

RIGOL

Service Guide

M300 Series Data Acquisition/Switch System

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RIGOL Technologies, Inc.**

Guaranty and Declaration

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RIGOL guarantees this product conforms to the national and industrial standards in China as well as the ISO9001:2008 standard and the ISO14001:2004 standard. Other international standard conformance certification is 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 use the instrument only specified by this manual.

Use Proper Power Cord.

Only the 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, it is essential to connect the earth terminal of the power cord to the Protective Earth terminal before connecting any inputs or outputs.

Connect the Probe Correctly.

If a probe is used, do not connect the ground lead to high voltage since it has isobaric electric potential as the ground.

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.

Make sure that no overvoltage (such as that caused by a thunderstorm) can reach the product, or else the operator might be exposed to the danger of electrical shock.

Do Not Operate Without Covers.

Do not operate the instrument with covers or panels removed.

Do Not Insert Anything Into the Holes of Fan.

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.

Do Not Operate With Suspected Failures.

If you suspect damage occurs 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.

Keep Well Ventilation.

Inadequate ventilation may cause an increase of instrument temperature which would cause damage to the instrument. So please keep the instrument well ventilated and inspect the intake and fan regularly.

Do Not Operate in Wet Conditions.

In order to avoid short circuiting to the interior of the device or electric shock, please do not operate the instrument in a humid environment.

Do Not Operate in an Explosive Atmosphere.

In order to avoid damage to the device or personal injuries, it is important to operate the device away from an explosive atmosphere.

Keep Product Surfaces Clean and Dry.

To avoid the influence of dust and/or moisture in the air, please keep the surface of the device clean and dry.

Electrostatic Prevention.

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.

Proper Use of Battery.

If a battery is supplied, it must not be exposed to high temperature or in contact with fire. Keep it out of the reach of children. Improper change of battery (note: lithium battery) may cause explosion. Use **RIGOL** specified battery only.

Handling Safety.

Please handle with care during transportation to avoid damage to buttons, knob interfaces and other parts on the panels.

Safety Terms and Symbols

Terms Used in this Manual. These terms may appear in this manual:



WARNING

Warning statements indicate conditions or practices that could result in injury or loss of life.



CAUTION

Caution statements indicate conditions or practices that could result in damage to this product or other property.

Terms Used on the Product. These terms may appear on the Product:

DANGER indicates an injury or hazard may immediately happen.

WARNING indicates an injury or hazard may occur.

CAUTION indicates potential damage to the instrument or other property might occur.

Symbols Used on the Product. These symbols may appear on the product:



Hazardous Voltage



Safety Warning



Protective Earth Terminal



Chassis Ground



Test Ground

Allgemeine Sicherheits Informationen

Überprüfen Sie die folgenden Sicherheitshinweise sorgfältig um Personenschäden oder Schäden am Gerät und an damit verbundenen weiteren Geräten zu vermeiden. Zur Vermeidung von Gefahren, nutzen Sie bitte das Gerät nur so, wie in diesem Handbuch angegeben.

Um Feuer oder Verletzungen zu vermeiden, verwenden Sie ein ordnungsgemäßes Netzkabel.

Verwenden Sie für dieses Gerät nur das für ihr Land zugelassene und genehmigte Netzkabel.

Erden des Gerätes.

Das Gerät ist durch den Schutzleiter im Netzkabel geerdet. Um Gefahren durch elektrischen Schlag zu vermeiden, ist es unerlässlich, die Erdung durchzuführen. Erst dann dürfen weitere Ein- oder Ausgänge verbunden werden.

Anschluss eines Tastkopfes.

Die Erdungsklemmen der Sonden sind auf dem gleichen Spannungspegel des Instruments geerdet. Schließen Sie die Erdungsklemmen an keine hohe Spannung an.

Beachten Sie alle Anschlüsse.

Zur Vermeidung von Feuer oder Stromschlag, beachten Sie alle Bemerkungen und Markierungen auf dem Instrument. Befolgen Sie die Bedienungsanleitung für weitere Informationen, bevor Sie weitere Anschlüsse an das Instrument legen.

Verwenden Sie einen geeigneten Überspannungsschutz.

Stellen Sie sicher, daß keinerlei Überspannung (wie z.B. durch Gewitter verursacht) das Gerät erreichen kann. Andernfalls besteht für den Anwender die Gefahr eines Stromschlages.

Nicht ohne Abdeckung einschalten.

Betreiben Sie das Gerät nicht mit entfernten Gehäuse-Abdeckungen.

Betreiben Sie das Gerät nicht geöffnet.

Der Betrieb mit offenen oder entfernten Gehäuseteilen ist nicht zulässig. Nichts in entsprechende Öffnungen stecken (Lüfter z.B.)

Passende Sicherung verwenden.

Setzen Sie nur die spezifikationsgemäßen Sicherungen ein.

Vermeiden Sie ungeschützte Verbindungen.

Berühren Sie keine unisolierten Verbindungen oder Baugruppen, während das Gerät in Betrieb ist.

Betreiben Sie das Gerät nicht im Fehlerfall.

Wenn Sie am Gerät einen Defekt vermuten, sorgen Sie dafür, bevor Sie das Gerät wieder betreiben, dass eine Untersuchung durch qualifiziertes Kundendienstpersonal durchgeführt wird. Jedwede Wartung, Einstellarbeiten oder Austausch von Teilen am Gerät, sowie am Zubehör dürfen nur von **RIGOL** autorisiertem Personal durchgeführt werden.

Belüftung sicherstellen.

Unzureichende Belüftung kann zu Temperaturanstiegen und somit zu thermischen Schäden am Gerät führen. Stellen Sie deswegen die Belüftung sicher und kontrollieren regelmäßig Lüfter und Belüftungsöffnungen.

Nicht in feuchter Umgebung betreiben.

Zur Vermeidung von Kurzschluß im Geräteinneren und Stromschlag betreiben Sie das Gerät bitte niemals in feuchter Umgebung.

Nicht in explosiver Atmosphäre betreiben.

Zur Vermeidung von Personen- und Sachschäden ist es unumgänglich, das Gerät ausschließlich fernab jedweder explosiven Atmosphäre zu betreiben.

Geräteoberflächen sauber und trocken halten.

Um den Einfluß von Staub und Feuchtigkeit aus der Luft auszuschließen, halten Sie bitte die Geräteoberflächen sauber und trocken.

Schutz gegen elektrostatische Entladung (ESD).

Sorgen Sie für eine elektrostatisch geschützte Umgebung, um somit Schäden und Funktionsstörungen durch ESD zu vermeiden. Erden Sie vor dem Anschluß immer Innen- und Außenleiter der Verbindungsleitung, um statische Aufladung zu entladen.

Die richtige Verwendung des Akku.

Wenn eine Batterie verwendet wird, vermeiden Sie hohe Temperaturen bzw. Feuer ausgesetzt werden. Bewahren Sie es außerhalb der Reichweite von Kindern auf. Unsachgemäße Änderung der Batterie (Anmerkung: Lithium-Batterie) kann zu einer Explosion führen. Verwenden Sie nur von RIGOL angegebene Akkus.

Sicherer Transport.

Transportieren Sie das Gerät sorgfältig (Verpackung!), um Schäden an Bedienelementen, Anschlüssen und anderen Teilen zu vermeiden.

Sicherheits Begriffe und Symbole

Begriffe in diesem Guide. Diese Begriffe können in diesem Handbuch auftauchen:



WARNING

Die Kennzeichnung WARNING beschreibt Gefahrenquellen die leibliche Schäden oder den Tod von Personen zur Folge haben können.



CAUTION

Die Kennzeichnung Caution (Vorsicht) beschreibt Gefahrenquellen die Schäden am Gerät hervorrufen können.

Begriffe auf dem Produkt. Diese Bedingungen können auf dem Produkt erscheinen:

DANGER weist auf eine Verletzung oder Gefährdung hin, die sofort geschehen kann.

WARNING weist auf eine Verletzung oder Gefährdung hin, die möglicherweise nicht sofort geschehen.

CAUTION bedeutet, dass eine mögliche Beschädigung des Instruments oder anderer Gegenstände auftreten kann.

Symbole auf dem Produkt. Diese Symbole können auf dem Produkt erscheinen:



**Gefährliche
Spannung**



**Sicherheits-
Hinweis**



Schutz-erde



Gehäusemasse



Erde

Document Overview

Main Topics in this Manual:

Chapter 1 Troubleshooting&Maintenance

This chapter provides information about the solutions of the common failures and maintenance of M300.

Chapter 2 Performance Verification Test

This chapter introduces the test methods and notices of the main performance specifications of M300.

Chapter 3 To Acquire Calibration Service

This chapter introduces the calibration interval, calibration notices and the method to get calibration service.

Chapter 4 Replaceable Parts

This chapter provides the exploded view of M300 and lists its replaceable parts.

Chapter 5 Disassemble and Assemble

This chapter introduces the disassemble and assemble procedures, tools and notices of M300.

Chapter 6 Appendix

This chapter provides the accessory list and warranty of M300.

Format Conventions in this Manual:

1. Button

The front-panel key is denoted by the format of "Text Box + Button Name (Bold)" in the manual, for example, **Utility** denotes the "Utility" key.

2. Menu

The menu is denoted by the format of "Character Shading + Menu Word (Bold)" in the manual, for example, **System** denotes the "System" menu item under **Utility**.

3. Operation Step

The next step of the operation is denoted by an arrow "→" in the manual. For example, **Utility** → **System** denotes pressing **Utility** at the front panel and then pressing **System**.

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Chapter 1 Troubleshooting&Maintenance

Topics of this chapter:

- General Inspection
- Troubleshooting
- To Select the AC Voltage Specification
- To Replace the Fuse
- System Maintenance
- General Care and Cleaning
- Environmental Considerations

General Inspection

Execute the following inspections when receiving a new instrument.

1. **Inspect the shipping container for damage**

Keep the damaged shipping container or cushioning material until the contents of the shipment have been checked for completeness and the instrument has passed both electrical and mechanical tests.

The consigner or carrier shall be liable for the damage to instrument resulting from shipment. **RIGOL** would not be responsible for free maintenance/rework or replacement of the unit.

2. **Inspect the instrument**

In case of any damage, or defect, or failure, notify your **RIGOL** sales representative.

3. **Check the accessories**

Please check the accessories according to the packing lists. If the accessories are incomplete or damaged, please contact your **RIGOL** sales representative.

Troubleshooting

This section lists the problems or failures which might occur when using this instrument as well as their solutions. Please solve them according to the corresponding steps. If the problem remains, please contact **RIGOL** and provide the device information of your instrument (**Utility** → **Info**).

1. The instrument cannot start?

- 1) Check the power cord connection.
- 2) Check whether the power switch at the front panel is turned on.
- 3) Remove the power cord and check whether the voltage selector is at the proper scale and whether the fuse specification is correct and the fuse is in good condition. If the fuse is blown, replace it with a specified one.
- 4) Restart the instrument after executing the above inspections.
- 5) If the problem remains, please contact **RIGOL**.

2. 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 Flash storage type, as this instrument does not support hardware storage type USB storage device.
- 3) Restart the instrument and insert the USB storage device to check it.
- 4) If the USB storage device still cannot work normally, please contact **RIGOL**.




3. How to recover the configurations from the last power failure or unexpected shutdown and continue the work before the shutdown automatically?

- 1) Restart the instrument.
- 2) Press **Utility** → **System**, select **PwrOffSt** using the up/down direction keys and select "ON" using the left/right direction keys.

