Operation Manual

Data recording software
for TC-351F

TC-7351

◆ Tokyo Measuring Instruments Lab.

NOTICE

This operation manual provides instructions to operate "TC-7351" Data recording software for TC-351F.

Please read this operation manual thoroughly to familiarize yourself with the functions and operating procedures of this product for maximum use of all the functions and precise and effective measurements.

Please keep this manual always at hand for your reference.

Guide to read this manual

The following symbols and indications are used to describe important items. Please read the description of each symbol carefully.

⚠ Danger   If you ignore this indication and use this system in an improper way, it may cause danger which will result in death or serious injury.

⚠ Warning   If you ignore this indication and use this system in an improper way, it may cause danger which will result in injury.

⚠ Caution   If you ignore this indication and use this system in an improper way, it may cause the occurrence of physical obstacles.

Note   Indicates precautions or supplementary instructions to avoid erroneous operation etc.

✎   Indicates useful information which will help you gain a better understanding of the contents of this manual.

This operation manual applies to TC-7351 software version 2.2.0.

Safety Precautions

⚠ Danger Do not operate the system in the presence of flammable gas or flammable vapor. This may cause fire.

⚠ Danger Do not disassemble or remodel the system on your own. It may cause electric shock or malfunction.

⚠ Danger Never connect the grounding cable to a gas pipe. Always disconnect the power supply cable BEFORE connecting or disconnecting the grounding cable. There is danger of fire and electric shock.

⚠ Warning Powder or dust inside the system may cause poor contact or a lowered insulation effect in the connector. Pay special attention not to allow dust to enter the system during use and storage.

⚠ Caution It is dangerous to use the system with liquid such as water or a metallic object entered. Pay attention not to allow foreign substances entering inside.

⚠ Caution Operate the system at a specified temperature range. When operating under direct sunlight or extremely low temperature, arrange for shading device or a thermal insulating material.
Do not leave the system in a closed vehicle because it may cause failure due to temperature rise.

⚠ Caution Operate the system at a relative humidity of 85% or less. Do not expose it to rain or extreme humidity. Otherwise, malfunction may be caused.

⚠ Caution Sudden change in ambient temperature may cause dew condensation. Leave the system in the ambient temperature before turning on the power. Do not leave the system under direct sunlight or freezing temperature.

⚠ Caution Do not use or place the system or its wiring close to large electric motors, cranes, transformers, or welding machines. Use a special cable such as a shielded cable when extending the sensor to a place subject to a strong electric field such as vicinity of power substation or radio transmission station.

⚠ Caution If a lowering, fluctuation or interruption of the AC power source is expected, use a constant voltage transformer or a commercial power source synchronous type uninterruptible power supply.

⚠ Caution Do not forcibly pull connection cables while they are connected. The cables may be broken and/or the connectors may be disconnected. Do not apply impact to cable connectors. Keep the connectors away from dirt, mud, water, oil, etc.

⚠ Caution When using the output of this system for some control or alarm, pay sufficient attention to Open and Over data which may be outputted by a sensor failure such as disconnection.

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Chapter 1

Overview

1.1 Overview

This software is used for controlling TML Small FWD System FWD-Light.

This software enables to obtain load and acceleration by controlling small FWD main body (KFD-100A) and external displacement sensor (KFDS-1A four units at maximum; these are optional items). Also it enables the followings.

Indicating values of maximum load, maximum displacement obtained

Calculation of coefficient of subgrade reaction (K_{TML}) and modulus of subgrade elasticity (E_{TML})

Indicating result of calculation data

1.2 Feature

- The measurement settings of Small FWD main body can be indicated
- List indication of measured data
- Calculation of Coefficient of subgrade reaction (K_{TML}) and Modulus of subgrade elasticity (E_{TML})

Chapter 2

Installation and uninstallation of software

2.1 Installation of software

The Data recording software for TC-351F (TC-7351) should be installed by the following procedure.

This section describes how to install the software on Windows 10.

> Note · The CD-ROM does not start automatically. Follow methods below to start the setup program (TC-7351.EXE).
> · If you have a version earlier than Ver. 2.2.0 installed, please uninstall the earlier version before installing Ver. 2.2.0.
> · This software is for Windows 7/ 8.1/ 10 32/ 64bit. Do not install it on other Windows.

❑ How to start the setup program
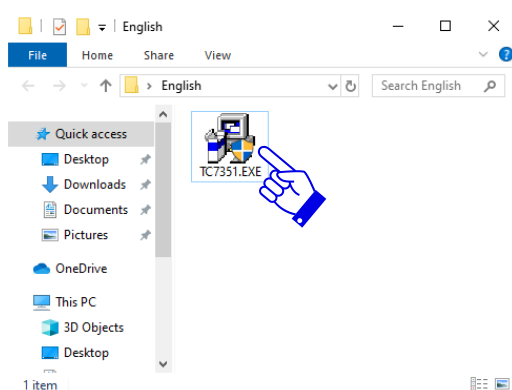
Insert the supplied CD-ROM for setting up the measurement processing software into your computer.

Select the CD-ROM drive from the drives in This PC.

Select the "English" folder in the CD-ROM.

Select the "TC7351.EXE" file in the "English" folder to start the setup program.

When [User Account Control] window appears, click [Yes].

❏ Software installation

[1] Setup window is indicated after starting the setup program. After that, the [Welcome] window will appear.
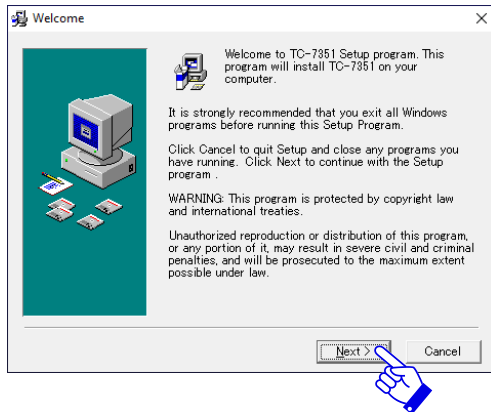
[2] To start the installation, click [Next >].
To cancel the installation, click [Cancel].
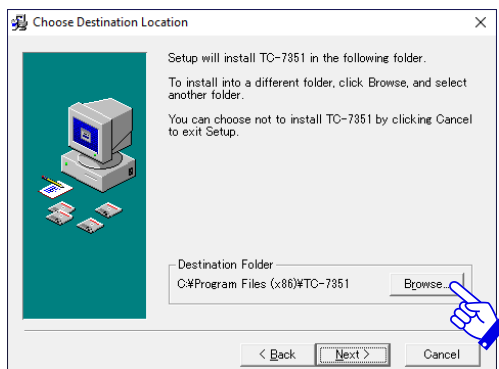
[3] [Choose Destination Location] window appears. In this window, designate the drive and directory where the software will be installed.
The default installation directory is [C:¥Program Files (x86)¥TC7351¥].
When changing the installation directory, click [Browse...] button.

