T&D

Thermo Recorder

TR-71S / TR-72S

User's Guide

Carefully read and fully understand instructions before using this unit.

2002.04 16004104060

■ Notices about this User's Guide

- Carefully read and fully understand these instructions before using this unit.
- All rights of this User's Guide belong to T&D Corporation. It is prohibited to use, duplicate and/or arrange a part or whole of this User's Guide without the permission of T&D Corporation.
- Please follow the safety precautions carefully. We cannot guarantee nor or we responsible for safety if this product is used in any manner other than was intended.
- 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 of the attached warranty.
- T&D Corporation accepts no responsibility for any results or effects from using this User's Guide.
- This User's Guide cannot be reissued, so please keep it in a safe place.
- On screen messages in this manual may vary slightly from the actual messages.
- Figures and illustrations in this manual may be slightly simplified and may differ from the actual product.
- Specifications, design and other contents are subject to change without notice.
- Please notify the shop where you purchased this product or T&D Corporation of any, mistakes, errors or unclarities in this manual.
- Microsoft®, Windows® and WindowsNT® are registered trademarks of Microsoft Corporation USA and are binding in the USA and all other countries. Company names and product names are trademarks or registered trademarks of each company.
- Teflon® is a registered trademark of the Dupont Corporation and of the Mitsui Dupont Fluro-chemical Corporation.

Published by T&D Corporation
1st Edition, April 2002

Safety Precautions and Instructions

In an attempt to ensure safe operation of our products and to protect them from the possibility of damage throughout this User's Guide the following symbols are used to indicate important warnings, cautions and notices. Please be sure to read, understand and follow the contents of all such warnings.

■ Explanation of Warning Symbols

⚠ DANGER	These entries are actions that absolutely under no circumstance should be taken. The taking of such an action may cause serious personal physical damage or death.
⚠ CAUTION	These entries are actions that if taken may lead to physical injury or damage to persons or things.

■ Explanation of Picture Symbols

△	This symbol denotes an important warning or caution. Inside or near the symbol will appear another symbol giving details. (EX: ⚠ stands for INFLAMMABLE)
⃠	This symbol denotes a forbidden action. Inside or near the symbol will appear another symbol giving details. (EX: stands for DO NOT TAKE APART)
●	This symbol denotes an action that you must take. Inside or near the symbol will appear another symbol giving details. (EX: ❗ stands for BE SURE TO FOLLOW)

⚠ DANGER

Do not take apart, repair or modify the main unit.
It may cause fire, electrocution or damage. Please ask the shop where you bought the product or T&D 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.

If water or a foreign body enters the case, immediately cease using it.
Continued use may cause fire, electrocution or damage.

Make sure to use only power sources compatible with this unit.
The use of the wrong voltage may cause fire, electrocution or damage.

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

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 by any problem caused by the malfunction of our unit. Please be fully aware of this before using our product.

⚠ CAUTION

The Thermo Recorder is a device to measure temperature. Do not use this unit for any purpose other than temperature measurement.

Do not apply sensors to the human body.

Do not put your fingers or foreign matter into the communication port.

Use these units under conditions with an ambient temperature of -10 to 60℃ and humidity of 90%RH or less.

Do not use or store the unit in places such as listed below:

- In places exposed to splashing water.
- In the direct sun light or in excessively hot and humid places.
- In excessively smoky, dusty, or steamy places.
- In areas exposed to harmful chemicals or gases.
- In areas exposed to strong magnetic fields.

Do not drop the unit, place heavy weight on the unit nor expose the unit to a strong impact.
Doing so may cause damage to the unit.

⚠ CAUTION

Remove batteries from any unit that is not to be used for a long period of time.
Batteries left in a unit not being used for a long time may leak and cause a malfunction.

Battery life depends on the measurement environment, communication frequency, recording interval and battery quality.
Approximate battery life of 1 year is a standard of battery life under use with a recording interval setting at 2 seconds or more and in no way do we guarantee a battery's life.

Recorded data and recording settings will be lost if the batteries run out.
It is recommended that the batteries be replaced before they run out.

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

⚠ CAUTION

■ TR-0106, Standard Temperature Sensor of TR-71S

Use the sensor only within the measurable temperature range (-40 to 110℃).

For extending the temperature sensor cable, use of only 1 extension cable is advised.

■ TR-3110, Standard Humidity Sensor of TR-72S

Use the sensor only within the measurable temperature and humidity range (Temperature: 0 to 50℃ , Humidity: 10 to 95%RH).

