AC ENERSİS
Ground Breaking Test and Measurement Equipment

DİRX Series
High Precision AC/DC Meter
User Manual
V1.3

Founded in 2017, Shenzhen Aerospace Precision Electronics Co., Ltd. is a technology-leading enterprise dedicated to the development, production, sales and customization of high-precision current transducers and measuring instruments. We will strive to build a well-known brand of precision current transducers and precision instruments in the DC field, and become a leading international leader in precision electronics in the field of DC systems.

Based on multi-faceted technology integration and innovation, Shenzhen Aerospace Precision Electronics Co., Ltd. has developed the industry's first high-precision digital current transducer and an analog current transducer featuring high precision, low costs, low zero drift and low temperature drift. This series of products reduces industry costs, improves industry efficiency, enhances user experience, and creates value for customers. The company's products have won many achievements in the national innovation and entrepreneurial competition, and won wide attention and support from all walks of life.

As a company with strong sense of responsibility and mission, we adhere to multi-point zero-flux technology-led approach, with client-oriented service and customized products, and improve the operating quality by successfully capital financing. We are making our efforts to build an innovative sharing enterprise.

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1 Preface

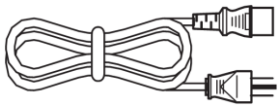
Thank you for choosing SAPE "DİRX Series High Precision AC and DC Meter". In order to make full and lasting use of this product, please keep the manual properly. The HIU series high precision AC/DC meter is referred as "this instrument" below.

1.1 Packing Checklist

When this instrument is delivered to you, please check if any abnormalities or damages occur during transportation befoı
panel, keys and other items. In c
or SAPE service center.

Please keep the packaging material for delivery properly for future transportation.

Please make sure that the contents of the packing are correct.

Packing checklist			
Item	Product photo	Specifications	Description
□ This instrument		See Part 3	High Precision AC and DC Meter
□ User manual（This manual）		Soft copy or hard copy	To describe the operational method, specifications, etc.
□ Power line		1.5 m/3*0.75 mm^2 Rated voltage：250V Rated current：10A	For power supply
□ Voltage test line		1 m/0.8mm^2 Rated voltage： CATIII 1000V/CATIV 600V Rated current：10A	To measure the voltage input signal

Remarks：

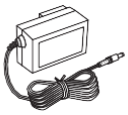
1) This instrument has been programmed when it was manufactured, and the latest

version can be downloaded from the homepage of our company

2) Instructions for use in other languages are available at our website： www.acenersis.com

1.2 Accessories

This instrument has the following options（to be sold separately）. Please contact the agent or sales center if you need purchase.

Option list			
Item	Product photo	Specifications	Description
□ USB to RS232 connection line		1.8 m/USB2.0/RS232	It can be used to transfer PC interface from USB2.0 to RS232
□ RS232 connection line		2 m/3*0.3mm^2 DB9 Female to female/23 connection line	It can be used to connect between RS232 and communication interface of this device.
□ USB to RS485 connection line		1.5 m/USB2.0/RS485	It can be used to transfer PC interface from USB2.0 to RS485.
□ RS485 connection line		0.1 m/2*0.3mm^2 DB9 Female to female	It can be used to connect between RS485 and communication interface of this device.
□ USB extension line		2.0 m/USB2.0/Male to male	It can be used for LCD screen program upgrade.
□ AC adapter		For overseas usage	Power adapter for different countries

1.3 About safety

The instrument is designed and tested in accordance with IEC61010 safety specifications, and is shipped in a safe state. In addition, failure to comply with the instructions may damage the functions provided by the instrument to ensure safety. Before using this instrument, please read carefully the following safety-related matters.

⚠Danger

If wrong method is used, it may lead to personal accident and instrument failure. Read the instructions carefully and operate after fully understanding the contents.

