

# Instruction Manual

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## Brief

Thanks for your purchasing universal system.

To ensure the correct operations, please read the manual carefully before using it. After that, please keep it well.

The instrument is produced according with the strict quality control standard. All the components are selected and aged in full range. It passes a series environmental experiments and it will be in optimum working state in the indicated working environment.

Service after sales: Please contact our customer service office if the instrument is defective to get effective service after sales.

### Composition:

- 1. DDS signal generator:** it adopts digital synthetic technology which can generate 5 waves of sine, square, triangle, pulse and TTL. The frequency range is 0.1Hz~10MHz.
- 2. Frequency Counter:** The frequency range is 1Hz~2.7GHz with high measurement accuracy and can realize equal accuracy measurement.
- 3. DC Power Supply:** It is composed of four groups outputs, 0~30V/0~3A adjustable voltage output, +15V/1A fixed voltage output, -15V/1A fixed voltage output and +5V/2A fixed voltage output.
- 4. DMM:** It has about 50 kinds of measurement functions with multi display: master display 80000, slave display 80000 and 21 segment of bar graph. The max. AC/DC voltage is up to 1000V DC/750V AC and DC/AC current up to 20A. Resistor measuring range is  $0.1\Omega \sim 80M\Omega$ ,  $10 M\Omega \sim 8000 M\Omega$ , capacitor measuring range is  $1pF \sim 100\mu F$  and the temperature range is  $-50^{\circ}C \sim 1372^{\circ}C$ ,  $-58^{\circ}F \sim 2502^{\circ}F$ . It has 16 kinds of frequency (0.5Hz~5kHz) and adjustable pulse waveform output of 1%~99% duty. It has RS232 interface which can be communicated with PC.

## I Panel Operation Instruction

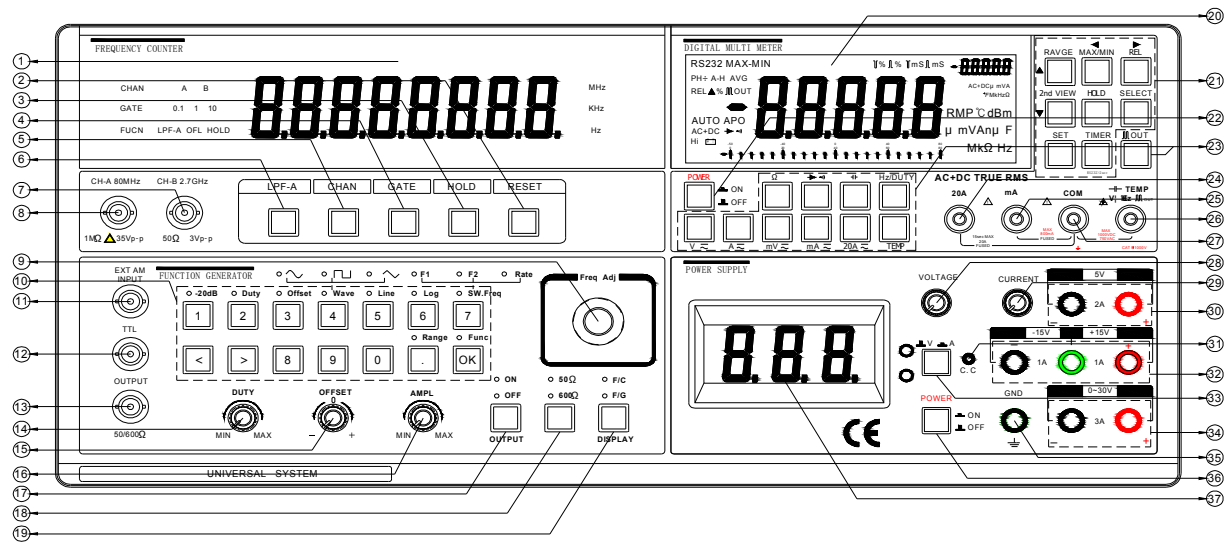


Diagram of Front Panel Operation Instruction

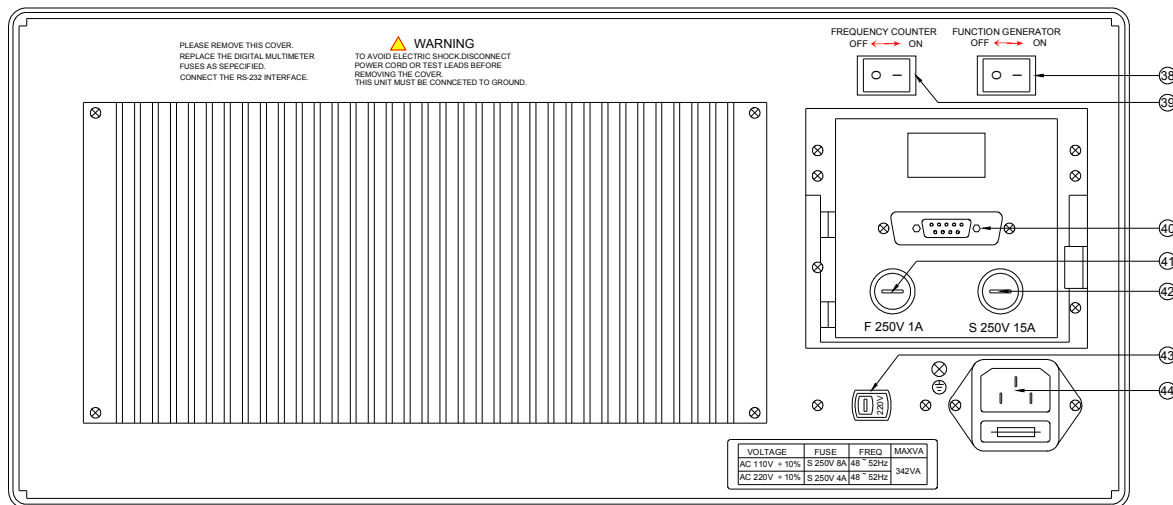


Diagram of Rear Panel Operation Instruction

- |  |   |
|--|---|
| ① Display window of FC                         | ② Reset of FC   |
| ③ Data hold of FC                              | ④ Gate time key of FC                                       |
| ⑤ Channel select key of FC                     | ⑥ Low pass filter key of FC                                 |
| ⑦ CHB input of FC                              | ⑧ CHA input of FC   |
| ⑨ Frequency variable knob of FG                | ⑩ Keyboard operation zone of FG                             |
| ⑪ Input of ext amplitude of FG                 | ⑫ TTL output of FG  |
| ⑬ Signal output of FG                          | ⑭ Duty variable knob of FG                                  |
| ⑮ DC offset variable knob of FG                | ⑯ Amplitude variable knob of FG                             |
| ⑰ Output on/off control key of FG              | ⑱ Output impedance select key of FG                         |
| ⑲ Display control key of FG                    | ⑳ Display window of DMM                                     |
| ㉑ Auxiliary function key zone of DMM           | ㉒ Power switch of DMM                                       |
| ㉓ Function keys zone of DMM                    | ㉔ Input terminal of 20A current of DMM                      |
| ㉕ Input terminal of mA current of DMM          | ㉖ Input terminal of voltage and current measurement of DMM  |
| ㉗ Common terminal of DMM                       | ㉘ Voltage variable knob of DPS                              |
| ㉙ Current variable knob of DPS                 | ㉚ Fix +5V/2A output terminal of DPS                         |
| ㉛ Constant current indicator of DPS            | ㉜ Fix $\pm 15\text{V}/1\text{A}$ output terminal of DPS     |
| ㉝ Voltage/current display select switch of DPS | ㉞ $0\sim 30\text{V}/0\sim 3\text{A}$ output terminal of DPS |
| ㉟ Grounding terminal                           | ㊱ Main power switch   |
| ㊲ Display window of DPS                        | ㊳ Power switch of FG  |
| ㊴ Power switch of FC                           | ㊵ DMM RS232 interface                                       |
| ㊶ mA current measurement fuse of DMM           | ㊷ 20A current measurement fuse of DMM                       |
| ㊸ AC110V/AC220V select switch                  | ㊹ Power socket  |

## II Operation Cautions

1. The instrument has already been done ex-factory inspection strictly. Please first check whether the instrument is damaged or not during the transportation once the user opens the package box.
2. Don't put it in chilly outside. The working temperature is  $0^{\circ}\text{C} \sim 40^{\circ}\text{C}$ .
3. Don't expose it at the sunshine or heat source such as stove, for long time.
4. Don't remove it from heat to chilly environment abruptly or vise versa which will cause frozen in the inner.
5. Keep it from humidity, water and dust. Otherwise the instrument maybe occur malfunctions. The optimum relative humidity is  $35\% \sim 90\%$ .
6. Keep it from the strong shocking environment. Otherwise the instrument maybe occur malfunctions.
7. Keep it far way from the high magnetic field and don't operate it near to magnetic field. And don't expose it under sunshine or ultraviolet directly.

