User's Guide

SA5041 DIGITAL MULTIMETER

Brief Introduction

Digital Bench-Type Multimeter Model SA5041 is the maximum reading 22000 and 4 $^{1/2}$ digits and could do accurate automatic true RMS measurement. It has full overload protection, as well as auto-manual switch and mains power supply mode. With clear and intuitive display, easy and convenient operation, and safety in use, it is widely used in area of institution, factory, Army, laboratory and R&D institution.

It could measure DC/AC voltage, DC/AC current, resistance, frequency, capacitance, temperature, diode, continuity buzzer, external trigger and etc.

This operating manual covers information on safety and cautions. Please read the relevant information carefully and observe all the Warnings and Notes strictly.

Function Overview

Measurement functions:

- DC Voltage: 200mV, 2V, 20V, 200V, 1000V
- AC Voltage: 2V, 20V, 200V, 750V
- DC Current: 200μA, 2000μA, 20mA, 200mA, 10A
- AC Current: 200μA, 2000μA, 20mA, 200mA, 10A
- 2-line resistance: 200Ω, 2kΩ, 20kΩ, 200kΩ, 2MΩ, 20MΩ
- Frequency: 20Hz ~ 200MHz.
- Capacitance: 20nF, 200nF, 2μF, 20μF, 200μF, 2mF, 20mF
- Diode measurement
- continuity buzzer measurement
- Temperature measurement

Additional function

- dB, dBm, Null, Trig

Remote control

- USB Device

Packing List

- SA5041 Digital Multimeter 1
- Power cord 1
- Test lead kit 1
- PT-100 Temperature Probe and Socket 1
- C D 1

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Note: This document is just a guide of operation of this instrument, it is unavoidable for not-so-adequate description of technology and wrong printing, please excuse any modification of the contents without special notification.

Safety Information

Review the following safe precautions to avoid injury and prevent damage to the product or any products connected to it. To avoid potential hazards, please make sure of the product only as specified.

1. Use power cord as specified.

   Use only power cord specified for this product and approved for the country of use.

2. Ground the product

   This product is grounded through the grounding conductor of the power cord. To avoid electric shock, the grounding conductor must be connected to earth ground. Before making connections to the input or output terminals, ensure that the product is properly grounded.

3. Instructions

   Review user's manual for detailed information of rating values before making connections to this product.

4. Do not operate without covers

   Do not operate this product with covers or panels removed.

5. Use proper fuse.

   Use only the fuse type and rating specified for this product.

6. Do not operate with suspected failures.

   If you suspect there is damage, stop using and contact us.

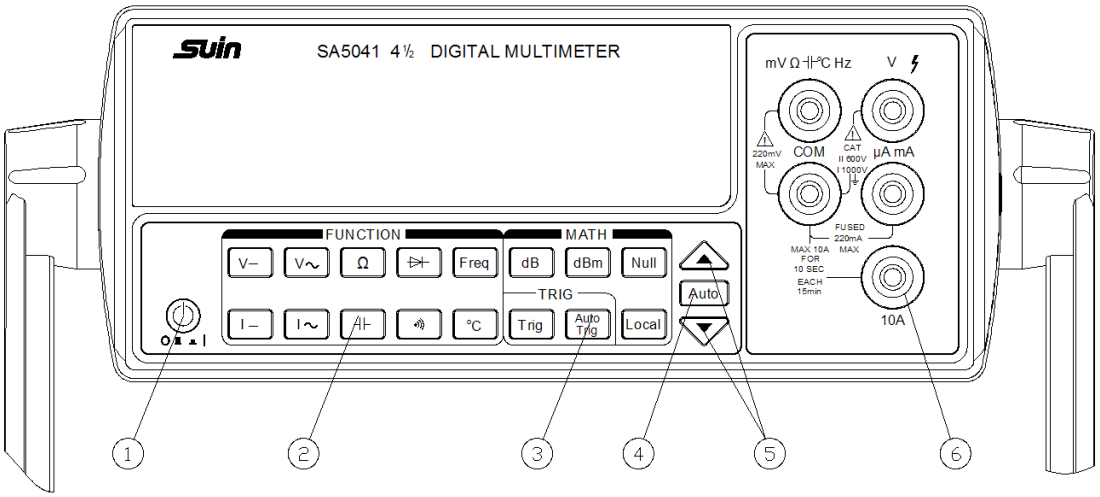
7. Provide proper ventilation

   Do not operate this product in wet or damp conditions.

   Do not operate this product under inflammable environment.

