RIGOL

Service Guide

DS8000-R Series Digital Oscilloscope

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RIGOL TECHNOLOGIES CO., LTD.

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RIGOL guarantees that this product conforms to the national and industrial standards in China as well as the ISO9001:2015 standard and the ISO14001:2015 standard. Other international standard conformance certifications are in progress.

Contact Us

If you have any problem or requirement when using our products or this manual, please contact **RIGOL**.

E-mail: service@rigol.com
Website: www.rigol.com

Safety Requirement

General Safety Summary

Please review the following safety precautions carefully before putting the instrument into operation so as to avoid any personal injury or damage to the instrument and any product connected to it. To prevent potential hazards, please follow the instructions specified in this manual to use the instrument properly.

Use Proper Power Cord.
Only the exclusive power cord designed for the instrument and authorized for use within the local country could be used.

Ground the Instrument.
The instrument is grounded through the Protective Earth lead of the power cord. To avoid electric shock, connect the earth terminal of the power cord to the Protective Earth terminal before connecting any input or output terminals.

Connect the Probe Correctly.
If a probe is used, the probe ground lead must be connected to earth ground. Do not connect the ground lead to high voltage. Improper way of connection could result in dangerous voltages being present on the connectors, controls or other surfaces of the oscilloscope and probes, which will cause potential hazards for operators.

Observe All Terminal Ratings.
To avoid fire or shock hazard, observe all ratings and markers on the instrument and check your manual for more information about ratings before connecting the instrument.

Use Proper Overvoltage Protection.
Ensure that no overvoltage (such as that caused by a bolt of lightning) can reach the product. Otherwise, the operator might be exposed to the danger of an electric shock.

Do Not Operate Without Covers.
Do not operate the instrument with covers or panels removed.

Do Not Insert Objects into the Air Outlet.
Do not insert anything into the holes of the fan to avoid damaging the instrument.

Use Proper Fuse.
Please use the specified fuses.

Avoid Circuit or Wire Exposure.
Do not touch exposed junctions and components when the unit is powered on.

Do Not Operate with Suspected Failures.
If you suspect that any damage may occur to the instrument, have it inspected by **RIGOL** authorized personnel before further operations. Any maintenance, adjustment or replacement especially to circuits or accessories must be performed by **RIGOL** authorized personnel.

Provide Adequate Ventilation.
Inadequate ventilation may cause an increase of temperature in the instrument, which would cause damage to the instrument. So please keep the instrument well ventilated and inspect the air outlet and the fan regularly.

Do Not Operate in Wet Conditions.
To avoid short circuit inside the instrument or electric shock, never operate the instrument in a humid environment.

Do Not Operate in an Explosive Atmosphere.
To avoid personal injuries or damage to the instrument, never operate the instrument in an explosive atmosphere.

Keep Product Surfaces Clean and Dry.
To avoid dust or moisture from affecting the performance of the instrument, keep the surfaces of the instrument clean and dry.

Prevent Electrostatic Impact.
Operate the instrument in an electrostatic discharge protective environment to avoid damage induced by static discharges. Always ground both the internal and external conductors of cables to release static before making connections.

Use the Battery Properly.
Do not expose the battery (if available) to high temperature or fire. Keep it out of the reach of children. Improper change of a battery (lithium battery) may cause an explosion. Use the **RIGOL** specified battery only.

Handle with Caution.
Please handle with care during transportation to avoid damage to keys, knobs, interfaces, and other parts on the panels.

Safety Notices and Symbols

Safety Notices in this Manual:

WARNING
Indicates a potentially hazardous situation or practice which, if not avoided, will result in serious injury or death.

CAUTION
Indicates a potentially hazardous situation or practice which, if not avoided, could result in damage to the product or loss of important data.

Safety Terms on the Product:

DANGER	It calls attention to an operation, if not correctly performed, could result in injury or hazard immediately.
WARNING	It calls attention to an operation, if not correctly performed, could result in potential injury or hazard.
CAUTION	It calls attention to an operation, if not correctly performed, could result in damage to the product or other devices connected to the product.

Safety Symbols on the Product:


Hazardous Voltage


Safety Warning


Protective Earth Terminal


Chassis Ground


Test Ground

Document Overview

Format Conventions in this Manual

1. **Key**
   The key on the front panel is denoted by the format of "Key Name (Bold) + Text Box" in the manual. For example, **RUN/STOP** denotes the "RUN/STOP" key.

2. **Menu**
   The menu items are denoted by the format of "Menu Word (Bold) + Character Shading". For example, **System** denotes the "System" menu item under "**Utility**" function.

3. **Operation Procedures:**
   → denotes the next step of operation. For example, **Utility** → **System** denotes clicking on the navigation function icon to enter the "Utility" menu first, and then clicking the **System** menu item.

Content Conventions in this Manual

DS8000-R series includes the following models. Unless otherwise specified, this manual takes DS8204-R (installed with the function/arbitrary waveform generator option) as an example to illustrate the disassembly and assembly of the DS8000-R series.

Model	Max. Analog Bandwidth	No. of Analog Channels	No. of Channels of Function/AWG
DS8104-R	1 GHz	4	1 (option)
DS8204-R	2 GHz	4	1 (option)

Manuals of this Product

The manuals of this product mainly include Quick Guide, User Guide, Programming Guide, Data Sheet, and etc. For the latest version of this manual, download it from the official website of **RIGOL** (www.rigol.com).

Contents

Chapter 1 Disassembly and Assembly

Notices to Disassembly and Assembly

Notices:

- Do not disassemble the instrument unless for working requirement.
- Only authorized personnel are allowed to disassemble the instrument.
- Cut off the power supply before disassembling the instrument.
- Please wear anti-static wrist strap or make other anti-static precaution when disassembling the instrument.
- Please use proper tools and follow the correct steps.
- Take care not to deform the metal structure or get hurt when disassembling the metal structures.
- To avoid causing damage to the instrument due to improper operation and to save your time, we recommend you to follow the disassembly steps and methods in this guide manual.