⚠Warning

It includes electrical hazards such as electric shock, heating, fire and arc discharge caused by short circuit. Personnel who first use electrical measuring instruments should use them under the supervision of senior electrical measuring personnel.

The instrument is measured under live state. In order to prevent electric shock accidents, please wear electrical rubber gloves, electrical rubber boots, safety hats and other insulation protective articles according to the rules of labor safety and health.

1.4 About label

This manual classifies and marks the severity and risk levels of risks as follows.

⚠Danger	A dangerous situation that is highly likely to cause death or serious injury to the operator is described.
⚠Warning	Situations that are likely to result in death or serious injury to the operator are described.
⚠Note	Conditions that may result in minor injury to the operator or expected damage or malfunction of the instrument are described.
Important matters	Information or content regarding operations and maintenance work that must be known in advance are described
	An indication of high voltage hazard is used to warn the risk of shock, burns and even death from electric shock due to neglection in safety confirmation or misuse
	Prohibited behavior is indicated.
	The "mandatory" matter which must be performed is indicated.

Symbol on the instrument

	To indicated caution or danger. When the symbol is displayed on the instrument, please refer to the corresponding position in the instruction manual.
	To indicate the ground terminal.
	To denote direct current (DC)
	To denote alternate current (AC)。
	To denote power “ON”.
	To denote power “OFF”.

Symbols related to standard

	Marking of regulations on the abandonment of electrical and electronic equipment (WEEE Directive) in EU countries.
	Consistent with the restrictions shown in the EC Ministerial Council Directive (EC Directive).

1.5About measurement safety level

In order to use the measuring instrument safely, IEC61010 classifies the measurement into three safety levels of CAT II to CAT IV according to the places of use.

⚠Danger

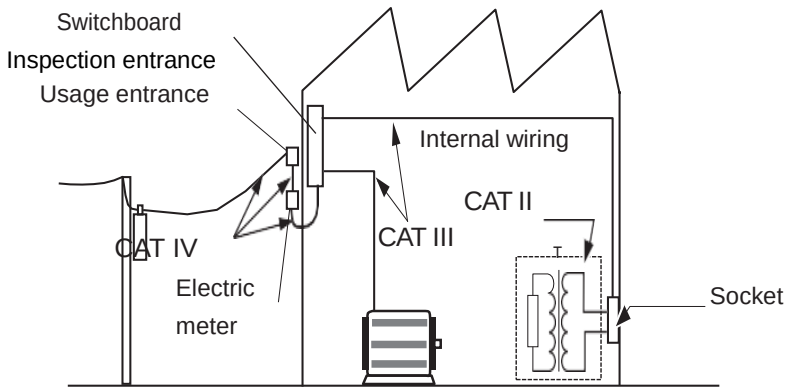
- Using a measuring instrument with a small classification level in a large numerical level may cause major accidents, so please avoid this situation absolutely
- Using a measuring instrument without a classification mark to measure CAT II to CAT IV may lead to major accidents, so please avoid this situation absolutely

This instrument is suitable for CAT III 1000 V.

CAT Ⅱ：The primary side circuit of an instrument (movable tool, household appliance, etc.) with a power cord that connects to the outlet, when the socket is directly measured.

CAT Ⅲ：Measuring the primary side circuit of an instrument (fixed device) that is directly powered from the switchboard, and the circuit from the switchboard to the outlet.

Fixtures



1.6 Precautions for use

In order to use the instrument safely and make full use of its functions, please observe the following precautions.

1.6.1 Inspection before use

⚠Warning

•If the test cable or the instrument is damaged, it may cause electric shock. Be sure to do the following checks before using it

•Before using it, please confirm that there are no problems caused by storage and transportation, and use it after checking and confirming the operation. If it is confirmed to be faulty, please contact the agent or the company after-sales center.

•The outer surface of the power cord damage or exposure may cause an electric shock or short circuit accident. Please do not use, and contact your dealer or company after-sales center

•The outer skin of the cable damage or metal exposure may cause short circuit or electric shock. Please replace with a device that is not damaged.