4. The screen is too dark?

Press **Utility** → **System**, select **Brightness** using the up/down direction keys and set the proper brightness using the left/right direction keys.

5. The instrument is locked?

- 1) Check whether the instrument is in remote mode (when the instrument is in remote mode, "Rmt" is displayed in the status bar of the user interface). If yes, press  to exit the remote mode and unlock the instrument.
- 2) Check whether the front panel of the instrument is locked (when the front panel is locked,  is displayed in the status bar of the user interface). If yes, press and hold  to unlock the front panel.
- 3) Check whether a progress bar is displayed in the interface. If yes, please wait for a moment and operate the instrument when the progress bar

disappears.

- 4) If the problem remains, please restart the instrument.

6. How to change the system language?

Press **Utility** → **System**, select **Language** using the up/down direction keys and select your desired language using the left/right direction keys.

7. How to view the information and model number of the plug-in modules?

Press **Utility** → **Detect**, select the desired module using the left/right direction keys and press **View** to view the information and model number of the module.

8. The corresponding indicator at the front panel does not go on when the module has been inserted?

- 1) Press **Utility** → **Detect**, select the desired module using the left/right direction keys and press **Re-test**. If the problem remains, press **View**.
- 2) If the information of the module cannot be viewed, please refer to problem 9.
- 3) If the information of the module can be viewed, the module indicator is possibly damaged and please contact **RIGOL** to consult maintenance information.

9. Unable to view the information of the module or unable to use the module when the module has been inserted?

- 1) Turn the instrument off, take out the module and insert the module into the instrument again firmly.
- 2) Restart the instrument, wait for about 1 minute and view the module information again.
- 3) If the problem remains, please contact **RIGOL**.

10. Unable to make configurations or operations related to the DMM module when it has been inserted?

- 1) Ensure that **Utility** → **System** → **DMM** is set to "ON". If the problem remains, please refer to the next step.
- 2) Press **Utility** → **Detect**, select the DMM module using the left/right direction keys and press **View** to view the information of the DMM module. If the information is not displayed or is not displayed correctly, the DMM module is abnormal due to high current or power load failure probably. At this point, please turn the instrument off and restart it a few minutes later.
- 3) If the problem remains, please contact **RIGOL**.

11. The GPIB interface does not work normally?

- 1) Check whether the cable works normally and the connection is correct and reliable.
- 2) Check whether the GPIB address of M300 is the same with that of the PC. If

not, please modify it.

- 3) If the problem remains, please contact **RIGOL**.

12. The USB Device interface does not work normally?

- 1) Check whether the cable works normally and the connection is correct and reliable.
- 2) Check whether the "USB Test and Measurement Device" drive program has been installed in your computer correctly (namely check whether "USB Test and Measurement Devices" is displayed in the device manager of your PC).
- 3) If the problem remains, please contact **RIGOL**.

13. The RS232 interface does not work normally?

- 1) Check whether the RS232 parameter settings of M300 are the same with those of the PC. If not, please modify them. If the problem remains, please refer to the next step.
- 2) Check whether the RS232 cable is a cross wire.
- 3) If the problem remains, please contact **RIGOL**.

14. The LAN interface does not work normally?

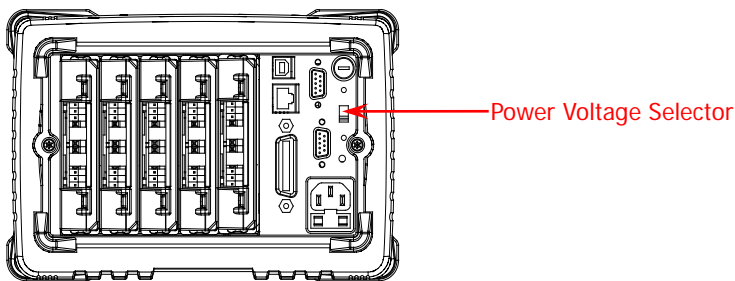
- 1) Check whether the cable works normally and the connection is correct and reliable.
- 2) Check the IP address configuration mode:
 - If DHCP is enabled, please ensure the network supports DHCP mode and can distributes network parameters (such as the IP address) to the instrument automatically.
 - If DHCP is disabled and Auto IP is enabled, please ensure the IP addresses of M300 and the PC are in the same network segment.
 - If only Manual IP is enabled, please ensure the IP addresses of M300 and the PC are in the same network segment.
- 3) If the problem remains, please contact **RIGOL**.

To Select the AC Voltage Specification

M300 supports two types of AC voltage inputs: 115 V and 230 V. Please adjust the power voltage selector at the rear panel of the instrument according to your power supply voltage.

If the power supply voltage is within $115^*(100\%-10\%)$ V to $115^*(100\%+10\%)$ V, please select 115.

If the power supply voltage is within $230^*(100\%-10\%)$ V to $230^*(100\%+10\%)$ V, please select 230.

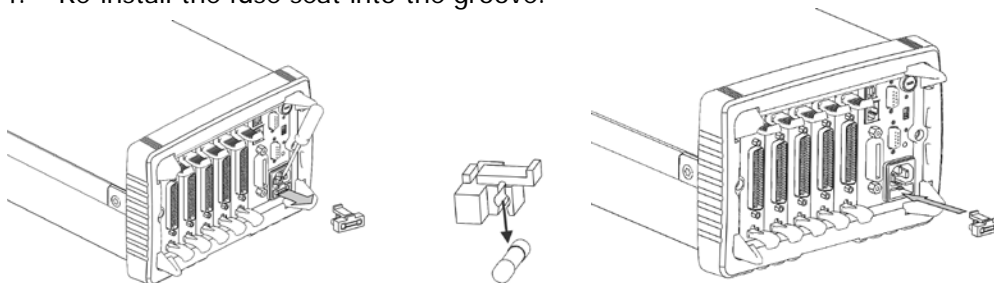


To Replace the Fuse

To Replace the Power Fuse

Please follow the steps below to replace the fuse.

1. Turn off the instrument and remove the power cord.
2. Insert a small straight screwdriver into the groove at the power socket and pry out the fuse seat.
3. Replace the old fuse with a specified one.
4. Re-install the fuse seat into the groove.



CAUTION

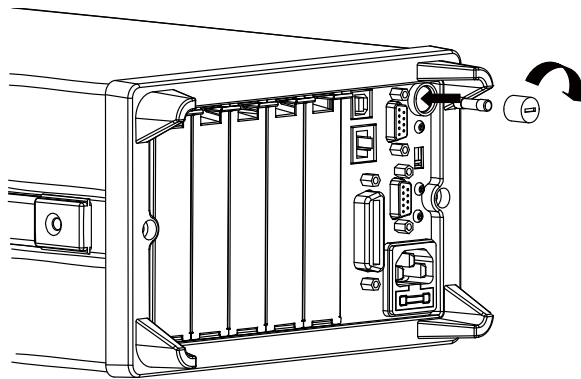
To avoid electric shock or fire, please use the specified fuse and make sure that the fuse seat is not short-circuited.

To Replace the Power Fuse of the DMM Module

The AC power input from the power socket is divided into two paths to energize the DMM module and the other circuits respectively. A power fuse (AC 250V T250 mA) is provided for the DMM module at the rear panel of M300.

Please follow the steps below to replace the fuse.

1. Turn off the instrument and remove the power cord.
2. Press down the fuse cap using a straight screwdriver and rotate clockwise.
3. Select the correct voltage scale at the voltage selector.
4. Disassemble the fuse cap and fuse.
5. Replace the old fuse with a specified one and reinstall the fuse cap.



CAUTION

To avoid electric shock or fire, please use the specified fuse.

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 performance and basic operating methods of the instrument before using it.
2. In order to ensure the measurement accuracy and service life of the instrument, the instrument should be used and stored in places away from dust, shock, moisture, magnetic field and static; besides, the instrument should be placed in places where it will not be exposed to sunlight for long periods of time.
3. Do not operate the instrument when failure occurs. In this situation, you need to first solve the failure. Besides, regular test and calibration should be performed to ensure the accuracy of the performance.
4. Arrange the instrument properly after finishing the operation of the instrument.
5. Keep the relative accessories of the instrument properly for future use.

General Care and Cleaning

General 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. To clean the exterior surface, perform the following steps:

1. Disconnect the instrument from all power sources.
2. Clean the loose dust on the outside of the instrument with a lint-free cloth (with a 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 injury resulting from short circuit, make sure the instrument is completely dry before reconnecting to a power source.

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. In order to avoid release of such substances into the environment and harm to human health, we encourage you to recycle this product in an appropriate way that will ensure that most of the materials are reused or recycled appropriately. Please contact your local authorities for disposal or recycling information

Chapter 2 Performance Verification Test

This chapter introduces the performance verification test methods and notices of M300.

Topics of this chapter:

- Devices Under Test
- Test Devices
- Quick Test
- Test Notices
- DMM Module Performance Test
- Plug-in Module Performance Test

Devices Under Test

When performing the performance verification test, different devices under test are required for different test items, as shown in Table 2-1.

Table 2-1 Devices Under Test

Test Item		Device Under Test	Device Used ^[1]
Zero Point Verification	DC Current	M300 Main Frame (×1) MC3065 (×1) MC3324 (×1) M3TB24 (×1)	M300 Main Frame (×1) MC3065 (×1) MC3324 (×1) M3TB24 (×1)
	DC Voltage	M300 Main Frame (×1) MC3065 (×1)	
	Resistance		
Gain Verification	DC Voltage	M300 Main Frame (×1) MC3120, MC3132, MC3164 ^[2] or MC3324 (×1)	
	AC Voltage		
	Resistance	M3TB20, M3TB32, M3TB64 or M3TB24 (×1)	
	Frequency		
	DC Current	M300 Main Frame (×1) MC3065 (×1) MC3324 (×1) M3TB24 (×1)	
	AC Current		
Module Performance Verification	Number of Relay Cycles	M300 Main Frame (×1) MC3120, MC3132, MC3164 ^[2] or MC3324 (×1) M3TB20, M3TB32, M3TB64 or M3TB24 (×1)	M300 Main Frame (×1) MC3324 (×1)
	Thermal Couple Reference Junction	M300 Main Frame (×1) MC3065 (×1) MC3120, MC3132 or MC3324 (×1) M3TB20, M3TB32 or M3TB24 (×1)	M300 Main Frame (×1) MC3065 (×1) MC3324 (×1) M3TB24 (×1)
	DAC Output Accuracy	M300 Main Frame (×1) MC3534 (×1) M3TB34 (×1)	M300 Main Frame (×1) MC3534 (×1) M3TB34 (×1)

Note^[1]: Devices used in the test procedures in the following sections.

Note^[2]: When MC3164 is used, you cannot perform 4-wire resistance measurement and temperature measurement is not recommended.

Test Devices

You are recommended to use the devices listed in Table 2-2 to test M300. Besides, devices that meet the “**Performance Requirement**” in the table can also be used.

Table 2-2 Recommended Devices

Test Item		Recommended Device	Performance Requirement
Zero Point Verification		None	None
Gain Verification	DC Voltage	Fluke 5520A and Agilent 3458A (with option 002) ^[1]	< 1/5 of the 24-hour Specification of the Instrument
	DC Current	Fluke 5520A and Agilent 3458A (with option 002) ^[1]	
	Resistance	Fluke 5520A and Agilent 3458A (with option 002) ^[1]	
	AC Voltage	Fluke 5520A	
	AC Current	Fluke 5520A	
	Frequency	Fluke 5520A	
Module Performance Verification	Thermal Couple Reference Junction	J Type Thermal Couple (Calibrated) and Thermostatic Bath	Error ≤ 0.1 °C
	DAC Output Accuracy	RIGOL DM3068	5½ or Higher Reading Resolution

Note^[1]: Agilent 3458A (with option 002) is used to calibrate Fluke 5520A.