8. Don't put other objects on it and don't block the vent holes.
9. Don't insert lead or pin into the vent holes.
10. Don't drag it through cables.
11. Don't put soldering iron on its surface or plastic frame.
12. Don't invert it for long time during storage and transportation.
13. Check steps before operation:

#### 13.1 Check voltage

Refer to the suitable working voltage as below before the power is on.

Rated voltage	Working voltage
AC220V	AC198V~242V
AC110V	AC99V~121V

#### 13.2 Make sure the fuse should be suitable.

To avoid the circuit damage caused by over current, please use the correct fuse.

Power fuse: AC220V S 250V 4A/AC110V S 250V 8A

Shape: 5×20mm

Type: slow-blow

DMM fuse: mA current: F 250V 1A

Shape: 6×30mm

Type: fast-blow

20A current division: S 250V 15A

Shape: 6×30mm

Type: slow-blow

## III Frequency Counter (FC) Operation Instruction

### 1. Technical Specifications

- 1.1 Freq measurement range:
 

CHA	1Hz~80MHz
CHB	80MHz~2.7GHz
- 1.2 Input sensitivity:
 

CHA	40mVrms sine wave or 100mVpp
CHB	40mVrms sine wave or 100mVpp
- 1.3 Measurement accuracy:  $\pm 1 \times 10^{-7}/s \pm \text{time base error} \pm \text{trig error}$
- 1.4 Max. Input voltage:
 

CHA	35Vpp
CHB	3Vpp
- 1.5 Input impedance:
 

CHA	1MΩ
CHB	50Ω
- 1.6 Time base: 10MHz
- 1.7 Resolution:  $[(\pm 1 \times 10^{-7}/s) \times \text{measured signal frequency}] / \text{Strobe time}$

### 2. Basic Operation

- 2.1 Please check voltage and fuse before the power is on. Turn on main power switch

- (Ⓢ) and then turn on FC power switch (Ⓣ) which is on the rear panel of instrument and then preheat 20 minutes.
- 2.2 After the power is on, the display window (①) of FC indicates “0”, the indicator of CHA will be on. The strobe time is 1s and the indicator of strobe is on. The indicators of Hold and Low pass filter (LPF-A) will be off.
- 2.3 LPF-A key (Ⓢ) : It is used to eliminate the noise when the freq is less than 300kHz and high freq noise disturbs CHA.
- 2.4 Channel key (Ⓣ) : It is used to select the measured channel. CHA can be used to measure 1Hz ~ 80MHz signal frequency. CHB can be used to measure 80MHz~2.7GHz signal frequency.
- 2.5 Strobe time select key (④) : It should choose a suitable strobe time if a suitable resolution is needed. Once the period of the measured signal is more than strobe time, the measurement time is regarded as a period time of the measured signal.
- 2.6 Data Hold (Ⓡ) : Press it down, the Hold indicator will be on. Then the FC will stop measurement. The display window will always keep the last measured data even the signal frequency is changed or test dot is broken. Press Hold again, its indicator will be off. Then FC re-starts to measure and the display window will record new frequency measurement data.
- 2.7 Reset (Ⓡ) : It is used to reset the FC.
- 2.8 Over-flow indicator (OFL) : When the measured signal frequency is over the range, the over-flow indicator(OFL) will be on, and “**00000000**” will be on the display window (①) .

## VI Function Generator (FG) Operation Instruction

1. Technical Specification
  - 1.1 Waveform characteristic:
    - 1.1.1 Waveform type: sine, triangle, square.
    - 1.1.2 Sine harmonious wave distortion (1Vpp, 50Ω) :
 

<20kHz	-50dBc
20 kHz~1MHz	-40dBc
1MHz~10MHz	-35dBc
    - 1.1.3 Sine wave distortion:  $\leq 1\%$  (0.1Hz~100 kHz)
    - 1.1.4 Square wave Rise/Fall time:  $\leq 50\text{ns}$  (1MHz, 50Ω, output voltage 5Vpp)
    - 1.1.5 Square overshoot:  $\leq 5\%$
    - 1.1.6 Square duty variable range: 10%~90% ( $\leq 100\text{ kHz}$ )
    - 1.1.7 Waveform asymmetry:  $< 1.5\% + 20\text{ns}$  of period ( $\leq 100\text{ kHz}$ )
    - 1.1.8 Triangle linearity:  $< 1\%$  ( $\leq 100\text{ kHz}$ )
  - 1.2 Frequency characteristic:
    - 1.2.1 Frequency range: Sine wave                      0.1Hz~10MHz

Square wave      0.1Hz~5MHz (2Vpp, 50Ω)

Other waveform   0.1Hz~1MHz

1.2.2 Frequency accuracy:  $\pm (5 \times 10^{-5} + 40\text{mHz})$

1.2.3 Frequency stability: 50ppm (long term)

1.2.4 Max. resolution: 0.01Hz

1.3 Amplitude Characteristic:

1.3.1 Output amplitude range: 100mVpp~20Vpp (High impedance)

1.3.2 Amplitude flatness:  $\pm 5\%$

1.3.3 Output impedance:  $50\Omega \pm 10\%$  /  $600\Omega \pm 10\%$

1.4 Overshot Characteristic:

1.4.1 DC offset range (Vpp AC+DC) :  $\pm 10\text{V}$  (high impedance) ;  $\pm 5\text{V}$  (50Ω)

1.5 Sweep Frequency Characteristic:

1.5.1 Type: Linearity or Log

1.5.2 Sweep frequency: Negative or positive

1.5.3 Sweep range: 1Hz~10MHz

1.5.4 Sweep freq velocity: 0.01Hz~100Hz

1.6 Attenuation:

1.6.1 Attenuation: -20dB

1.6.2 Error:  $\pm 3\%$  (open)

1.7 Ext amplitude:

1.7.1 Input impedance: 1kΩ

1.7.2 Ext amplitude freq range: 0.1Hz~20kHz (Inner impedance 50Ω of modulation source)

1.7.3 Ext amplitude sensitivity: 0~4Vpp

1.7.4 Amplitude depth: 0~100%

1.8 TTL Output:

1.8.1 Output amplitude: Low level  $\leq 0.3\text{V}$ ; high level  $\geq 3.3\text{V}$

1.8.2 Output impedance:  $50\Omega \pm 10\%$

2. Panel Layout

2.1 There are 3 ports on panels, signal output port (⑬) , TTL synchronized output port (⑭) and ext amplitude signal input port (⑪) .

2.2 There are four variable knobs on panels, freq variable knob (⑨) to adjust output frequency of signal and change setting of sweep frequency parameter, Duty variable knob (⑭) used to adjust duty ratio of square wave, DC offset variable knob (⑬) used to adjust DC offset of signal and Amplitude variable knob (⑩) used to adjust amplitude of the output signal.

2.3 There are 14 keys on keyboard operation zone: 10 number keys (number **【0】** ~ **【9】** ); 2 direction keys (left **【<】** , right **【>】** ); 1 decimal point (**【.】** ); 1 OK key (**【OK】**) . There are three function keys: One is signal output switch (⑯) which is used to control whether FG output signal or not. Press it, FG output is

switched between on/off state. The indicator above the key is corresponding to the FG output state; The secondly is output impedance key (Ⓢ), the indicator above the key is corresponding to FG output impedance. Press it, FG output impedance will be switched between 50Ω and 600Ω; The thirdly is display function switch key(Ⓣ) which is used to change the display function of window (Ⓛ). When F/C indicator is on, the display window will be used to display frequency counter, and when F/G indicator is on, the display window will be used to display the frequency of FG. Once the power is on, the display window (Ⓛ) is defaulted as the frequency indication of FG.