The unit may give an error in humidity value if there is a rapid change of temperature. However, the value will return to normal after the sensor temperature stabilizes.

When the sensor is not used, put it in the attached plastic bag with a drying agent and keep it in a cool, dark place at 5 to 25℃ and 30%RH or less.

An extension cable cannot be used with the Temperature/ Humidity Sensor.

Table of Contents

Introduction

Getting Ready

Basic Usage

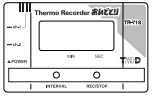
Other

Outline of the Product

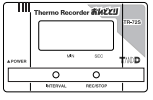
■ Outline

Thermo Recorder TR-71S is a 2-channel data logger unit designed to measure, display and record temperature. The TR-72S is a data logger designed to measure, display and record temperature on 1 channel and humidity on its other channel. The recorded data from either unit can be downloaded to your computer via the included software "Thermo Recorder for Windows" where you can use the software to create colorful graphs, tables, export text files, as well manage files and control printing.

■ Contents of Package

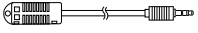


TR-71S



TR-72S

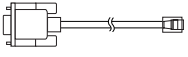
Standard Temperature Sensors
(TR-0106) x 2



Temperature / Humidity Sensor
(TR-3110) x 1

● Accessories (Both TR-71S and TR-72S)

AAA Alkaline Batteries (LR03)
x 2



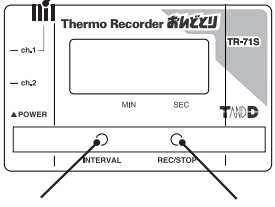
Communication Cable
(RS-232C : D-Sub 9Pin)
Cable Length 1.5m x 1

Standard Software
(Thermo Recorder for Windows)
x 1 set

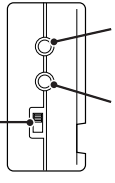
User's Guide and Warranty
Software User's Guide
x 1 set

Part Names and Functions

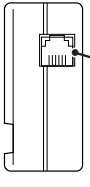
■ Front View



■ Left Side View



■ Right Side View



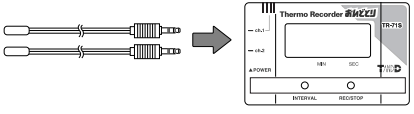
Connect the Sensors

Connecting the standard sensors to the main units.

▶ Optional temperature sensors can be used. For details, see page 22 "Optional Sensors List".

■ TR-71S

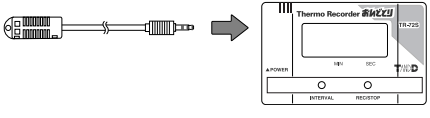
Standard Temperature Sensors (TR-0106)



Connection condition	Channel 1	Channel 2
Both are unconnected	Internal Sensor	—
Ch. 1 is connected	External Sensor	—
Ch. 2 is connected	Internal Sensor	External Sensor
Ch. 1 and 2 are connected	External Sensor	External Sensor

■ TR-72S

Standard Temperature/Humidity Sensor (TR-3110)



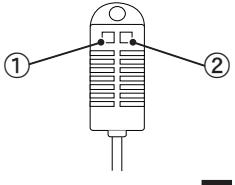
Connection condition	Channel 1	Channel 2
Temp/Humidity sensor connected	External (Temp.)	External (Humidity)
No external sensor connected	Internal (Temp.)	—
Temperature sensor connected	External (Temp.)	—

Temperature and Humidity Sensors

Caution

- The replacement period for the standard sensor is 1 year. Replace it when 1 year has passed after opening the bag. When using the Temperature and Humidity Sensor, the surface can become dirty and may decrease its sensitivity and accuracy. Therefore, if the unit is being used in a dusty or smoky environment, it may be necessary to change the sensor sooner than usual. The accuracy of the sensor may decrease even within 1 year if it is used (kept) outside the specified operation conditions.
- When the sensor is not used, put it in the attached plastic bag with a drying agent and keep it in a cool, dark place at 5 to 25℃ and 30%RH or less.
- Two types of sensor seals are pasted on the sensor. If the seal shows abnormality (appears red), replace the sensor as soon as possible.

■ Sensor Seal Details



① **Water Leakage Sensor Seal**

Normal (White) ☐ Abnormal (Red)) ■

The seal turns red in an abnormal state. This indicates that the sensor has gotten wet.

② **Temperature Sensor Seal**

Normal (White) ☐ Abnormal (Red) 60

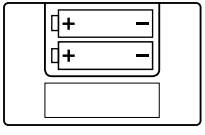
The seal turns red in an abnormal state and the figure 60 is displayed. This indicates that the sensor was exposed to a temperature of 60℃ or more.