Quick Test

In quick test, only some of the test points (points marked with Q in Table 2-4 to Table 2-9) in normal performance verification test are used to test M300.

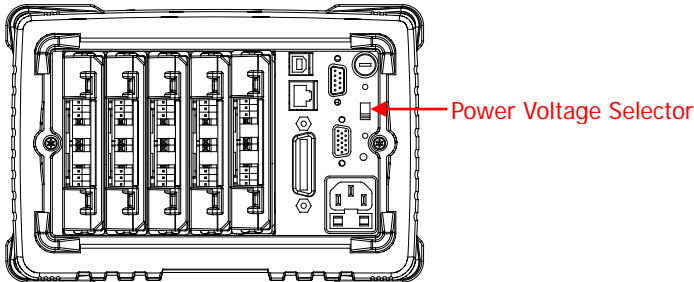
Tip

Quick test is not applicable to devices with function abnormalities. Devices that do not pass the quick test must be calibrated or repaired before being used.

Test Notices

Before performing the test, adjust the power voltage selector at the rear panel of M300 according to your power supply voltage.

- If the power supply voltage is within $115*(100\%-10\%)$ V to $115*(100\%+10\%)$ V, please select 115.
- If the power supply voltage is within $230*(100\%-10\%)$ V to $230*(100\%+10\%)$ V, please select 230.



To ensure optimum performance, all the test procedures should follow the recommendations below.

1. During the test, the environment temperature should be stable and be between 18°C and 28°C . The ideal environment temperature is $23^{\circ}\text{C} \pm 1^{\circ}\text{C}$.
2. Make sure that the environment relative humidity is lower than 80%.
3. Before performing the test, make sure that the instrument (installed with MC3065, multiplexer module and external terminal block; the corresponding channel of the terminal block is short-circuited) has been warmed up for more than 90 minutes.
4. Use copper connector to reduce the thermoelectric potential effect.
5. Use Teflon shielded twisted pairs (as short as possible) to reduce the effect of external interference.
6. Connect the shield of the input cable with the LO terminal of the calibrator. When special requirement is provided, ground the LO terminal of the calibrator.

As M300 is a high-precision measuring instrument, special attention should be paid to the additional errors caused by the calibration source and calibration operations. Ideally, the precision specifications of the verification and calibration standard sources should be more than 4 times higher than that of the test device.

When performing DC voltage, DC current and resistance gain tests, make sure that the "0" output of the calibrator is correct.

Before performing the performance verification test of plug-in module, remove all the connecting cables of the module and terminal block.

DMM Module Performance Test

Input Connections

In this manual, the mixed multiplexer (MC3324) is used for the zero point verification and gain verification. The connecting method is as shown in the figure below.

Note: Please use Teflon shielded twisted pairs to reduce noise errors. Connect the shield of the input cable with the LO terminal of the calibrator.

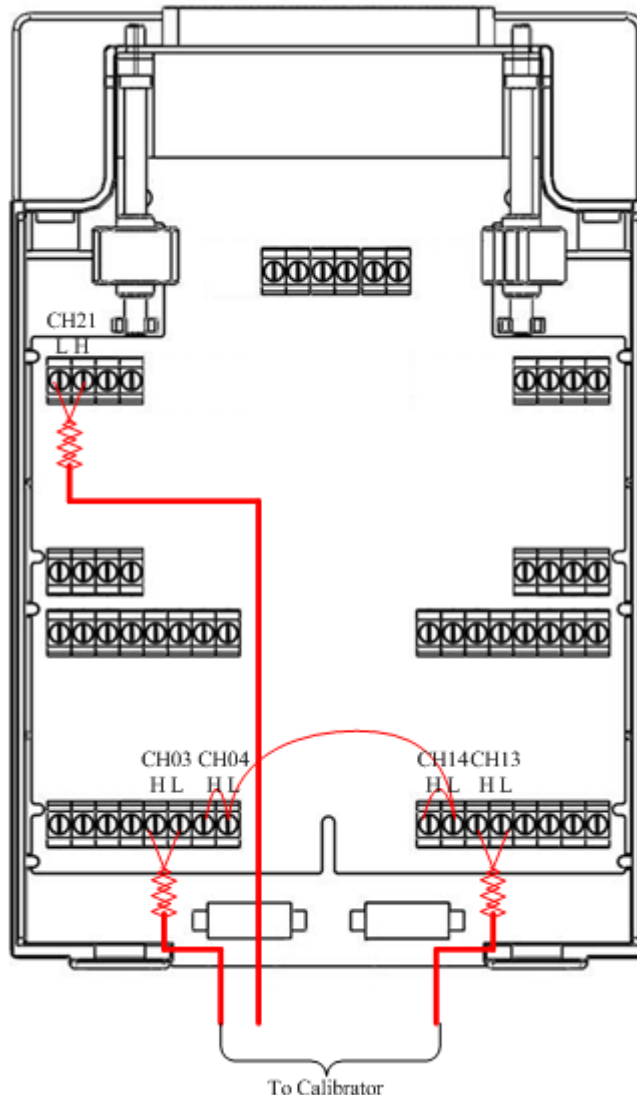


Figure 2-1 Input Connections

You can also use MC3120, MC3132 or MC3164 to perform voltage, frequency and resistance tests. The recommended connecting channels are as shown in the table

below.

Note: For MC3120, MC3132 and MC3164, current test is not supported. For MC3164, 4-wire resistance test is not supported and temperature test is not recommended.

Table 2-3 Recommended Channels Under Test

Test Item		MC3120	MC3132	MC3164	MC3324
Zero Point Verification	DCI	Not Supported			Open CH21
	DCV	Short-circuit CH04 and CH14	Short-circuit CH13 and CH29	CH13 and COM	Short-circuit CH04 and CH14
	2WR 4WR			The same as above; but 4WR is not supported	
Gain Verification	DCI ACI	Not Supported			
	DCV ACV	Use CH05 for 2-wire connection CH05 and CH15 for 4-wire connection	Use CH14 for 2-wire connection CH14 and CH30 for 4-wire connection	CH13 and COM	Use CH03 for 2-wire connection CH03 and CH13 for 4-wire connection
	2WR 4WR			The same as above; but 4WR is not supported	
	FREQ		CH13 and COM		

Zero Point Verification

Test Procedures:

1. Insert the DMM module (MC3065) into Slot 3 of M300.
2. Measurement connections:
 - (1) Open the top cover of the external terminal block (M3TB24). Short-circuit CH04 and CH14 as well as open CH21 by referring to “**Input Connections**”.
 - (2) Connect M3TB24 to the 78 Pin interface of MC3324. Tighten the two screw bolts and the nuts on the module. Close the top cover of M3TB24.
 - (3) Insert MC3324 connected with M3TB24 into Slot 1 of M300.
3. Power on and start M300. Warm the instrument up for at least 90 minutes.
4. Test the functions and ranges in Table 2-4 in sequence.
 - (1) Press **Config** at the front panel of M300 to enter the scan list configuration interface.
 - (2) Add the desired channel (CH121 or CH104) into the scan list, select the function and range by referring to Table 2-4 as well as set the integration time to 100PLC.
 - (3) Press **Monitor** at the front panel of M300 to turn on the single-channel monitor function.
 - (4) Read the measurement result and compare the measurement result with the test limit in the table.

Table 2-4 Zero Point Offset Check Table

CH121		Input Signal	Quick Test ^[3]	Allowed Error Range		
Function ^[1]	Range			24 Hours	90 Days	1 Year
DC Current	200μA	Open	Q	±24nA	±30nA	±30nA
	2mA	Open		±60nA	±60nA	±60nA
	20mA	Open	Q	±2.4μA	±3μA	±3μA
	200mA	Open		±4μA	±6μA	±6μA
	1A	Open	Q	±200μA	±200μA	±200μA
CH104		Input Signal	Quick Test ^[3]	Allowed Error Range		
Function ^[1]	Range			24 Hours	90 Days	1 Year
DC Voltage	200mV	Short-circuit	Q	±4μV	±5μV	±5μV
	2V	Short-circuit		±10μV	±12μV	±12μV
	20V	Short-circuit		±80μV	±100μV	±100μV
	200V	Short-circuit	Q	±1.2mV	±1.2mV	±1.2mV
	300V	Short-circuit		±1.8mV	±3mV	±3mV
Resistance ^[2]	200Ω	Short-circuit		±6mΩ	±8mΩ	±8mΩ
	2kΩ	Short-circuit		±10mΩ	±20mΩ	±20mΩ
	20kΩ	Short-circuit	Q	±100mΩ	±200mΩ	±200mΩ
	200kΩ	Short-circuit		±1Ω	±2Ω	±2Ω
	1MΩ	Short-circuit	Q	±10Ω	±10Ω	±10Ω
	10MΩ	Short-circuit		±100Ω	±100Ω	±100Ω
	100MΩ	Short-circuit		±10kΩ	±10kΩ	±10kΩ

Note^[1]: 90-minute warm-up, 100PLC integration time.

Note^[2]: The specifications are for 4-wire resistance. For 2-wire resistance, 3 Ω additional error should be added.

Note^[3]: Q marks the test points can be used in quick test.

Gain Verification

Test Procedures:

1. Insert the DMM module (MC3065) into Slot 3 of M300.
2. Measurement connections:
 - (1) Open the top cover of the external terminal block (M3TB24) and connect the specified channel to the calibrator using Teflon shielded twisted pair by referring to "**Input Connections**".
 - (2) Connect M3TB24 to the 78 Pin interface of MC3324. Tighten the two screw bolts and the nuts on the module. Close the top cover of M3TB24.
 - (3) Insert MC3324 connected with M3TB24 into Slot 1 of M300.
3. Power on and start M300. Warm the instrument up for at least 90 minutes.
4. Perform the following tests respectively.

DC Gain Verification

Test the functions and ranges in Table 2-5 in sequence.

1. Press **Config** at the front panel of M300 to enter the scan list configuration interface.
2. Add the desired channel (CH121 or CH103) into the scan list, select the function and range by referring to Table 2-5 as well as set the integration time to 100PLC.
3. Input the specified signal in Table 2-5 using the calibrator. Make sure that the output of the calibrator is fully established.
4. Press **Monitor** at the front panel of M300 to turn on the single-channel monitor function.
5. Read the measurement result and compare the difference between the measurement result and the value of "**Test Signal**" in Table 2-5 with the test limit in the table.