•Check whether the instrument is damaged. if it is damaged, please send it for repair.

•When the power is turned on and the start button is lit red, the power cord may be broken or a malfunction occur inside the instrument. Please send it for

repair.

•After the end of the test (displaying the company LOGO), if the main measurement function screen is not displayed, a malfunction may occur inside the instrument. Please send it for repair.

1.6.2 Placement environment

⚠Warning

Please do not place the instrument in the following places, otherwise it will cause malfunction or accident of the instrument.

- Direct sunlight or high temperature places
- Locations where corrosive gases and explosive gases are generated
- Places where strong electromagnetic waves are generated or near charged objects
- Close to induction heating device (high frequency induction heating device, IH induction cooker, etc.)
- Locations where mechanical vibrations are frequent
- Locations affected by water, oil, chemicals and solvents
- Wet, dew condensation
- A place with a lot of dust

1.6.3 Placement method

⚠Warning

Please do not place on unstable pedestals or in inclined places. Otherwise, personal injury or malfunction of the main unit may occur due to falling or tipping over.

- Place the bottom side down.
- In order to prevent the temperature of the instrument from rising, please be sure to keep a specified distance from the surroundings when placing it.

The means to cut off the power supply of this instrument is to unplug the power cord. In case of emergency, the power cord can be unplugged to cut off the power supply immediately, so please make sure that there is enough space for operation.

1.6.4 Use of the instrument

⚠Danger

To prevent an electric shock, never remove the main unit casing, since there are high voltage and high temperature parts inside.

⚠Note

In order to prevent damage to the instrument, please avoid vibration and collision during handling and use, and pay attention to collisions caused by falling.

1.6.5 Before connecting the power cord

⚠Warning

To avoid electric shock and to ensure the safety of this instrument, please connect the supplied power cord to a three-phase outlet.

1.6.6 Before connecting the test cable

⚠Danger

Be sure to connect the test cable to the secondary side of the circuit breaker. Even if a short circuit occurs on the secondary side of the circuit breaker, the short circuit current is cut by the circuit breaker. The current capacity on the primary side is very large, and in the event of a short circuit accident, damage to the instrument or equipment may occur.

⚠Warning

To avoid electric shock and short circuit accidents, please use the specified test cable.

1.6.7 Before turning on the power

⚠Warning

Before turning on the power, please confirm whether the power voltage listed on the power connection of the instrument and the one you are using are consistent. Using the power supply voltage outside the specified range may cause instrument damaged or an electrical accident.

⚠Note

Do not use UPS and DC-AC inverters with square wave or approximate sine wave output to drive this instrument to avoid damage to this instrument.

1.6.8 Before measurement

When measuring voltage

⚠Danger

• The maximum in-phase voltage of the voltage measurement terminal is as follows.

CAT II ： AC/DC 300 V

Without measurement classification：AC/DC 800 V

Exceedance of this voltage may cause damage to the instrument or cause personal injury.

• The maximum input voltage of the voltage measurement terminal is DC 1000 V、1100 V peak。

When the voltage exceeds 800V, it can be measured only when the object to be tested is insulated from the ground. Exceedance of this voltage may cause damage to the instrument or personal injury.

•To prevent an electric shock, do not use the test cable tip to avoid short circuit in the voltage-applied circuit.

Before connecting the communication cable

⚠Note

When connecting or removing the communication cable, please be sure to turn off the power of the instrument and the connected device. Failure to do so may result in false action or malfunction.

2 Summary

2.1 Product summary

DİRX series high-precision AC/DC meter is a new generation of high-precision AC/DC meter produced by our company. The product adopts a new software and hardware design, which can simultaneously measure single-phase AC and DC voltage, current, frequency, phase, active power, etc. It can be widely used in AC and DC measurement of institute of metrology, power, measurement, military, manufacturing, academic research and other fields.