Install Batteries and Turn Power On

■ Battery Installation

1 Open the battery cover on the backside of the main unit. 。

2 Install 2 AAA-size alkaline batteries in the correct direction to align ＋ and － .



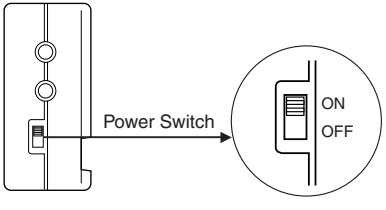
Caution

- Install 2 new batteries. Avoid mixing old and new batteries.
- Sometimes, after installing new batteries, nothing will appear on the display for about 3 seconds; this is not a malfunction.

3 Close the battery cover.

■ Turn Power On

1 Turn ON the power switch on the left side of the unit.



- If during recording the switch is turned OFF, recording will stop and all recorded data will be stored in the main unit.

Battery Life

1 Approximate time till [BAT] mark appears on the LCD display after installing a new set of batteries is as follows:

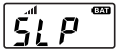
- Recording interval of 2 sec. or longer	Approx. 10 months
- Recording interval of 1 sec.	Approx. 6 months

2 When the battery power becomes low, the [BAT] mark will appear on the LCD display on the main unit. Once the [BAT] mark appears, you should replace the batteries as soon as possible.

- Recording will continue and the recorded data and recording conditions will be stored in the main unit. You can still download the data to your computer.
- Recording will continue while you replace the batteries.
- The main unit will remain operating without batteries during replacement for up to 3 minutes.
- Continuing to use the unit without changing the batteries will cause it to go into sleep mode. From the time the [BAT] mark appears to the time the unit will go into sleep mode is roughly as below. Please change the batteries before the unit goes into the sleep mode.

- Recording interval of 2 sec. or longer	Approx. 3 months
- Recording interval of 1 sec	Approx. 2 months

3 Continuing to use the unit with the [BAT] mark displayed and without changing the batteries will cause the display to change to [SLP] and the unit will enter sleep. Please change the batteries immediately.

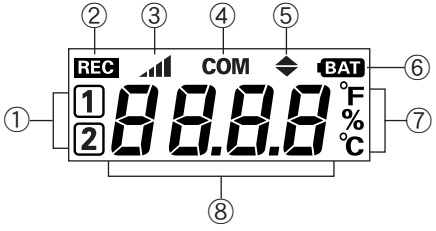


- Recording stops and the recorded data and recording conditions are stored in the main unit.
- Downloading data is only possible if you change the batteries.
- To start recording again after replacing the batteries you must reset the Start Recording settings.
- While replacing the batteries the main unit will continue to function for up to 1 hour without batteries.
- From the time the unit enters sleep mode until battery power is totally lost is about 1 year.

4 If left in sleep mode, the battery power will be lost and the display will turn off.

- Recorded data and recording conditions will be lost from the main unit.
- To start recording again after replacing the batteries you must reset the Start Recording and Recording Conditions settings.

LCD Display



① Displays alternately channel number of present reading.

② Displayed during recording; flashes when waiting to start programmed recording.

③ Indicates amount of data recorded.

④ Indicates communication is occurring with computer.

⑤ Indicates when measurement is above or below the limit.
▼ is displayed for -40 (-60)℃ or less, and ▲ for 110 (155)℃ or more.

※ Figures in ( ) show the usage of TR-71S wide range temperature sensor.

⑥ Indicates battery life warning; displayed when battery power becomes low.

⑦ Displays unit of temperature. Can be changed between Celsius and Fahrenheit via computer.
% (Humidity unit) display is only for TR-72S.

⑧ Displays alternately Present Temperature or Humidity for each channel.

Start Recording and Set Recording Interval via Main Unit

Recording can be started and interval settings made via the buttons on the main unit.

▶ Only Recording Start/Stop and Recording Interval can be controlled by using the main unit buttons. Other settings, such as Temperature Unit of Display (C/F) and Recording Mode, can only be made via computer.
See page 18 "Start Recording and Set Recording Conditions via Computer" for more details.

■ Start Recording

⚠ **CAUTION**

- Once a new recording starts, all the recorded data in the main unit is erased.
- Pressing the [REC/STOP] even during waiting for a programmed start will start recording immediately.