Required Tools:

- Phillips screwdriver T10
- 8mm hexagon socket wrench
- 5mm hexagon socket wrench

WARNING
Ensure that the power supply is cut off before disassembling the instrument. Only well-trained professional personnel or qualified personnel are allowed to disassemble the instrument.

Exploded View Drawing

You need to get a basic understanding of the main parts of the instrument before disassembling and assembling the instrument. When disassembling or assembling the instrument, please follow the procedures and take care not to scratch the surfaces of the instrument. This manual mainly introduces the disassembly and assembly methods for the DS8000-R series digital oscilloscope. The exploded view drawing of DS8000-R (installed with the function/arbitrary waveform generator option) is shown in Figure 1-1. For the replacement parts list, refer to Table 1-1.

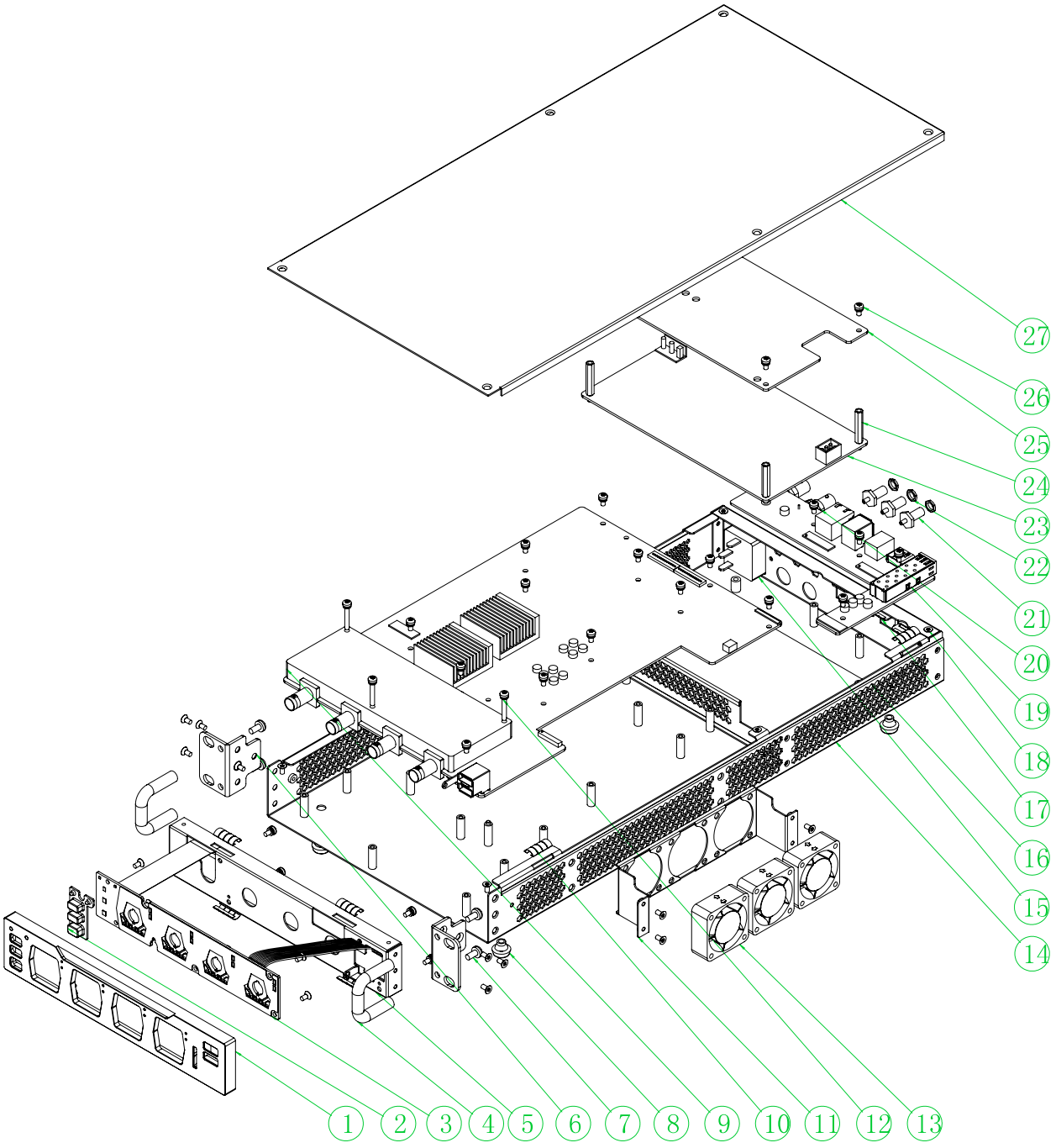

Figure 1-1 Exploded View Drawing of DS8000-R (Installed with the Function/AWG Option)

Table 1-1 Replacement Parts List

No.	Part No.	Qty.	Name/Description
1	2010004774	1	Front Panel
2	1020004713	1	Rubber Keypad
3	2010004764	1	Probe Board
4	2010004767	2	Handle
5	1020004722	1	Metal Front Panel
6	1020004724	2	Hanging Ear
7	1020003428	1	M4x8 Torx Pan Head Screw
8	1020004764	4	Pad
9	2010004757	1	Main Board
10	1010002308	8	BeCu Fingerstock (Slot Mount-4)
11	1020004721	1	Fan Bracket
12	1020000573	3	M3x20 Torx Pan Head Combination Screw
13	1020004765	1	Fan Components
14	1020004720	1	Metal Chassis
15	1010005871	1	Power Cord Connector
16	1020004762	1	Mylar Film
17	1010005841	2	BeCu Fingerstock (Slot Mount-2)
18	1020004774	23	M3x6 Torx Flat Head Countersunk Screw
19	2010004759	1	Interface Board
20	1020000619	2	BNC Nut
21	1010006726	3	SMA Cable
22	—	3	SMA Nut
23	2010003934	1	Power Supply Board
24	1020004763	4	Multiple-station Screw
25	1010006704	1	Isolation Board
26	1020000571	24	M3x6 Torx Pan Head Combination Screw
27	1020004723	1	Metal Cover