2.2 Product characteristics

- It can measure single-phase AC and DC voltage, current, frequency, phase and active power.
- Ripple test can be performed to detect AC ripple below 1 kHz.
- Equipped with RS232, RS485 communication interface which can communicate directly with PC.
- Voltage, current and multi-range can be automatic switched, and it can measure the limit of 120%.
- Equipped with 4.3-inch or 5.6-inch LCD.
- Equipped with online upgrade of product program.

2.3 Product composition

Front

1	Display area (touch panel)	Display measurement data, set parameters, etc.
2	Cable piercing hole	Please refer to the chapter "Measurement Process" for details.
3	Busbar fixing hole	For fixed busbars
4	Handle	For instrument handling

Back

1	Housing fixed position	The whole machine is fixed by six trap screws.
2	Busbar fixing hole	For fixed busbars
3	Cable piercing hole	Please refer to the chapter "Measurement Process" for details.
4	Vents	For body cooling

Left

1	Power input	Please refer to "Check before measurement"
2	Main power switch	For ON/OFF of the main power
3	Voltage measuring terminal (positive)	Connect the test cable HIGH terminal: connect the red cable
4	Voltage measuring terminal (negative)	Connect the test cable LOW terminal: connect the black cable

Right

1	Current direction indication of the measured cable	Route the cable through the test hole as indicated by the arrow for current testing
2	Manufacturing nameplate	Do not strip off for management purposes.

3 Product selection guide and technical parameters

3.1 Product selection

HIU series product selection				
	DİRX-600B	DİRX-600C	DİRX-1000B	DİRX-1000C
AC voltage measurement	1V~707V			
AC current measurement	200mA~424A		500mA~707A	
DC voltage measurement	1V~1000V			
DC current measurement	200mA~600A		500mA~1000A	
AC accuracy	0.05%			
DC accuracy	0.02%	0.05%	0.02%	0.05%

3.2 Technical parameters

HIU series technical parameter					
		DİRX-600B	DİRX-600C	DİRX-1000B	DİRX-1000C
AC voltage measurement	Measuring limit	35V、71V、141V、354V、707V			
	Measuring range	(0~110%)RG			

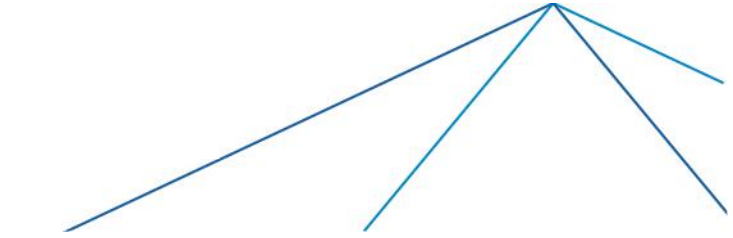
	Accuracy	±0.05%RD (20V≤U≤707V)			
	Resolution	0.01%RG			
AC current measurement	Measuring limit	200mA、8A、17A、42A、85A、170A、424A		500mA、14A、28A、71A、141A、354A、707A	
	Measuring range	(0~110%)RG			
	Accuracy	±0.05%RD(5A≤I≤424A) ±0.05%RD(200mA≤I≤5A)(Accessories needed)		±0.05%RD(10A≤I≤707A) ±0.05%RD(500mA≤I≤10A) (Accessories needed)	
	Resolution	0.01%RG			
DC voltage measurement	Measuring limit	10V、20V、50V、100V、200V、500V、1000V			
	Measuring range	(0~110%)RG			
	Accuracy	±0.02%RD(20V≤U≤1000V)	±0.05%RD(20V≤U≤1000V)	±0.02%RD(20V≤U≤1000V)	±0.05%RD(20V≤U≤1000V)
	Resolution	0.005%RG			
DC current measurement	Measuring limit	200mA、12A、24A、60A、120A、240A、600A		500mA、40A、100A、200A、400A、1000A	
	Measuring range	(0~110%)RG			
	Accuracy	±0.02%RD(10A≤I≤600A) ±0.02%RD(200mA≤I≤10A) (Accessories needed)	±0.05%RD(10A≤I≤600A) ±0.05%RD(200mA≤I≤10A) (Accessories needed)	±0.02%RD(20A≤I≤1000A) ±0.02%RD(500mA≤I≤20A) (Accessories needed)	±0.05%RD(20A≤I≤1000A) ±0.05%RD(500mA≤I≤20A) (Accessories needed)
	Resolution	0.005%RG			
Power measurem	AC power measuring	±0.02%RD(20V≤U≤707V, 5A≤I≤424A)	±0.05%RD(20V≤U≤707V, 5A≤I≤424A)	±0.02%RD(20V≤U≤707V, 10A≤I≤707A)	±0.05%RD(20V≤U≤707V, 10A≤I≤707A)