Table 2-5 Gain Error Check Table

CH121		Test Signal	Quick Test ^[3]	Allowed Error Range		
Function ^[1]	Range			24 Hours	90 Days	1 Year
DC Current	200μA	200μA	Q	±44nA	±110nA	±130nA
	200μA	-200μA	Q	±44nA	±110nA	±130nA
	2mA	2mA		±200nA	±660nA	±1.06μA
	2mA	-2mA		±200nA	±660nA	±1.06μA
	20mA	20mA	Q	±3.8μA	±9μA	±13μA
	20mA	-20mA	Q	±3.8μA	±9μA	±13μA
	200mA	200mA		±24μA	±66μA	±106μA
	200mA	-200mA		±24μA	±66μA	±106μA
	1A	1A	Q	±700μA	±1mA	±1.2mA
	1A	-1A		±700μA	±1mA	±1.2mA
CH103		Test Signal	Quick Test ^[3]	Allowed Error Range		
Function ^[1]	Range			24 Hours	90 Days	1 Year
DC Voltage	200mV	200mV		±8μV	±11μV	±13μV
	200mV	-200mV		±8μV	±11μV	±13μV
	2V	2V	Q	±40μV	±52μV	±82μV
	2V	-2V		±40μV	±52μV	±82μV
	20V	20V	Q	±480μV	±700μV	±900μV
	20V	-20V		±480μV	±700μV	±900μV
	200V	200V	Q	±5.2mV	±9.2mV	±11.2mV
	200V	-200V		±5.2mV	±9.2mV	±11.2mV
	300V	300V	Q	±7.8mV	±15mV	±19.5mV
	300V	-300V		±7.8mV	±15mV	±19.5mV
Resistance ^[2]	200Ω	200Ω		±12mΩ	±24mΩ	±28mΩ
	2kΩ	2kΩ		±50mΩ	±180mΩ	±220mΩ
	20kΩ	20kΩ	Q	±500mΩ	±1.8Ω	±2.2Ω
	200kΩ	200kΩ		±5Ω	±18Ω	±22Ω
	1MΩ	1MΩ	Q	±30Ω	±110Ω	±130Ω
	10MΩ	10MΩ		±1.6kΩ	±3.1kΩ	±4.1kΩ
	100MΩ	100MΩ		±310kΩ	±810kΩ	±810kΩ

Note^[1]: 90-minute warm-up, 100PLC integration time.

Note^[2]: The specifications are for 4-wire resistance. For 2-wire resistance, 3 Ω additional error should be added.

Note^[3]: Q marks the test points can be used in quick test.

AC Voltage Gain Verification

Test the functions and ranges in Table 2-6 in sequence.

1. Press **Config** at the front panel of M300 to enter the scan list configuration interface.
2. Add the desired channel (CH103) into the scan list, select the function and range by referring to Table 2-6 as well as set the AC filter to 3Hz.
3. Input the specified signal in Table 2-6 using the calibrator. Make sure that the output of the calibrator is fully established.
4. Press **Monitor** at the front panel of M300 to turn on the single-channel monitor function.
5. Read the measurement result and compare the difference between the measurement result and the value of "Test Signal" in Table 2-6 with the test limit in the table.

Table 2-6 AC Voltage Gain Check Table

Range ^[1]	Test Signal Vrms	Input Frequency	Quick Test ^[2]	Allowed Error Range		
				24 Hours	90 Days	1 Year
200mV	200mV	10Hz		±760μV	±780μV	±780μV
	200mV	20kHz	Q	±140μV	±180μV	±200μV
	200mV	50kHz		±300μV	±320μV	±340μV
	200mV	100kHz		±1.26mV	±1.36mV	±1.36mV
	200mV	300kHz		±9mV	±9mV	±9mV
2V	2V	10Hz		±7.4mV	±7.6mV	±7.6mV
	2V	20kHz	Q	±1.2mV	±1.6mV	±1.8mV
	2V	50kHz		±2.8mV	±3.2mV	±3.4mV
	2V	100kHz		±12.6mV	±13.6mV	±13.6mV
	2V	300kHz		±90mV	±90mV	±90mV
	100mV	1kHz		±440μV	±650μV	±660μV
20V	20V	10Hz		±76mV	±78mV	±78mV
	20V	20kHz	Q	±16mV	±22mV	±24mV
	20V	50kHz		±30mV	±34mV	±40mV
	20V	100kHz		±126mV	±136mV	±136mV
	3.2V	300kHz		±228mV	±228mV	±228mV
200V	200V	45Hz		±120mV	±200mV	±220mV
	200V	20kHz	Q	±120mV	±200mV	±220mV
	200V	50kHz		±280mV	±340mV	±400mV
	200V	100kHz		±1.26V	±1.36V	±1.36V
300V	300V	45Hz		±180mV	±300mV	±330mV
	300V	20kHz	Q	±180mV	±300mV	±330mV
	300V	50kHz		±1.89V	±2.04V	±2.04V
	300V	100kHz		±13.5V	±13.5V	±13.5V

Note^[1]: 90-minute warm-up, slow filter, sine input.

Note^[2]: Q marks the test points can be used in quick test.

AC Current Gain Verification

Test the functions and ranges in Table 2-7 in sequence.

1. Press **Config** at the front panel of M300 to enter the scan list configuration interface.
2. Add the desired channel (CH121) into the scan list, select the function and range by referring to Table 2-7 as well as set the AC filter to 3Hz.
3. Input the specified signal in Table 2-7 using the calibrator. Make sure that the output of the calibrator is fully established.
4. Press **Monitor** at the front panel of M300 to turn on the single-channel monitor function.
5. Read the measurement result and compare the difference between the measurement result and the value of “**Test Signal**” in Table 2-7 with the test limit in the table.

Table 2-7 AC Current Gain Check Table

Range ^[1]	Test Signal	Input Frequency	Quick Test ^[2]	Allowed Error Range		
				24 Hours	90 Days	1 Year
200μA	200μA	1kHz	Q	±420nA	±420nA	±420nA
	200μA	5kHz		±420nA	±420nA	±420nA
	200μA	10kHz		±2.1μA	±2.1μA	±2.1μA
2mA	2mA	1kHz	Q	±3.2μA	±3.2μA	±3.2μA
	2mA	5kHz		±3.2μA	±3.2μA	±3.2μA
	2mA	10kHz		±9μA	±9μA	±9μA
20mA	20mA	1kHz	Q	±42μA	±42μA	±42μA
	20mA	5kHz		±42μA	±42μA	±42μA
	20mA	10kHz		±210μA	±210μA	±210μA
200mA	200mA	1kHz	Q	±280μA	±280μA	±280μA
	200mA	5kHz		±280μA	±280μA	±280μA
	200mA	10kHz		±900μA	±900μA	±900μA
	10mA	10kHz	Q	±520μA	±520μA	±520μA
1A	2A	1kHz	Q	±2.1mA	±2.1mA	±2.1mA
	2A	5kHz		±2.1mA	±2.1mA	±2.1mA

Note^[1]: 90-minute warm-up, slow filter, sine input.

Note^[2]: Q marks the test points can be used in quick test.

Frequency Gain Verification

Test the functions and ranges in Table 2-8 in sequence.

1. Press **Config** at the front panel of M300 to enter the scan list configuration interface.
2. Add the desired channel (CH103) into the scan list, select the function and range by referring to Table 2-8 as well as set the gate time to 1s.
3. Input the specified signal in Table 2-8 using the calibrator. Make sure that the output of the calibrator is fully established.
4. Press **Monitor** at the front panel of M300 to turn on the single-channel monitor function.
5. Read the measurement result and compare the difference between the measurement result and the value of "**Signal Frequency**" in Table 2-8 with the test limit in the table.

Table 2-8 Frequency Gain Check Table

Signal Effective Value Vrms	Signal Frequency	Quick Test ^[1]	Range	Allowed Error Range ^[2]		
				24 Hours	90 Days	1 Year
20mV	98Hz		200mV	±4.9mHz	±5.88mHz	±6.86mHz
200mV	500kHz	Q	2V	±25Hz	±30Hz	±35Hz

Note^[1]: Q marks the test points can be used in quick test.


Note^[2]: 90-minute warm-up, 1s gate time.

Plug-in Module Performance Test

To Query the Number of Relay Cycles

M300 counts the number of cycles of each relay and record the results in the non-volatile memory of the corresponding module. M300 reads the number of cycles of each relay on the module when checking the module currently inserted at each start-up.

Test Procedures:

1. Insert MC3324 into Slot 1 of M300.
2. After starting the instrument, press  at the front panel of M300 for 4 times and the instrument enters the channel information display interface. At this point, you can view the number of on/off of each channel.

For the numbering information of the relays, please refer to the module schematic diagrams in “**Appendix B: Module Schematic Diagrams**”.

Thermal Couple Reference Junction Test

Test Procedures:

1. Insert the DMM module (MC3065) into Slot 3 of M300.
2. Measurement connections:
 - (1) Open the top cover of the external terminal block (M3TB24) and connect a calibrated J type thermal couple (with 0.1°C or even lower error) to CH1.
 - (2) Connect M3TB24 to the 78 Pin interface of MC3324. Tighten the two screw bolts and the nuts on the module. Close the top cover of M3TB24.
 - (3) Insert MC3324 connected with M3TB24 into Slot 1 of M300.
3. Power on and start M300. Warm the instrument up for at least 90 minutes.
4. Connect the other end of the J type thermal couple to a thermostatic bath (the temperature is known).
5. Press **Config** at the front panel of M300 to enter the scan list configuration interface.
6. Add CH101 into the scan list as well as select the temperature measurement function and J type thermal couple.
7. Press **Monitor** at the front panel of M300 to turn on the single-channel monitor function and read the measurement result.
8. Subtract 0.1°C error from the measurement result and compare the result with the known temperature under test. The error should be lower than $\pm 2.5^{\circ}\text{C}$.

DAC Output Accuracy Test

The DAC output accuracy test is used to verify the output accuracy of the 4 DAC channels of the multifunction module (MC3534).

Test Procedures:

1. Measurement connections:
 - (1) Open the top cover of the external terminal block (M3TB34) and connect the test cables to the connecting terminals of the 4 DAC by referring to the figure below.
 - (2) Connect M3TB34 to the 78 Pin interface of MC3534. Tighten the two screw bolts and the nuts on the module. Close the top cover of M3TB34.
 - (3) Insert MC3534 connected with M3TB34 into Slot 1 of M300.

Note: For this test, the DMM module (MC3065) can be omitted.

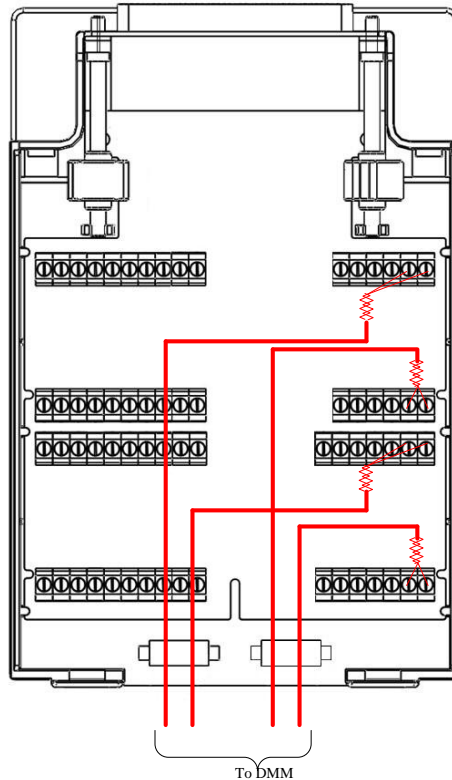


Figure 2-2 DAC Output Accuracy Test Connections

2. For each DAC channel, perform the following test.
 - (1) Connect the test cable connected to the corresponding connecting terminal of the external terminal block to the digital multimeter (select the DCV measurement function and auto range).

- (2) Press **Control** at the front panel of M300. At this point, MC3534 in Slot 1 is selected by default. Press **Single** to enter the MC3534 control interface. Use the direction keys to select the DAC channel to be tested.
- (3) Test the output values listed in Table 2-9 in sequence: press **Write**, input the output value and read the test result of the multimeter. Then, compare the difference between the test result and the DAC channel output value with the test limit in the table.