The recommended disassembly procedures are as follows:

Disassemble the Metal Cover → Disassemble the Hanging Ear → Disassemble the Front Panel Assembly → Disassemble the Metal Front Panel → Disassemble the Probe Board → Disassemble the Fan Components → Disassemble the Main Board → Disassemble the Power Supply Board → Disassemble the SMA Cable → Disassemble the Interface Board

Disassemble the Metal Cover

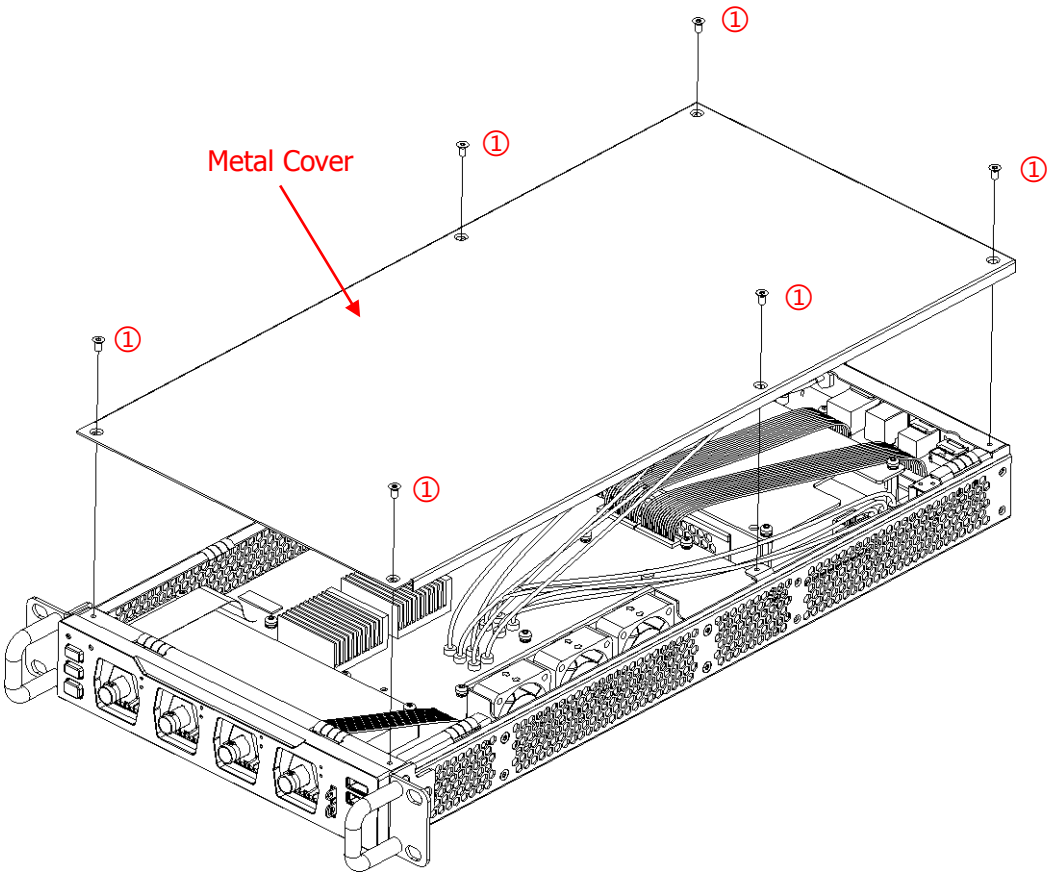

Figure 1-1 Disassemble the Metal Cover

Part Description:
① 6 screws (M3x6 torx flat head countersunk screw, used for fastening the metal cover)

Disassembly Steps:
1. Use the T10 screwdriver to remove 6 screws (①) that secure the metal cover.
2. Lift up the metal cover gently to remove it.

Disassemble the Hanging Ear

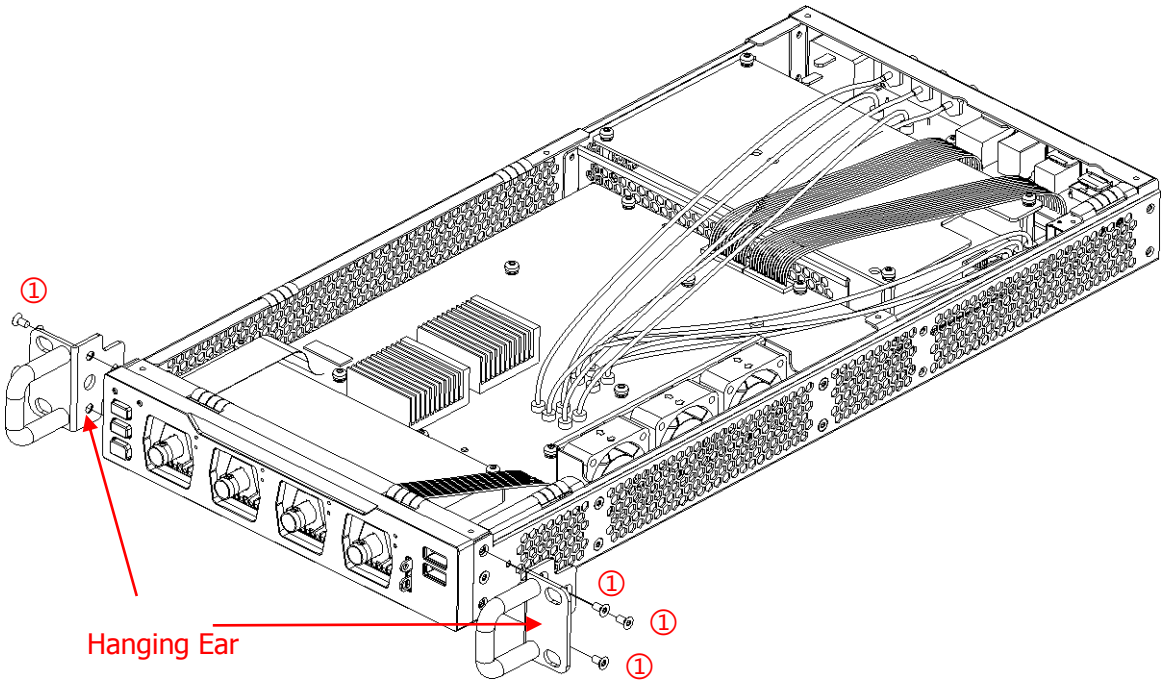

Figure 1-3 Disassemble the Hanging Ear

Part Description:

① 6 screws (M3x6 torx flat head countersunk screw, used for fastening the two hanging ears); not all screws are indicated in the above figure.