	DC power measuring accuracy	±0.02%RD(20V≤U≤1000V, 10A≤I≤600A)	±0.05%RD(20V≤U≤1000V, 10A≤I≤600A)	±0.02%RD(20V≤U≤1000V, 20A≤I≤1000A)	±0.05%RD(20V≤U≤1000V, 20A≤I≤1000A)
Phase measurement	Measuring range	0.00°~359.99°			
	Accuracy	±0.02°(20V≤U≤707V, 5A≤I≤424A)		±0.02°(20V≤U≤707V, 10A≤I≤707A)	
	Resolution	0.001°			
Frequency measurement	Measuring range	40Hz~70Hz			
	Accuracy	±0.01Hz			
	Resolution	0.001Hz			
Ripple measurement	Accuracy	±0.05%RG			
	Bandwidth	≤1kHz			
Other parameters	Working power voltage range	AC85V～265V，50/60Hz			
	Power consumption	<30VA			
	Preheat time	≤30 minutes			
	Working temperature	10℃～35℃			

	Relative humidity	≤85%, Non-corrosive gas
	Dimensions	Around 300mm×185mm×100mm(Length× Width× Depth)(No protrusions)
	Weight	1.5kg

Remarks：

1. Measuring range automatically switched
2. RD-Reading value，RG-Range value



4 Instructions for use

4.1 Steps

1) Place the instrument
2) Check before measurement
3) Connect the power cord
4) Connect the test cable
5) Turn on the power
6) Start measuring
7) Record data
8) Measurement completed

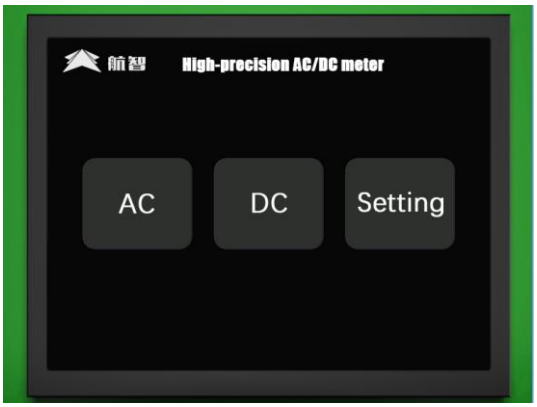
4.2 Instructions of interface

4.2.1 Boot interface

The boot interface is displayed within 1-2 seconds after the power is turned on, and the boot interface is as shown below.