Click [Next >] button to continue.
Click [Cancel] to cancel the installation.
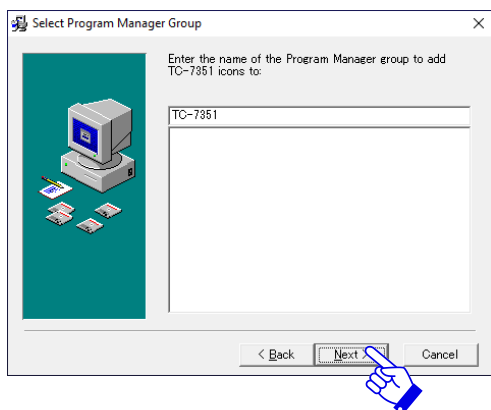
[4] [Select Program Manager Group] window appears.

Click [Next >] to continue.
Click [Cancel] to cancel the installation.
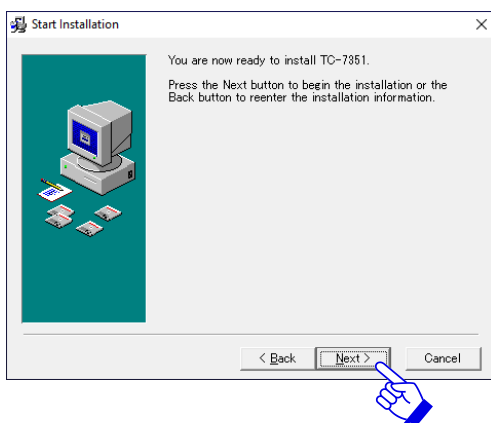
[5] [Start Installation] window appears.

Click [Next >] to start copying the file.
Click [Cancel] to cancel the installation.
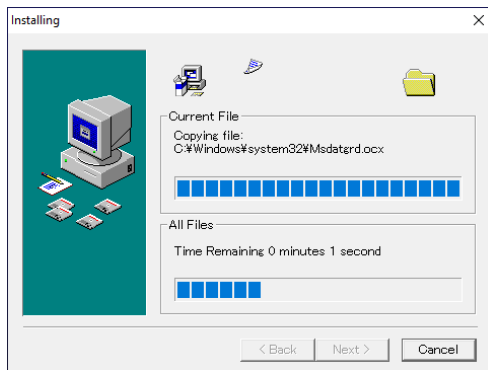
[6] Indicator appears to show the installation condition.

If [Cancel] button is clicked, the installation is quitted and the file contents already copied up the cancel time are deleted.
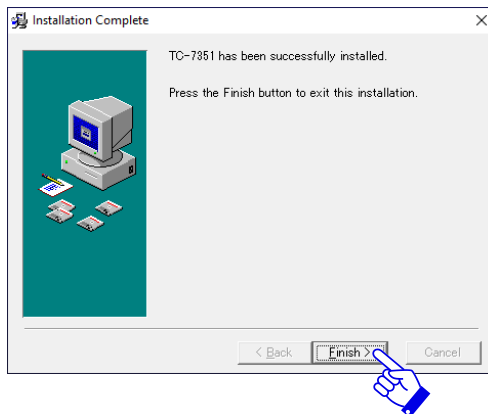
[7] When the installation is finished, [Installation Complete] window will appear.

Click [Finish >] to finish the installation of the Measurement/Analysis software.

When the installation is completed successfully, the software can be launched from the [⊞ Start] menu.

2.2 Uninstallation of software

The Data recording software for TC-351F (TC-7351) should be uninstalled by the following procedures.
This section describes how to uninstall the software on Windows 10.

> Note ・The data files will not be deleted by uninstalling the software.
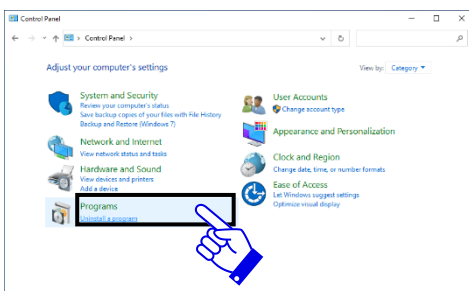
[1] From the [⊞ Start] menu, select [Windows System] – [Control Panel].

Select [Uninstall a programs] in [Control Panel].
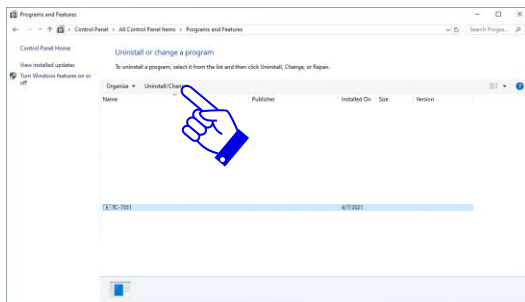
[2] Select "TC-7351" among the list, and click on the [Uninstall/Change] button.
When [User Account Control] window appears, click [Yes].

[3] The uninstaller initialization screen will appear.
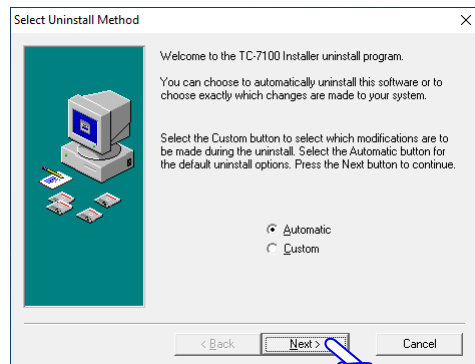
[4] [Select Uninstall Method] window will appear. Select Automatic or Custom.

Click [Next >] to continue.
Click [Cancel] to cancel the uninstallation.
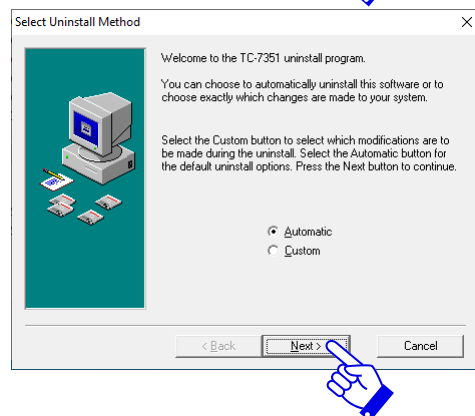
[5] [Perform Uninstall] window will appear.