Disassembly Steps:

1. Use the T10 screwdriver to remove 6 screws (①) that secure the two hanging ears.
2. Remove the two hanging ears gently.

Disassemble the Front Panel Assembly

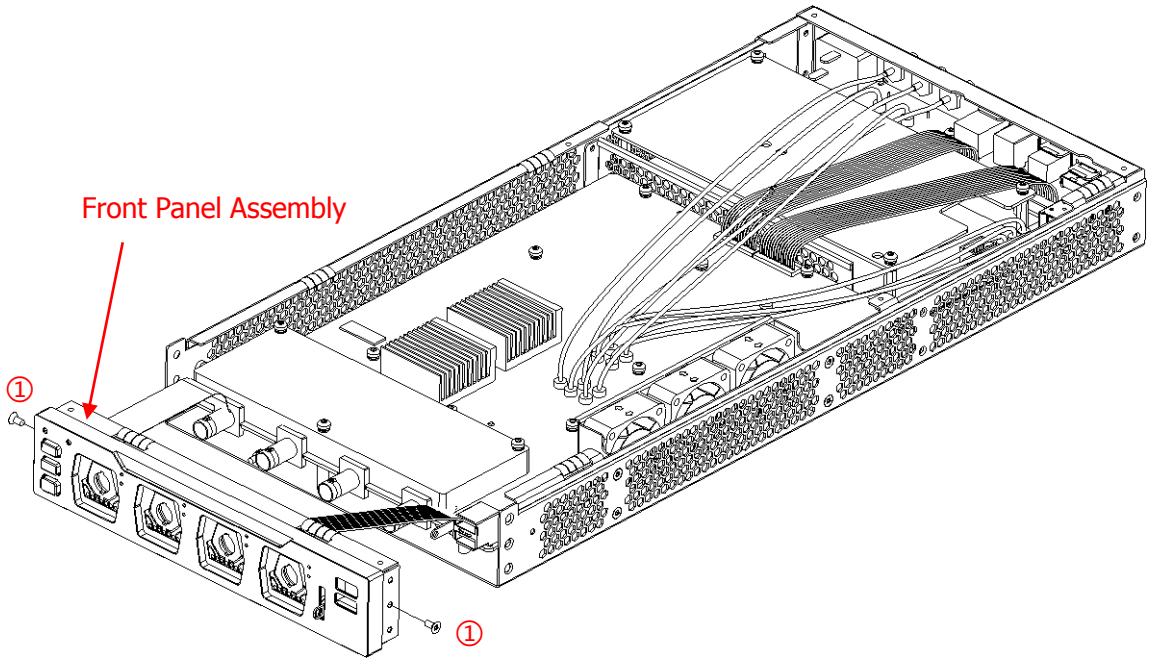

Figure 1-4 Disassemble the Front Panel Assembly

Part Description:

① 2 screws (M3x6 torx flat head countersunk screw, used for fastening the front panel assembly)

Disassembly Steps:

1. Use the T10 screwdriver to remove 2 screws (①) that secure the front panel assembly.
2. Take off the front panel assembly gently.

Disassemble the Metal Front Panel

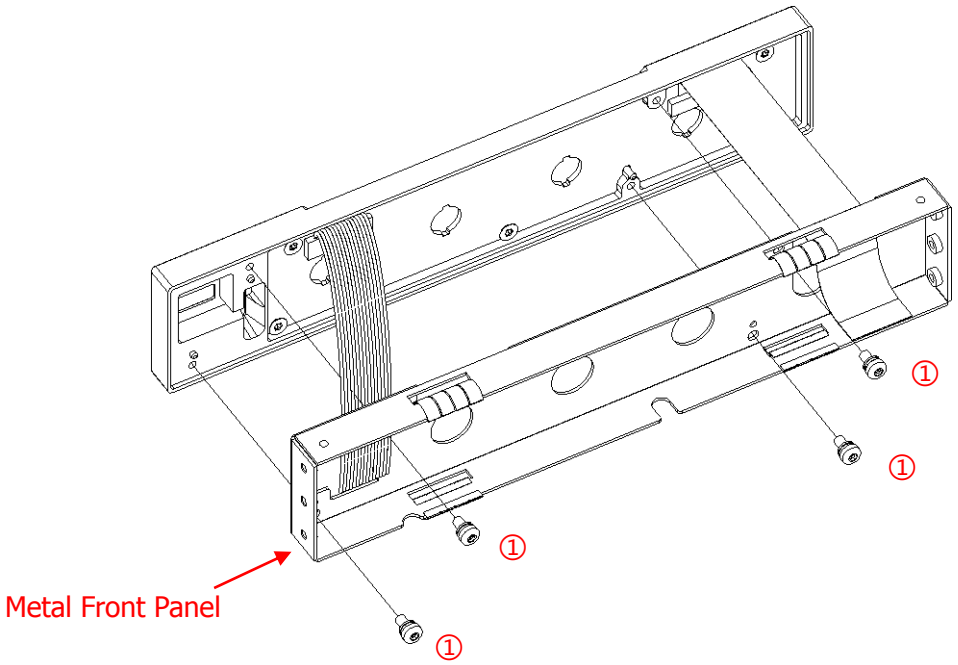

Figure 1-5 Disassemble the Metal Front Panel

Part Description:

① 4 screws (M3x6 torx pan head combination screw, used for fastening the metal front panel)

Disassembly Steps:

1. Use the T10 screwdriver to remove 4 screws (①) that secure the metal front panel.
2. Take off the metal front panel gently.