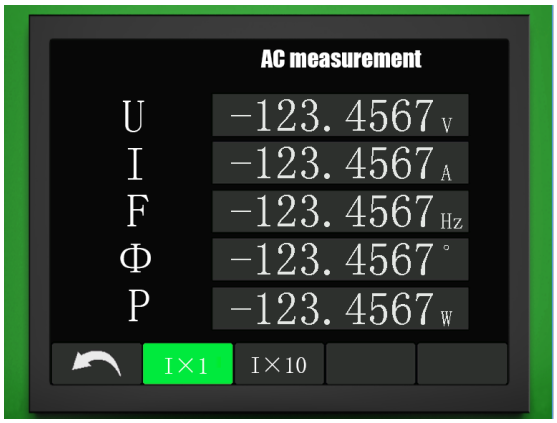
4.2.2 Main interface

After the boot screen, the main screen as shown below will appear. The main interface has a total of 3 buttons, which are AC, DC, and settings. If you click “AC”, AC measurement interface will appear. If you click “DC”, DC measurement interface will appear. If you click “Settings”, Settings interface will appear.



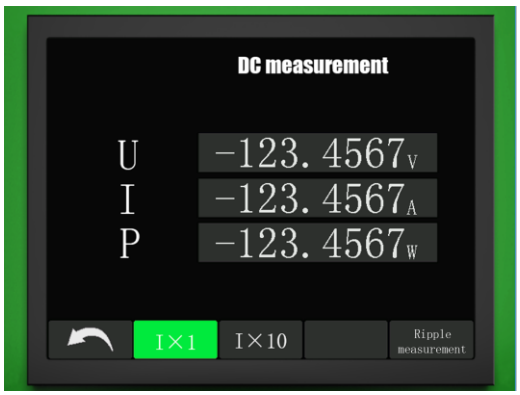
4.2.3 AC measurement interface

After clicking the “AC” button on the main interface, the AC measurement interface as shown below will appear. The AC interface can display voltage, current, frequency, phase, and active power.

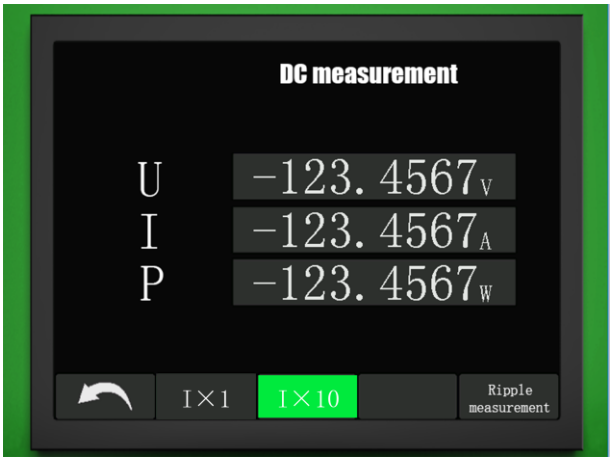


4.2.4 DC measurement interface

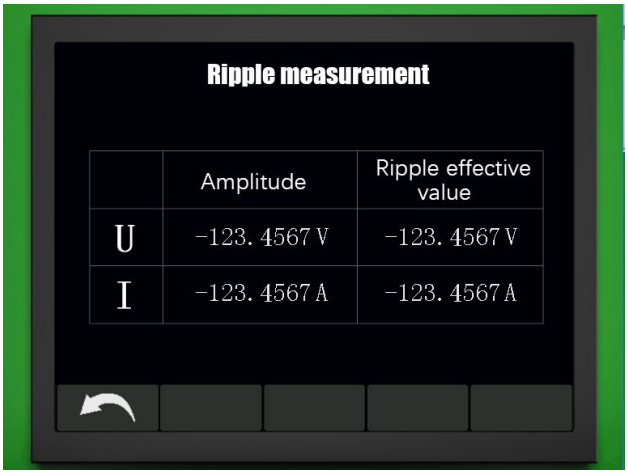
After clicking the “DC” button on the main interface, the DC measurement interface as shown below will appear. The DC interface can display voltage, current and active power.



After clicking “Current X10”, this instrument enters the extension ring mode, and the current line must use the extension ring for the data to be displayed correctly.



After clicking “Ripple Measurement”, this instrument enters the ripple measurement function mode as shown below, and the magnitude of the voltage and current and the ripple effective value will show.