- 2.4 The secondary function key: Once the power is on, the indicator “FUNC” above key **【OK】** will be on. Parts of keys (Number keys **【1】** ~ **【7】**, decimal point **【.】** and **【OK】** is used for the second functions which is indicated above the keys,

### 3. Basic Operation

- 3.1 FC display window (Ⓛ) displays frequency. 6 digits of FG.

- 3.2 The frequency can be adjusted by hand wheel or enter numbers directly. Once the power is on, the default output frequency is 1kHz. At the time, number “1” is flashing. Remove the flashing number horizontally by **【<】** and **【>】** and the flashing number can be changed through rotating the hand wheel. Press **【.】**, indicator “Range” above **【.】** will be on. Then the frequency unit indicator will be flashing such as (kHz). Rotate the hand wheel, the value will be changed as ×10 times or 1/10 times each time. Press **【.】** again, the “Range” indicator will be off and re-start adjustment mode by hand wheel. Press **【OK】**, “Func” indicator will be off, frequency on window is cleared and enter into state of entering numbers directly. All the entered numbers will be flashing and they are can be deleted freely from left to right through **【<】**, which can correct the numbers. And also units, such as MHz, kHz, Hz, can be selected through **【>】**. Press **【OK】** again after entering numbers, the key of “Func” will be on, the signal frequency will be displayed on frequency window.

- 3.3 The operation of Secondary function key.

Once the power is on, the “Func” indicator above **【OK】** will be on. Part of keys are corresponding to the secondary functions which is indicated on panel.

**【-20dB】:** Press **【1】**, the indicator “-20dB” will be on. The attenuation amplitude of output signal is -20dB. Press the key again, the indicator “-20dB” will be off, the amplitude of output signal will normal.

**【Duty】:** Press **【2】**, the indicator above “Duty” will be on. Adjust the Duty variable knob (Ⓢ) to change duty ratio of square wave. Press the key again, the indicator “Duty” will be off, the output duty ratio of square

wave is 50%. At the time, the Duty variable knobs (Ⓐ) won't be work.

**【Offset】:** Press **【3】**, the indicator above "Offset" will be on. Adjust the DC offset variable knob (Ⓑ), DC offset of output waveform can be adjusted. Press the key again, the indicator "offset" will be off, the output waveform is back to normal. At the time, the DC offset variable knob (Ⓑ) won't be work.

**【Wave】:** When the power is on, the default output of FG is sine wave. The "Sine" indicator will be on. Once press number **【4】** each time, output waveform of FG will be switched between sine, square and triangle in turn.

**【Line】:** Press **【5】**, the "Line" indicator will be on, the FG is in the state of linearity sweep frequency mode. F1 indicator is on above number key **【7】**, then the first frequency of linearity sweep frequency can be set. Press **【7】**, indicator "F2" will be on, then the end frequency can be set. Press **【7】** again, indicator "Rate" is on, then sweep frequency velocity can be set. Press number key **【5】**, indicator "Line" will be off. All the indicators above **【7】** are off, FG will quit sweep frequency mode.

**【Log】:** Press number key **【6】**, indicator "Log" will be on. FG is in the state of log sweep frequency mode. At the same time, indicator "F1" will be on. Then the first frequency of log sweep frequency can be set. Press **【7】**, indicator "F2" will be on. At the same time, the end frequency of log sweep frequency can be set. Press **【7】** again, indicator "Rate" will be on, then the velocity of sweep frequency can be set. Press number key **【5】**, indicator "Log" will be off. All the indicators above **【7】** are off, FG will quit the sweep frequency mode.

**【Func】:** When the power is on, the indicator "Func" above **【OK】** is on, it is in the state of function setting. Press **【OK】**, the indicator "Func" will be off. At the time, the window is cleared up and enter the state of entering number.

**【Range】:** Press **【.】**, the indicator "Range" will be on. Then the indicator of frequency unit is flashing (such as kHz). Rotate hand wheel (Ⓒ), the value will be changed as  $\times 10$  times or  $1/10$  times. Press **【.】** again, the indicator "Range" will be off and enter the mode of hand wheel.

## V DC Power Supply (DPS) Instruction

### 1. Technical Specification



#### 1.1 CH1 output (output port Ⓐ)

##### 1.1.1 Output voltage: 0~30V

- 1.1.2 Output current: 0~3A
- 1.1.3 Ripple and noise:  $\leq 1\text{mVrms}$
- 1.1.4 Load effect:  $0.1\% + 5\text{mV}$
- 1.1.5 Source effect:  $0.1\% + 5\text{mV}$
- 1.1.6 Max. output current: 3.3A
- 1.1.7 Display accuracy: Voltage  $\pm 1\% + 2 \text{ words}$ ; Current  $\pm 2\% + 2\text{words}$
- 1.2 CH2 output (output port ②)
- 1.2.1 Output voltage:  $\pm 15\text{Vfixed}$
- 1.2.2 Output current: 1A
- 1.2.3 Ripple and noise:  $\leq 2\text{mVrms}$
- 1.2.4 Load effect:  $0.1\% + 50\text{mV}$
- 1.2.5 Source effect:  $0.1\% + 30\text{mV}$
- 1.2.6 Max. output current: 1.2A
- 1.3 CH3 output (output port ③)
- 1.3.1 Output voltage:  $+5\text{V fix}$
- 1.3.2 Output current: 2A
- 1.3.3 Ripple and noise:  $\leq 2\text{mVrms}$
- 1.3.4 Load effect:  $0.1\% + 70\text{mV}$
- 1.3.5 Source effect:  $0.1\% + 30\text{mV}$
- 1.3.6 max. output current: 2.2A
- 2. Basic Operation
- 2.1 Please check fuse before the power is on. Disconnect all the cables connected to the output ports. Adjust Current knob (②) to maximum clockwise and set the current to the max output value.
- 2.2 Press Power switch (⑥). DPS window (⑦) will display output current/voltage value of CH1 (output port ④). The indicator of CH2 (output port ②) & CH3 (output port ③) will be on. And the voltage will be output at three channels of the DPS.
- 2.3 Display window (⑦) can display voltage value or current value. Once the key is push up, display window (⑦) will display output voltage value of CH1 (output port ④). Once the key is press down, display window (⑦) will display the output current value of CH1 (output port ④).
- 2.4 Voltage variable knob (③) is used to change CH1 (output port ④) output voltage value. Once adjust it clockwise, the voltage value will be bigger gradually and vise versa. Current variable knob is used to set CH1 (output port ④) max. current value. Adjust it clockwise, the current value will be bigger gradually and vise versa.
- 2.5 Once the output current is more than the set max. current output value, CH1 (output port ④) will be in the constant current state. At this time, the indicator C.C will be on. The extra current will cause the voltage down.

## VI Digital Multimeter (DMM) Operation Instruction

### 1. Safe Operation Rules

- 1.1 It is suitable for the over voltage standard of IEC 61010 CAT II 1000V & CAT III 600V。
- 1.2 Please check whether the shell, test lead and isolating layer are perfect and without any damage before use it.
- 1.3 Please check the voltage to confirm the meter is in good working state. Otherwise, please contact to repair immediately instead of using it.
- 1.4 Please use the terminals and select divisions of function and range correctly when measure it.
- 1.5 Please don't measure the voltage when the test lead is inserted into the current terminal.
- 1.6 Please don't use voltage more than the indicated rated voltage (Refer to the sign   ) between any terminal and earth.
- 1.7 Please care for the voltage more than 42VAC or 60VDC to avoid electric shock. Please make sure to put figures on the finger protection part.
- 1.8 Please cut off power and discharge all the high voltage capacitors, especially for big capacitance capacitors, before measure the online resistors, capacitors, diodes and switching inspection.
- 1.9 Please don't store and operate the meter under the environment of high temperature, high humidity, flammable and strong magnetic field.

### 2. Panel Instruction

- 2.1 Refer to Table 1 for terminals (Chart 1)

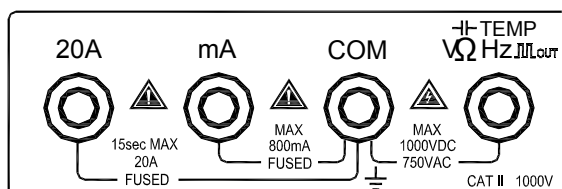



Chart 1.

Table 1

Terminal symbol	Function
COM	For all the common terminals
mA	mA current input terminal
20A	20A current input terminal
VΩHz	Voltage, resistor, switching, diode, capacitor, frequency, temperature measurement and square wave output terminal.