Table 2-9 DAC Output Accuracy Check Table

DAC Channel Output Value	Quick Test ^[1]	Allowed Error Range
		1 Year
10.000V	Q	±45mV
0.000V		±20mV
-10.000V		±5mV

Note^[1]: Q marks the test points can be used in quick test.

Chapter 3 To Acquire Calibration Service

Topics of this chapter:

- Calibration Interval
- Calibration Notices
- How to Acquire Calibration Service

Calibration Interval

Periodic calibration is required for M300. The calibration interval depends on the measurement accuracy requirement.

In applications requiring relatively higher measurement accuracy, the recommended calibration interval is 90 days. In most cases, a 1-year calibration interval is acceptable.

The accuracy specification can only be guaranteed when periodic calibration is performed.

No matter in what kinds of applications, longer than 1-year calibration interval is not recommended.

Calibration Notices

No matter which kind of calibration interval do you use, it is recommended that you perform a complete re-calibration when the calibration interval expires to make sure that the accuracy of M300 will be within the specification range during the next calibration interval.

The instrument might not be within the accuracy specification range even though it passes the performance verification test unless you re-calibrate the instrument.

How to Acquire Calibration Service

Calibrations by users themselves are not recommended. If calibration is required, please contact **RIGOL**.

Chapter 4 Replaceable Parts

Topics of this chapter:

- Exploded View of the Instrument
- List of Replaceable Parts

Exploded View of the Instrument

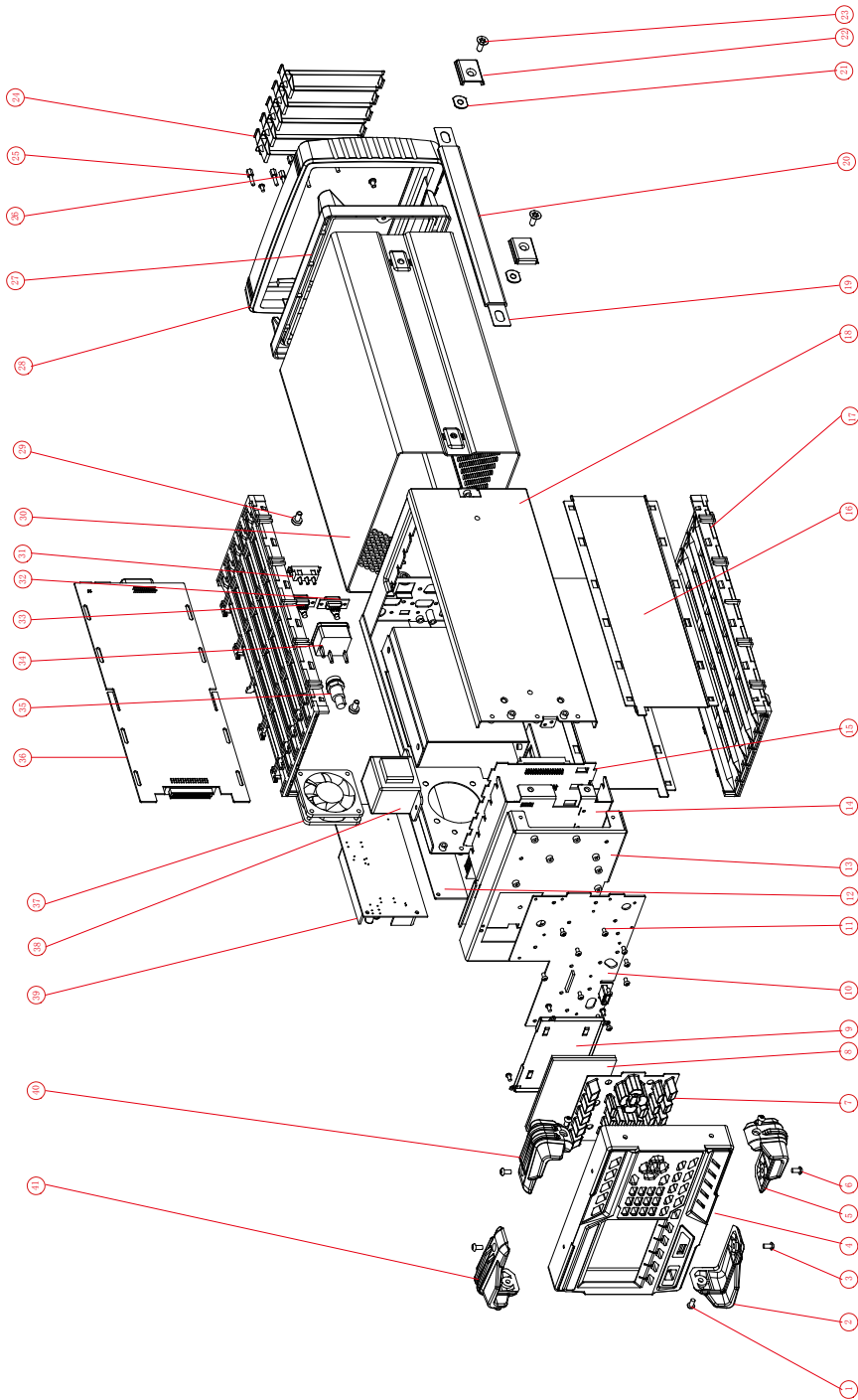


Figure 4-1 M300 Exploded View

List of Replaceable Parts

Table 4-1 M300 Replaceable Parts

No.	Name	Qty.
1	Torx pan head screw M4*10	4
2	Front shield (lower-left)	1
3	Torx pan head screw M4*6	1
4	Front panel	1
5	Front shield (lower-right)	1
6	Torx pan head screw M4*8	3
7	Rubber key	1
8	LCD	1
9	Screen hold-down frame	1
10	Key board	1
11	Torx pan head screw assembly FW3*6	31
12	Connect board	1
13	Metal plate	1
14	Chassis portion	1
15	Back plate	1
16	Tank sidewall	2
17	Module slot plate	2
18	Chassis	1
19	Handle metal plate	1
20	Handle rubber sleeve	1
21	Handle locating ring	2
22	Handle locating plastic part	2
23	Torx pan head screw M5*14	2
24	Placeholder plate	5
25	Multi-station screw 40*5*7	2
26	Multi-station screw 40*7*14	2
27	Rear panel	1
28	Rear rubber sleeve	1
29	Torx pan head screw M5*10	2
30	Sleeve	1
31	Dial switch	1
32	HDB interface	1
33	Internal analog bus	1
34	Power socket	1
35	Fuse	1
36	Main board	1
37	Fan	1
38	Transformer	1
39	Power board	1
40	Front shield (upper-right)	1
41	Front shield (upper-left)	1

Note: Some of the screws are not listed in the table above. Please refer to the detailed introductions in “**Disassemble and Assemble**” when disassembling and assembling the parts.

Chapter 5 Disassemble and Assemble

Topics of this chapter:

- Disassemble and Assemble Notices
- Instrument Appearance
- Step 1: To Disassemble the Rear Panel
- Step 2: To Disassemble the Handle and Metal Chassis
- Step 3: To Disassemble the Front Panel Assembly
- Step 4: To Disassemble the Fan/Power Board/Connect Board
- Step 5: To Disassemble the Transformer/Power Socket/Dial Pipe/Interfaces
- Step 6: To Disassemble the Chassis Portion
- Step 7: To Disassemble the Chassis
- Step 8: To Disassemble the Main Board
- Step 9: To Disassemble the Back Plate

Disassemble and Assemble Notices

Notices:

- Do not disassemble the instrument unless for working requirement.
- Only authorized personnel can 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 and be scuffed when disassembling the metal structures.

Tools Required:

- Torx screwdriver T10/T20
- Socket S5/S7



WARNING

Make sure that the power supply is cut off before disassembling the instrument. Only personnel with relative training or relative qualification certification can disassemble the instrument.

Instrument Appearance

The appearance of M300 is as shown in Figure 5-1. You need to get a basic understanding of the main instrument parts before disassembling and assembling the instrument. When disassembling or assembling the instrument, treat the parts carefully and follow the steps below to avoid scratching the part surface or damaging the PCB board. For details, refer to “**Disassemble and Assemble Notices**”.

The recommended disassemble procedures are as follows:

Rear panel → handle and metal chassis → front panel assembly → fan/power board/connect board → transformer/power socket/dial pipe/interfaces → chassis portion → chassis → main board → back plate.

The assemble procedures are the reverse of the disassemble procedures.

Note: Before disassembling the instrument, make sure that no plug-in module or placeholder plate is in the 5 slots at the rear panel.

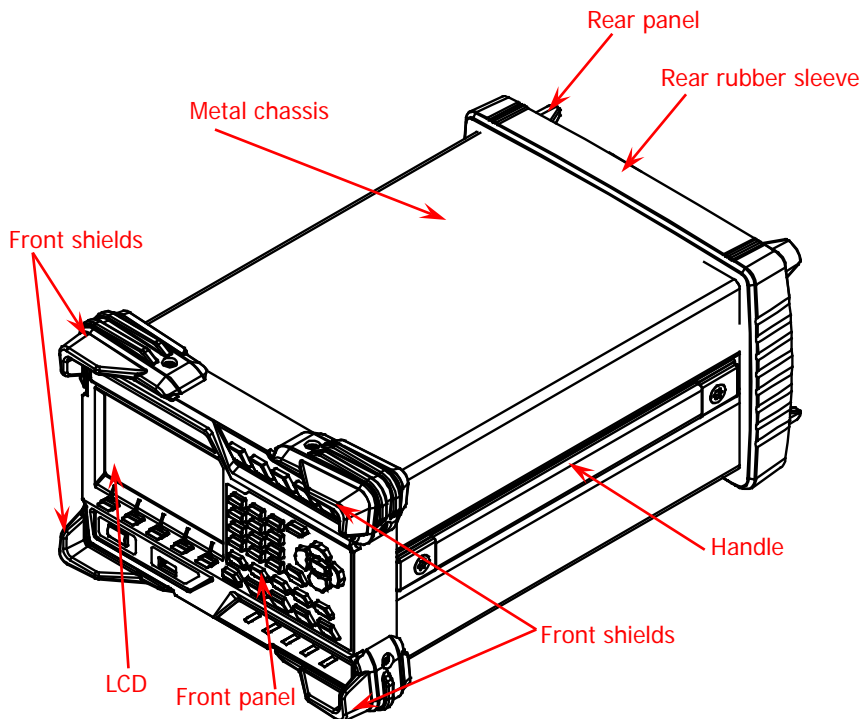


Figure 5-1 M300 Appearance

Step 1: To Disassemble the Rear Panel

Part Explanation:

- ① 2 screws (torx pan head screw M4*6) fixing the rear panel.

Tool:

Torx screwdriver T20

Disassemble Steps:

1. Make sure that no plug-in module or placeholder plate is in the 5 slots at the rear panel. Disassemble the rear rubber sleeve manually.
2. Remove the 2 screws ① on the right and left sides of the rear panel using screwdriver T20.
3. Take off the rear panel.