Disassemble the Probe Board

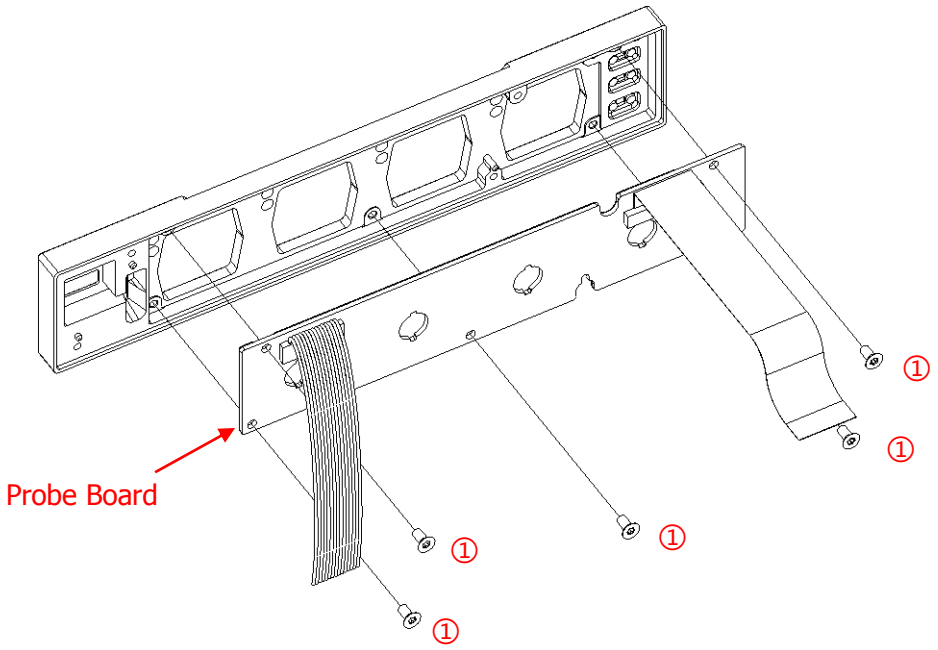

Figure 1-6 Disassemble the Probe Board

Part Description:

① 5 screws (M3x6 torx flat head countersunk screw, used for fastening the probe board)

Disassembly Steps:

1. Use the T10 screwdriver to remove 5 screws (①) that secure the probe board.
2. Take off the probe board gently.

Disassemble the Fan Components

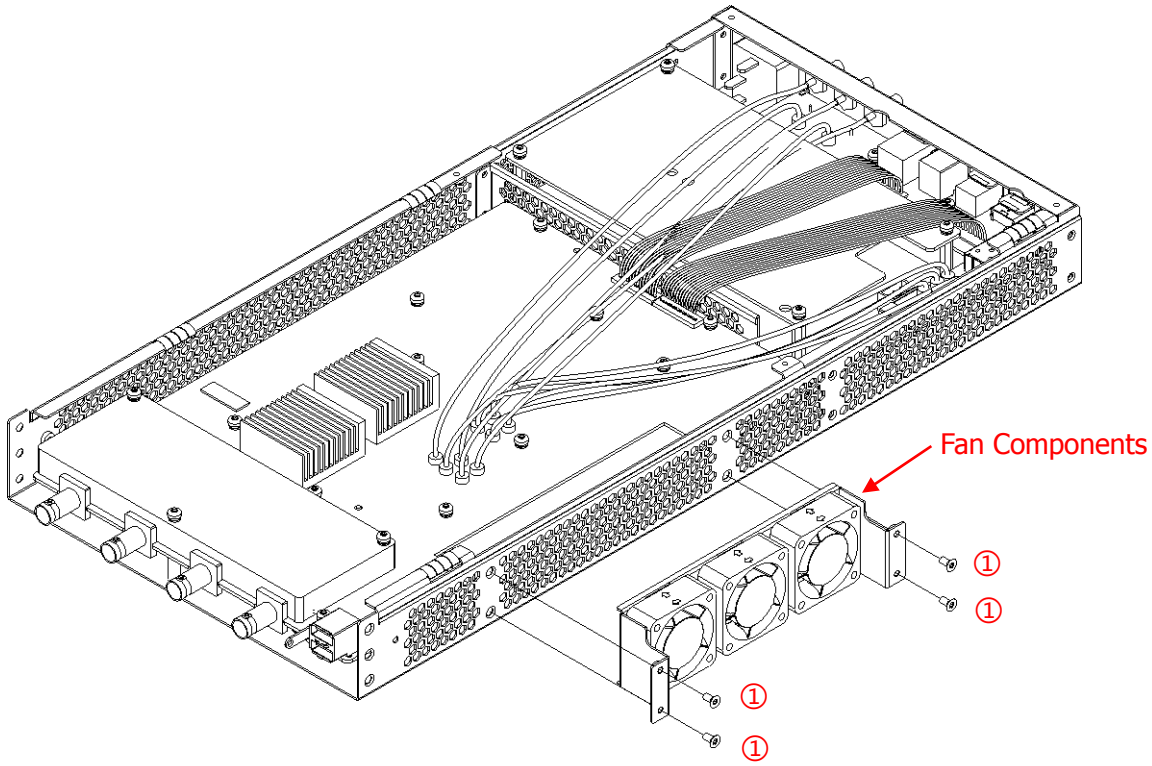

Figure 17 Disassemble the Fan Components

Part Description:

① 4 screws (M3x6 torx flat head countersunk screw, used for fastening the fan components)

Disassembly Steps:

1. Use the T10 screwdriver to remove 4 screws (①) that secure the fan component.
2. Take off the fan components gently.

Tip
When disassembling the fan, pay attention to the installation position of the fan and the direction of the fan cable outlet to avoid any improper assembly operation.