Chapter 1 Quick Start

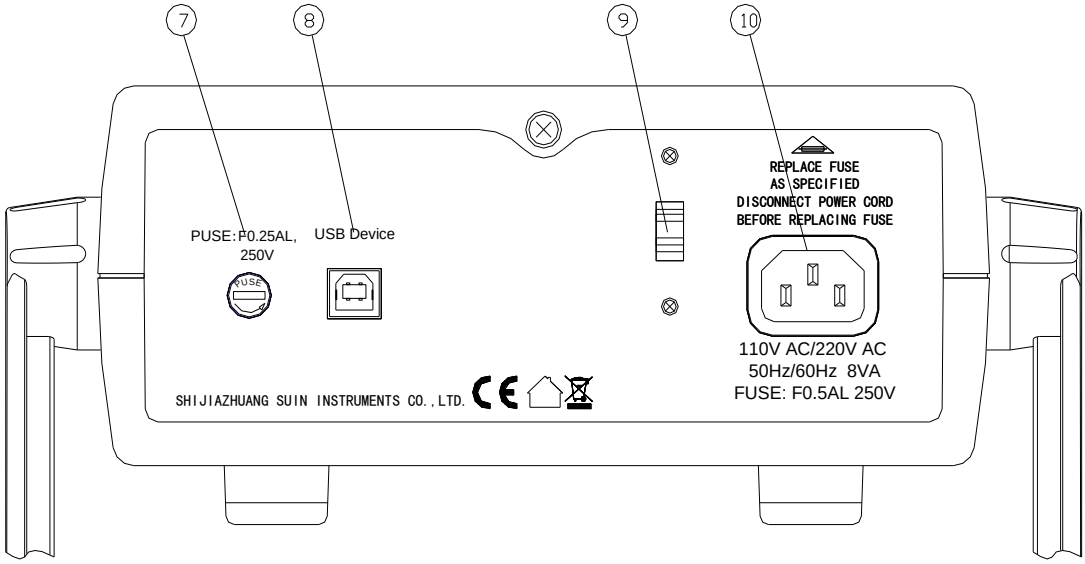
1.1 Front panel



① On/Off Switch ②Functional keys ③ Auxiliary function keys ④Auto key

⑤ Manual keys ⑥Input terminals

1.2 Rear panel



⑦ Current input fuse ⑧USB Device port ⑨ 110V/220V Switch ⑩ Power socket

1.3 Service Guide

1.3.1 The meter is not available to power on

● Make sure that DMM is connected to AC power.

Confirm that the power cord is firmly connected to the power socket in the rear panel of meter.

● Confirm the voltage setting of power cord

The voltage switch was set to match with the destination country when out of factory, but if the voltage is different, please select the right one, which should be 110 or 220Vac.

● Check the fuse.

The fuse type is 500mAT, 250V.

1.3.2 Change the current input fuse

The first fuse is fast type melted fuse in the rear panel with specification of 250mA, 250Vac.

The second fuse is installed inside of meter with specification of 10A, 250Vac and which provides 10A current protection. User should open the case if the fuse needs to be changed.

Warning: In order to ensure the safety of the operator, use triple-core power socket with ground wire.

Chapter 2 Measurement Function

2.1 Measuring DC Voltage

Voltage Range: 200mV, 2V, 20V, 200V, 1000V

Max. Resolution: 10μV

Input Protection: 1000V (MAX)

Measuring method

(1) Insert the red test lead into the 'V' terminal (when measuring DC Voltage) or 'mV/R/D/-||-/℃/Hz' (when measuring DC mV Voltage) terminal and the black test lead into the COM terminal.

(2) Press 【V-】key to select DC voltage, and make test lead parallel connected with object being measured.

(3) Press 【▲】or 【▼】to select requested voltage range manually. And press 【AUTO】key to lock auto range. (The range with mv unit could not be selected by pressing 【AUTO】key, only with 【▼】key.)

(4) If 'Over' in display is lighten up, which means that measuring voltage beyond the setting range, and press 【▲】key to set higher range until normal reading displayed.

(5) Reading is shown as the measuring voltage on the display.

(6) The input impedance of the Meter is around 10MΩ, which can cause measurement errors in high impedance circuits. In most cases, the error could be negligible (0.1% or less) for circuit impedance below 10KΩ.

(7) The input impedance is around 2GΩ for mV range measurement.

Note:

Do not input the voltage higher than 200mV when using mV range, or the instrument is more likely to be damaged.

Do not input the voltage higher than DC 1000V to the input port.

Special care should be taken when measuring high voltage to avoid electric shock.

2.2 Measuring DC current

Current Range: 200μA, 2000μA, 20mA, 200mA, 10A

Max. Resolution: 0.01μA

Input Protection: 0.25A, 250V fuse (for the measurement range below 200mA)

10A, 250V fuse (for the measurement range below 10A)

Measuring method

(1) Insert the red test lead into the μA mA or 10A terminal and black test lead into the COM terminal. (Select 10A for high current, and select μA or mA for low current less than 1A)

(2) Press【I-】key to select DC current measurement, and make test lead series connected with object being measured.