Click [Finish] to perform the uninstallation.
Click [Cancel] to cancel the uninstallation.
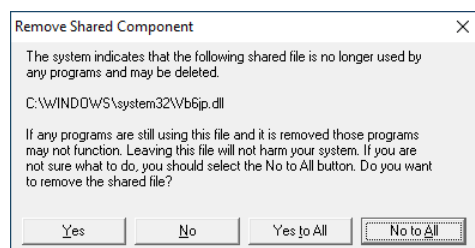
[6] In some cases, [Remove shared Component] window appears.

For the shared component, click [Yes] if you don't need it, or click [No] if you are using it in other software.

2-5
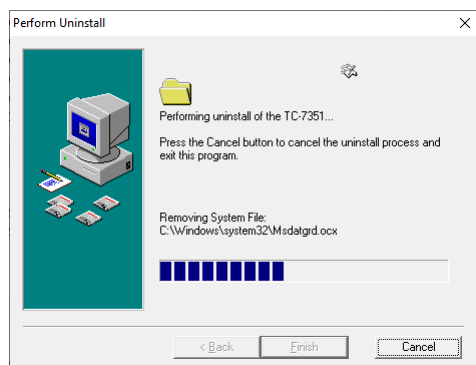
[7] Indicator appears to show the uninstallation condition.

Click [Cancel] to cancel the uninstallation.

When the uninstallation is completed successfully, windows will disappear.
Verify that the program has been uninstalled from the [▦ Start] menu.

Chapter 3

Starting and quitting application

3.1 Starting application
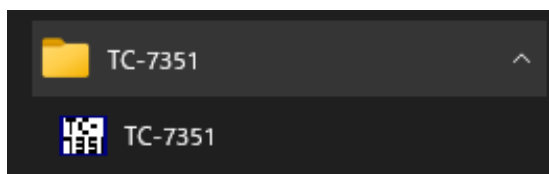
Select [TC-7351] from the list of programs in the [⊞ Start] menu, and then select the desired software.

When the program is launched, the main menu screen will be displayed.
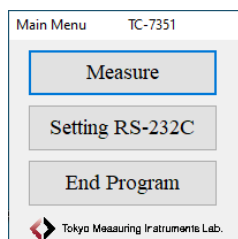
3.2 Quitting application

To quit the software, press the [End Program] button.
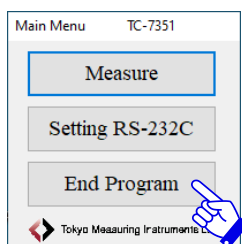
3.3 Displaying software version information

The software version information can be indicated by double-clicking the [Tokyo Measuring Instruments Lab.] in the [TC-7351] main menu screens.
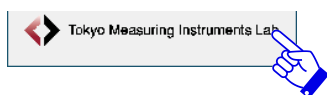
Double-clicking
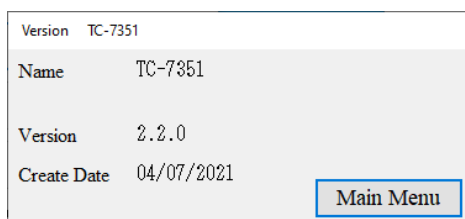
Version indicate

Software Name
    Indicates the name of the software.
    TC-7351
Version
    Indicates the version of the software.
Create Date
    Indicates the creation date of the software.

Chapter 4

Before starting measurement

4.1 Connecting TC-351F and small FWD main body

In case of using only Exclusive indicator TC-351F and Small FWD main body, connect the TC-351F and the Small FWD main body using the 5 meter long 7-pin- 5-pin cable provided for the Small FWD main body as in the figure below.

Insert the connectors tight enough to avoid them from being loosened. If loosened, it may cause operation failure.

Small FWD main body
KFD-100A

7-pin 5-pin cable provided for
small FWD main body

5-pin side

7-pin side

Exclusive indicator
TC-351F
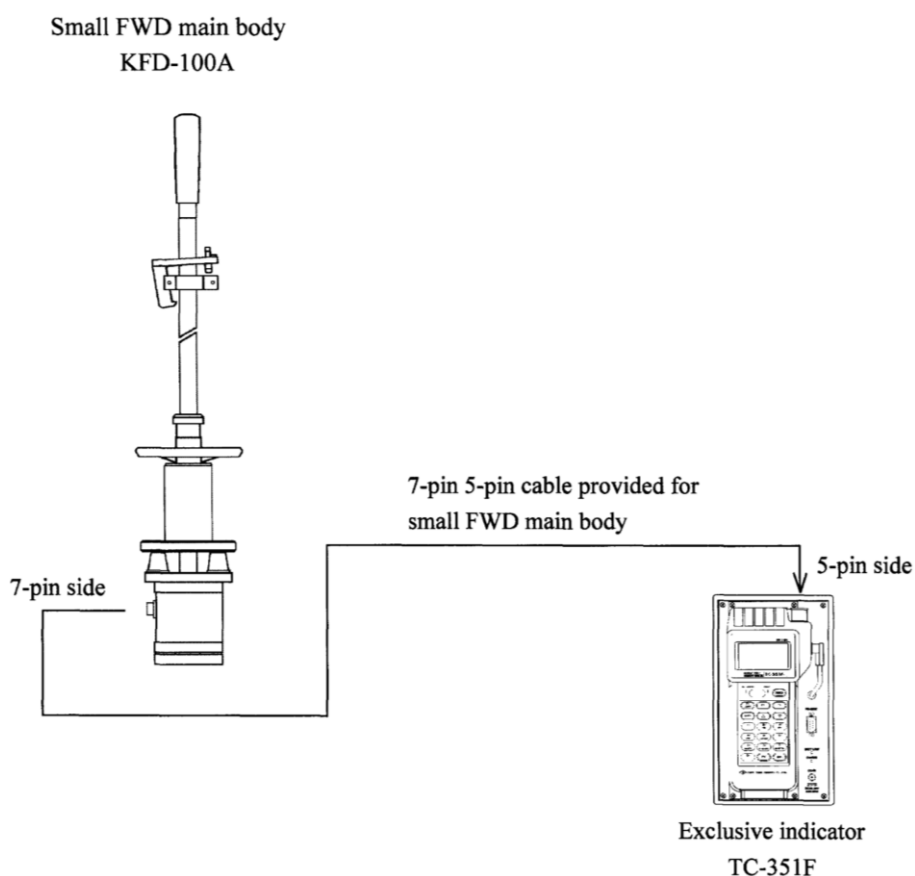
4.2 Connecting TC-351F, external displacement sensor

In case of using Exclusive indicator TC-351F, Small FWD main body and External displacement sensor, connect the TC-351F and the Small FWD main body using the 5 meter long 7-pin- 5-pin cable provided for the Small FWD main body.