Disassemble the Main Board

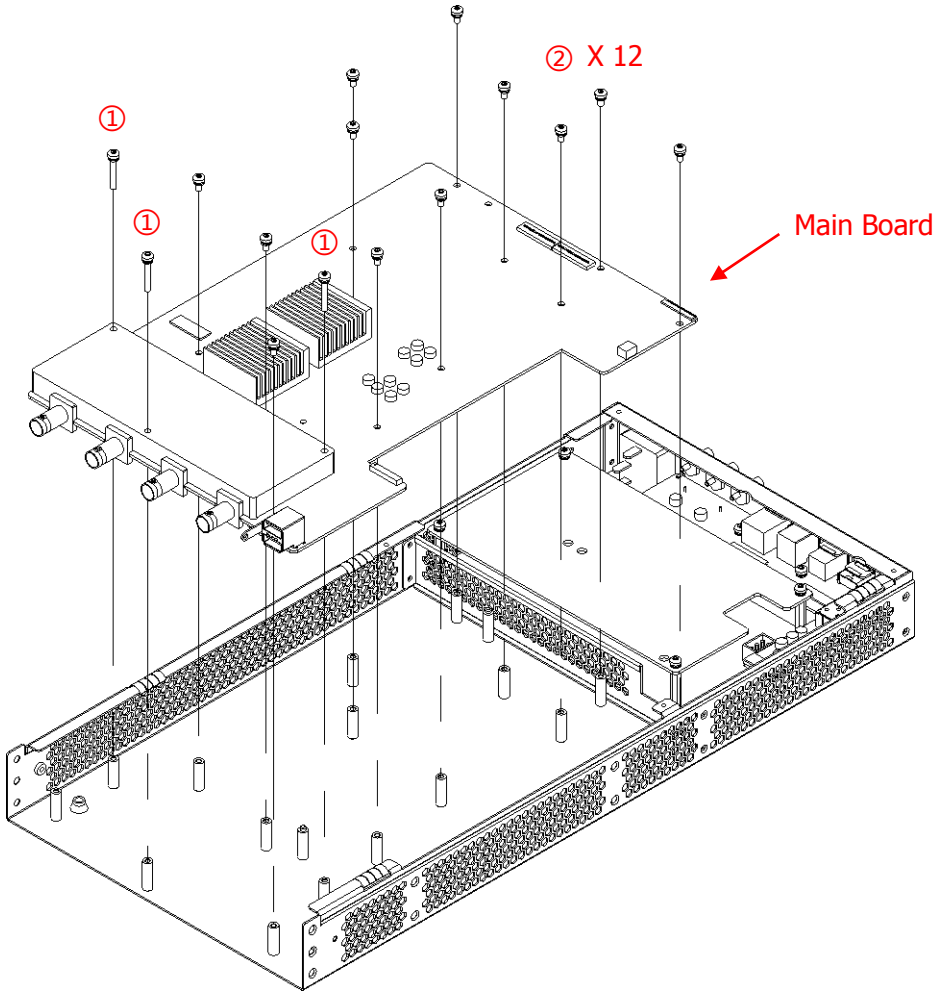

Figure 1-8 Disassemble the Main Board

Part Description:

① 3 screws (M3x20 torx pan head combination screw, used for fastening the main board)

② 12 screws (M3x6 torx pan head combination screw, used for fastening the main board)

Disassembly Steps:

1. Use the T10 screwdriver to remove 3 screws (①) that secure the main board.
2. Use the T10 screwdriver to remove 12 screws (②) that secure the main board.
3. Take off the main board gently.

Tip
Before disconnecting the cables from the main board, pay attention to the connecting positions of the cables to avoid incorrect connection or incomplete connection when assembling the cables.

