non-shielded cables may result in interference to radio or television reception.

Caution

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Reading the LCD

Basic LCD Display

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

① ② ③
REC BAT ➞⊏ ℃
888.8
④
lr ⑤

①	Recording ([REC] Mark)	The recording status is shown here. ON : Recording in progress or Storage Capacity FULL. BLINKING :Waiting for programmed start.
②	Battery Life Warning Signal	When it is time for the battery to be replaced, this signal will appear.
③	Recording Mode	➞⊣ :One-Time ⊏⊐ : Endless
④	Measurement and Message Area	Measurements or operational messages are shown here.
⑤	Infrared Communication ([Ir] Mark)	The infrared communication status is shown here. ON : Permitting infrared communication. Not ON : Forbidding infrared communication.

Battery Replacement Mark

1. **When it is time for the battery to be replaced, a battery life warning signal will appear.**

Please replace the battery as soon as possible if this mark appears.

BAT
REC BAT ⊏⊐ ℃
24.6
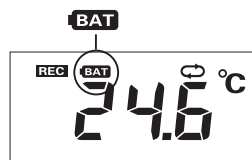
2. **After removing the battery, wait for about three seconds until the "bAtt" mark appears. Once this appears, please insert the new battery as quickly as possible.**

REC ⊏⊐ ℃
bAtt

-If the battery is replaced before the "bAtt" mark appears, the battery life warning signal may remain even after replacing.
-If you change the battery at this point, all recorded data will be saved.

3. **If the battery is further left unchanged, the display will automatically shut off.**

If, at this time, a new battery is placed in the Unit, the "CHEC" mark will appear on the display after which recording will begin again using the previously set recording conditions. Note however that all previously recorded data will have been lost.

Estimating Battery Life

The battery-life warning signal will appear based upon the calculation of battery use. This mark may not appear correctly if the same battery is taken out and put in, therefore do not remove the battery until it can be replaced with a new one. If infrared communication is set to be permitted, battery life will be shortened.

When communication frequency is 4 times a month:

Recording Interval	1 second	2 seconds	5 seconds	10 seconds or longer
Infrared Communication Forbidden	About 18 months	About 2 years	About 3 years	About 4 years
Infrared Communication Permitted	About 14 months	About 14 months	About 19 months	About 2 years

- The battery life warning signal may appear sooner than noted above.
- Battery life will be shortened if used under the following conditions: downloading data very often, setting the recording interval at less than 10 seconds, leaving the Unit with the warning LED blinking, measuring in an environment below -20℃ , or leaving the Unit unconnected to the sensor for several months (TR-52i).

Other Messages

[FULL (Storage Capacity FULL)]

REC ➞⊣
FULL

When Recording Mode has been set to "One Time" and the Unit reaches its storage capacity of 16,000 readings, recording will automatically stop and in the LCD the measurement reading and the word "FULL" will alternately appear.

Estimation of time until "FULL" is displayed

| Recording Interval	1 second	30 seconds	1 minute	10 minutes	60 minutes
Period	About 4 hours	About 5 days	About 11 days	About 111 days	About 1 year and 10 months

[Check]

CHEC

If this appears, all data that was stored in the Unit 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
- If the battery is replaced after the battery power has been lost.

Warning (set limit exceeded)

Hi
(ALM)
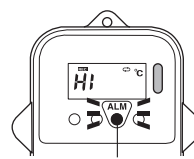
Warning LED (flashes)

Using the Software that comes with the Communication Port or Data Collector, you can make settings for the Upper / Lower Limits and Judgment Time. If a measurement exceeds one of the set limits, the warning LED and a message will be displayed.

REC ⊏⊐ ℃
Hi

[Upper Limit Exceeded]
If a measured temperature exceeds the set upper limit, the Logger LED will alternately flash between [Hi] and the measurement.

REC ⊏⊐ ℃
Lo

[Lower Limit Exceeded]
If a measured temperature exceeds the set lower limit, the Logger LED will alternately flash between [Lo] and the measurement.

❶ Starting the Warning Monitoring Function
If these settings are made in an environment where one of the limits is being exceeded and recording is started, the monitoring function will enter "wait" mode. Once a measurement returns to within the set limits, the monitoring function will begin to operate.

❶ How to Turn Off a Warning
-Restart recording from the software.
-Use [Clear Warning] setting from the software (only via TR-50U).
-Download the recorded data (only when successfully completed).
-Produce a condition so that "CHEC" is displayed. (see [Check] above).

[Measurement Range Exceeded (for TR-52i only)]

REC ⊏⊐ ℃
155.0

The temperature display blinks when the temperature exceeds the measurement range (-60℃ or below / 155℃ or above).

[Sensor Unconnected (for TR-52i only)]

REC ⊏⊐ ℃
- - - -

This will be displayed when a sensor has not been connected or the wire has been broken. Measurement and recording will continue so battery power will be consumed.

-If after re-connecting the sensor and measurements can still not be displayed, it is very possible that the sensor or the Unit are defective or have been damaged.

Communication with your Computer

❶ In order to change settings in the Unit such as recording settings, download recorded data from the Unit to your computer, or communicate with your computer, it is necessary to purchase separately a Communication Port or Data Collector.