Also connect between the external displacement sensors and one of the external displacement sensor and the Small FWD main body using the 5 meter long 7-pin- 7-pin cable provided for the external displacement sensor.

Insert the connectors tight enough to avoid them from being loosened. If loosened, it may cause operation failure.

Small FWD main body
KFD-100A

External displacement
sensor
KFDS-1A

7-pin - 7-pin cable
provided for
external displacement sensor

7-pin 5-pin cable
provided for
small FWD main body

5-pin side

7-pin side

7-pin
side

7-pin - 7-pin cable provided for
external displacement sensor

Exclusive indicator
TC-351F

4-3
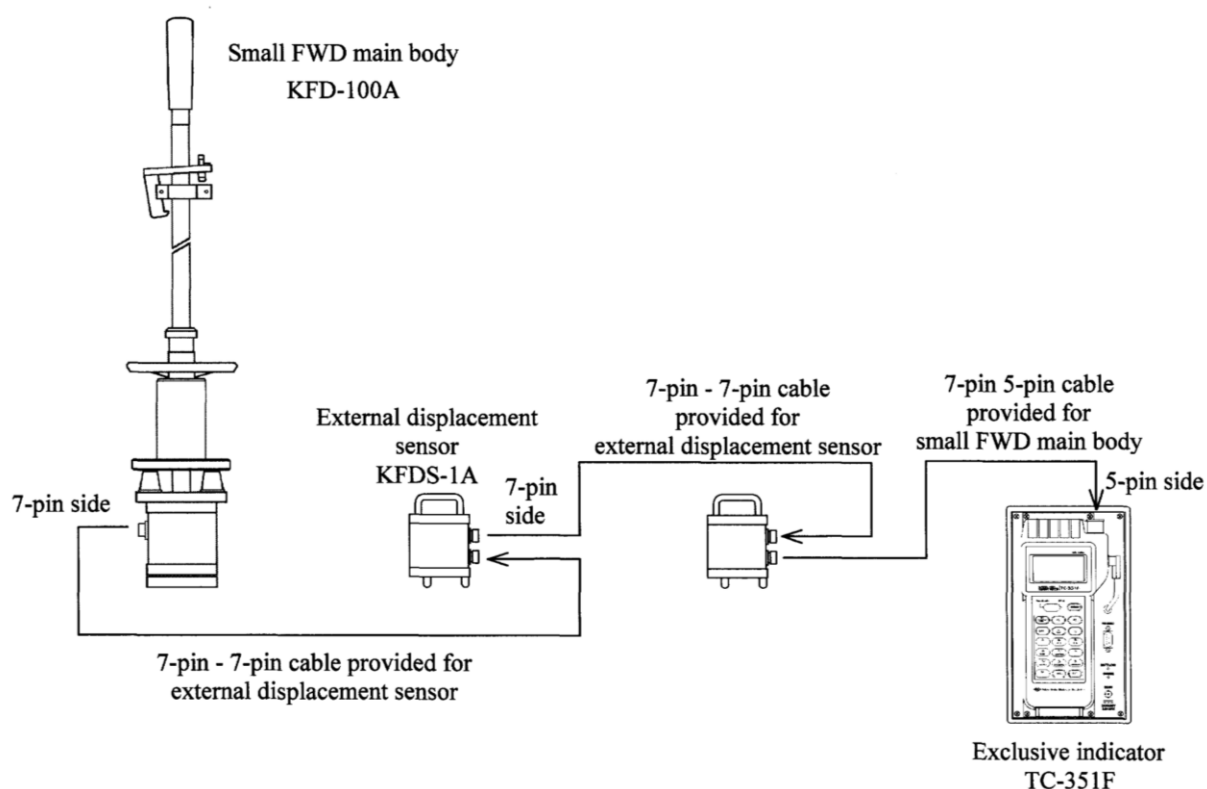
4.3 Connecting AC power package

The instrument can be operated by AC power package where AC power source is available.

Connected to DC-IN

AC Adapter
CR-1870

Connected to
AC 100V to 240V

Exclusive indicator
TC-351F
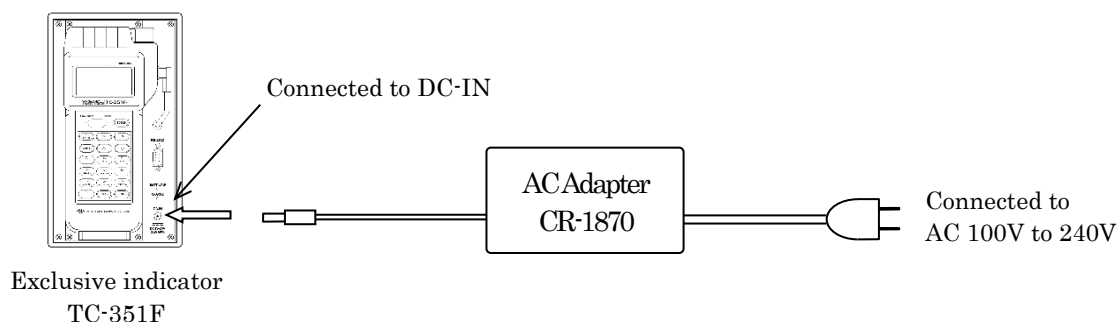
4.4 Connecting TC-351F and PC

Connect between the TC-351F and a personal computer using RS-232C cable (CR-5360).
The CR-5360 is a 9-pin - 9-pin cable.
If the RS-232C connecter of the PC is other than 9-pin, use a conversion adaptor.
If the PC has no RS-232C connector but the USB connector, use the USB-RS-232C conversion adapter.

1) In the case of connection to a PC's RS-232C connector.