- 2.2 Refer to Table 2 for Function keys (  ) :

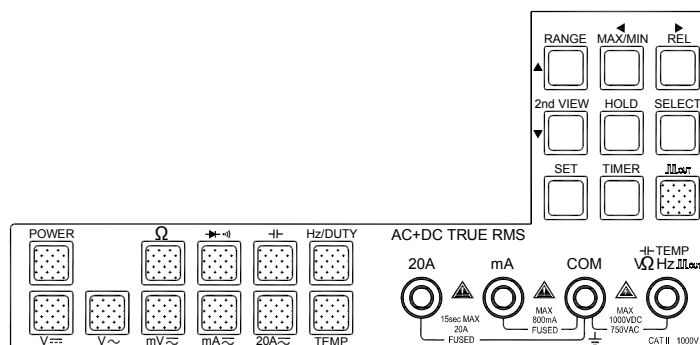


Chart 2.

Table 2:

Key Position	Division	Key position	Division
V $\overline{\sim}$	DC voltage	→ • )	Test for diode and switching
V $\sim$	AC voltage	→	Capacitor
mV $\overline{\sim}$	DC/AC mV voltage	Hz/DUTY	Freq/Duty ratio
mA $\overline{\sim}$	DC/AC mA current	TEMP	Temperature
20A $\overline{\sim}$	DC/AC 20A current	□□ OUT	Square wave output
Ω	Resistor	POWER	Power switch

### 2.3 Auxiliary function keys ( ② )

When press these keys, the corresponding symbol will be on LCD alongside a buzz. .

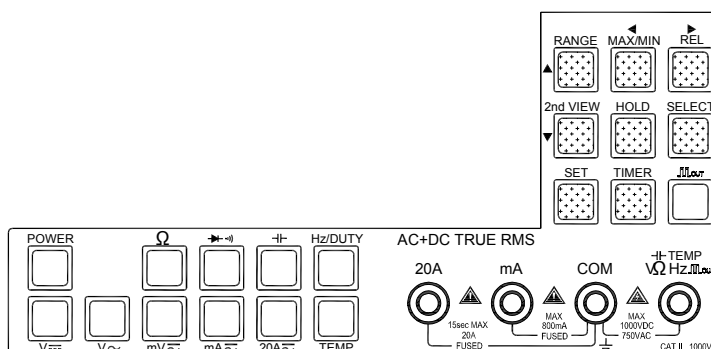


Chart 3.

**Notice:** Because of many functions for the meters, when press these keys, the meter have to make logic judge which need some time to do it. Please make measurements after it is stable.

#### 2.3.1 【SELECT】

- Press **【SELECT】** to select the needed measurement state.
- When the DMM output square wave, please press **【SELECT】** to change duty of square wave signal. Press it each time, it will change 1% (The variable

change 1%~99%) .

#### 2.3.2 【RANGE】

- Once the power is on, the DMM is in AUTO range state. Press **【RANGE】** can select your measurement range. Press it quickly to select the range you needed. And press it once, it change a range.
- After run **【SET】** key, **【RANGE】** will be change as **【▲】** (moving up) . Press it to move setting digits up.
- Press **【RANGE】** lasting more than 2s, it will be back to AUTO range.

#### 2.3.3 【MAX/MIN】

- Press **【MAX/MIN】** , it will be dynamic record mode which can capture and record MAX, MIN and MAX-MIN from variable input signal and calculate AVG of all readings. Press **【MAX/MIN】** to display MAX/MIN/(MAX-MIN)/AVG in sequence on slave display.
- Press **【MAX/MIN】** lasting more than 2s, it will be back to normal mode.
- In state of MAX/MIN, the record time is 36 hours.
- After run **【SET】**, **【MAX/MIN】** will be change as **【◀】** (moving left) . Press it to move setting digits left.

#### 2.3.4 【TIMER】 (RS232)

- When the power is on, the DMM will enter RS232 communication state at the same time and its sign “RS232” will display on LCD synchronized. In RS232 state, the function of auto power-off will be closed.
- Press **【TIMER】** lasting more than 2s. It will quit RS232 state and back to normal mode.
- Refer to “Special Functions” for time setting.

#### 2.3.5 【HOLD】

- Press **【HOLD】** , the DMM will enter auto data hold mode and “A—H” appear on display screen.
- This function can keep user’s current measured value on screen. When user change the measured signal, the value will be also be updated alongside a buzzer.
- In DC voltage (current) state, press **【HOLD】** once to display “A—H” and press it again, it will switch to display “PH+/PH-”.
- Press **【HOLD】** lasting more than 2s to quit data Hold mode and back to normal mode.

#### 2.3.6 【2nd VIEW】

- In Table3 measuring state, press **【2nd VIEW】** to switch and display each function in slave display.

Table 3:

Function key position	Measure state	Master display	Slave (switch them by pressing <b>【2nd VIEW】</b> )
$V \sim$	ACV+ Hz	ACV	Hz/ $\mu$ %/ $\mu$ %/ $\mu$ ms/ $\mu$ ms
	AC dBm+Hz	AC dBm	Hz/ACV
$V \equiv$	(ACV+DCV)+Hz	ACV+DCV	Hz/ACV
	dBm+Hz	dBm	Hz/ACV/DCV/ACV+DCV
mV $\approx$	ACmV+ Hz	ACmV	Hz/ $\mu$ %/ $\mu$ %/ $\mu$ ms/ $\mu$ ms
	dBm+Hz	dBm	Hz/ACmV/DCmV/ACmV+DCmV
Hz/DUTY	Hz	Hz	$\mu$ %/ $\mu$ %/ $\mu$ ms/ $\mu$ ms
$\square\square$ OUT	$\square\square$ OUT	Press <b>【2nd VIEW】</b> to change output signal frequency	Press <b>【SELECT】</b> to change duty of output signal

- Press **【2nd VIEW】** to select output frequency of square wave when it is in Square wave output function:  
0.5000Hz/1.0000Hz/2.0000Hz/10.000Hz/50.000Hz/60.24Hz/74.63Hz/100.00Hz/151.5Hz/200.00Hz/303.00Hz/606.1Hz/1.25kHz/1.6660kHz/2.5kHz/5.0000kHz
- Press **【2nd VIEW】** lasting more than 2s, the output square wave will back to 606.1Hz, 50% of duty output state.
- After run **【SET】**, **【2nd VIEW】** will be change as **【▼】** (moving down). Press it to move setting digits down.

### 2.3.7 **【REL】**

- Press **【REL】**, it will be in state of relative measurement function and at the same time, symbol “REL▲” will be displayed. It indicates the different between measuring value and reference value which means press **【REL】**, it will treat current measurement value as reference value(Ref). After that, REL▲ or REL% is on the reading of master display and reference value on slave display. Press **【REL】** again, the measured value will be on slave display again.
- In the state of **【REL】**, Press **【SELECT】** to select “REL▲” or “REL%”. And at the same time, “REL%” and “REL▲” will be on screen.  
REL▲ = measured value- reference value  
REL% = (REL▲ / REL) × 100%
- After run **【SET】**, **【REL】** will be change as **【▶】** (moving right). Press it, the pre-setting value can be removed towards right.
- Press **【REL】** lasting more than 2s, it will be back to normal.
- Setting of relative measured value:
  - ① Press **【RANGE】** to select the suitable range.
  - ② Press **【SET】** once and press **【SELECT】** twice, it will be in state of relative value setting and at the same time **【▲】**, **【▼】**, **【◀】** and **【▶】** are workable.

③ After setting, please press **【SET】** to confirm it.

### 2.3.8 **【SET】**

- Press **【SET】** and run **【▲】**, **【▼】**, **【◀】** and **【▶】**, then **【RANGE】**, **【2nd VIEW】**, **【MAX/MIN】** and **【REL】** will not be workable.