Disassemble the Power Supply Board

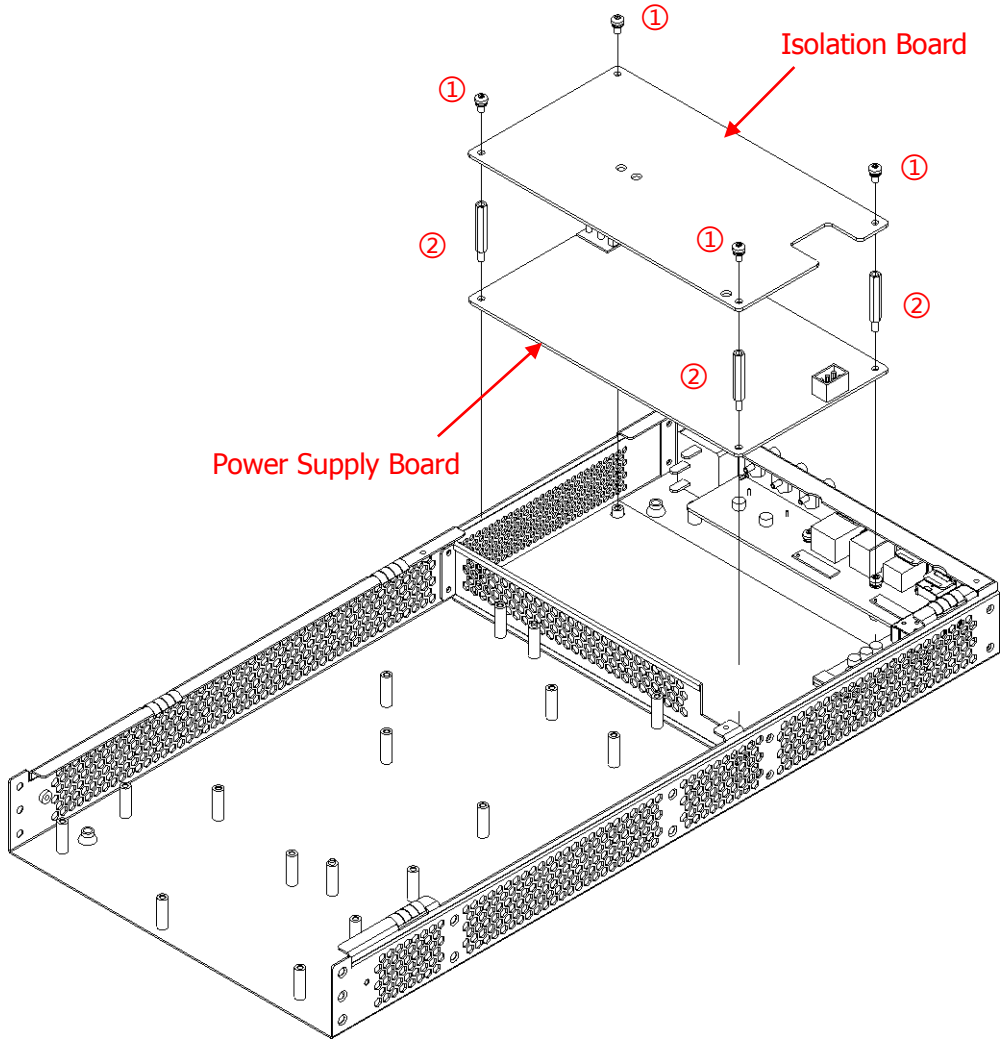

Figure 19 Disassemble the Power Supply Board

Part Description:

① 4 screws (M3x6 torx pan head combination screw, used for fastening the isolation board)

② 4 screws (M3x26 multiple-station screw, used for fastening the power supply board); not all screws are indicated in the above figure.

Disassembly Steps:

1. Use the T10 screwdriver to remove 4 screws (①) that secure the isolation board.
2. Take off the isolation board gently.
3. Use the 5 mm hexagon wrench socket to remove the multiple-station screws (②) that secure the power supply board.
4. Take off the power supply board gently.

Tip

Before disconnecting the cables from the power supply board, pay attention to the connecting positions of the cables to avoid incorrect connection or incomplete connection when assembling the cables.

Disassemble the SMA Cable

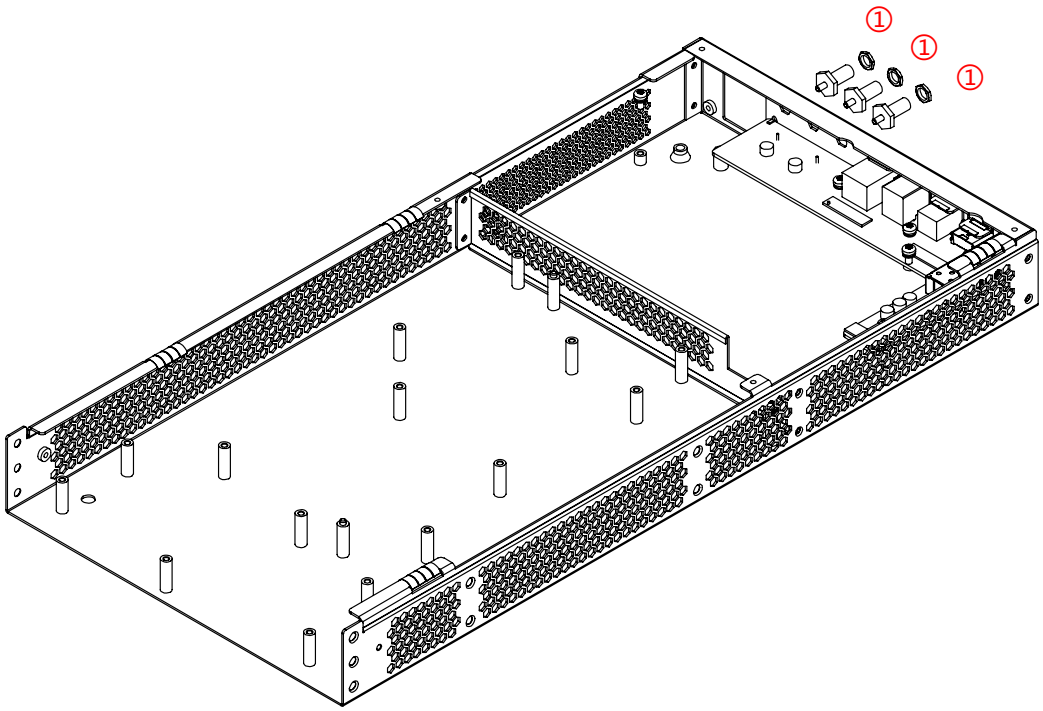

Figure 1-10 Disassemble the SMA Cable

Part Description:

① 3 screws (used for fastening the SMA cable)

Disassembly Steps:

1. Use the 8mm hexagon wrench socket to remove 3 screw (①) that secure the SMA cable.
2. Remove the SMA cable gently.

Tip

Before disconnecting the SMA cables, pay attention to the connecting positions of the cables to avoid incorrect connection or incomplete connection when assembling the cables.