1 Press the [REC/STOP] Button for more than 3 seconds or until "REC" appears on the LCD and recording starts.

※ If the unit is set for Endless Method "LOOP" will be displayed on the LCD before "REC" appears.

■ Stop Recording

1 Press down on the [REC/STOP] button until the "REC" mark disappears from the display (about 3 seconds) and recording will be stopped.

■ Set Recording Interval

⚠ **CAUTION**

The Recording Interval cannot be set or changed during recording and /or during wait for a programmed start.

1 Press down on the [INTERVAL] button for about 3 seconds or until the measurement value display changes to the Recording Interval display. Release the button.

EX: Recording interval is 15 seconds .15

Recording interval is 15 minutes 15.

- If during recording or while waiting for a programmed recording to start the [INTERVAL] button is pressed down for 3 seconds or more, the present recording interval setting will be displayed. Upon releasing the button the measurement display will return.

2 Select the desired recording interval by pressing the [INTERVAL] button. The interval will change each time you press on the button.

3 Stop pressing the button when the desired recording interval has been reached.When the display returns to the measurement value display the interval setting will be completed.

Start Recording and Set Recording Conditions via Computer

Start Recording and Recording Conditions can be set via your computer by using the software "Thermo Recorder for Windows". The following settings can also will be made:

▶ For more details, see the Thermo Recorder for Windows User's Manual or the "HELP" menu of the software.

■ Recording Start/Stop

Start and Stop the Recording via the Software.

⚠ **CAUTION**

By starting a new recording or by making new recording conditions, recorded data stored in the main unit will be erased. Be sure to download and save any necessary recorded data left in main unit before making new settings.

■ Set Recording Conditions

Recording Conditions such as "Record Starting Date", "Interval", "Recording Mode" and "Temperature Unit of Display(C/F)" can be set or changed easily via your computer.

In "Recording Mode" you can select from two recording methods.

- **One Time Method**
  One Time Method: Recording stops when 8,000 data readings have been recorded and "FULL" is indicated on the LCD. The estimated time to reach "FULL" can be calculated with the following formula:

  EX: A 30 second recording interval x 8,000 readings (Maximum readings that the unit can record)
  = 240,000 seconds =Approx. 2 days, 18 hours, and 40 minutes.

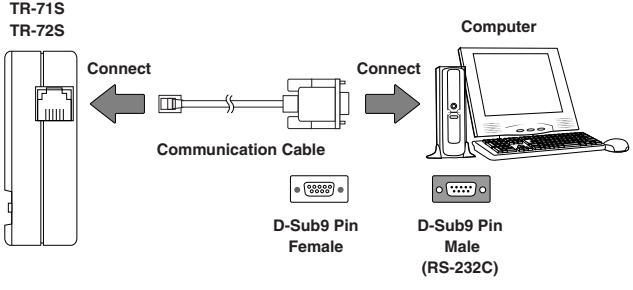
- **Endless Loop Method**
  When 8,000 readings have been recorded the oldest data is overwritten and recording continues.

■ Set Up Procedure

1 Connect the serial port of your computer and the main unit through the standard communication cable. Connect the cable to a serial port which has the following mark:

⚠ CAUTION

- Make sure to fully insert the connector to secure a proper connection.
- Connecting to a wrong port will result in communication failure.



2 Open "Thermo Recorder for Windows" on your computer and make settings such as "Start Recording" and other "Recording Conditions".

▶ For more details, see Thermo Recorder for Windows User's Manual or the "HELP" menu of the software.

Display Amount of Recorded Data

Amount of recorded data stored in the main unit will be displayed on the LCD.

Recording Mode	As Recorded Data Increases	After Reaching Max
One-time Method		FULL
Endless Loop Method		

- In One Time Method, the display will read [FULL] when it reaches capacity and recording will stop.
- In Endless Loop Method, when it reaches capacity the indication will remain the same but recording will continue.

Collecting Recorded Data

With our exclusive software "Thermo Recorder for Windows" it is possible to download all of the recorded data from TR-71S and TR-72S as well as carry out the following functions in managing the data.

- Display 8 channels of data in colorful graphs
- Control Display ON / OFF for each channel
- Zoom in and out of graph data
- Display data for two points on graph and differences in measurements for those points
- Select calculation range and calculate highest, lowest and average values for that range
- Select and set precise recording start date and time
- Change channel names
- Change channel order
- Merge channels
- Delete channels
- Change graph background color, line color and line width.
- Create data tables
- Print out graphs and tables
- Create and export data in Text file format
- Save data files

▶ For more details about these functions and operation of the software , see Thermo Recorder for Windows User's Manual or the "HELP" menu of the software.