(3) Press【▲】or 【▼】key , and select current measuring range manually. Press 【AUTO】key to lock automated measuring range.(【AUTO】key enables you to switch ranges between uA and mA. 10A range can only be selected by pressing 【▲】key.)

(4) If the "Over" light on, which means the measuring current value exceeds current range, press【▲】to select a higher range until a normal reading show up.

(5) Reading is shown as the measuring current on the display.

Note:

- **Before make device series connected with measured circuit, please turn off the power of circuit.**
- **Please use correct terminal when measuring. If you can't estimate the current value, please start from the high range of current.**
- **Continue measurement is allowed if ≤5A; the measuring time should be ≤10 second and interval time should ≥ 15 minutes to meet safe use when the current is between 5A to 10A.**
- **To avoid possible damage to the device and fuse, never place the testing leads in parallel with any circuit or component when the leads are plugged into the current terminals.**
- **When current measurement completed, first power off, then disconnect testing lead with tested circuit and remove testing lead away from the input terminals of the Meter.**

Fuse replacement

1. Cut off the power, disconnect the testing wire.

2. Rotate fuse holder with screwdriver counter-clockwise to pop-up the fuse

3. Replace fuse with the same specification

4. Install it after replacement.

Warning: Never do the replacement with fuses over the specifications.

2.3 Measuring AC Voltage

Voltage Range: 2V, 20V, 200V, 750V

Max. Resolution: 100μV

Input Protection: $750V_{rms}$(MAX)

Measurement method:

(1) Insert the red test lead into the V terminal and the black test lead into the COM terminal.

(2) Press 【V~】key to measure AC voltage, and make test lead parallel connected with object being measured.

(3) Press【▲】 or 【▼】key, to select expected voltage measurement range manually. Press 【AUTO】key to lock the automated range, the light of which will be on after pressing.

(4) If the "Over" light on, it means the measuring voltage value exceeds current range, press【▲】to select a higher range until a normal reading showed up.

(5) Reading is shown as measured current on the display.

Note:

- **Do not input the voltage over AC 700Vrms to input port.**
- **Special care should be taken when measuring high voltage to avoid electric shock.**

2.4 Measuring AC Current

Current Range: 200μA , 2000μA, 20mA, 200mA, 10A

Max. Resolution: 0.01μA

Input Protection: 0.25A, 250V fuse (for the measurement range below 200mA)

10A, 250V fuse (for the measurement range below 10A)

Measuring method

(1) Insert the red test lead into the μA mA or 10A terminal and black test lead into the COM terminal.

(2) Press 【I~】 key, to measure AC current, the light of which will be on after pressing.

(3) Press 【▲】 or【▼】key, to select the expected current measurement range manually. Press【AUTO】key to lock the automated measuring range. (【AUTO】key enables you to switch

ranges between uA and mA. 10A range can only be selected by pressing 【▲】key.)

(4) If the "Over" light on, it means the measuring current value exceeds current range, press【▲】to select a higher range until a normal reading showed up.

(5) Reading is shown as measured current on the display.

Note:

- **Before make device series connected with measured circuit, please turn off the power of circuit.**
- **Please use correct terminal when measuring. If you can't estimate the current value, please start from the high range of current.**
- **Continue measurement is allowed if ≤5A; 5A~10A continue measurement time; the measuring time should be ≤10 second and interval time should ≥ 15 minutes to meet safe use.**
- **To avoid possible damage to the device and fuse, never place the testing leads in parallel with any circuit or component when the leads are plugged into the current terminals.**
- **When current measurement completed, first power off, then disconnect the testing lead with circuit under test and remove testing lead away from the input terminals of the Meter.**

2.5 Two-line Resistance measurement

When testing low resistance, the resistance of the testing cable may cause certain error, the error value caused by typical testing cable may range from 0.5 to 2Ω for two-line resistance.【NULL】key could help user to correct this error.

- Select two-line Ω function
- Short the testing cable to get the resistance of testing cable.
- Keep the short and press NULL key, the instrument displays 0Ω.

Resistance measurement

Resistance Range: 200Ω, 2.0kΩ, 20kΩ, 200kΩ, 2MΩ, 20MΩ

Max. Resolution: 0.01Ω

Measuring method

(1) Insert the red test lead into the 'mV/R/D/-||-/℃/Hz' terminal and the black test lead into the

COM terminal.

(2) Press【Ω】key, to measure two-line resistance, the light of which will be on after pressing.

(3) Press 【▲】 or【▼】key, and select expected voltage measuring range manually. Press 【AUTO】key to lock automated measuring range, the light of which will be on after pressing.