Inserted to
[RS-232C IOIOI]
connector

Inserted to
[RS-232C] connector

Female pin side

RS-232C cable
CR-5360 (Option)

PC (Option)

Exclusive indicator
TC-351F
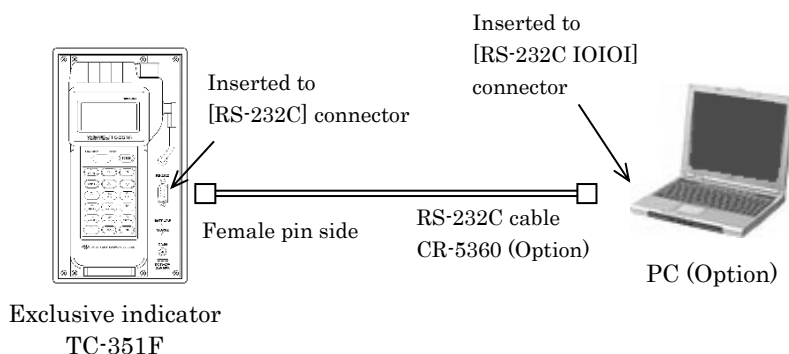
2) In the case of connection to the PC's USB connector with a conversion adapter.

Inserted to
[USB] connector

Inserted to
[RS-232C] connector

RS-232C cable
CR-5360 (Option)

USB-RS-232C
conversion adapter
(Option)

PC (Option)

Exclusive indicator
TC-351F
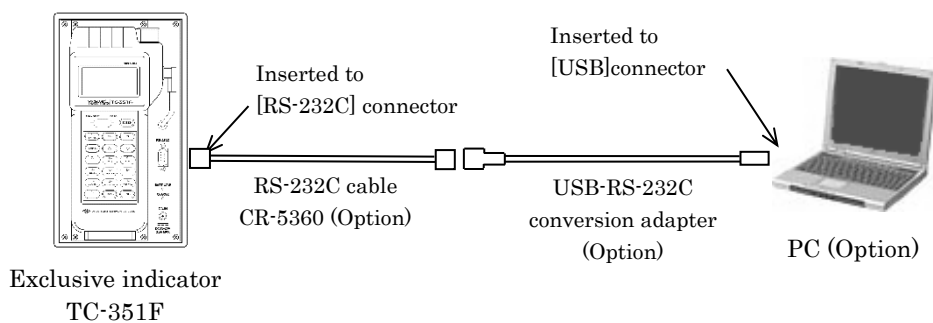
4.5 Turning on the power of TC-351F

By pressing (POWER) key and turning the power on, the following standby screen is indicated.

```
┌─────────────────────────────┐
│                             │
│  ┌───────────────────────┐  │
│  │ FWD  Handy  Meter     │  │
│  │ TC-351F  VerX. XX     │  │
│  │ XXXX. XX. XX          │  │
│  └───────────────────────┘  │
│                             │
│  Tokyo  Sokki              │
│  Kenkyujyo Co., Ltd.       │
│                             │
└─────────────────────────────┘
```
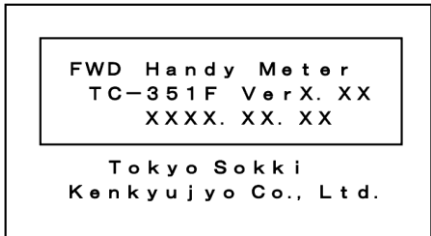
The product name, type name and version are indicated for approximately 1 second.

```
┌─────────────────────────────┐
│                             │
│  ┌───────────────────────┐  │
│  │ FWD  Handy  Meter     │  │
│  │ TC-351F  VerX. XX     │  │
│  │ XXXX. XX. XX          │  │
│  └───────────────────────┘  │
│                             │
│  Param.  Reading....       │
│                             │
└─────────────────────────────┘
```
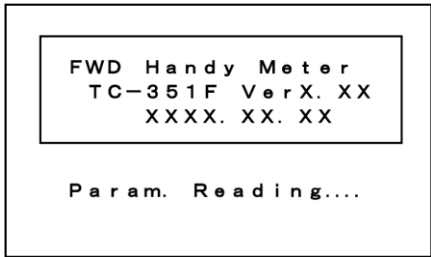
Test conditions are read in from the small FWD main body. If the small FWD main body is unconnected, a message "Un-connection" is displayed and the screen displays standby screen.

```
┌─────────────────────────────┐
│ <<Param. >>      12:00:00   │
│                             │
│ Diameter     φ 100  mm      │
│ Poisson's    0. 300         │
│                             │
│ F-Name                      │
│    A000 . CSV  No. 00       │
│                             │
└─────────────────────────────┘
```
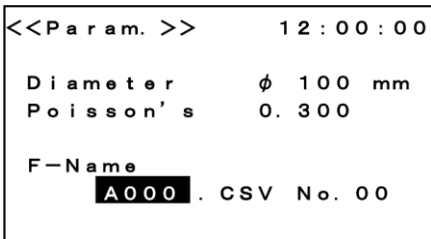
The following test conditions are displayed in standby screen,

12:00:00	: Current time (hour:min:sec)
Diameter	: Diameter of loading plate (mm)
Poisson's	: Poisson's ratio
F-Name	: Name of stored files
No.	: Measurement No.

Repressing (POWER) key turn the power off.

4.6 Monitoring by TC-351F

Confirm the connection of Small FWD main body and External displacement sensor by the TC-351F.

Note   The sensor whose connection is not confirmed by the TC-351F cannot be used in the software. Be sure to confirm the connection. If the sensor is not monitored even though it is connected, check the cable connection.
   Set the display of the TC-351F to standby screen in order to conduct measurement using the software. Control from the software is impossible in other screens.

```
<<Param. >>        12:00:00

Diameter        φ 100 mm
Poisson's       0.300

F-Name
     A000 . CSV No. 00
```

Standby screen

Change to monitor screen by pressing (5 MONITOR) key.

```
<<Monitor>> 12:00:00

+       50   [P0]
             N

+      0.1   [A0]
             m/S²
 A1/A2        BAL
```

Load and acceleration of the Small FWD main body is indicated.

— Load of main body (P0, Unit m/s²)
— Acceleration of main body (A0, Unit m/s²)

Acccleration of external displacement sensor A1 and A2 is indicated by pressing (F1 LIHGT) key (A1/A2).
(In case of connecting optional external displacement sensor.)

```
<<Monitor>> 12:00:00

+      0.3   [A1]
             m/S²

+      0.1   [A2]
             m/S²
 A3/A4        BAL
```

— Acceleration of external displacement sensor1 (A1, Unit m/s²)
— Acceleration of external displacement sensor2 (A2, Unit m/s²)

Acccleration of external displacement sensor A3 and A4 is indicated by pressing (F1 LIHGT) key (A3/A4).
(In case of connecting optional external displacement sensor.)

```
<<Monitor>> 12:00:00

+      0.2   [A3]
             m/S²

+      0.1   [A4]
             m/S²
 P0/A0        BAL
```

— Acceleration of external displacement sensor3 (A3, Unit m/s²)
— Acceleration of external displacement sensor4 (A4, Unit m/s²)

Load and acceleration of the Small FWD main body is indicated by pressing (F1 LIHGT) key (P0/A0).

```
<<Param. >>        12:00:00

Diameter        φ 100 mm
Poisson's       0.300

F-Name
     A000 . CSV No. 00
```

The display returns to standby screen by pressing (ESC) key.