### 3. Display ( ㊟ )

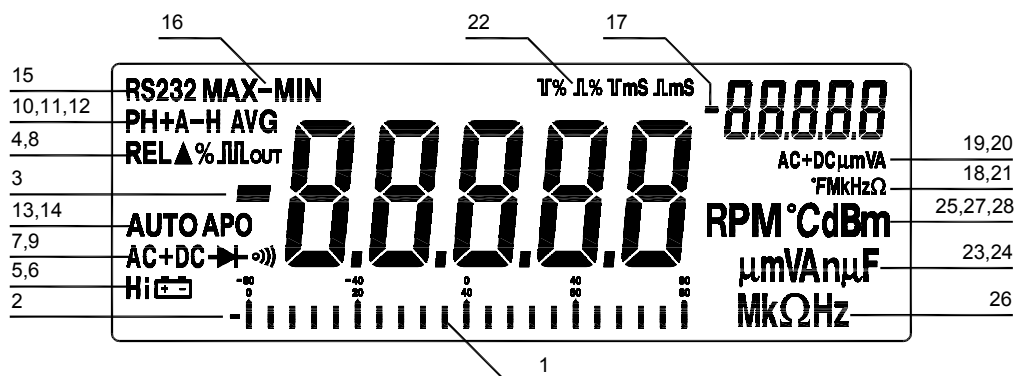


Chart 4.

It has multi display function. No matter in any case, it can display the two, three or more reading and symbols of the measured signal. Please refer to Chart 4 for the instruction of function and unit symbol.

Table 4:

Number	Symbol	Instruction
1	▮▮▮▮▮	Bar graph : display bar graph of the current input signal
2, 3, 17	—	Negative sign
4	⏏ Out	Square wave output
5	Hi	Mode of high frequency measurement and thermocouple temperature measurement
6	⚡	Lass of power voltage
7	→•••••	Check of diode and switching
8	REL▲ REL%	Symbols of relative measuring value and relative percent measurement value
9, 19	AC AC+DC DC	AC, AC+DC, DC voltage or current
10	PH+ PH-	Positive peak, negative peak
11	A—H	Auto data hold
12	AVG	Record average value
13	AUTO	Auto range
14	APO	Auto power off
15	RS232	Communication port
16	MAX MIN MAX—MIN	Record max, min and different value
20	mV/V/mA/A	Voltage and current unit on slave display

21	Hz/kHz/MHz/ $\Omega$ /k $\Omega$ /M $\Omega$	Frequency and resistance unit on slave display
22	$\overline{\text{L}}\%$ $\overline{\text{U}}\%$ $\overline{\text{L}}\text{ms}$ $\overline{\text{U}}\text{ms}$	Duty cycle unit and pulse width unit
23	nF/ $\mu$ F	Capacitance unit: nF/ $\mu$ F
24	mV/V/mA/A	Voltage and current unit on primary display
25	dBm	Level unit: decibel
26	Hz/kHz/MHz/ $\Omega$ /k $\Omega$ /M $\Omega$	Frequency and resistance unit on primary display
27, 18	$^{\circ}\text{C}$ $^{\circ}\text{F}$	Temperature unit: Celsius and Fahrenheit
28	RPM	Speed unit: r/min
	OL	Too high input for the selected range indicates

#### 4. Special Function

##### 4.1 Auto Power Off

- The DMM has function of power off. When it display “APO” on screen, the power off function is active. If don’t press any key within 30 minutes, it will be off automatically. Even there is no any display on screen, only any active on function key will re-turn of the power and continue to test.
- When it runs (MAX/MIN) and (RS232), the auto-power off will be close. If you don’t set the measurement time, you have to turn off the power through pressing key POWER (⏻).

##### 4.2 Set measurement time

- Except diode, frequency and square wave output, the other functions division can be used to set measure time.
- Time style is “0.00.00” (on slave display), the first number as hour, second and third as minute and the fourth and fifth as second. The max time is “9.59.59”.
- Press **【TIMER】** to enter the mode of time setting (“0.00.00” on slave display); Press **【SELECT】** to set time. At the time, the last number of time “0” is flashing. Press **【◀】** and **【▶】** to set time numbers and press **【▲】** and **【▼】** to set time value. Press **【TIMER】** again to confirm the set time. From now on, the measure begins to count time.
- In the set time, it does measurement normally. Once the counting time is finished, it will make buzzer continuously.
- Once the clocking function is active, the set time and time counting won’t be affected by the changes of function and operation. Only **【HOLD】** is active, the time counting will stop and clear the counted time. If you need to restart time counting again, press **【SELECT】** to run clocking function (the initial set time is on slave display). Press **【TIMER】**, the time counting starts to run again. Press **【TIMER】** again to observe the time counting on slave display.

##### 4.3 Set Limit of upper and lower

- It has functions of upper limit (**HJ**) and lower limit (**L0**) or set the two limits (**HJ-L0**) at the same time.

- Procedures to set limits of upper and lower.
  - ① Upper limit set: Turn on the power. Select the functions state and select suitable range with **【RANGE】**. Press **【SET】** to run setting mode ( “**SEtH**” will be on slave display). Press **【◀】**, **【▶】**, **【▲】** and **【▼】** to set the upper limit value. Press **【SET】** to confirm it.
  - ② Lower limit set: Turn on the power. Select the functions state and select suitable range with **【RANGE】**. Press **【SELECT】** to run setting mode ( “**SEtLO**” will be on slave display). Press **【◀】**, **【▶】**, **【▲】** and **【▼】** to set the lower limit value. Press **【SET】** to confirm it.
- It can start to measure once the set of upper and lower limit is finished. There are three kinds of display mode for the measured value:
  - ① The measured value is more than upper limit. The measured value will be on master display and “**H**” will be on slave display.
  - ② The measured value is less than lower limit. The measured value will be on master display and “**L**” will be on slave display.
  - ③ The measured value is between upper and lower limit. The measured value will be on master and “**H-L**” will be on slave display.

#### 4.4 Analog Bar Graph Display

The Function of bar graph is analog needle of meter but without the overload, and updates 40 times per second because the graph responds 10 times faster than the digital display it is useful for making peak and null adjustments and observing rapidly changing inputs. The bar graph has 20 segments. The number of lit segments is relative to the full-scale value of the selected range .The unit of the bar graph is 4000 counts/bar except when in the relative mode .The polarity indicated at left of the bar graph.

#### 4.5 Square wave output

The square wave output is a useful function which let user have free space for application .For instance , PWM (Pulse Width Modulation) out, regulate voltage control, timer to control circuit , clock synthesized and etc.

### 5. Instructions for Measuring Functions

#### 5.1 DC Voltage measurement

**⚠ Caution: the measured voltage should not be more than 1000V !**

- Press **【V=】** and it will be in DC voltage measurement .

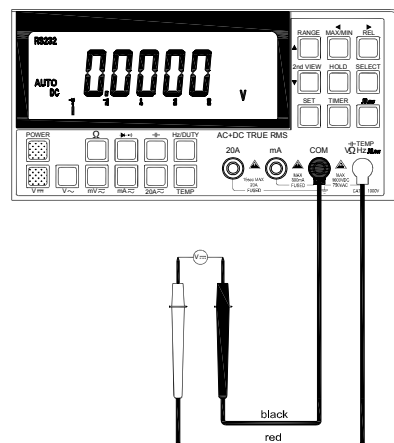


Chart 5. DC Voltage Measurement

- There are DCV, DCV+ACV and dBm for DC voltage. Press **【SELECT】** to select one of them.
- When the power is on, it will be on AUTO state. Press **【RANGE】** to select range: 8.0000V/80.000V/800.00V/1000.0V
- According with the user's requirements, press (**【REL】**), (**【MAX/MIN】**) and **【2nd VIEW】**) to do test and record. All of them will be on slave display.
- Insert red test leads into “VΩHz” and black into “COM”. Contact the test point with lead's pin. Please refer to Chart 5. The measured value and relative symbols will be on master and slave screen at the same time. Please refer to Table 5:

Table 5:

State (Press <b>【SELECT】</b> to select state)	Master	Slave (switch them by pressing <b>【2nd VIEW】</b> )
DCV	DCV	
DCV+ACV	DCV	ACV/Hz
dBm	dBm	Hz/DCV/ACV/DCV+ACV

- As test dBm, the default resistor is 600Ω. Press **【RANGE】** to change the load resistance and the selectable values are as below: 4Ω, 8Ω, 16Ω, 32Ω, 50Ω, 75Ω, 93Ω, 110Ω, 125Ω, 135Ω, 150Ω, 200Ω, 250Ω, 300Ω, 500Ω, 600Ω, 800Ω, 900Ω, 1000Ω and 1200Ω. From 600Ω, once press **【RANGE】**, the resistance value will be changed.