(4) If the "Over" light on, it means the measuring voltage value exceeds current range, press【▲】to select a higher range until a normal reading showed up.

(5) Reading is shown as measured resistance on the display.

Note:

- **For open circuit or exceeding maximum range, the "Over" will light on.**
- **Before measuring on-line resistance, make sure that turn off all power of inner measured circuit. And run out of charge of all capacitors to guarantee correct measurement.**
- **When measuring low resistance, the test leads may cause an error range from 0.1Ω to 0.2Ω. For accurate measurement, short connect test lead and press 【Null】key to automatically subtract this value.**
- **For high-resistance (>1MΩ), normal measurement is not so fast, user may need a few seconds to obtain a stable reading. User can short connect lead to get more stable reading.**
- **To avoid harms to user, please do not attempt to input voltage higher than 60V DC or 30V AC.**

2.6 Capacitance Measurement

Capacitance Range: 20nF, 200nF, 2μF, 20μF, 200μF, 2mF, 20mF

Max. Resolution: 0.001nF

Input Protection: 1000V (MAX)

Measuring method

(1) Insert the red test lead into the 'mV/R/D/-||-/℃/Hz' terminal and the black test lead into the COM terminal.

(2) Press【-||-】 key to measure capacitance, the light of which will be on after pressing.

(3) Press 【▲】or【▼】 key to select expected capacitor measurement range. Press【AUTO】

key to lock automatic range, the light of which will be on after pressed.

(4) If the light of "Over" light on , it indicates that measured capacitor is over current range, press 【▲】key in this case to select higher range till the reading turn to be normal.

(5) Reading is shown as measured capacitance on the display.

Note:

- **The capacitance is required to be measured with short cable.**
- **The measurement over 400μF may take more time than low capacitance.**
- **To ensure accuracy, the Meter inside is discharged against the tested capacitor.**

2.7 Frequency Measurement

Voltage Range A: 200mVrms≤A≤30Vrms

Frequency Range: 20Hz, 200Hz, 2000Hz, 20kHz, 200kHz, 2MHz, 20MHz, 200MHz

Max. Resolution: 0.001Hz

Input Protection: $750V_{rms}$ (MAX)

Measuring method

(1) Insert the red test lead into the 'mV/R/D/-||-/℃/Hz' terminal and the black test lead into the COM terminal.

(2) Press 【Freq】 key to measure frequency, the light of which will be on after pressing.

(3) Press 【▲】or【▼】 key, and select expected frequency measuring range manually. Press 【AUTO】key to lock automated measuring range, the light of which will be on after pressing.

(4) If the light of "Over" light on , it indicates that measured voltage is over current range, press 【▲】key in this case to select higher range till the reading turn to be normal.

(5) Reading is shown as measured frequency on the display.

Note

- **The requirement of Input amplitude "A" is as follows:**

  When 10Hz ~ 40MHz: 200mVrms≤A≤30Vrms

  > 40MHz: Un-specified

- **To avoid harms to user, please do not attempt to input tested frequency voltage higher than 30V rms.**

2.8 Diode measurement

(1) Insert the red test lead into the 'mV/R/D/-||-/℃/Hz' terminal and the black test lead into the COM terminal. The polarity of red test lead is '+', while black test lead is '-'.

(2) Press【⊳|】 key to measure diode. Connect red test lead with positive polarity of tested diode and black test lead with negative polarity of tested diode.

(3) In a circuit, a good diode should still produce a forward voltage drop reading of 0.5V to 0.8V.

Note

- **For open circuit of diode or wrong polarity connection, the "Over" will light on.**
- **To avoid damages to the Meter or tested device, disconnect circuit power and discharge all the high-voltage capacitors before testing diodes.**
- **Open circuit voltage approximate 2.8V.**
- **To avoid harms to you, please do not attempt to input voltages higher than 60V DC or 30V AC.**

2.9 Short circuit measurement

Short circuit measurement is enabled by the 200Ω circuit of resistance function, the default critical resistance is fixed as 10Ω, and once tested value less than this reference value, the buzzer will make a sound.

Measurement Method

(1) Insert the red test lead into the 'mV/R/D/-||-/℃/Hz' terminal and the black test lead into the COM terminal.

(2) Press【))) 】 key to measure short circuit, and make test lead parallel connected with two ends of tested circuit. The buzzer makes a sound if resistance of two ends ≤10Ω.

(3) Reading is shown as tested load and unit is Ω.

Note:

- **When checking continuity, disconnect circuit power and discharge all the high-voltage capacitors before measuring continuity. (是否需要保留？)**
- **Open circuit voltage around –1.2V and selected range is 200Ω.**
- **To avoid harms to you, please do not attempt to input voltage higher than 60V DC or 30V AC.**

2.10 Temperature measurement

Measurement Method

(1) Insert the red test lead of PT100 temperature probe into the 'mV/R/D/-||-/℃/Hz' terminal and the black test lead into the COM terminal.