4.7 Use with TC-7351

To use the TC-351F with TC-7351, follow the precautions below.

> Note
> ・The screen display of TC-351F should be set to standby screen when use TC-351F with TC-7351. If the screen display is set to any other screen, RS-232C communication cannot be performed and an errors will occur.
> ・Do not operate the main unit of TC-351F while using TC-351F with TC-7351. RS-232C communication will be interrupted and an errors will occur.

✎memo

Chapter 5

Various operation methods

5.1 Main menu

Main Menu is used to call Submenu, disclose version information.
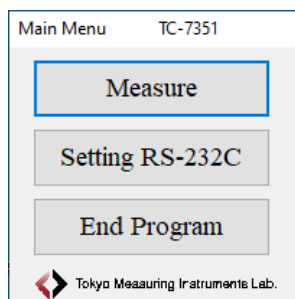
[Measure]	Conduct measurement, indicate List of measured data.
[Setting RS-232C]	Indicates RS-232C setting.
[End Program]	Quit the program.

5.2 Measure

Note   Please set TC-351F to standby mode. Do not operate TC-351F while the measurement monitor screen is being displayed.
If TC-351F is operated or an error occurs in the communication of RS-232C, the following error message is displayed and it returns to the main menu.
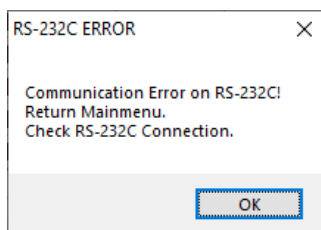
If the above message is indicated after operating TC-351F, set TC-351F to standby mode.
If the error message is indicated in other cases, check the connection of RS-232C cable, etc. and execute the measurement monitor again.

With the [Measure] screen, indication of monitored values and measured values, balancing and measurement start are enabled.

When the [Measure] is selected in the main menu, the connection of TC-351F, small FWD main body (KFD-100A), and external displacement sensor (KFDS-1B) is checked first.

Screen while confirming connection

Indication of confirming connection

If the connection cannot be confirmed, the following message appears.
Click [OK] button to return to Main Menu.

Connection of TC-351F was not confirmed. Click [OK] to return to Main Menu and check such as RS-232C setting, connection of cables and RS-232C cable.

Connection of small FWD main body (KFD-100A) or external displacement sensor (KFDS-1B) was not confirmed. Click [OK] to return to Main Menu and check connection of KFD-100A and KFDS-1B.

When the connection of TC-351F is confirmed, the following screen is indicated. (In case of only small FWD main body used)

Indicates the load and displacement.

Indicates sensor input values.

Explanation of buttons
[Setting]   Indicates test condition.
[Balance]   Balances sensor inputs.
[Start]   Indicates measurement screen and waits for the measurement start. After measurement completion, loads measured data to PC and conducts calculation and the result indication.
[Meas.No.]   Change the Measurement Number.

When external displacement sensor(s) (option) is being connected, the following screen is indicated.

No.	Date Time	Load P0 N	Disp. D0 mm	K-TML MN/m3	E-TML MN/m2	Disp.D1 mm	Disp.D2 mm	Disp.D3 mm	Disp.D4 mm
00188	2009/07/09 13:20:25	1659	2.563	27	7	0.281	0.126	0.281	0.126
00187	2009/07/09 11:58:12	2022	2.152	40	11	0.312	0.144	0.312	0.144
00186	2009/07/09 10:51:10	1653	3.741	19	5	0.261	0.128	0.261	0.128
00185	2009/07/09 10:50:59	1581	4.991	13	4	0.255	0.119	0.255	0.119
00184	2009/07/09 10:43:00	1988	2.166	39	11	0.305	0.153	0.305	0.153
00183	2009/07/09 10:08:55	2025	2.228	39	11	0.258	0.156	0.258	0.156
00182	2009/07/09 10:08:47	2003	2.292	37	10	0.249	0.156	0.249	0.156
00181	2009/07/09 10:07:43	2034	2.299	38	10	0.259	0.156	0.259	0.156
00180	2009/07/09 10:07:29	2003	2.186	39	11	0.258	0.153	0.258	0.153
00179	2009/07/09 10:07:01	2004	2.239	38	10	0.264	0.152	0.264	0.152

Measure   TC-7351

Result Data   Diameter   150   mm   Poisson's Ratio   0.300

Load P0	36	N
Acc. A0	-0.2	m/s2
Acc. A1	-1.8	m/s2
Acc. A2	-0.6	m/s2
Acc. A3	0.8	m/s2
Acc. A4	0.2	m/s2

Setting   Start   Balance   Meas. No.   Main Menu

Indicates external displacement

Indicates external acceleration

❏ Explanation of screen display

Indicates diameter of loading plate.　　　　Indicates Poisson's ratio.

No.	Date Time	Load P0	Disp. D0	K-TML	E-TML	Disp.D1	Disp.D2	Disp.D3	Disp.D4
		N	mm	MN/m3	MN/m2	mm	mm	mm	mm
00188	2009/07/09 13:20:25	1659	2.563	27	7	0.281	0.126	0.281	0.126
00187	2009/07/09 11:58:12	2022	2.152	40	11	0.312	0.144	0.312	0.144
00186	2009/07/09 10:51:10	1653	3.741	19	5	0.261	0.128	0.261	0.128
00185	2009/07/09 10:50:59	1581	4.991	13	4	0.255	0.119	0.255	0.119
00184	2009/07/09 10:43:00	1988	2.166	39	11	0.305	0.153	0.305	0.153
00183	2009/07/09 10:08:55	2025	2.228	39	11	0.258	0.156	0.258	0.156
00182	2009/07/09 10:08:47	2003	2.292	37	10	0.249	0.156	0.249	0.156
00181	2009/07/09 10:07:43	2034	2.299	38	10	0.259	0.156	0.259	0.156
00180	2009/07/09 10:07:29	2003	2.186	39	11	0.258	0.153	0.258	0.153
00179	2009/07/09 10:07:01	2004	2.239	38	10	0.264	0.152	0.264	0.152

Measure TC-7351
Diameter 150 mm Poisson's Ratio 0.300
Result Data

Load P0　36 N
Acc. A0　-0.2 m/s2
Acc. A1　-1.8 m/s2
Acc. A2　-0.6 m/s2
Acc. A3　0.8 m/s2
Acc. A4　0.2 m/s2

Setting　　Start　　Balance　　Meas. No.　　Main Menu

Indicates sensor input values.　　　　Indicates measurement result

Error indication of measurement data.

