K-125 系列数字示波表用户手册

HANDHELD DIGITAL SCOPEMETER

USER MANUAL

郑州中健电气设备有限公司

Abstract

K-125 Series handheld scopemeter is a portable tool for the measurement of waveform.Contrast with analog oscilloscope or desktop digital oscilloscope and digital multimeter, it is one best tool for observation in the field of teaching or in field use.

The series contains 3 kinds of products K-125(Standard version), k-125S(without multimeter), k-125Q(automobile);

It uses a high speed AD to convert the input signal into digital signal ,and display the signal on a 128*64 lcd by a high speed CPU;

Using a high speed comparator to get a good edge trigger for a steady display , which is good for observation;

The multimeter part is using a dedicated chip wich is 6000 count and with a high precision;

It equiped with a large capacity lithium battery, which is to provided a 10 hours using when it is fully charged.。

Notices

★Make sense of the instructing contents in this Instruction correctly;

★when it is charging,do not use multimeter or connect with other circut by the black probe of multimeter;

★The 1200mAH lithium polymer battery built in the Scope meter shall use the built-in dedicated charger rather than any other charger or DC source adapter to avoid the occurrence of hazard.

★Please pay attention to the range of input voltage so as to prevent from the damage of instrument.

★Never set the Scopemeter in an unstable stand or table to avoid of a falling down and subsequently resulting in the damage of products.

★Never set the Scope meter nearby the hot body to prevent from damage of instrument due to superheating.

★The liquid substance is forbidden to flow into the Scope meter.

★Never set the Scopemeter under a heavy load.

★Never use the liquid or gas detergent, but a dry cloth for cleanness is available.

★Make sure of it is fully charged before a long time in storage, turn off the host machine you can charge it

up more quickly.

1.Apperarance

1.1 host machine

K-125 with cross-grip design is easy for operation even using one hand , the appearance of it is concise generous; as shown in Figure 1。

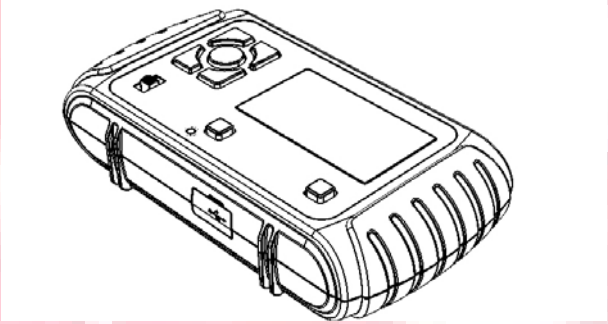


Figure 1 appearance of K-125

1.2 Control panel

The keyboard is on the left, the lcd is on the right, the power on /power off and switch is on the bottom ,as shown in Figure 2

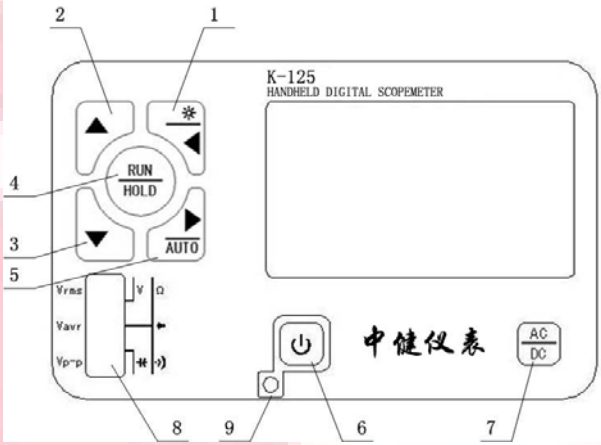


Figure 2 the layout of control panel

Keyboard:

1、left(◀)/Backlight: to switch between different key, press and hold the key can switch between the status of on or off of baclight(it changed until the key is released)

2、up(▲): to change the setting of current function object

3、down(▼): to change the setting of current function object

4、RUN/HOLD: set the status of host machine to RUN or HOLD

5、Right (▶) /Auto: to switch between different key,press and hold it is to change the voltage base and time base of the host machine (namely call the "AUTO"Function)

6、Power on/off: power on /power off

7、AC / DC: To change the "Couple" of input signal, the status is displayed on the right side of bottom

8、Option switch: multimeter: V----to mesure the voltage

R----to measure the resistance/diode/ON-OFF

C----to measure the capcitor

scopemeter: Vrms----to get the RMS(Root-Mean-Square) value of voltage

Vavr----to get the average value of voltage

Vp-p----to get P-p(peak-peak) value of voltage

Indicator:

9、Battery charging: the red light is on when it is charging, the light will off until it is charged up