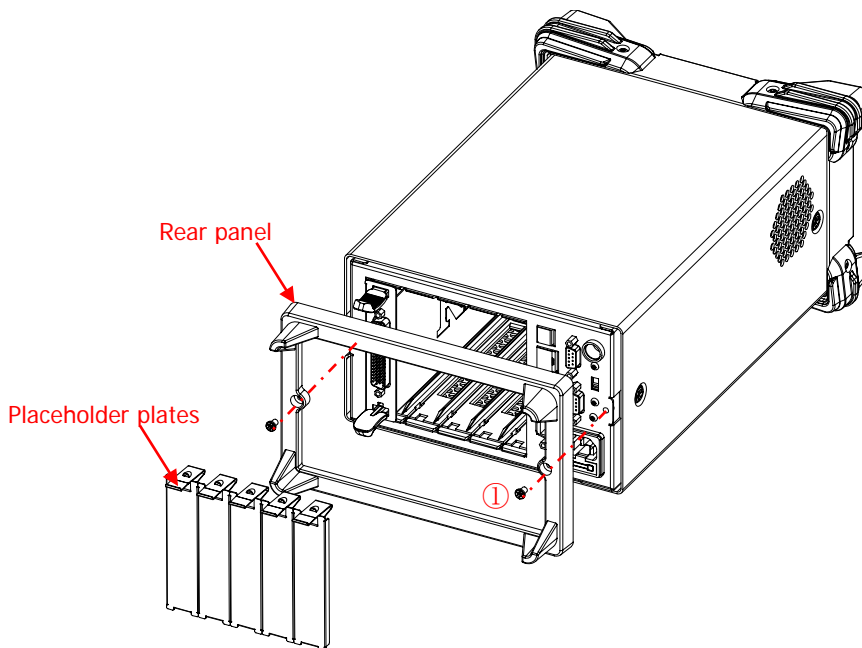


Figure 5-2 To Disassemble the Rear Panel

Step 2: To Disassemble the Handle and Metal Chassis

Part Explanation:

- ① 2 screws (torx pan head screw M5*14) fixing the handle.
- ② 2 screws (torx pan head screw M5*10) fixing the metal chassis.

Tool:

Torx screwdriver T20

Disassemble Steps:

1. Remove the 2 screws ① fixing the handle using screwdriver T20 and take off the handle assembly (include the handle rubber sleeve and the handle metal plate in it, the handle locating rings as well as the handle locating plastic parts).
2. Remove the 2 screws ② fixing the metal chassis using screwdriver T20.
3. Take off the metal chassis.

Assemble Notices:

1. When assembling the metal chassis, pay attention to the direction (take the fan vents and the installation position of the handle as reference to determine the left/right direction. The combine seam of the metal chassis should face downward).
2. When assembling the handle, the curved side of the handle rubber sleeve should face outwards.

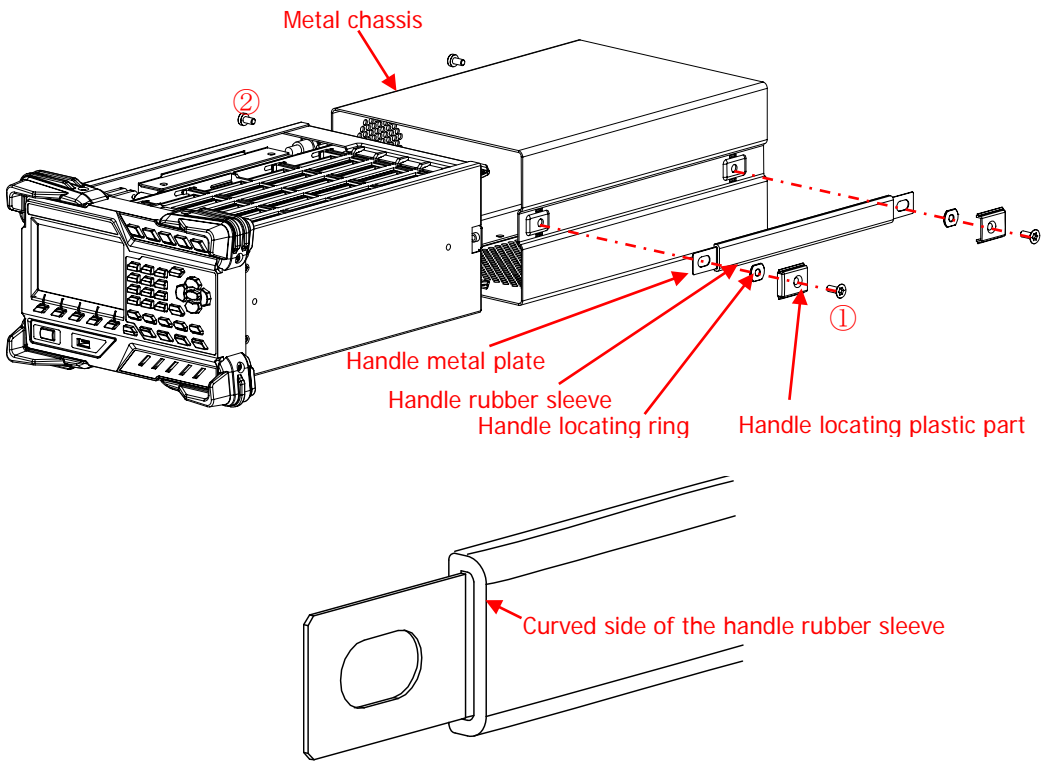


Figure 5-3 To Disassemble the Handle and Metal Chassis

Step 3: To Disassemble the Front Panel Assembly

Part Explanation:

- ① 4 screws (torx pan head screw M4*10, on left and right sides) fixing the front shields.
- ② 1 screw (torx pan head screw M4*6, lower-left and close to the USB Host interface) fixing the front shield.
- ③ 3 screws (torx pan head screw M4*8; upper-left, upper-right and lower-right) fixing the front shields.
- ④ 4 screws (torx countersunk head screw M4*8) fixing the front panel assembly.
- ⑤ 5 screws (torx pan head screw assembly FW3*6) fixing the front panel and metal plate.
15 screws (torx pan head screw assembly FW3*6) fixing the key board and metal plate.
4 screws (torx pan head screw assembly FW3*6) fixing the screen hold-down frame and front panel.

Tools:

Torx screwdriver T10/T20

Disassemble Steps:

1. Remove the 8 screws (①, ② and ③) using screwdriver T20 and take off the four front shields.
2. Remove the 4 screws ④ at both sides of the chassis using screwdriver T20, remove the 45Pin FFC cable and 3Pin screen cable connected to the digital board and take off the front panel assembly.
3. Remove the 5 screws fixing the front panel and metal plate using screwdriver T10.
4. Remove the 15 screws fixing the key board and metal plate using screwdriver T10.
5. Remove the 4 screws fixing the screen hold-down frame and front panel using screwdriver T10.

Assemble Notice:

When assembling the front panel assembly, the surface of the 45Pin FFC cable of which the two ends are blue should face upward.

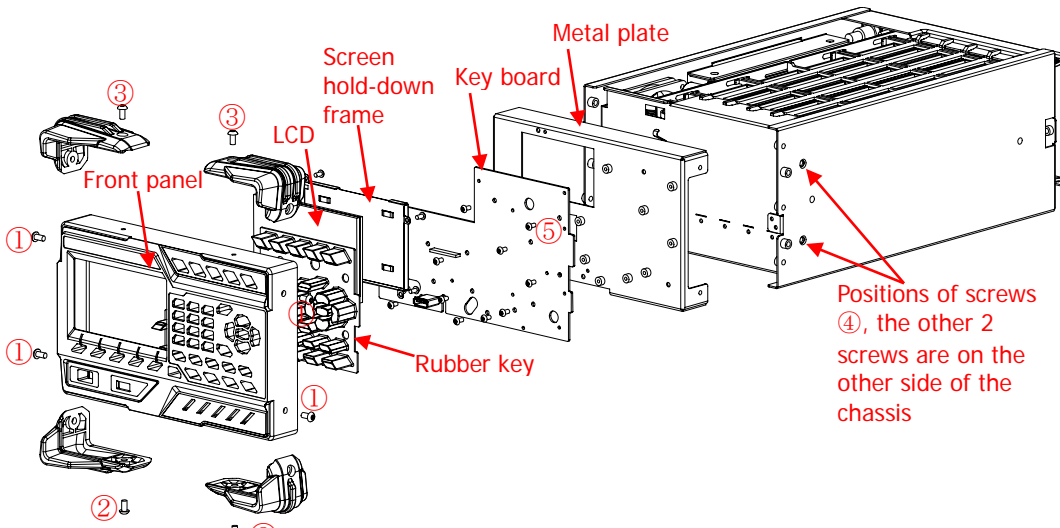


Figure 5-4 To Disassemble the Front Panel Assembly

Step 4: To Disassemble the Fan/Power Board/Connect Board

Part Explanation:

- ① 4 screws (torx countersunk head tapping screw F5*10) fixing the fan.
- ② 7 screws (torx pan head screw assembly FW3*6) fixing the power board and connect board.

Tool:

Torx screwdriver T20

Disassemble Steps:

1. Remove the 4 screws ① using screwdriver T20, remove the cable connecting the fan and digital board and take out the fan.
2. Remove the cables connecting the power board and connect board with the internal part of the chassis. As shown in the figure below, remove the 4 screws (torx countersunk head screw FM3*6) on the top and bottom of the chassis using screwdriver T10 and take out the power cover plate with the power board and connect board.
3. Remove the 7 screws ② using screwdriver T20 and take off the power board and connect board.

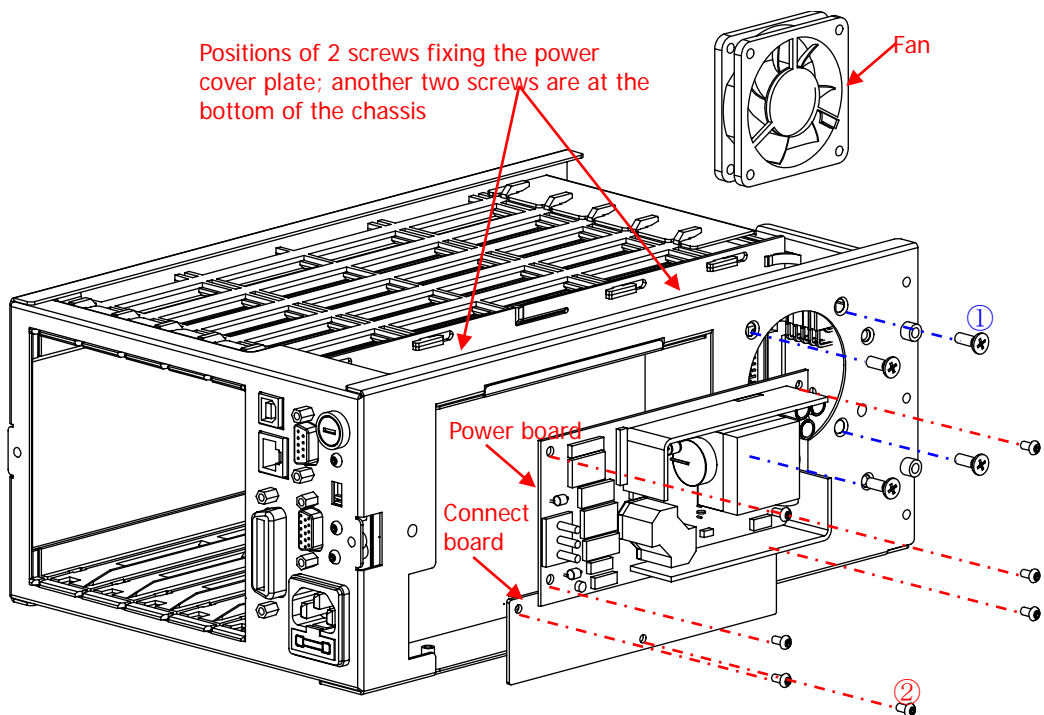


Figure 5-5 To Disassemble/Assemble the Fan/Power Board/Connect Board

Step 5: To Disassemble the Transformer/Power Socket/Dial Pipe/Interfaces

Part Explanation:

- ① 2 screws (torx pan head screw assembly FW4*8) fixing the transformer.
1 screw (torx pan head screw assembly FW4*8) grounding the power socket.
- ② 2 screws (torx pan head screw P3*8) fixing the dial pipe.
- ③ 2 screws (multi-station screw 40*5*7) fixing the analog bus interface.
2 screws (multi-station screw 40*5*7) fixing the RS-232/Alarms/Ext Trig interface.
- ④ 2 screws (multi-station screw 40*7*14) fixing the GPIB interface.