If the peak value of force or displacement cannot be detected, or if KTML or ETML value cannot be calculated because the peak value of force or displacement cannot be detected, an error message will be indicated respectively.

When the peak value cannot be detected in load P0, displacement D0, displacement D1, displacement D2, displacement D3, displacement D4

　　Indicates [------].

When KTML or ETML value cannot be calculated
　　Indicates [Calc Error].

Indicate if there is an error

Measure TC-7351
Diameter 150 mm Poisson's Ratio 0.300
Result Data

No.	Date Time	Load P0	Disp. D0	K-TML	E-TML	Disp.D1	Disp.D2	Disp.D3	Disp.D4
		N	mm	MN/m3	MN/m2	mm	mm	mm	mm
00188	2009/07/09 13:20:25	1659	2.563	27	7	0.281	0.126	0.281	0.126
00187	2009/07/09 11:58:12	2022	2.152	40	11	0.312	0.144	0.312	0.144
00186	2009/07/09 10:51:10	1653	------	Calc Error	Calc Error	0.261	0.128	0.261	0.128
00185	2009/07/09 10:50:59	1581	4.991	13	4	0.255	0.119	0.255	0.119
00184	2009/07/09 10:43:00	1988	2.166	39	11	0.305	0.153	0.305	0.153
00183	2009/07/09 10:08:55	2025	2.228	39	11	0.258	0.156	0.258	0.156
00182	2009/07/09 10:08:47	2003	2.292	37	10	0.249	0.156	0.249	0.156
00181	2009/07/09 10:07:43	2034	2.299	38	10	0.259	0.156	0.259	0.156
00180	2009/07/09 10:07:29	2003	2.186	39	11	0.258	0.153	0.258	0.153
00179	2009/07/09 10:07:01	2004	2.239	38	10	0.264	0.152	0.264	0.152

Load P0　36 N
Acc. A0　-0.2 m/s2
Acc. A1　-1.8 m/s2
Acc. A2　-0.6 m/s2
Acc. A3　0.8 m/s2
Acc. A4　0.2 m/s2

Setting　　Start　　Balance　　Meas. No.　　Main Menu

Error indication

❏ Condition

Indicates the test condition.

Display Setting		
Sampling	50	us
Length of data	800	Data
Data Length before trigge	400	Data
Trigger Channel	1	
Trigger Level	0.10	kN
Diameter of loading plate	150	mm
Poisson's Ratio	0.300	
Calculation type of groun	Boussinesq	
CH	1	2
Sensor	Load	Acc.
Capacity	1	100
Unit	kN	m/s2
Sens	1000.0	1000.0
Full Scale	4000	4000
L.P.F.(Hz)	500	500
H.P.F.	OFF	OFF

[Print]   [Measure]

Sampling	Sampling interval of A/D conversion.
Length of data	Number of measurement data for one measurement.
Data Length before trigger	Falling height of weight.
Trigger Channel	Channel to judge the trigger.
Trigger Level	Level to judge the trigger.
Diameter of loading plate	Diameter of loading plate to be used. (90, 100, 150, 200, 300)
Poisson's Ratio	Poisson's ratio of subgrade. (0.001 – 0.999)
Calculation type of ground elasticity coefficient	Boussinesq or Burmister
CH	Channel of measurement.
Sensor	Sensor type.
Capacity	Rated capacity of the sensor.
Unit	Unit of Physical Quantity (kN, m/s^2)
Sens	Output value when the rated capacity of the sensor is input.
Full Scale	Sensitivity range of the sensor (1000, 4000)
L.P.F. (Hz)	500, 1000, 2000, 5000 (Hz)
H.P.F	ON/OFF
[Print] button	Prints indicated contents.
[Measure] button	Returns Measure screen.

❏ Balancing

Measures and balances initial value of sensor.

| Balancing	
Balancing?	
OK	Cancel
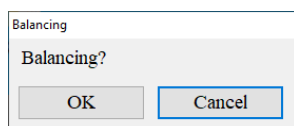
[OK]   Executes balancing.
[Cancel]   Balancing is not executed.

❏ Start

Starts measurement. Data is automatically transferred and data list is indicated on the monitor screen by letting the weight fall from the small FWD main body.

The screen returns to Measure screen by pressing [Measure] button.

Start	TC-7351
File No.	301
Measuring	
Wait for Trigger. Click [Measure] button.Return to Measure.	Measure
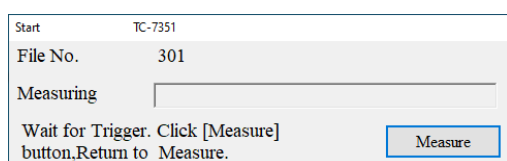
Screen waiting for the measurement to start

When the measurement is completed, the data is automatically transferred. Data transfer is completed when the [Measuring] bar comes to right end. Then the screen returns to measure screen.
Displacement, K_{TML} value and E_{TML} value are calculated and the result is indicated.

Measure screen after measurement

Measure   TC-7351

Diameter 150 mm Poisson's Ratio 0.300

Result Data

No.	Date Time	Load P0	Disp. D0	K-TML	E-TML
		N	mm	MN/m3	MN/n
00315	04/09/2021 14:20:20	459	------	Calc Error	Calc Error
00314	04/09/2021 14:20:12	607	0.001	17175	368
00313	04/09/2021 14:20:03	345	0.001	9762	209
00312	04/09/2021 14:19:54	375	------	Calc Error	Calc Error
00311	04/09/2021 14:19:45	392	------	Calc Error	Calc Error
00310	04/09/2021 14:19:30	338	------	Calc Error	Calc Error
00309	04/09/2021 14:19:21	414	------	Calc Error	Calc Error
00308	04/09/2021 14:19:05	525	------	Calc Error	Calc Error
00307	04/09/2021 14:18:47	440	------	Calc Error	Calc Error
00306	04/09/2021 14:18:33	381	------	Calc Error	Calc Error

| Load P0 | -6199 | N |
| Acc. A0 | -587.9 | m/s2 |

Setting   Print   Meas. No.
Start   Balance   Main Menu

Explanation of additional button
[Print]   Prints maximum load and displacement, K_{TML} value and E_{TML} value indicated in the screen.