(2) Press 【℃】key to measure temperature.

(3) Reading is shown as measured temperature on display.

Note:

- **The temperature reading is not correct when the ambient temperature is out of range from 12℃ to 35℃. The error is more apparent when the instrument is placed in cold environment.**
- **The testing temperature range is from -200℃ to 800℃.**
- **To avoid harms to you, please do not attempt to input voltages higher than 60V DC or 30V AC.**

Chapter 3 Additional Functions

3.1 Return-to-zero Function

Operation guide

(1) Return-to-zero feature makes it possible for user to store a referenced reading, so the display is a relative value. Press【Null】key to save current reading value, and the next displayed value is the difference between measured value and this reference value. Null will light on under this function.

(2) Return-to-zero feature is compliant with all functions.

(3) Press【Null】key again to exit return-to-zero function, and Null will light off.

(4) If user change to other function, return-to-zero function will be disabled and character Null off.

3.2 Trigger function

Operation guide

(1) External trigger mode

External trigger mode is enabled by pressing the【Trig】 key. Under this mode, there is not any old data on the display, only if press the [Trig] key, the new measuring period enabled and new data on the display. There is no trig function in frequency and capacitance.

(2) Press【Auto Trig】key to exit trigger mode.

3.3 Mathematical function

Mathematical function of this instrument means calculation of dB and dBm, only working under AC voltage function.

(1) dB

dB is a unit of power gain. It is relative value. Formula as:

$dBV=20\log_{10}V_{in}$

(2) dBm

dBm is a unit of absolute value of power. Formula as:

$dBm=10\log_{10}(V_{in}{}^2/REF)/1mW$

REF takes 600Ω as granted.

Operating Method

(1) Under AC voltage function, press 【dB】 key to show dB value on the screen.

(2) Under AC voltage function, press 【dBm】 key to show dBm value on the screen.

Chapter 4 Programming Guide

4.1 Interface operation

With the technology of Single-Chip USB to UART Bridge, the USB interface of the Meter realizes the communication by series technology, and follows its setting. But if user don't have the address, please refer to following instructions to select COM port.

Operating instructions

1. Connect USB and device using USB cable, then click as per below sequence: My computer→Right-click→Hardware→Device Manager→Port→CP2101 USB to UART Bridge Controller (COMX)

2. Open the software then set serial interface as per PC prompt.

Note: Baud rate: 9600, Check bit: None, Data bit: 8 bits, Stop bit: 1

4.2 SCPI Commands

Command Keywords and Parameters

Command commands and SCPI commands have two types: parameters and non-parameters. Take the followings as example:

*RST	parameters
:FUNCtion <name>	parameter <name> required
:IMMediate	non- parameters

A space at least is needed between command keywords and parameter.

Square bracket [ ]: parameters enclosed in Square bracket are optional and could be omitted. For example,

: RANGe[:UPPer] <n>

:UPPer is optional and you can send above command in one of following two formats,

: RANGe <n>

or : RANGe:UPPer <n>

Note: when using optional commands in your program, don't include square bracket [ ].

Angular bracket < >: indicates this option is a parameter type. And < > should be omitted when programming. For example,

[:SENSe]:CURRent:AC:RANGe:AUTO <b>

<b> indicates that a Boolean parameter required here. Thus, if enable Auto function in

ACI, you must send the command with parameter 1or ON as below,

[:SENSe]:CURRent:AC:RANGe:AUTO 1

Parameter types:

<b> Boolean: Used to enable or disable an instrument operation. 0 or OFF disables the operation; 1 or ON enables the operation.

CURRent:AC:RANGe:AUTO 1 enable AUTO range

<name> Name parameter: Select a parameter name from a listed group.For example,

:FUNCtion <name>

<name> = "VOLTage:AC" select AC voltage

"VOLTage[:DC]" select DC voltage

"CURRent:AC" select AC current

"CURRent[:DC]" select DC current

"RESistance" select 2-line resistance

"FREQuency" select frequency

"DIODe" select diode testing

"CONTinuity" select continuity testing

"TEMPerature" select temperature testing

<n> Numeric value: This parameter stands for an integer (take 6 for example), numbers of real number (take 25.3 for example)

[SENSe[1]:CURRent[:DC]:NPLCycles 1

[SENSe[1]:CURRent[:DC]:NPLCycles 0.1

Command abbreviation rules

1. If the command length less than or equal to four characters, there is no abbreviation.

For example,

:AUTO=:AUTO

2. The rule is available for commands which longer than four characters.

3. If the fourth characters is v,o,w,e,l, then cancel it and all characters behind them.

For example,

:IMMediate=:IMM

4. Special rules – the abbreviation of the below command only uses the first two

characters. For examples,

:TCcouple=:TC

5. When the fourth characters is consonant letters, remain it and cancel characters behind them. For example,

:FORMat=:FORM

6. If the command contains query mark '?' or an unselective numbers, then must remain it in abbreviation format. For example,

:delay?=:del?