After clicking "Settings" on the main interface, this instrument will enter the setting interface as shown below, and you can click “Calibration” button to view information such as the product software version.

4.3 The usage of extension ring

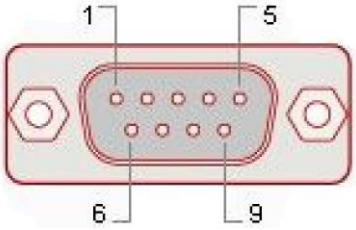
1) When measuring current is in a small range, please use the corresponding extension ring to connect it to the threading hole of the instrument.
2) Before measuring, let the extension ring pass through the test hole of the instrument according to the direction of the mark, and then insert the joint. The red terminal is connected to the inflow current, and the black terminal is connected to the outflow current.
3) Connect the X10 top ring (optional), turn on the power switch, then enter the main interface, and click “AC” or “DC”. After entering the AC or DC measurement interface, click “Current X10”.

Precautions

1) In the "current X10" mode, the optional corresponding extension ring must be selected.
2) The current direction marked on the extension ring should be the same as the current direction marked on the meter case. If the directions are inconsistent, the measured value is negative when measuring the forward DC current. When measuring AC voltage and current, the phase of the AC voltage and AC current signal is 180 degrees out of the true phase. The negative AC current measurement is not affected only when the AC current is measured and the directions are inconsistent.
3) The connection of the extension ring must be tight to prevent from breaking. After the extension ring is inserted, the impedance of the two terminals can be measured with a multimeter. When the link is correct, the impedance between the two terminals is about zero.
4) The extension ring must pass through the test hole of the instrument completely. If the current line is worn less or more, the measurement error will occur. If the "current X10" extension ring is used, the number of turns passing through the meter hole should be 10. If the number of turns is incorrect, there will be an error in the measurement.