Tools:

Torx screwdriver T20, socket S5/S7

Disassemble Steps:

1. Remove the 2 screws ① fixing the transformer using screwdriver T20.
2. Remove the screw ① grounding the power socket inside the chassis using screwdriver T20.
3. Remove the 2 screws ② fixing the dial pipe using screwdriver T10.
4. Remove the 4 screws ③ fixing the analog bus interface and RS-232/Alarms/Ext Trig interface using socket S5. Remove the 2 screws ④ fixing the GPIB interface using socket S7.

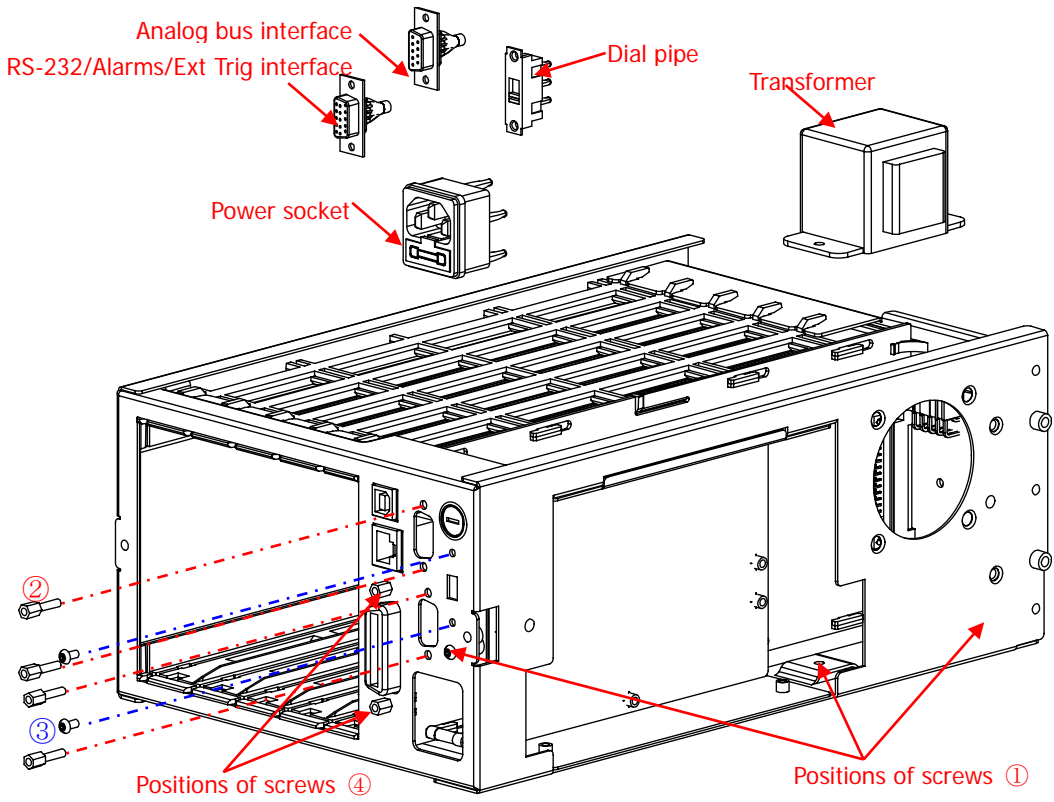


Figure 5-6 To Disassemble the Transformer/Power Socket/Dial Pipe/Interfaces

Step 6: To Disassemble the Chassis Portion

When the front panel assembly is disassembled, the metal plate at the front of the chassis is the chassis portion. It is fixed onto the chassis using 5 torx countersunk head screws (M4*8) with 2 on each side and 1 at the bottom.

Part Explanation:

① 5 screws (torx countersunk head screw M4*8) fixing the chassis portion.

Tool:

Torx screwdriver T20

Disassemble Steps:

1. Remove the 5 screws ① at each side and at the bottom of the chassis using screwdriver T20.
2. Take off the chassis portion.

Step 7: To Disassemble the Chassis

After disassembling the chassis portion, take off the metal chassis from the back of the instrument. At this point, the only part of the instrument reserved is the tank (with the main board being installed), including the tank sidewalls, module slot plates (as shown in the figure below) and back plate.

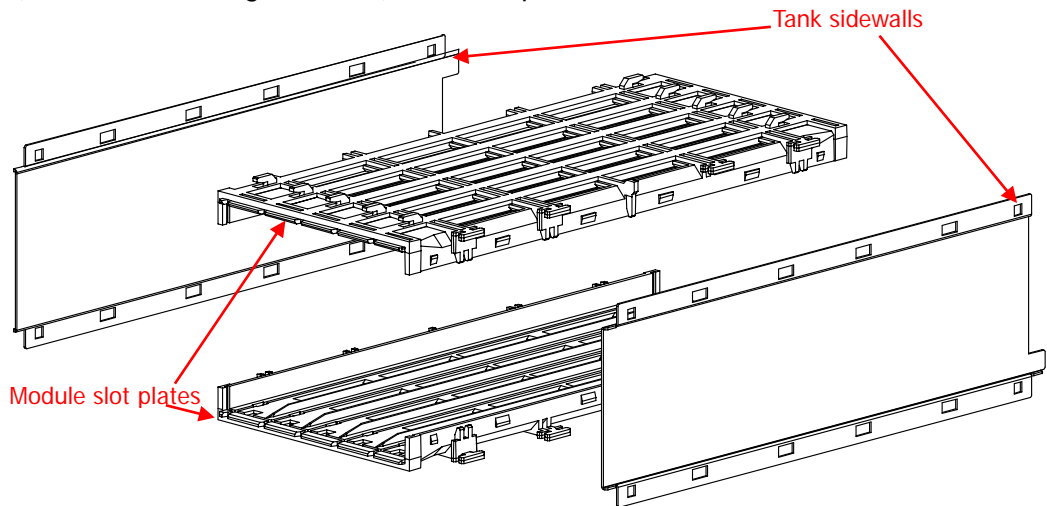


Figure 5-7 Tank Sidewalls and Module Slot Plates

Step 8: To Disassemble the Main Board

As shown in the figure below, there is a notch on each side of the main board. Lift the projecting parts of the two notches at the same time and push the main board in the arrow direction to disassemble the main board.

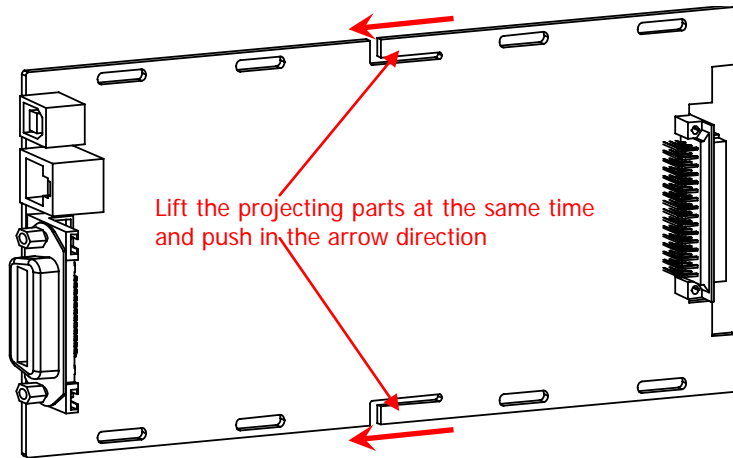


Figure 5-8 Main Board

Step 9: To Disassemble the Back Plate

After disassembling the main board, the only part of the instrument reserved is the tank consisting of the tank sidewalls, module slot plates and back plate. Grasp the two module slot plates and pull it outward to disassemble the tank. At this point, you can take out the back plate.

Assemble Notice:

Before disassembling, pay attention to the installation direction of each plate. When assembling, please first install the back plate and two tank sidewalls; then, install the two module slot plates.

Chapter 6 Appendix

Appendix A: Accessories and Options

	Description	Order Number
Main Frame	M300 data acquisition/switch system	M300
	M300 data acquisition/switch system + DMM module	M301
Standard Accessories	Power Cord conforming to the standard of the country	-
	USB Cable	CB-USBA-USBB-FF-150
	Mixed-interface Separator Line	MIX-SEPARATOR
	Four Spare Fuses: Two AC, 250 V, T250 mA fuses Two AC, 250 V, T3.15 A fuses	-
	Quick Guide	-
	Resource CD (User's Guide and Ultra Acquire)	-
	Optional Accessories : Module	DMM Module (6½ digits)
20-channel Multiplexer		MC3120
32-channel Multiplexer		MC3132
64-channel Single-ended Multiplexer		MC3164
20-voltage-channel+4-current-channel Mixed Multiplexer		MC3324
16-channel Actuator		MC3416
Multifunction Module		MC3534
4×8 Matrix Switch		MC3648
Dual 4-channel RF Multiplexer		MC3724
Optional Accessories : Terminal Block		MC3120 Terminal Block
	MC3132 Terminal Block	M3TB32
	MC3164 Terminal Block	M3TB64
	MC3324 Terminal Block	M3TB24
	MC3648 Terminal Block	M3TB48
	MC3534 Terminal Block	M3TB34
	MC3416 Terminal Block	M3TB16
Optional Accessories	RS232 Cable	-
	External Port for Analog Bus Interface	A-BUS-EXT-PORT
	Rack Mount Kit	RM-DP-1
	Rack Mount Kit for Two Instruments	RM-2-M300
	PC Software for M300 Series	Ultra Acquire

Note: All the standard or optional accessories can be ordered from you local **RIGOL** Office.