## 5.2 AC Voltage measurement

**⚠ Caution: The measured voltage can't be more than AC 750V!**

- Press **【V~】** to enter AC voltage function
- AC voltage has three states of ACV, ACV+Hz and dBm. Press **【SELECT】** to choose one of them.
- When the power is on, the measurement is in AUTO state. Press **【RANGE】** to select suitable range. The selectable ranges are as below: 8.0000V/80.000V/750.00V
- Press (**【REL】**), (**【MAX/MIN】**) and **【2nd VIEW】**) to do relative test and record. All of them can be on slave display.
- Insert red test leads into “VΩHz” and black into “COM” and contact the test point via lead's pin. Please refer to Chart6 for the measurement mode. The measured values and relative symbols will be on master and slave display at the same time. Please refer to Table 6:

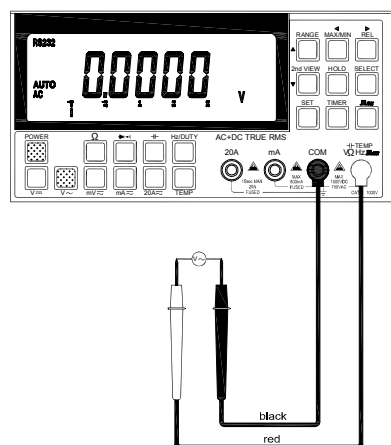


Chart 6. AC Voltage Measurement

Table 6:

Press 【SELECT】 to choose state	Master	Slave (switch them by pressing 【2nd VIEW】)
ACV	ACV	
ACV+Hz	ACV	Hz/√ %/√ %/√ ms/√ ms
dBm	dBm	Hz/ACV

- As test dBm, the default resistor is 600Ω. Press 【RANGE】 to change the load resistance and the selectable values are as below: 4Ω, 8Ω, 16Ω, 32Ω, 50Ω, 75Ω, 93Ω, 110Ω, 125Ω, 135Ω, 150Ω, 200Ω, 250Ω, 300Ω, 500Ω, 600Ω, 800Ω, 900Ω, 1000Ω and 1200Ω. From 600Ω, once press 【RANGE】, the resistance value will be changed.

### 5.3 AC/DC milli voltage measurement

**⚠ Caution: it should not exceed DC 250V or ACpeak voltage at the input terminal!**

- Press 【mV  $\approx$ 】 to enter the function of AC/DC milli voltage measurement.
- It has three states of DCmV, ACmV +Hz, dBm for AC/DC milli voltage. Press【SELECT】to select one of them.
- When the power is on, it will be in (AUTO). Press 【RANGE】 to select the suitable ranges. The optional ranges are: 80.000mV/800.00mV.
- Press 【REL】, 【MAX/MIN】 and 【2nd VIEW】 to do the relative test or record which will be in slave display.
- Insert red test leads into “VΩHz” and black into “COM” and contact the test point via lead’s pin. Please refer to Chart 7. for the measurement mode. The measured values and relative symbols will be on master and slave display at the same time. Please refer to Table 7:

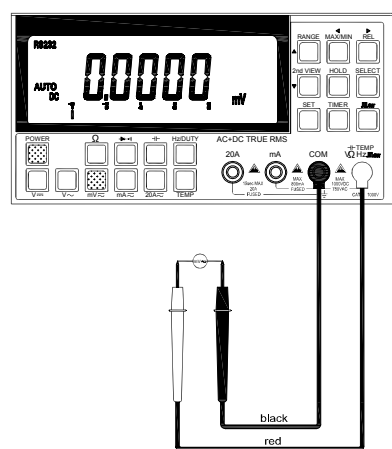


Chart 7. AC/DC mV Measurement

Table 7:

Press (【SELECT】 to choose state)	Master	Slave (switch them by pressing 【2nd VIEW】)
DCmV	DCmV	
ACmV+Hz	ACmV	Hz/√ %/√ %/√ ms/√ ms
dBm	dBm	Hz/ACmV/DCmV/DCmV + ACmV

**Notice:** At millivoltage mode the input impedance more than 1000MΩ, therefore at test leads opening state input easy caused interference. Some random digits on display, but have not effect on result of measurement.

- As test dBm, the default resistor is 600Ω. Press 【RANGE】 to change the load

resistance and the selectable values are as below: 4Ω, 8Ω, 16Ω, 32Ω, 50Ω, 75Ω, 93Ω, 110Ω, 125Ω, 135Ω, 150Ω, 200Ω, 250Ω, 300Ω, 600Ω, 800Ω, 900Ω, 1000Ω and 1200Ω. From 600Ω, once press **【RANGE】**, the resistance value will be changed.

#### 5.4 AC/DC Current Measurement

##### **⚠ Caution For AC/DC Current measurement**

**To avoid damage to meter or injury, if the fuse blows .Never attempt an in-circuit current measurement .Where the open-circuit potential to earth is greater than 1000V. To avoid damage to the meter ,check the meter’s fuses before proceeding. Use the proper terminals , function and range for your measurement . Never place the probes in parallel with a circuit or component when the leads are plugged into the current terminals. Never test voltage when test lead plug in “mA” or “10A” terminal !**

##### 5.4.1 DC/AC mA Current Measurement

- Press **【mA  $\approx$ 】** to enter the function of AC/DC milli current measurement. .
- It has three states of DCmA, ACmA , ACmA+Hz, DCmA+ACmA. Press **【SELECT】** to select one of them.
- When the power is on, it will be in (AUTO) . Press **【RANGE】** to select the suitable ranges. The optional ranges are: 80.000mV/800.00mV.
- Press **【REL】** , **【MAX/MIN】** and **【2nd VIEW】** to do the relative test or record

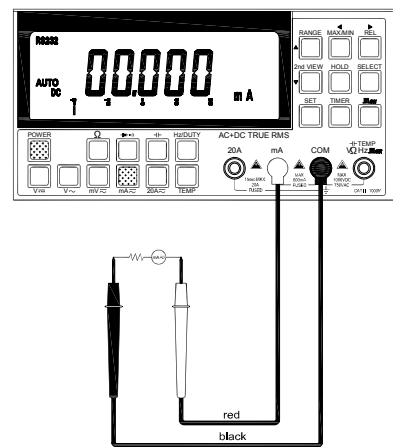


Chart 8. AC/DC mA Measurement

which will be displayed in slave display.

- Insert red test leads into “VΩHz” and black into “COM” and contact the test point via lead’s pin. Please refer to Chart 8. for the measurement mode. The measured values and relative symbols will be on master and slave display at the same time. Please refer to Table 8:

Table 8:

Press <b>【SELECT】</b> to Choose State	Master display	Slave display
DCmA	DCmA	
ACmA	ACmA	
ACmA+Hz	ACmA	Hz
DCmA+ACmA	(DC+AC) mA	ACmA

##### 5.4.2 AC/DC Ampere Current Measurement

- Press **【20A  $\approx$ 】** to enter the function.

- It has three states of DCA, ACA, ACA + Hz, DCA + ACA. Press **【SELECT】** to select one of them.
- When the power is on, it will be in (AUTO) . Press **【RANGE】** to select the suitable ranges. The optional ranges are 8.0000A/20.000A
- Press **【REL】** , **【MAX/MIN】** to do the relative test or record which will be in slave display.
- Insert red test leads into “20A” and black into “COM” and contact the test point via lead’s pin. Please refer to Chart 9. for the measurement mode.

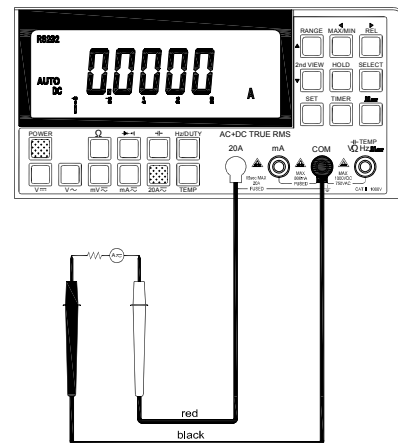


Chart 9. AC/DC Ampere Measurement

The measured values and relative symbols will be on master and slave display at the same time. Please refer to Table 9.

Table 9:

Press <b>【SELECT】</b> to Choose State	Master display	Slave display
DCA	DCA	
ACA	ACA	
ACA+Hz	ACA	Hz
DCA+ACA	(DC+AC) A	ACA

#### 5.5 Resistance Measurement ( $\Omega$ )

**⚠ Caution:** To avoid damage to meter or to the equipment under test, disconnect circuit power and discharge all high-voltage capacitors before measuring resistance.