Optional Sensors List

■ Temperature Sensors (for TR-7 Series)

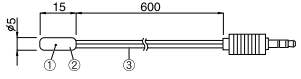
Possible Measurement Range: -40 to 110℃
Sensor Temperature Durability: -50 to 115℃
Measurement Accuracy: Average ± 0.3℃ (-20 to 80℃)
Average ± 0.5℃ (-40 to -20 ／ 80 to 110℃)

Materials ① Thermistor ② TPE resin-shielded sensor ③ TPE resin-shielded wire ④ M3 Screw Hole ⑤ Compaction Tube ⑥ Stainless Pipe(SUS304) ⑦ Stainless Pipe(SUS316)

All dimensions in mm

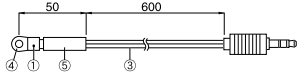
TR-0106 TPE resin-Shielded Sensor

Cable Length: 0.6m
Thermal-Constant Time
In the Air: Approx. 75 Sec.



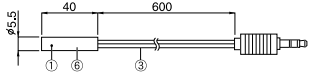
TR-0206 Stainless Protection Sensor

Cable Length: 0.6m
Thermal-Constant Time
In the Air: Approx. 75 Sec.



TR-0306 Stainless Protection Sensor

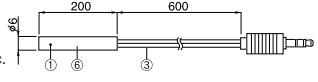
Cable Length: 0.6m
Thermal-Constant Time
In agitated water: Approx. 18 Sec.



※ Only stainless section is water resistant.

TR-0406 Stainless Protection Sensor

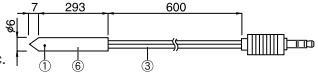
Cable Length: 0.6m
Thermal-Constant Time
In agitated water: Approx. 20 Sec.



※ Only stainless section is water resistant.

TR-0506 Stainless Protection Sensor

Cable Length: 0.6m
Thermal-Constant Time
In agitated water: Approx. 20 Sec.



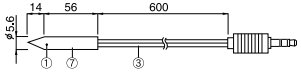
※ Only stainless section is water resistant.

TR-0706 Stainless Protection Sensor

Cable Length: 0.6m

Thermal-Constant Time

In agitated water: Approx. 18 Sec.



※ Only stainless section is water resistant.

■ Wide Range Temperature Sensors (for TR-71S)

⚠ **CAUTION**

These sensors cannot be used with TR-72S/TR-71/TR-72.

Possible Measurement Range: -60 to 155℃

Sensor Temperature Durability: -70 to 180℃

Water Resistant Ability: Splash Resistant

Measurement Accuracy: Average ± 0.5℃ (-40 to 80℃)
Average ± 1.0℃ (-60 to -40 ／ 80 to 100℃)
Average ± 2.0℃ (100 to 155℃)

Materials ① Thermistor ② Stainless Pipe(SUS316) ③ Teflon Compaction Tube
④ Teflon Resin(FEP) Shielded

TR-1106 Teflon-Shielded Sensor

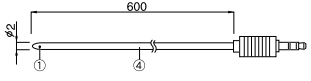
All dimensions in mm

Cable Length: 0.6m

Thermal-Constant Time

In the Air: Approx. 15 Sec.

In agitated water: Approx. 2 Sec.



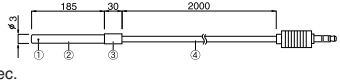
TR-1220 Stainless Protection Sensor

Cable Length: 2m

Thermal-Constant Time

In the Air: Approx. 36 Sec.

In agitated water: Approx. 7 Sec.



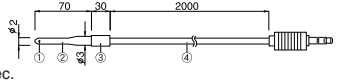
TR-1320 Stainless Protection Sensor

Cable Length: 2m

Thermal-Constant Time

In the Air: Approx. 12 Sec.

In agitated water: Approx. 2 Sec.



■ Temperature and Humidity Sensors (for TR-72S/TR-72)

Humidity Measurement Range: 10 to 95%

Temperature Measurement Range: 0 to 50℃

Sensor Durability Range: -10 to 55℃

Humidity Measurement Accuracy: ± 5%RH (at 25℃ and 50%RH)

Service Life: 1 year under normal conditions

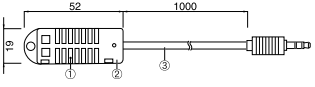
Operational Conditions: No Dew Condensation or Water Leakage
No contact with organic solvents, solution or gasses emitted from spoiled foods.