7. The commands or characters containing in Square is selective, which can be omitted in code.

Command structure rules

1. Both uppercase and lowercase are allowed. For example,

FUNC VOLT:AC =func volt:ac= FUNC volt:AC

2. Space (which is shown by _) can be put back and forth of colon. For example,

FUNC "VOLT_:_AC" (wrong)

FUNC "VOLT:AC" (correct)

3. Commands can be abbreviated or complete spelling. For example,

FUNCtion "VOLTage:AC"= FUNC "VOLT:AC"

4. Users can inquiry most parameters value on the condition of adding '?' on behind of command word. For example,

FUNC?

Command path rule

1. Each program must start from root commands unless the root command is optional. (for example, : [SENSe]). In this case, you can make next level command to be root command.
2. If instrument detect a program with colon (:), it will move to next level command.
3. The command path can only go ahead from the one to next higher level. Once meet a higher level command, it should be start from root command again.

Command reference

See below subsystem commands,

1)SENSe 2)SYStem 3) CALCulate 4)TRIGger

SENSe subsystem commands

FUNCtion command

:FUNCtion <name>

Command syntax: [:SENSe]:FUNCtion <name>

Parameter: <name> = "VOLTage:AC" select AC voltage

"VOLTage[:DC]" select DC voltage

"CURRent:AC" select AC current

"CURRent[:DC]" select DC current

"RESistance" select 2-line resistance

"FREQuency" select frequency

"DIODe" select diode testing

"CONTinuity" select continuity testing

"TEMPerature" select temperature testing

"CAPacitance" Select capacitance testing

Queary : FUNCtion? Query current programmed function

Description: Use this command to select the measurement function of the instrument.

:RANGe Command

:[UPPer] <n>

Command syntax: [:SENSe]:CURRent:AC:RANGe[:UPPer] <n> ACI measurement range

Command syntax: [:SENSe]:CURRent[:DC]:RANGe[:UPPer] <n> DCI measurement range

Command syntax: [:SENSe]:VOLTage:AC:RANGe[:UPPer] <n> ACV measurement range

Command syntax: [:SENSe]:VOLTage[:DC]:RANGe[:UPPer] <n> DCV measurement range

Command syntax: [:SENSe]:RESistance:RANGe[:UPPer] <n> Ω2 measurement range

Command syntax: [:SENSe]: FREQuency:RANGe[:UPPer] <n> FREQ measurement range

Command syntax: CAPacitance:RANGe[:UPPer] <n> -||- measurement range

Command syntax: [:SENSe]: TEMPerature:RANGe[:UPPer] <n> ℃ measurement range

Parameter	<n>=0.1-10(A)	ACI,DCI
	0-750(V)	ACV
	0-1000(V)	DCV
	0-20000000 (KΩ)	Ω2
	10-150000000（Hz）	FREQ
	0-20000000.0（nF）	-||-
	-200-800 (℃)	℃

Query :RANGe[:UPPer]?

Description: The command is used to select measurement range manually for specific function, which is selected as user expected value. Then the instrument will find matched range closest to expected value. If the expected value close to 50mV, then make parameter <n>=0.05, so the instrument will select 100mV range automatically.

:AUTO<b>

Command syntax: [:SENSe]:CURRent:AC:RANGe:AUTO <b> ACI auto range

Command syntax: [:SENSe]:CURRent[:DC]:RANGe:AUTO <b> DCI auto range

Command syntax: [:SENSe]:VOLTage:AC:RANGe:AUTO <b> ACV auto range

Command syntax: [:SENSe]:VOLTage[:DC]:RANGe:AUTO <b> DCV auto range

Command syntax: [:SENSe]:RESistance:RANGe:AUTO <b> Ω2 auto range

Command syntax: [:SENSe]: FREQuency:RANGe:AUTO <b> FREQ auto range

Command syntax: [:SENSe]: CAPacitance:RANGe:AUTO <b> -||- auto range

Command syntax: [:SENSe]: TEMPerature:RANGe:AUTO <b> ℃ auto range

Parameter	<b>=1/ON	enable auto range
	0/OFF	disable auto range
Query:AUTO?		Query auto on/off

Description: This command is used to control auto range. If make auto range enable, the instrument will select the most matched range to perform measurement, parameter <n> in the command :RANGe will automatically change within range. Once auto range is canceled, the instrument will remain on the range of auto selecting until a piece of valid command :RANGe[<n> is sent.