**Notice:** when test small resistance, the test leads voltage has to cause the measurement error. To eliminate the error, set the test leads in short circuit. Press **【REL】**, the master display is zero and the slave display is the voltage of test leads. Once test it again, the master display is regarded as the measured resistant value.

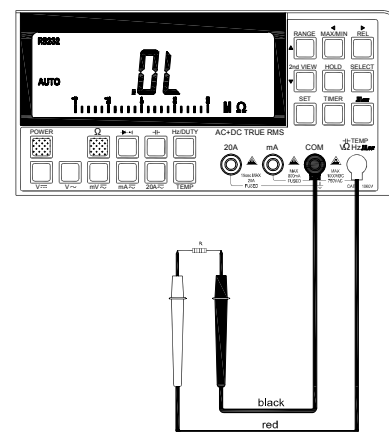


Chart 11. Resistance Measurement

- Press **【 $\Omega$ 】** to the function of resistor measurement.
- It has three states: common ( $\Omega$ ), switching ( $\bullet$ )) and hi-impedance (Hi) .

Press **【SELECT】** to select one of them.

- Common resistor check ( $\Omega$ )
  - ① When the power is on, it will be in (AUTO) . Press **【RANGE】** to select the suitable ranges. The optional ranges are: 800.00 $\Omega$  / 8.0000k $\Omega$  / 80.000k $\Omega$  / 800.00 k $\Omega$  / 8.0000M $\Omega$  / 80.000M $\Omega$
  - ② Press **【REL】**, **【MAX/MIN】** to do the relative test or record which will be in slave display.
  - ③ Insert red test leads into “V $\Omega$ Hz” and black into “COM” and contact the test point via lead’s pin. Please refer to Chart10 for the measurement mode. The measured values and relative symbols will be on master and slave display at the same time. Please refer to Table 10.

Table 10:

Measurement state	Master display	Slave display
$\Omega$	$\Omega$ /k $\Omega$ /M $\Omega$	Relative to MAX/MIN and REL

- Switching test (•))
 

In the mode of common resistor measurement, press **【SELECT】** to select Switching function. There is symbol of “•))” on master display. Once the measured resistor is less than 50 $\Omega$ , it will buzz.
- High impedance measurement (Hi)
 

In the mode of common resistor measurement, press **【SELECT】** to choose Switching function. It has symbol of Hi on master display. In such mode, it can measure resistance more than 80M $\Omega$

#### 5.6 Capacitance Measurement (→|)

**⚠ Caution: In order to avoid damage of instrument, please cut off power supply and discharge of capacitor before testing capacitor. Check and confirm whether the capacitor is discharged through function division of DC voltage.**

- Press **【→|】** to enter capacitor measurement function.
- When the power is on, it will be in AUTO state. Pres **【RANGE】** to select the suitable range:1.0000 nF/10.000nF/100.00nF/1.0000 $\mu$ F/10.000 $\mu$ F/ 100.00 $\mu$ F.
- Insert red test leads into “V $\Omega$ Hz” and black into “COM” and contact the test point via lead’s pin. Please refer to Chart11 for the measurement mode. The measured values and relative symbols will be on master and slave display at the same time. Please refer to Table 11.

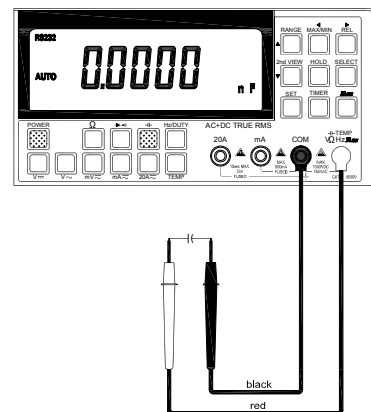


Chart 11. Capacitance Measurement

Table 11:

Measurement State	Master Display	Slave Display
$\rightarrow \vdash$	nF/ $\mu$ F	Relative to MAX/MIN and REL

- When testing small capacitance, it will cause measurement error because of its distributed capacitors of test leads and input circuit. Press **【REL】** and make master display as zero. Noted, after pressing **【REL】**, the shape of testing cables won't change any more. When test it again, the measured capacitance value will be on master display and distributed capacitance value will be on slave display.

#### 5.7 Measurements of Frequency (Hz) and Speed (RPM)

- Press **【Hz/DUTY】** to enter the function of freq/speed measurement.
- It has three states of NORMAL, HiHz and RPM. Press **【SELECT】** to choose one of them.
- In the state of NORMAL, the frequency is as follows: 999.99Hz / 9.9999kHz/99.999kHz/999.99kHz/ 8.0000MHz. When test it, it will be always in state of auto range. Then he frequency range is 0.5Hz~8MHz.
- In the state of HiHz, the frequency is 8.0000MHz/80.000MHz/800.00MHz/ 1000.0MHz. During measurement, it will be always in auto measurement state. The frequency range is 8MHz ~1000MHz in such state. Also, Master and slave display will be combined into 10 counter, the former as high 5 bits of freq display and the latter as low 5 bits of freq display which means: master display + slave display = 10 readings.
- In state of RPM, it will measure speed. The range is 0~99999 RPM (cycle/minute). The measured value will be on master display.
- Insert red test leads into "V $\Omega$ Hz" and black into "COM" and contact the test point via lead's pin. Please refer to Chart12 for the measurement mode. The measured values and relative symbols will be on master and slave display at the same time. Please refer to Table 12.

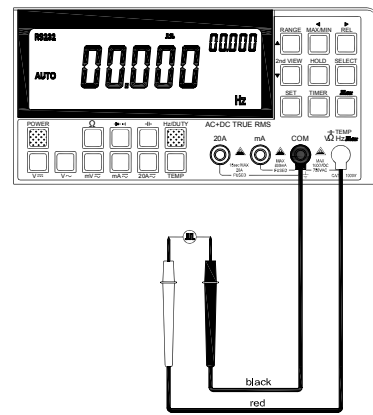


Chart 12. Frequency Measurement

Table 12:

State (Press <b>【SELECT】</b> to choose)	Master Display	Slave (switch them by pressing <b>【2nd VIEW】</b> )
Hz	Hz/kHz/MHz	$\square$ %/ $\surd$ %/ $\square$ ms/ $\surd$ ms
HiHz	00000	00000MHz
RPM	RPM	

#### 5.8 Temperature Measurement (TEMP)

- Press **【TEMP】** to enter the function of temperature measurement.
- Press **【SELECT】** . Symbol of Hi will be displayed on master display. It will be on heat couple mode. Press **【SELECT】** again, “Hi” will display. Now the displayed temperature on master display is the instrument’s temperature.
- When test temperature, it should be matched with K heat couple.
- The temperature range is  $-50^{\circ}\text{C} \sim 1372^{\circ}\text{C}$  and  $-58^{\circ}\text{F} \sim 2502^{\circ}\text{F}$ .
- Insert positive (red) into “VΩHz” and negative (black) into “COM”. Please refer to Chart 13.

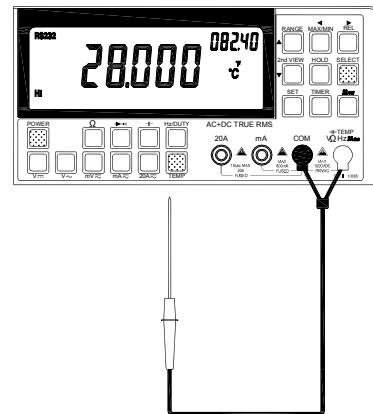


Chart 13. Temperature Measurement

- It will display reading “°C” on master display and “°F” on slave display.

#### 5.9 Measurement of Diode and Switching (→•••••)

**⚠ Caution: To avoid the damage of instrument, please cut off power and discharge the capacitors before testing diode.**

- Press **【→•••••】** to enter the function of diode and switching measurement.
- Insert red test leads into “VΩHz” and black into “COM” and contact the test point via lead’s pin. Please refer to Chart 14. for the measurement mode. The measured values and relative symbols will be on master and slave display at the same time. Please refer to Table 13.



Chart 14. Diode and Switching Check

- Insert red test lead into the positive of the measured diode and black into the negative of diode. The voltage drop of diode will be on master display and the perfect voltage drop is approximately  $0.5\text{V} \sim 0.8\text{V}$ .

Table 13:

Measurement State	Master Display	Slave Display
→•••••	V	<b>OPEN</b> >2V indicates diode is open circuit or reversed polarity <b>----</b> 0.1~2V indicates the diode is normal. <b>SHRT</b> 0~0.1V indicates diode is short circuit and it will buzz.