❶ By using the Software "T&D Recorder for Windows" supplied with the Communication Port or Data Collector, it is possible to carry out communication with a PC. For details about how to make recording settings, download data and other operations, please see the User's Manual that comes with the Communication Port or Data Collector.

❶ The latest version of "T&D Recorder for Windows" can be downloaded free of charge from our Web Site. (TR-51i and TR-52i can be operated with the Software version 1.80E or later.)

Set-up Procedure

1. As instructed by the software, connect the Communication Port or Data Collector to your computer using the provided communication cable.

Communication Cable

2. Place the Unit face down on the Data Collector or Communication Port, making sure that the optical communication areas are aligned properly.
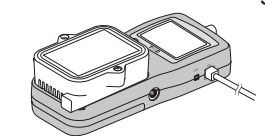
Data Collection Devices (Data Collector)
TR-57U , TR-57DCi
RTR-57U, RTR-57C
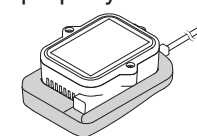
Data Collection Devices (Communication Port)
TR-50U,TR-50C

Recording settings for the Unit and the downloading of recorded data from the Unit can now be carried out from your computer.

❶ Notes about Optical Communication
-Proper communication may not be possible in the following situations: where temperatures are very high or very low, in an environment with intense brightness (higher than 5,000lx), or when the remaining battery life for the Unit is very low.
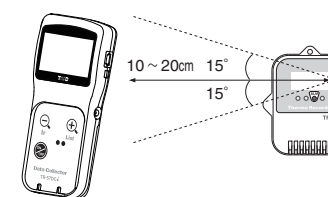
Downloading Recorded Data via Infrared Communication

By using a Data Collector TR-57DCi, it is possible to download the recorded data from a TR-51i /52i via infrared communication.

Getting Ready and Downloading Data

1. Using the software "T&D Recorder for Windows" which comes with the Data Collector TR-57DCi, make necessary settings for infrared communication function and set to "Permit". For more details, see the User's Manual that comes with the software.

2. With the Unit and the TR-57DCi face-to-face and with about 10 to 20 cm of space between them, download the recorded data from the TR-51i/52i to the TR-57DCi(within 15 degrees from side to side and top to bottom).

For detailed information about the operation and functions of the Data Collector TR-57DCi, see the TR-57DCi User's Manual.

10～20cm 15°
15°

Note ＞

-Please note that infrared communication is a function limited to the downloading of recorded data. Other functions such as making Unit settings cannot be carried out.

-For downloading one TR-51i/52i Unit at full storage capacity, it takes about 60 seconds.

Recording Settings for the Unit

Recording settings for the Unit can be changed by using the software supplied with the Communication Port or Data Collector.

The factory default settings are as follows: Recording Interval at 10 minutes, Recording Start at Immediate Start, Recording Mode at Endless, Infrared Communication at Forbid.

Recording Intervals	Select from 15 choices: 1, 2, 5, 10, 15, 20, and 30 seconds or 1, 2, 5, 10, 15, 20, 30, and 60 minutes	
Recording Start	Immediate Start : Recording starts immediately upon battery installation.	
	Programmed Start : Recording starts on the set date and time.	
Recording Modes	One-Time : Upon reaching storage capacity of 16,000 readings, recording automatically stops (Measurements and the word "FULL" will alternately appear in the LCD.)	
	Endless : Upon reaching the storage capacity of 16,000 readings, the oldest data is overwritten and recording continues.	
Infrared Communication Function	Permit : Infrared Communication will be possible. Forbid : Infrared Communication will not be possible.	

It is possible to carry out the following data processing by using the software.

View and Print	: View and print graphs and lists of recorded data.
Save	: Create and save recorded data files and text files.

❶ Notes about Communication Devices
-When using a Data Collector, you can download recorded data, view the data in graph form, and make all necessary recording settings without connecting to a PC.
-When using optical communication with a Communication Port TR-50C, please note that some newer functions of the TR-5i Series Data Loggers, such as the warning monitoring function, cannot be carried out.
-The time necessary to download one Unit of full data varies depending upon the type of device being used.

⚠ **Cautions about the Infrared Communication Sensor**

-This Unit is an infrared-equipped device. Do not place the Unit in areas exposed to direct sunlight, directly below an incandescent lamp, or near other infrared devices. Placing in such an area may cause infrared communication to not work properly.
-Also, Infrared communication may not be carried out properly in a low-temperature environment (below -20℃).
-Proper communication may not be possible if the infrared port is dirty.
-During the infrared communication, do not touch the infrared port or interrupt the communication.

⚠ **Cautions about Changing the Battery**

-Before replacing a battery, please make sure to download any necessary data and proceed with changing the battery.
-Downloading of data cannot occur while the battery is removed.

Cautions for Using in a Low-temperature Environment below -20℃
-When using in an environment below -20℃ , the battery life will be halved.If the battery life has depleted to half or less under normal conditions and then is moved to an environment of −20℃ or less, the battery warning mark will come on and in about one day's time the battery may lose all power. If you use the Unit in a low-temperature environment, we suggest replacing the battery as early as possible.