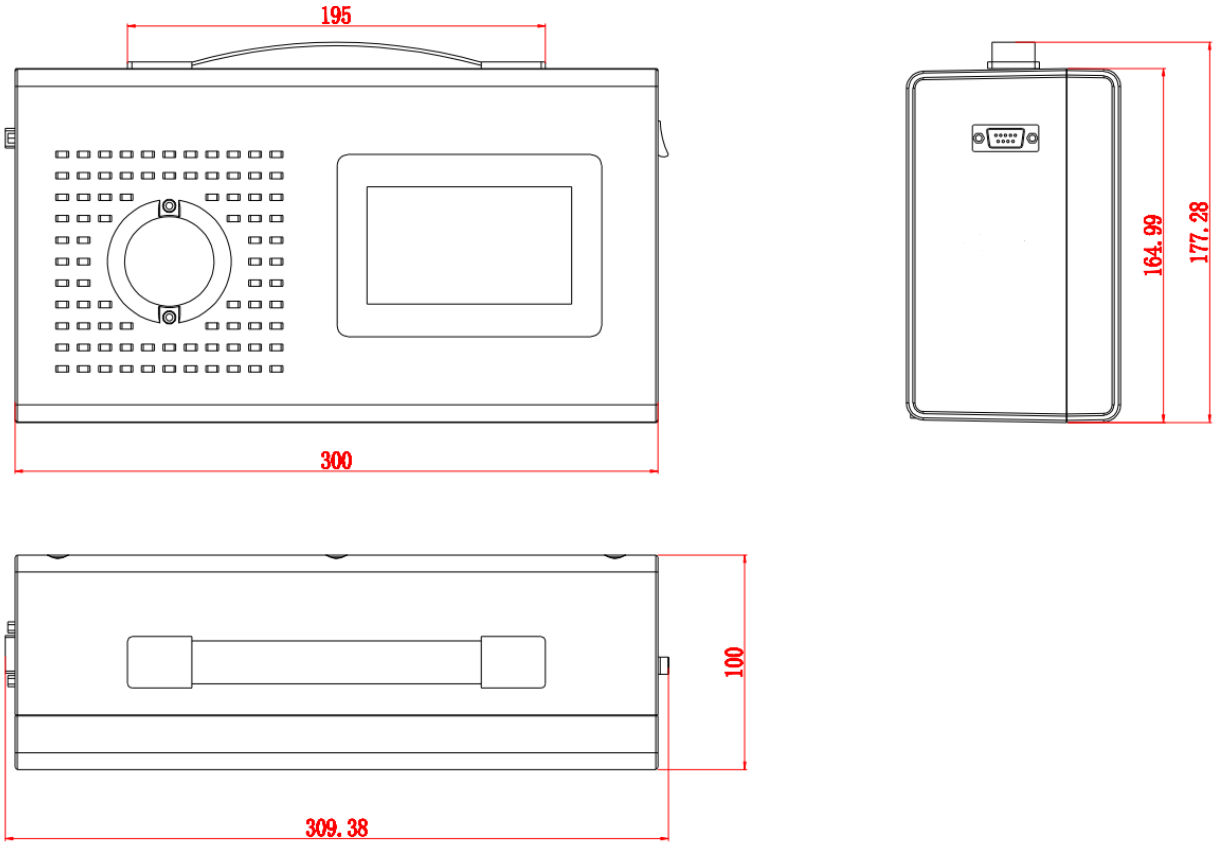
5 Connector information

5.1 DB9 terminal definition（DB9 male）

Pin	Definition	Description	Connector picture
1	RS485_B	RS485 communication B	
2	RS232_RX	RS232 transmission	
3	RS232_TX	RS232 reception	
4	RS485_A	RS485 communication A	
5	GND	RS485/RS232 isolated	
6	CAN_L	CAN communication L	
7	CAN_G	CAN communication isolation	
8	CAN_H	CAN communication H	
9	N.C	Not connected	

6 Dimensions

Unit：mm，if not specified, the dimensional deviation is ±2mm or 1%, whichever is greater.



7 Maintenance and service

Warning

Please do not modify, disassemble or repair the instrument. Failure to do so may result in fire, electric shock, or personal injury.

7.1 Calibration and repair

• The calibration period varies depending on the customer's usage or environment. It is recommended to determine the calibration period based on the customer's usage or environment, and commission our company to make regular corrections.
• When commissioning our company to perform calibration or repair of the instrument, the settings will be restored to the initial state.

7.2 Instrument transportation

• For safe transportation of the product, please use the box and cushioning material at the time of purchase. If the package is damaged/deformed and the cushioning material is flattened, please do not use it and contact the dealer or the service center.
• If the original package and cushioning materials are not used during transportation and lead to damage, the repair costs will be incurred even if the product is within warranty period.
• When sealing the instrument, be sure to unplug the cable from the unit.
• Be careful not to drop the instrument or subject to severe collisions during transport.

7.3 Replacement of parts and life

• Parts used in the product may experience performance degradation due to years of use.
• Regular replacement is recommended for long-term use of the instrument.
• Please contact your dealer or company service center for replacement.

7.4 Cleaning

When removing the dirt from the instrument and options, wipe it off with a soft cloth dampened with a small amount of water or a mild detergent. Wipe the display area gently with a soft, dry cloth.

7.5 Frequently Asked Questions

If it is confirmed that there is a fault, please check the following items. If there is no matching item, please contact the agent or the company service center.

NO.	Item	Please check		Possible reason → Action
1-1	The power is not turned on	Start button color	Not lit (extinguished)	Unpowered → Please confirm the continuity of the power cord

	(nothing is displayed)			The power supply voltage is different from the frequency → Please check the power supply rating. (AC220V±20%、50 Hz/60 Hz)
1-2	Cannot perform touch panel operation	Icon display	Display number icon	Key lock has been performed → Please unlock the key.
1-3	PC cannot be displayed.			Check whether R232C interface is loose.

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