2. Interface

2.1 The interface of oscillograph

The waveform area is on the left, and the status is on the right, shown as Figure 3

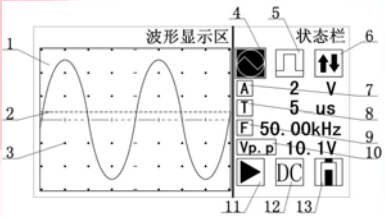


Figure 3 The interface of oscillograph

Waveform area:

1. Waveform: Show the waveform

2. Trigger line: A horizontal line of dashes indicate the position of trigger level

3. Grid: horizontal lines and vertical lines form a grid; to indicate the level of voltage and time base

Status area

The selected fuction is changed by pressing the Left key(backlight) or Right key(auto), then the status area show the selected fucntion icon white against black; press the up key /down key is to change the setting of selected function. the detailed is as below:

4.scopemeter function: the current function of scopemeter, press up(▲) or down (▼) to switch between scopemeter and multimeter.

5.trigger type: Rising edge/falling edge/none, press up(▲) or down (▼) to change the type.

6.trigger level: the position of trigger level, press up(▲) or down (▼) to change the position.

7.amplitude range: the range of voltage(value for each grid in vertical), press up(▲)/down (▼) to increase/decrease

the range.

8.time range: the range of time(value for each grid in horizontal),press up(▲)/down (▼) to increase/decrease the range.

9.frequency: show the frequecy of current waveform in this line;

10.amplitude measue:Vrms(Root-Mean-Square) / Vavr(average) / Vpp(peak-peak value).

it is decieded by the Option switch on the control pannel.

11.RUN/HOLD: Press the key "RUN/HOLD" to swich between run status(start sampling) and hold status(stop sampling), and show different icon in each status.

12.couple: AC/DC. press the key "AC/DC" to change the couple.

13.capacity of battery: the icon will filled up if the capctiry is sufficient. and if the capacity insufficient ,charge it up timely.

2.2 The interface of multimeter

The result area is on the left, and the status is on the right, shown as Figure 4

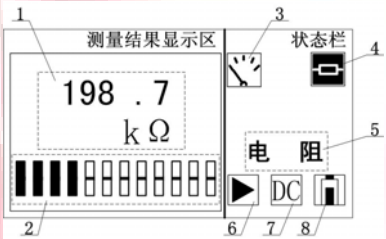


Figure4 the interface of multimeter

Result area:

1.result: consist of result and unit;

2.visual result analog bar: like progress bar (or analog multimeter), to view intuitively;

3.multimeter icon: means the current function is multimeter. press "up"(▲) or "down" (▼) to change between multimeter and scopemeter;

4.resistance/diode/ON-OFF: press "Left"(◀) or "Right" (▶) to select the icon. press "up"(▲) or "down" (▼) to switch among them. the icon will dispear if move to the position "V" and "C";

5.measure object: **voltage(V DC/C AC), resistance(Ω), diode,ON-OFF;**

6.RUN/HOLD Status: **RUN/HOLD is same as scopemeter;**

7.Couple: **AC/DC when measure the voltage it shows ,it is same as scopemeter;**

8.capacity of battery: **is same as scopemeter.**

3. operation

3.1 Operation of scopemeter

3.1.1 the setting of couple

Pressing the key "AC/DC" (on the control pannel) is to change the AC/DC staus, when the key is up the couple is set as DC,namely all the signal will pass; if the key is pressed down, the couple is set as AC,namely only the AC part of signal will pass.

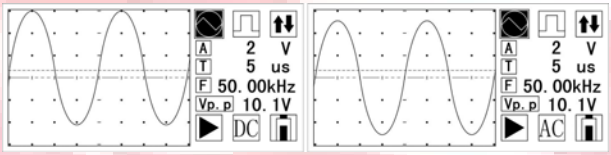


Figure 5 couple setting

3.1.2 Adjust the amplitude range

press "Left"(◀) or "Right" (▶) to select the **amplitude range**.when the icon show white against black, press "up"(▲) or "down" (▼) to switch among 50mV/DIV，100 mV/DIV，200 mV/DIV，500 mV/DIV，1V/DIV，2V/DIV，5V/DIV，10V/DIV and 20V/DIV. "up" is to increase the range (to 20V/Div), "down" is to decrease the range (to 50mV/Div). As Figure 6 below:

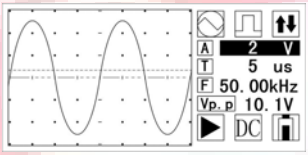


Figure 6 Adjust the amplitude range

3.1.3 Adjust the time range

press "Left"(◀) or "Right" (▶) to select the **time range** .when the "time range" show white against black, press "up"(▲) or "down" (▼) to switch among10ns、20ns、50ns、100ns、200ns、500ns、1us、2us、5us、10us、20us、50us、100us、200us、

500us、 1ms、2ms、5ms、10ms、20ms、50ms、100ms、200ms、500ms、1s、2s and 5s. "up" is to increase the range (to 5S/Div), "down" is to decrease the range (to 50nS/Div) As Figure 7 below:

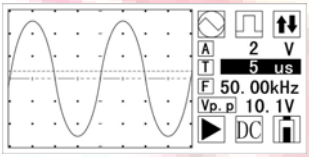


Figure 7 Adjust the time range

3.1.4 Settings of trigger

press "Left"(◀) or "Right" (▶) to select the trigger type.when the icon show white against black, press "up"(▲) or "down" (▼) to switch among AC,DC and auto.

press "Left"(◀) or "Right" (▶) to select the trigger level .when the icon show white against black, press "up"(▲) or "down" (▼) to change the position of trigger level which is display as line of dashes.

All is as Figure 8:

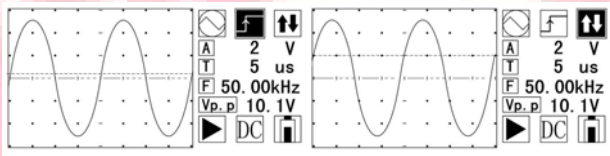


Figure 8 Settings of trigger

3.1.5 Capture Waveform

Press the key "RUN/HOLD" when the status is run that a waveform will be captured,if the status is set as hold will stop capture waveform. As Figure 9 below:

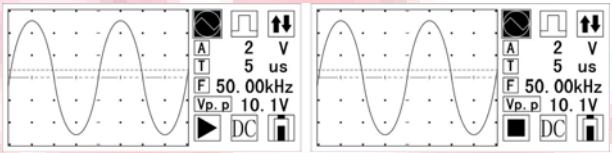


Figure 9: Capture waveform

3.1.6 Auto

press and hold the key "Right" (▶)which contain the auto funciton,the auto function will be performed, then the amplitude

range and the time range will be changed to fit the waveform for a good view.

3.2 Operation of multimeter

3.2.1 Enter the interface of multimeter

press "Left"(◀) or "Right" (▶) to select the scopemeter function,when the icon show white against black, press "up"(▲) or "down" (▼) to switch to multimeter function.. then the object of measure will decided by the option switch(on the control pannel), and show the status on the status area.

3.2.2 switch between multimeter function

change the option switch can change the mutimeter function.if change the option switch to "V",it enter the voltage measurement of multimeter(you may change the AC/DC according the signal);if change the option switch to "R",it enter the resistance/diode/ON-OFF measurement of multimeter,press "Left"(◀) or "Right" (▶) to select the function of multimeter , press "up"(▲) or "down" (▼) to switch among them.。the function is as Figure 10:

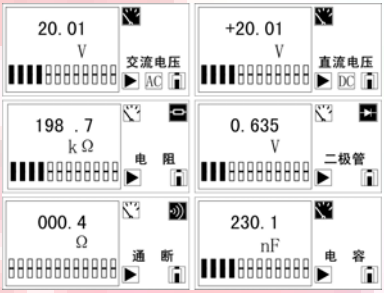


Figure 10 Sub-interface of multimeter

3.2.3 RUN/HOLD

You may hold a waveform by Pressing the key "RUN/HOLD" when it is in the "run" status, else when you press the key "RUN/HOLD" ,It go on to measure.

3.3 Charge & capacity of battery

the power is provided with Lithium battery(1200mAh) which is charged through usb as Figure 5.

a light will on if it is charging until it is charged up,and the time for charge it up is about 6 hour.

after power on, the status of battery show the capacity of battery, when the capacity is high the icon is filled up, the icon

will become(increase/decrease) accroding the capacity.

when the capacity is low, you may change it .what you need do is to open the back cover,replace it with a Lithium battery have the same specification.。battery holder is as Figure 6

Figure 5 Battery charge interface

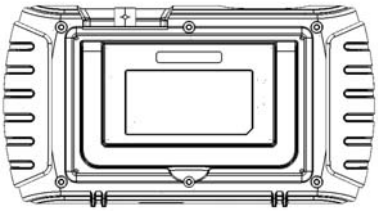


Figure 6 the back of K-125（Battery holder is here）

4. Appendix

A. Technology index

Specification:

Specification of scopemeter	
Bandwidth（-3dB）	25MHz
Sample	Max sample：100MSa/S
Channel	1
Couple	AC, DC
Rising time	< 17.5 nS
Input independence	1MΩ，≤20pF
Max input voltage	1x CAT III 300 VAC 10x, 100x CAT III 600 VAC
Vertical resolution	8bit
Vertical sensitive	50mV/div-20V/div note 1
Horizontal resolution	10nS/div
Horizontal sensitive	10nS/div -5S/div note 2
Depth-sampling	0.1K/Channel
Trigger mode	AUTO, Rising edge, falling edge
Fundmental specification	
Screen size	128(horizontal)×64(vertical)；backlight:LED
Battery	3．7V Lithium battery 1200mAH
charger	Input：100VAC-240VAC Output：5V**±10%**DC 1000mA
size	174*92*40mm
wheight	330g（host machine）

Specification of multimeter	
Measure count	6000
Input	Max input voltage :600 Vrms CAT II, 300 Vrms CAT III。
On resistance	25Ω(at the range of 600Ω), if less it beep
Diode measure	>2V shows OL(overload) <0.25 beep
Capacity measure	6.000nF- 6mF 7range
Resistance measure	600.0Ω- 60.00MΩ 6 range
Voltage measure	6V- 600V 3 range

Index：

(running at the temperature 10℃-25 ℃,30 minutes after power on)

Specification of multimeter	
Vertical system: channels of scope meter	
Bandwidth（-3dB）	25MHz
Precision	50 mV/div to 5 V/div: ± 3% full scale
offset on vertical (DC)	±0.2 div ±2 mV ±0.5% offset
Trigger sensitivity	DC to25 MHz: 0.8 div
Specification of probe	

Rising time	X1 23.3nS
	X10 17.5nS
Bandwidth	X1 DC-15MHz
	X10 DC-25MHz
Input impedance	X1 1M
	X10 10M (without scope meter input resistance 1M)
Input capacitance	X1 46pF (without input capacitor of scope meter)
	X10 about 15pF

Specification of multimeter ± (%reading+byte)

Function	Range	requency, measure current, load voltage	Tcal± 5 ℃/(year)
	voltage		
DC Voltage			
	6.000 V		0.5 +8
	60.00 V		0.5 + 8
	600.0 V		0.5 +8
AC Voltage	6V – 600.0 V	40 Hz – 400Hz	1.0 +10
		400Hz –2 kHz	3.0 +10
AC + DC Voltage	6.0000 V – 600.0 V	40 Hz – 400Hz	1.0 +10
		400Hz – 2 kHz	3.0 +10
	Resistance		
	600.0Ω		1.0 + 5
	6.000 KΩ		1.0 + 5
	60.00 kΩ		1.0 + 5
	600.0 kΩ		1.0 + 5
	6.000 MΩ		1.0 + 5
	60.00 MΩ		2.0 + 5
	Capacitance		
	6.000 nF		3.0 +8
	60.00 nF		3.0 +8
	600.0 nF		3.0 +8
	6000 nF		3.0 +8
	60.00 uF		3.0 +8
	600.0 uF		3.0 +8
	6.000 mF		3.0 + 8
Diode			
2.000 V 2mA	It beeps if the voltage is lower than 0.25V		
ON-OFF			
	<25Ω, it beeps		

Note：1、Vertical sensitive 9 range：50mV/div，100 mV/div，200 mV/div，500 mV/div，1V/div，2V/div，5V/div，10V/div，20V/div。

2、Horizontal sensitive 27 range：10ns/div, 20ns/div, 50ns/div, 100ns/div, 200ns/div, 500ns/div, 1us/div, 2us/div, 5us/div, 10us/div, 20us/div, 50us/div, 100us/div, 200us/div, 500us/div, 1ms/div, 2ms/div, 5ms/div, 10ms/div, 20ms/div, 50ms/div, 100ms/div, 200ms/div, 500ms/div, 1s/div, 2s/div, 5s/div.

B. input port & definition

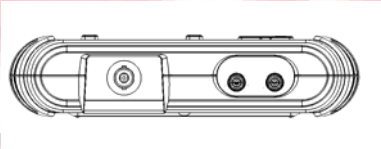
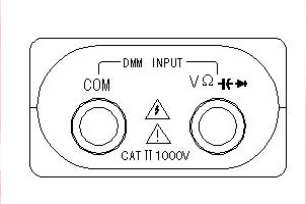


Figure 7 input port for measuremnet

1、Input interface of multimeter



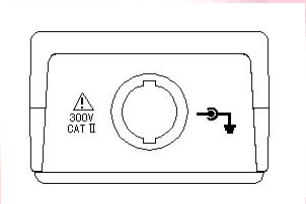


Figure 8 interface of multimerter

Figure 9 input interface of scopemeter

The black port on the left is for reference port/groud(-). the red port onthe right is form measure port (+).