:REFerence commands

:STATe<b>

Command syntax：[:SENSe]:CURRent:AC:REFerence:STATe <b> control reference for ACI

Command syntax：[:SENSe]:CURRent[:DC]:REFerence:STATe <b> control reference for DCI

Command syntax：[:SENSe]:VOLTage:AC:REFerence:STATe <b> control reference for ACV

Command syntax：[:SENSe]:VOLTage[:DC]:REFerence:STATe <b> control reference for DCV

Command syntax：[:SENSe]:RESistance:REFerence:STATe <b> control reference forΩ2

Command syntax：[:SENSe]:FREQuency:REFerence:STATe <b> control reference for FREQ

Command syntax: [:SENSe]: CAPacitance: REFerence:STATe <b> control reference for -||-

Command syntax: [:SENSe]: TEMPerature: REFerence:STATe <b> control reference for ℃

Parameter	<b>=1/ON	Enable reference
	0/OFF	Disable reference
Query	:STATe?	Query reference state

Description: These commands are used to enable or disable Reference (that is the

return to zero function) for the specified function. When enabled, the displayed reading will include the programmed reference value. When disabled, the reading does not include the reference value.

SYSTem subsystem command

:LOCal

Command syntax: :SYSTem:LOCal

Description: Use the command to cancel remote control mode and return to panel operation

CALCulate subsystem command

:CALCulate

Command syntax: :CALCulate:FUNCtion DB

:CALCulate:FUNCtion DBm

Query: :CALCulate:FUNCtion? Query math function

Description: Use the command to return DB or DBm.

Command syntax：: :CALCulate:STATe 1/ON

:CALCulate:STATe 0/OFF

Query :CALCulate:STATe? ery whether open math function

Description: Use the command to enable or disable math function.

TRIGger subsystem command

:TRIGger

:SOURce<name>

Command syntax: :TRIGger:SOURce IMMediate inner trigger

Queary: :SOURce?

Description: TRIGger subsystem commands are used for instrument setting of trigger mode.

Common command

Common commands can be used to all instruments. We provide some common commands as below,

*RST

Command syntax: *RST

Description: Reset the instrument.

*TRG

Command syntax： *TRG

Description: Trigger the instrument for measurement.

Read?

Command syntax： :Read?

Description: Get the update readings of instrument.

Chapter 5 Service and Support

5.1 Warranty

Shijiazhuang Suin Instruments Co., Ltd. will give one year's warranty to maintaining or replacing since consignment for the verified quality problem of the product.

Except for this explanation and the description in the warranty card, the company has no other warranty, in proclamation or in implication. Under no circumstances, the company will responsible for the direct, indirect or other secondary loss.

5.2 Contact us

If you have any questions or inconvenience during the use of our products please do not hesitate to contact us.

Monday to Friday Beijing Time 8: 00-17: 00

Telephone: 86-311-86086971(after service) Fax: 86-311-86018511

86-311-86014314(technical support)

E-mail address: export@suintest.com

Website: http://www.suintest.com

Chapter 6 Specifications

6.1 General Specifictions

6.1.1 To ensure the reliable working, please follow below conditions:

Environment Conditions:

Working temperature: 0℃ ~ +40℃(32℉～104℉)

Storage Temperature: 0℃ ~ +40℃(14℉～122℉)

Relative humidity: 0℃ ~30℃(≤75%)

30℃~ 40℃(≤50%)

Atmospheric pressure: 86kPa ~ 106kPa

Impact and Vibration: accords with Mil-T-28800E Type Ⅲ, Class 5(only Sine)

Power Conditions:

Frequency: 50 Hz（±5%）

Voltage: 110 or 220Vac（±10%）

Power: 8VA

6.1.2 Dimension:

H×W×D: 102mm×256mm×306mm

6.1.3 Weight: 2kg

6.1.4 Safety standard:

Conform to IEC61010-1，CAT Ⅰ 1000V/CAT Ⅱ 600V

6.2 Performance Specifications

Accuracy: (a% of reading) + (number of least significant digits), guarantee for 1 year.

Operating temperature: 18℃~28℃

Warm up: >30min

6.2.1 DC Voltage

Range	Resolution	Accuracy
200mV	0.01 mV	±(0.03%+15)Under RELΔ mode
2V	0.0001V	±(0.05%+15)
20V	0.001V	
200V	0.01V	
1000V	0.1V	±(0.1%+18)

Input Impedance: Approx 2.5GΩ under 200mV, Approx 10MΩ for others.

Overload Protection: 1000V.