❏ Print

Prints indicated contents.

[Print example]

TC-7351 Data Measuring Software for TC-351F Measured Data.   04/09/2021 14:26:09

Test Condition
   Sampling   50 us
   Data Length   800 Data
   Pre-area Data Length   400 Data
   Trigger Channel   1
   Trigger Level   0.10 kN
   Diameter of loading plate   100 mm
   Poisson's Ratio   0.300
   Calculation type of ground elasticity coefficient   Boussinesq

Amp setting

Channel	1	2	3
Sensor	Load	Acc.	Acc.
Capacity	20	500	200
Unit	kN	m/s^2	m/s^2
Sens	1000.0	1581.3	1600.0
FullScale	1000	4000	4000
L.P.F.(Hz)	500	500	500
H.P.F.	OFF	ON	ON

No.	Date/Time	Load P0 N	Disp. D0 mm	K_{TML} MN/m^3	E_{TML} MN/m^2	Disp. D1 mm
00018	2009/04/21 15:56:48	2632	1.530	73	20	0.064
00017	2009/04/21 15:48:25	1891	1.331	60	16	0.050
00016	2009/04/21 15:39:23	1831	1.300	60	16	0.048
00015	2009/04/21 15:20:29	1279	1.132	48	13	0.036

❏ Meas. No.

Change the measure number.
Enter the measure number in the range of 0 to 32767, and click the [OK] button.

Change Measure No.

Meas.   316   0 - 32767

        OK   Cancel

Measure No.   Range of 0 to 32767.
[OK]   Set the measure No. Setting to Small FWD.
[Cancel]   Returns to Measure screen.

5.3 Setting RS-232C

Indicates RS-232C setting. Only the port number is changeable.

Setting RS-232C

Port No.	8
Baud rate	9600
Parity Bits	NONE
Stop Bits	1
Handshaking	OFF
Delimiter	CR+LF
Changeable Port No. Only	

Main Menu

Port No.	Select a port number usable for computer
Baud Rate	Fixed (9600)
Parity Bits	Fixed (NONE)
Stop Bits	Fixed (1)
Handshaking	Fixed (OFF)
Delimiter	Fixed (CR+LF)

✎memo

Chapter 6

Explanation of various calculation

6.1 Calculation method of K$_{TML}$ value

Coefficient of subgrade reaction (K$_{TML}$ value) is calculated by the following expression.

$$K_{TML} = \frac{P}{\pi \cdot r^2 \cdot D} \times \frac{R}{R_{300}} \times 10^3$$

K$_{TML}$: Coefficient of subgrade reaction (MN/m^3)
P : Maximum value of load (N)
D : Maximum value of displacement (mm)
r : Radius of loading plate (mm)
R : Diameter of loading plate R=2r (mm)
R$_{300}$: Diameter of standard loading plate (φ300mm)

6.2 Calculation method of E$_{TML}$ value

Module of subgrade elasticity (E$_{TML}$ value) is calculated by the following expression.

When using the Boussinesq formula.

$$E_{TML} = \frac{(1-\nu^2) \cdot P}{2 \cdot r \cdot D}$$

E$_{TML}$: Module of subgrade reaction (MN/m^3)
ν : Poisson's ratio
P : Maximum value of Load (N)
r : Radius of loading plate (mm)
D : Maximum value of displacement (mm)

When using the Burmister formula.

$$E_{TML} = \frac{2 \cdot (1-\nu^2) \cdot P}{\pi \cdot r \cdot D}$$

E$_{TML}$: Module of subgrade reaction (MN/m^3)
ν : Poisson's ratio
P : Maximum value of Load (N)
r : Radius of loading plate (mm)
D : Maximum value of displacement (mm)
π : Pi

6.3 Number of digits of each value

Each value is indicated in the following number of digits.

Value	Number of digits	Decimal places	Physical unit
Load	6	0	N
Displacement	6	3	mm

Chapter 7

Specifications

7.1 Setting

The settings are used for the Small FWD main body and the external displacement sensor.
Please change the setting from the dedicated indicator unit for small FWD, TC-351F.

7.2 System requirements

Operation System	Windows 7(32/64bit) / 8.1(32/64bit) / 10(32/64bit)
Computer performance	Models recommended by the above OS, CD drive required
Storage	At least 2G bytes of free storage is required
Monitor	Requires a resolution of 800 x 600 pixels or higher
Interface	RS-232C or USB (when TC-351F is connected)

Note   When using RS-232C, RS-232C cable (CR-5360) is required.
When using USB, a USB-RS conversion adapter and RS-232C cable (CR-5360)
are required.

Printer	Something that can run on the installed OS.
Mouse	Something that can run on the installed OS.

Measuring instruments
Small FWD main body	KFD-100A	1 set
Exclusive indicator for small FWD	TC-351F	1 set
External displacement sensor	KFDS-1B	4 units at maximum (option)

*Windows 7, 8.1, 10 are trademarks owned by U.S.A. Microsoft Corporation and registered in U.S.A. and other countries.

■Specifications subject to change without prior notice.

Before Requesting for Maintenance and Service (repair)

If there should be any failure or malfunction of this product, please contact your local representative or Tokyo Measuring Instruments Laboratory Co., Ltd.

■When you send us the device for repair and maintenance service:

- For quick and precise repair and delivery service, please let us know the conditions of trouble or likely cause of such trouble.
- When packing the device to return it to us, use the packing material employed upon delivery of the device from us or the equivalent.
- If the device must be adjusted with accessory parts or element attached, make sure to deliver them to us at the same time.

■Guarantee

This product has been carefully examined by our in-house inspection division before delivery. If it malfunctions due to a manufacturing fault or an accident during shipment, please report on the condition to your nearest dealer or directly to Tokyo Measuring Instruments Laboratory Co., Ltd.

The guarantee period of this product is twelve months from the date of delivery. If the product goes out of order or is broken during this period, we will repair it free of charge. However, this free guarantee repair service will not apply in the case of trouble or damage caused by improper handling of the product, remodeling or modification by the user, or an act of God.

Tokyo Measuring Instruments Laboratory Co., Ltd. shall not take any responsibility for claims and guarantee of loss and/or damage arising from the operation of this product regardless of any misdescription, inaccuracy or missing items in the contents of this manual.

Data recording software for TC-351F TC-7351

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