Appendix B: Module Schematic Diagrams

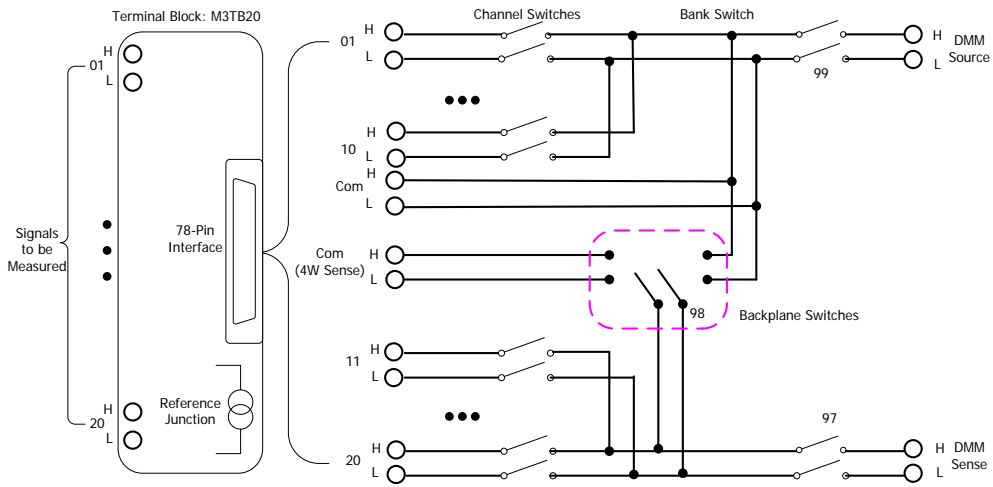


Figure 6-1 MC3120 Schematic Diagram

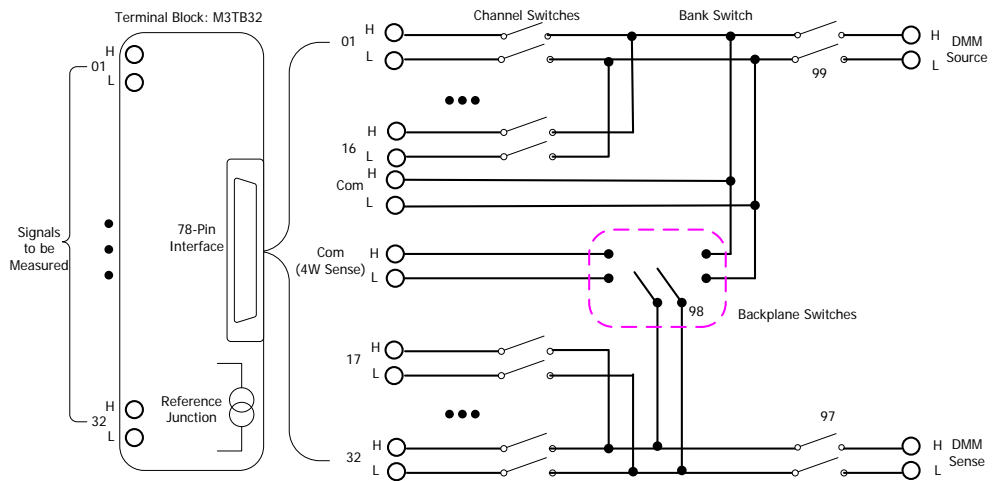


Figure 6-2 MC3132 Schematic Diagram

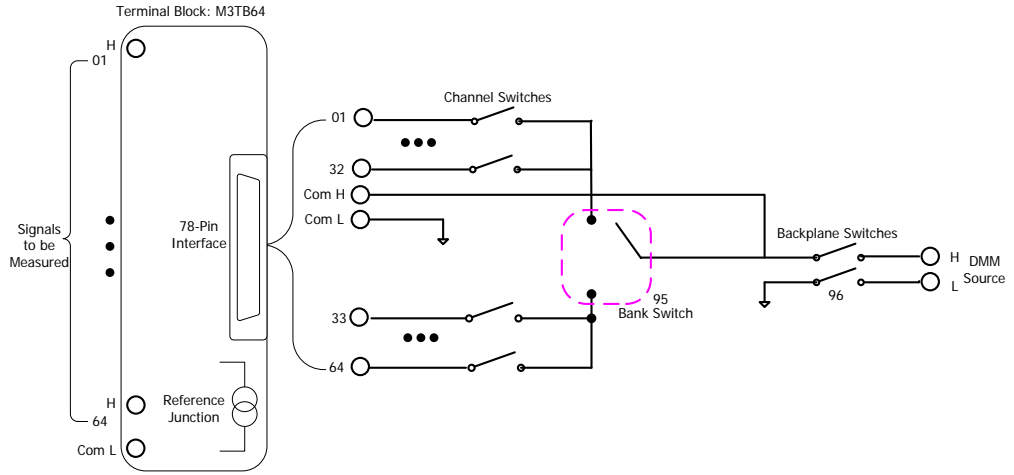


Figure 6-3 MC3164 Schematic Diagram

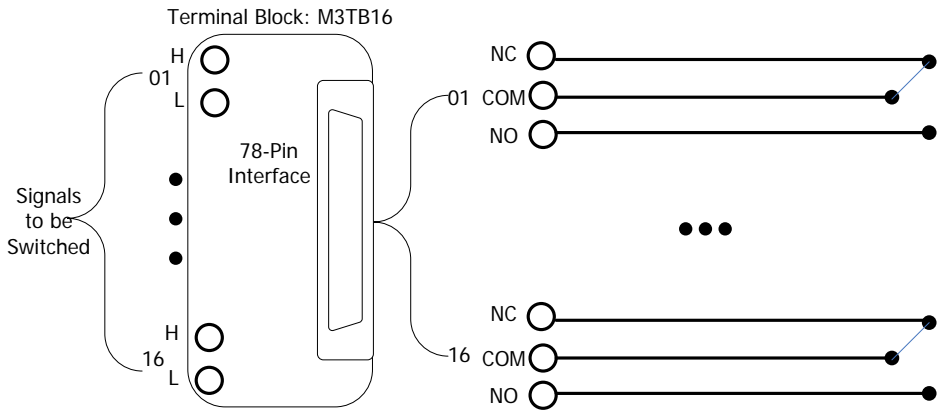


Figure 6-4 MC3416 Schematic Diagram

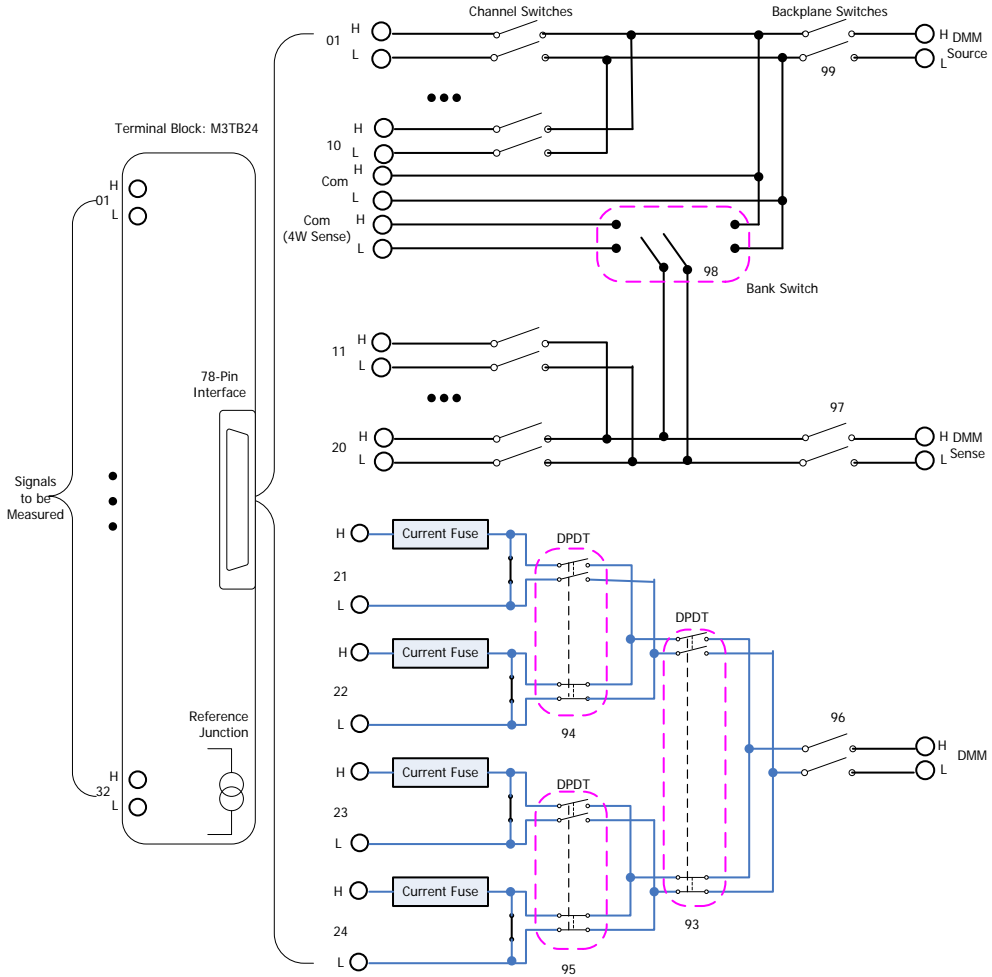


Figure 6-5 MC3324 Schematic Diagram

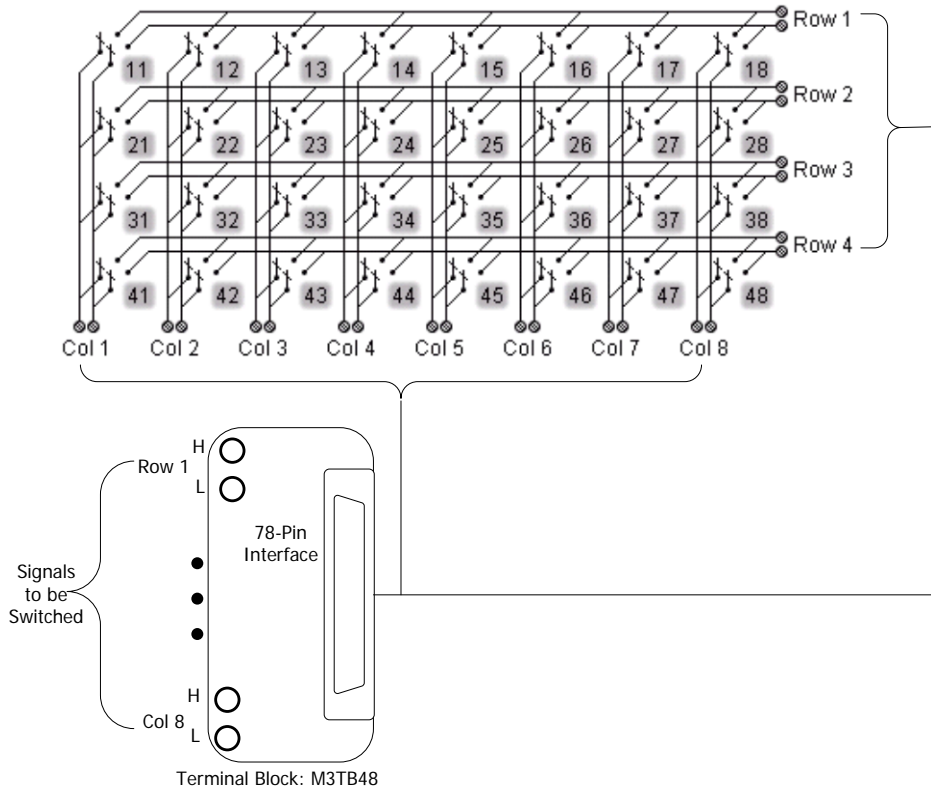


Figure 6-6 MC3648 Schematic Diagram

Appendix C: Warranty

RIGOL warrants that its products mainframe and accessories will be free from defects in materials and workmanship within the warranty period.

If a product is proven to be defective within the respective period, **RIGOL** guarantees the free replacement or repair of products which are approved defective. To get repair service, please contact with your nearest **RIGOL** sales and service office.

RIGOL does not provide any other warranty items except the one being provided by this warranty statement. The warranty items include but not being subjected to the hint guarantee items related to tradable characteristic and any particular purpose.

RIGOL will not take any responsibility in cases regarding to indirect, particular and ensuing damage.