Disassemble the Interface Board

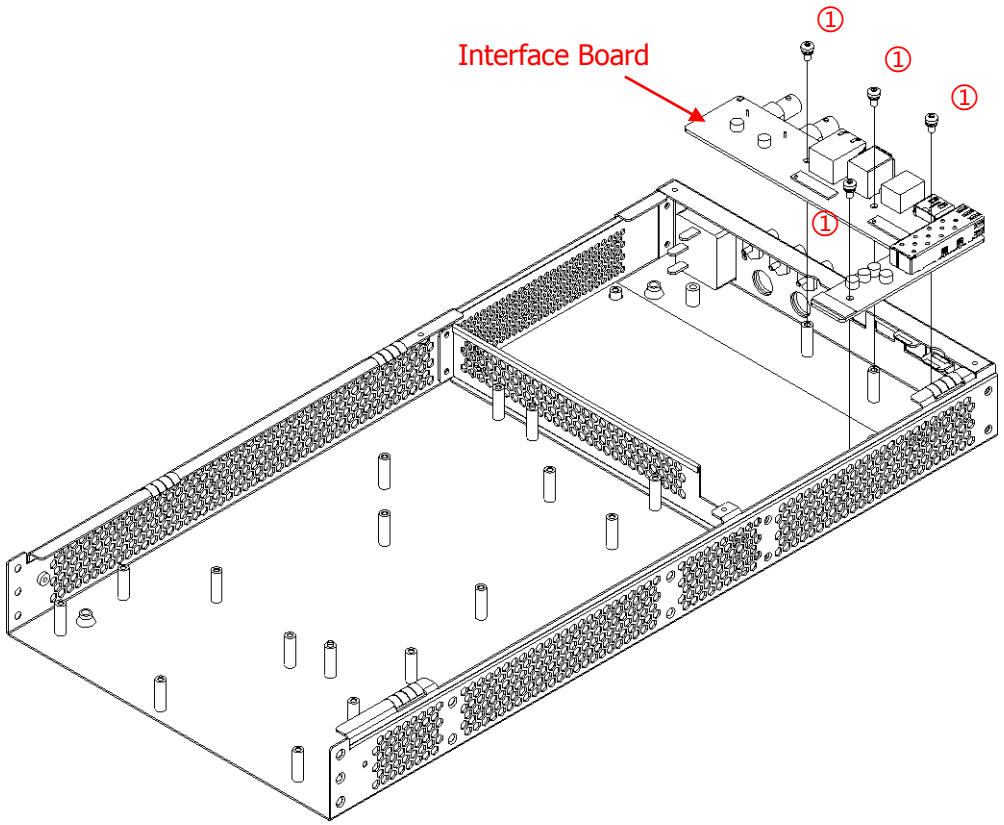

Figure 1-11 Disassemble the Interface Board

Part Description:

① 4 screws (M3x6 torx pan head combination screw, used for fastening the interface board)

Disassembly Steps:

1. Use the T10 screwdriver to remove 4 screws (①) that secure the interface board.
2. Take off the interface board gently.

Tip

Before disconnecting the cables from the interface board, pay attention to the connecting positions of the cables to avoid incorrect connection or incomplete connection when assembling the cables.

Assembly Procedures

The assembly procedures are simply the reversal of the disassembly procedures. Check whether the cables are correctly connected and whether all the screws are installed after completing each assembly procedure.

Chapter 2 Troubleshooting&Maintenance

Basic Troubleshooting

The commonly encountered failures of the oscilloscope and their solutions are listed below. If the following problems occur, locate and resolve the problems according to the following steps. If the problems still persist, contact **RIGOL** and provide your instrument information to us.

1. When I power on the instrument, the instrument stays black and does not display anything.

(1) Check whether the power switch is really on.
(2) Check whether the power is correctly connected.
(3) Check whether the fuse is blown. If you need to replace the fuse, use only the specified fuse that conforms to the product.
(4) Restart the instrument after finishing the above inspections.
(5) If the problem still persists, please contact **RIGOL**.

2. No waveform of the signal is displayed on the externally connected screen.

(1) Check whether the probe is properly connected to the item under test.
(2) Check whether there are signals generated from the item to be tested (you can connect the probe compensation output signal to the faulty channel to locate the problem, and then determine whether the channel or the item to be tested has a problem).
(3) Resample the signal.

3. The display of waveform is ladder-like.

(1) The horizontal time base might be too low. Increase the horizontal time base to improve the display effects.
(2) If the display type is "Vector", the lines between the sample points may cause ladder-like display results. Click on the function navigation icon  at the lower-left corner of the screen to enter the function navigation. Click on the "Utility" icon  to enter the utility setting menu. Click **Type** continuously to select "Dots".

4. The USB storage device cannot be recognized.

(1) Check whether the USB storage device can work normally.
(2) Make sure the USB storage device used is FAT32-format Flash storage type, as this instrument does not support USB3.0 and hardware storage type USB storage device.
(3) Check whether the capacity of the USB storage device is too large. It is recommended that the capacity of the USB storage device should not exceed 8 GB for this oscilloscope.
(4) Restart the instrument and insert the USB storage device to check it.
(5) If the USB storage device still cannot work normally, please contact **RIGOL**.

Maintenance

System Maintenance

In order to ensure the performance and prolong the service life of the instrument, please follow the recommendations below.

1. Get a full understanding of the instrument performance and its basic operating method before using it.

2. In order to ensure the measurement accuracy and prolong the service life of the instrument, protect the instrument against dust, shock, moisture, magnetic field, and static electricity. Moreover, the instrument should not be exposed to sunlight for long periods of time.

3. Do not operate the instrument with functional failures. If a certain function of the instrument fails to work normally during its operating period, locate the problem and resolve it, then you can continue to operate the instrument. Besides, regular test and calibration should be performed to ensure the accuracy of its performance.

4. Arrange the instrument properly after you complete the operation.

5. Keep instrument accessories properly for future use.

Warranty

RIGOL TECHNOLOGIES CO., LTD. (hereinafter referred to as **RIGOL**) warrants that the product will be free from defects in materials and workmanship within the warranty period. If a product proves defective within the warranty period, **RIGOL** guarantees free replacement or repair for the defective product.

To get repair service, please contact with your nearest **RIGOL** sales or service office.

There is no other warranty, expressed or implied, except such as is expressly set forth herein or other applicable warranty card. There is no implied warranty of merchantability or fitness for a particular purpose. Under no circumstances shall **RIGOL** be liable for any consequential, indirect, ensuing, or special damages for any breach of warranty in any case.

Care and Cleaning

Care

Do not store or leave the instrument where it may be exposed to direct sunlight for long periods of time.

Cleaning

Clean the instrument regularly according to its operating conditions.

1. Disconnect the instrument from all power sources.
2. Clean the external surfaces of the instrument with a soft cloth dampened with mild detergent or water. When cleaning the LCD, take care to avoid scarifying it.

CAUTION

To avoid damage to the instrument, do not expose it to caustic liquids.

WARNING

To avoid short-circuit resulting from moisture or personal injuries, ensure that the instrument is completely dry before connecting it to the power supply.

Environmental Considerations

The following symbol indicates that this product complies with the WEEE Directive 2002/96/EC.

Product End-of-Life Handling

The equipment may contain substances that could be harmful to the environment or human health. To avoid the release of such substances into the environment and avoid harm to human health, we recommend you to recycle this product appropriately to ensure that most materials are reused or recycled properly. Please contact your local authorities for disposal or recycling information.