6.2.2 AC Voltage

Range	Resolution	Frequency Range	Accuracy
2V	0.0001V	45Hz~1kHz	±(0.4%+50)
		1kHz~10kHz	±(3%+50)

		10kHz~100kHz	±(6%+100)
20V	0.001V	45Hz~1kHz	±(0.4%+50)
		1kHz~10kHz	±(3%+50)
		10kHz~100kHz	±(6%+100)
200V	0.01V	45Hz~1kHz	±(0.4%+50)
		1kHz~10kHz	±(5%+50)
		10kHz~100kHz	±(8%+120)
750V	0.1V	45Hz~1kHz	±(1%+50)
		1kHz~5kHz	±(5%+50)
		5kHz~10kHz	±(10%+120)

Input Impedance: Approx 10MΩ, Overload Protection: 1000V.

Display: AC crest factor can be up to 3.0 (750V range is 1.5).

A residual reading of 80 digits is allowed for shorted input.

The accuracy guarantee range 10% ~ 100%.

6.2.3 DC Current

Range	Resolution	Accuracy
200.00μA	0.01uA	±(0.1%+30)
2000.0μA	0.1uA	
20.000mA	0.001mA	±(0.15%+15)
200.00mA	0.01mA	
10.000A	0.001A	±(0.5%+30)

Overload Protection: uA mA range: fuse φ5×20mm F0.25AH 250V

10A range: fuse φ5×20mm F15AH 250V

Note:

At 10A range: when the measured current is ≤5A, continuous measurement is allowed.

When the measured current is between 5A and 10A, continuous measurement ≤10 seconds and interval ≥ 15 minutes.

6.2.4 AC Current

Range	Resolution	Accuracy
200.00μA	0.01uA	45~1kHz ±(0.7%+30) 1 kHz ~5kHz ±(1.5%+50) 5kHz~10kHz ±(5%+70)
2000.0μA	0.1uA	
20.000mA	0.001mA	
200.00mA	0.01mA	
10.000A	0.001A	45~1kHz ±(1.5%+40) 1 kHz~5kHz ±(3.5%+40) 5kHz~10kHz ±(7%+40)

Display: ① True RMS value are valid from 10% to 100% of range

② AC crest factor can be up to 3.0.

③ A residual reading of 80 digits is allowed for shorted input.

④ The accuracy guarantee range 10% ~ 100%.

Overload Protection: uA mA range: fuse φ5×20mm F0.25AH 250V

10A range: fuse φ5×20mm F15AH 250V

Note:

At 10A range: when the measured current is ≤5A, continuous measurement is allowed.

When the measured current is between 5A-10A, continuous measurement ≤10 seconds and interval more than 15 minutes.

6.2.5 Resistance

Range	Resolution	Accuracy
200Ω	0.01Ω	±(0.3%+40)+ test leads shorted value
2kΩ	0.0001KΩ	±(0.3%+40)
20kΩ	0.001KΩ	
200kΩ	0.01KΩ	±(0.5%+40)
2MΩ	0.0001MΩ	±(1%+40)
20MΩ	0.001MΩ	±(1.5%+40)

Overload Protection: 1000V

If measurement of resistance over 1MΩ, you should wait several seconds for stable reading, and shorter testing lead will get more stable reading.

6.2.6 Capacitance

Range	Resolution	Accuracy
20nF	0.01nF	±(1%+35)+ test leads opened value
200nF	0.1nF	±(1%+20)
2μF	0.001μF	
20μF	0.01μF	
200μF	0.1μF	±(1.2%+20)
2mF	0.001mF	±(5%+20)
20mF	0.01mF	±(6%+30)

Overload Protection: 1000V

6.2.7 Frequency

Range	Resolution	Accuracy
20Hz	0.001Hz	±(0.01%+8)
200Hz	0.01Hz	
2000Hz	0.1Hz	
20kHz	0.001kHz	
200kHz	0.01kHz	
2MHz	0.0001MHz	
20MHz	0.001MHz	

200MHz	0.01MHz	±(0.05%+10)

Overload Protection: 1000V

Input amplitude “A” as follows; When 10Hz~40MHz : 200mVrms≤A≤30Vrms

(DC electric level is zero) When > 40MHz : Not specified

6.2.8 Diode Test

Range	Resolution	Accuracy
	0.0001V	Open circuit voltage approximate 2.8V, A good silicon junction drops between 0.5V and 0.8V.

Overload Protection: 1000V

6.2.9 Continuity Test

Range	Resolution	Accuracy
	0.01Ω	Open circuit voltage approximate 1.2V. The buzzer does not sound if resistance is >10Ω. The buzzer make constant sound for good continuity, the tested resistance is ≤10Ω.

Overload Protection: 1000V

6.2.10 Temperature

With PT100 temperature probe

Range	Resolution	Accuracy
-200~40℃	0.1℃	±(3%+30)
40~400℃		±(1%+30)
400~800℃		±(2.5%+30)