2.Input interface of scopemeter

The input of scopemeter is by a bnc with insulation protection. The outside of bnc is for groud, the inside of bnc is for input

3.Input interface for charge

The input interface for charge is a standard MINI USB, it can be connect to the USB of PC or the charger of telephone support this function

C. Terminology

Trigger, edge trigger, trigger level

In order to make the scanning signals and the measured signal synchronously, Signal will be constantly compared with some supposed conditions.when the signal meet the condition we set, the frequency to scan is some times or the same as the frequency of signal to be measurd, namely they are synchronously.

the technique also called "trigger". and the condition we set is called the "trigger condition".

there are many condition can be set as the "trigger condition". take the "edge trigger" as example which is as a common condition,

when the signal changed (rising or falling) to some level (used as the trigger level), it generated a trigger signal, then the host machine begin to scan for a waveform.

Vertical sensitivity

is the ability of detecting a weak signal, usally it is indicated with X mV/Div,the typical value of scopemeter can be detected is 5mV/Div.

Sampling rate

the input frequecy of sampling signal to get a waveform in a certain period.usually it is indicated with X Sa/S.

the more quickly the sampling rate is, the higher sensitivity will be, and the less information will lose.

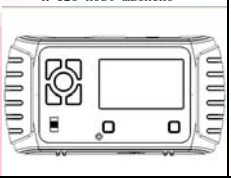
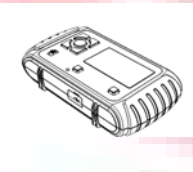
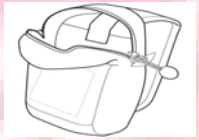
and the minimum sampling rate will be more important if it is to observe a waveform changed slowly in a long period.

Bandwidth

The differential of the frequecy between the original amplitude and the amplitude weakening to 70.7% of it(-3dB).
that is he range of scopemeter to detect a waveform exactly.
with the increase of frequency, the ability of scopemeter to detect a waveform will decrease.
the scopemeter will not detect a waveform exactly if the bandwidth is not big enough,in that case the amplitude will distort,edge will dispear and some detailed data will lose.it will become meaningless about some specification such as singing diabolo etc.

D. Standard layout

The products contain the things list below:

#	Description	amount	equipped	#	Description	amount	equipped
1	K-125 host machine 	1pcs	√	2	K-125S(wihtou multimeter) 	1pcs	√
3	20M(10:1)Probe 	1pcs	√	6	Test porbe 	1pcs	√
7	Charger (with communication line) 	1pcs	√	8	Built in Battery(1200mAh) 	1pcs	√
9	《 products guarantee card 》 	1pcs	√	10	《user manual》 	1pcs	√
11	Toolkit 	1pcs	optional				

E. the icon of status area

Description:

1. press the "left" (▶) the function to be selected as scopemeter/multimeter followed by trigger type, trigger level, amplitude range, time range, then back to socpemeter/multimeter.

2. press the "right" (◀) the function to be selected as scopemeter/multimeter followed by time range, amplitude range, trigger level, trigger type, then back to scopemeter/multimeter.

	Setting					Display	Setting	Setting	Setting	Setting
Scope	scopemeter/multimeter Scopemeter multimeter	Trigger type AUTO Rising edge Falling edge	Trigger level	Amplitude range 50mV/DIV 100mV/DIV 200mV/DIV 500mV/DIV 1V/DIV 2V/DIV 5V/DIV 10V/DIV 20V/DIV	Time range 10ns/DIV 20ns/DIV 50ns/DIV ……. …… …… 1s/DIV 2s/DIV 5s/DIV	Frequency	Voltage RMS Average Peak-peak value	RUN/HOLD Run Hold	Couple AC DC	Battery capacity
	▲▼ to operate	▲▼ to operate	▲▼ to operate	▲▼ to operate	▲▼ to operate	Display	Option switch	RUN/HOLD	AC/DC	Display
multi	Scopemeter/multimeter scopemeter multimeter	Function of multimeter Resistance diode ON-OFF					measure Voltage Resistance /on-off /diode capacitance	RUN/HOLD run hold	Couple AC DC	Battery capacity
	▲▼ to operate	▲▼ to operate					Option	RUN/HOLD	AC/DC	Just display

郑州中健电气设备有限公司

地址：郑州市文化路 9 号永和国际 1406 室

网址：www.371ee.com

电话：0371-66066975，69138790

传真：0371-63980436

邮编：450012