Materials ① Temperature / Humidity Sensor ② Polypropylene ③ Vinyl Chloride Coated Wire

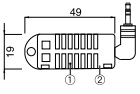
TR-3110 Humidity and Temperature Sensor

All dimensions in mm

Cable Length: 1m



TR-3100 Humidity and Temperature Sensor

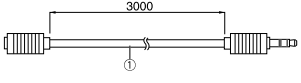


■ Sensor Extension Cable

TR-1C30 Sensor Extension Cable

All dimensions in mm

Cable Length: 3m



Materials ① Vinyl Chloride Coated Wire

⚠ **CAUTION**

- Cannot be used with Temperature / Humidity sensor.
- Use only one extension cable per temperature sensor.

Product Specifications

Unit	TR-71S	TR-72S	
Measurement Channel	2 Channel (Select from Internal or External)	2 Channel (Temperature and Humidity)	
Measurement Item	Temperature Only	Temperature	Humidity
Internal Sensor	-10 to 60℃	-10 to 60℃	-
External Sensor	-40 to 110℃	0 to 50℃	10 to 95% RH
Optional Sensor	-60 to 155℃ ※1	-40 to 110℃	-
Measurement Accuracy (Standard Sensor)	Average ± 0.3℃ (-20 to 80℃) Average ± 0.5℃ (-40 to -20 / 80 to 110℃)		± 5% RH (at 25℃ and 50%RH
Measurement Resolution Display	0.1℃		1% RH
Sensor Materials	Thermistor		Polymer
Recording Intervals	1. 2. 5. 10. 15. 20. 30 Seconds, 1. 2. 5. 10. 15. 20. 30. 60 Minutes / Total of 15 choices		
Recording Capacity	8000 Readings × 2 Channels		
Recording Mode	Endless Loop Method / One time Method		
LCD Display	Current Temperature, Recording Settings, Battery Life Warning, Exceed Measurement Range Warning, Reading Capacity, Unit of Temperature		
Battery	AAA Alkaline Batteries x 2		
Battery Life	Approximately 1 year ※2		
Data Back-up	Low Battery Power/Switched OFF		
Interface	Serial Communication (RS-232C)		
Communication Speed	Download at 9,600 bps (50 Sec./per Unit when data is full)		
Dimensions	H55mm x W88mm x D24mm		
Weight	95g (Including AAA Alkaline Batteries x 2)		
Temp. and Humidity Durability of the Unit	Temperature:-10 to 60℃ Humidity :Less than 90%RH (Without dew condensation)		
Standard Sensors	TR-0106 x 2	TR-3110 x 1	
Accessories	AAA Alkaline Batteries (LR03) x 2 Communication Cable (RS-232C D-Sub9 pins cable length 1.5m) x 1 Standard Software x 1 set / User's Guide x 1 set		

※1 There are 2 types of temperature sensors covering different ranges for use with the TR-71S. For details, see page 22 "Optional Sensors List".

※2 Battery life differs depending on measurement environment and battery performance. Changing the battery is possible even during recording.

Provisions for Free Repair

1 If the unit does not work properly despite the fact that the customer used it properly and in line with the User's Guide, the unit shall be repaired free of charge through the agent which sold the unit.

2 If the customer requests free repair because of trouble within the warranty period, bring or send the unit along with the warranty to the dealer. A service charge may be added if a repairperson must be sent out to the place of use for repair.

3 If you have moved after purchasing, or the product was received as a gift, or there are some difficulties contacting the shop from which you purchased the unit, please contact us directly for service.

4 Free repair is not available in the following cases even though it is within the warranty period:

(1) Trouble or damage was caused by careless operation, natural disaster, fire, public pollution, or use of a power source other than specified.

(2) If repair, adjustment, disassembly or modification of the unit has been carried out by a person other than a T&D authorized engineer.

(3) Trouble or damage was caused by transportation, movement or dropping of the unit after purchase.

(4) Failure to submit the Warranty or failure to fill in all items required in the Warranty.

5 The Warranty cannot be reissued.

This Warranty only promises customers free repair within the period and conditions clarified in this Warranty. Therefore, the customer's legal rights will not be limited by this Warranty. For further information on repair and others service questions after the termination of the warranty period, contact your dealer.

T&D CORPORATION

5652-169 Sasaga Matsumoto City NAGANO 399-0033 JAPAN
Phone:+81-263-27-2131　Facsimile:+81-263-26-4281

Homepage : http : //www.tandd.co.jp/english/
E-Mail:overseas@tandd.co.jp