### 5.10 Square wave output signal ( $\square$ OUT )

- Press **【 $\square$  OUT】**, it will be treated as a square wave source. And square signal is output through terminals of “V $\Omega$ Hz” and “COM”.
- The output square wave frequency is :0.5Hz/1.0Hz/2.0Hz/10Hz/50Hz/60.24Hz/74.63Hz/100Hz/151.5Hz/200Hz/303Hz/606.1Hz/1250Hz/1666Hz/2500Hz/5000Hz.
- Press **【2nd VIEW】** to change frequencyFor square wave signal. Pres **【SELECT】** to change duty signal ratio. Press **【SELECT】** once, the duty will change 1%. Press **【2nd VIEW】** lasting more than 2s, the square wave signal will be back to 606.1Hz and 50% duty.
- Please see Chart 15. The output frequency and relative parameters will be on master and slave display at the same time. Please refer to Table 14.

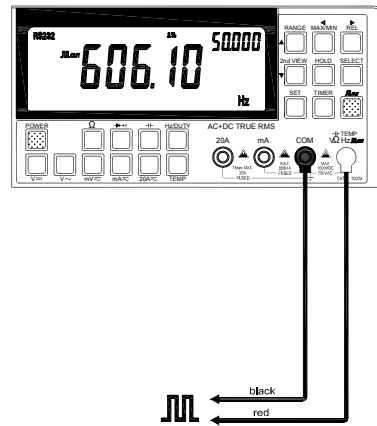


Chart 15. Output of square wave

Table 14:

Measurement State	Master display	Slave display
$\square$ OUT	Hz	$\square$ %

## 6. Technical specification

Temperature environment: 18℃～28℃ and humidity 0～75%. The accuracy validity is one year.

The accuracy is indicated as:  $\pm (a\% \times \text{reading} + n)$

a—relative factor of measurement error

n—absolute error with numbers.

### 6.1 DC Voltage Measurement

Range	Resolution	Accuracy	Remark
80mV	1μV	±(0.3% +10)	Input impedance: 80mV～800mV>1000MΩ 8V～1000V: 10MΩ
800mV	10μV	±(0.05% +10)	
8V	0.1mV		
80V	1mV		
800V	10mV	±(0.08% +10)	
1000V	0.1V		

## 6.2 True RMS of AC voltage

Range	Resolution	Accuracy		
		<75% Range:50Hz~20kHz	<75% Range:20kHz~50kHz	>75% Range:50Hz~20kHz
80mV	1μV	±(0.8% +50)	±(6.0% +50)	±(8.0% +50)
800mV	10μV	±(0.8% +50)	±(5.0% +50)	±(8.0% +50)
8V	0.1mV	±(0.8% +50)	±(5.0% +50)	±(8.0% +50)
80V	1mV	±(0.8% +50)		±(8.0% +50)
750V	10mV	50Hz~1kHz: <90% Range:±(0.8% +50) & >90% Range:±(5.0% +50)		

Remark: Input impedance: 80mV~800mV>1000MΩ; 8V~1000V: 10MΩ

Parallel capacitance: <100pF

## 6.3 DC Current

Range	Resolution	Accuracy	Remark
80mA	1μA	±(0.2%g+10)	Fuse: F 250V 1A S 250V 15A Voltage drop: ≤800mV Max. input current: 20A (less than 15s)
800mA	10μA		
8A	0.1mA	±(0.8% +10)	
20A	1mA	±(1.5% +10)	

## 6.4 True RMS of AC Current

Range	Resolution	Accuracy	Remarks
80mA	1μA	±(0.8% +20)	Fuses : F 250V 1A S 250V 15A Voltage drop: ≤800mV
800mA	10μA		
8A	0.1mA	±(1.5% +20)	Sensitivity : mA Range is 50Hz~5kHz, A Range is 50Hz~500Hz
20A	1mA	±(2.0% +20)	Max. Input Current: 20A(up to 15 seconds)

## 6.5 Resistor

Range	Resolution	Accuracy		Remark
800Ω	0.01Ω	±(0.2% +10)		Overload protection: 250Vrms
8kΩ	0.1Ω	±(0.2% +5)		
80kΩ	1Ω			
800kΩ	10Ω			
8MΩ	100Ω	±(0.3% rdg+10)		
80MΩ	1kΩ	≤40MΩ: ±(1.5 % +10)	>40MΩ: ±(3.0% +10)	
HiΩ:8000MΩ	0.1MΩ	≤4000MΩ: ±(5.0 % +50)	>4000MΩ: ±(10% +50)	

## 6.6 Diode

Function	Range	Accuracy	Resolution	Remarks
Diode	3.0000V	±(3.0% +5)	0.0001V	Diode positive voltage drop; overload protection: 250Vrms

## 6.7 dBm

Function	Range	Accuracy	Resolution
dBm	-80.00dBm~ +80.00dBm	±1.0%	0.01dBm

## 6.8 Frequency

Range	Resolution	Accuracy	Remarks
999.99Hz	0.01Hz	$\pm(0.05\% + 5)$	Overload protection: 250Vrms Sensitivity: $\geq 200\text{mV}$
9.9999kHz	0.1Hz		
99.999kHz	1Hz		
999.99kHz	10Hz		
8.0000MHz	100Hz		
10.0MHz	1kHz	$\pm(0.1\% + 5)$	Plus adapter
100.0MHz	10kHz		
1000.0MHz	100kHz		

## 6.9 Capacitor

Range	Resolution	Accuracy	Remark
1nF	1pF	±(5.0% +50)	Overload protection: 250Vrms
10nF	10pF	±(2.5% +50)	
100nF	100pF		
1μF	1nF		
10μF	10nF		
100μF	100nF		

## 6.10 Temperature

Temperature	Accuracy	Resolution	Remark
-50 $^{\circ}\text{C}$ ~ 1372 $^{\circ}\text{C}$	$<0^{\circ}\text{C}$ or $32^{\circ}\text{F}$ : $\pm(10\% + 5^{\circ})$ $\geq 0^{\circ}\text{C}$ or $32^{\circ}\text{F}$ & $\leq 1000^{\circ}\text{C}$ or $1832^{\circ}\text{F}$ : $\pm(2.0\% + 2^{\circ})$ $>1000^{\circ}\text{C}$ or $1832^{\circ}\text{F}$ : $\pm(3.0\% + 20^{\circ})$	0.1 $^{\circ}\text{C}$	type K thermocouple
-58 $^{\circ}\text{F}$ ~ 2502 $^{\circ}\text{F}$		0.1 $^{\circ}\text{F}$	

## 6.11 Square wave output

$\square$ OUT	Description
Voltage amplitude	3V approx.
Frequency	0.5Hz ~ 5000Hz
Duty cycle	1% ~ 99%

## 7. RS232 Communication

It has function of RS232 communication which can make user record and save measured data conveniently. The user should setup RS232 software disc to PC and connect to PC with RS232 cables.

## VII Accessories

The standard accessories are as below:

1. Universal system	1pc
2. Power cord	1pc
3. User manual	1pc
4. BNC cable	2pcs
5. Connection cable	2pairs
6. F 250V 1A (6×30mm) fuse	2pcs
7. S 250V 15A (6×30mm) fuse	2pcs
8. S 250V 4A (5×20mm) fuse	2pcs
9. S 250V 8A (5×20mm) fuse	2pcs
10. Test leads(red, black)	1pair
11. TP01 temperature probe	1pc
12. RS232 disc	1pc
13. RS232 cable (DB9 hole /hole, uncrossed)	1pc

## VIII Maintenance and Service

It is one kind of precision instrument. Please don't repair it by yourself unless you are professional serviceman and familiar with service manual.

Some parts of it are composed of intelligent instruments which is auto-calibrated. Except some components noted changeable, please don't replace other components randomly to avoid technical deviations.

Please clean the shell with soft cloth or neutral detergent. The dirt on terminals and test leads will affect the readings. Please clean them with cotton balls moist with detergent.

When it is only stored, please pull out the key of power switch. And it should take off the external connected power cord if it is not used for long time.

The instrument should not be stored in place of humidity, high temperature and strong magnetic field.

If the instrument seems defective, please check power supply and fuse. According with the operation procedures of the instruction, if you diagnose it is defective, please contact with customer service department or contact Sales department directly.