

EM120
Digital ScopeMeter
Users Manual

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Specifications

General Safety Requirement

Carefully read the following safety information to avoid personal injury and the damages of this product or any other connected products. To avoid all possible dangers, this product only should be used in stated range.

Only an eligible technologist has the maintenance right.

Avoiding fire or personal injury

Use the proper power adapter. Use only the power supply or sanctified power adapter.

Connect or disconnect correctly. Do not connect or disconnect probes and test leads at will when they are connected to the power.

Notice all terminals' ratings. To avoid electrical shock or fire, notice carefully all ratings and signs of this product. And read carefully the users manual to get more information about the ratings before connect to this product.

Do not operate the meter without its cover. Do not use the meter if its cover or panel has been unloaded.

Avoid touching bare circuit. Do not touch the bare nodes or parts of the product

with power on.

Do not operate with dubious troubles. If you have dubious troubles on the product, let an eligible technologist have a check.

Do not operate under a humid environment.

Do not operate under an explosive environment.

Keep the meter clean and dry.

Safety terms and signs

This manual is possible to show following terms:

Warning. The word Warning indicates that the condition or the operation maybe cause personal injury.

Carefully. The word Carefully indicates that the condition or the operation maybe cause the damages of this product or other properties.

Package Checklist

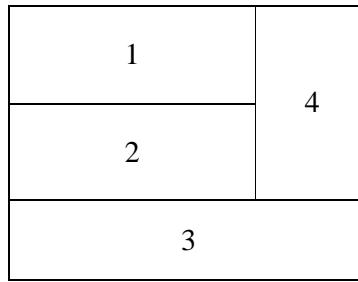
The following items are included in this ScopeMeter package.

1、 Handheld ScopeMeter EM120	1 piece
2、 Li Battery Pack (installed)	1 piece
3、 AC/DC Power Adapter	1 piece
4、 ScopeMeter Probes	2 piece
5、 Multimeter Test Leads (red and black)	1 pair
6、 Users Manual	1 piece

Getting Start

Dividing the Screen Areas

The screen is divided into three areas: Parameter area, Waveform area, and Menu area. Refer to the following figure.



Waveform area is area 1 and area 2 when menu is not pop-up. And Waveform area can show two channels' waveforms. Area 3 shows the screen's status or functions, which displays the operations corresponding to press-buttons "F1" "F2" "F3" "F4". Area 4 is Parameter area, which displays all kinds of parameters about channel A's and channel B's waveforms such as voltage and frequency.

Waveform area is area 1 when menu is pop-up. And area 2 displays menu options, which can be selected through arrow keys "↑" "↓" "←" "→".

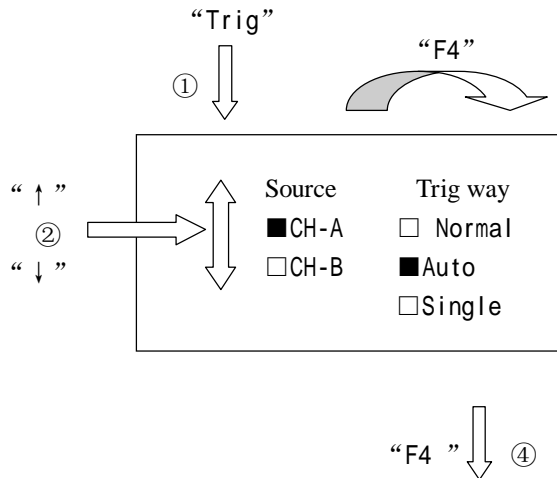
Using Menu

There are two ways to open menu, press the Menu key directly and press the key "F1" on the basis of other opened menus.

Let's show an example to open the TRIGGER menu.

1. Press the "TRIGGER" key to pop up the TRIGGER menu.
2. Press the arrow key "↑" "↓" "←" "→" to select the item, and the selected item is highlighted.
3. Press the key "F4" to confirm selection or the key "F3" to cancel selection, then the screen returns to the normal mode.

The selections of the menu options are showed as the following figure.



Powering the ScopeMeter

Power the ScopeMeter from a standard ac outlet as the following procedure (step 1 to step 3):

1. Socket the power adapter to the electrical supply socket.
2. Connect the other terminal of the power adapter to the power jack on the ScopeMeter.
3. Turn on the power key on the panel.

The ScopeMeter powers up in its last setup configuration. **Checking Function**

Have a fast functional check to verify this meter.

1. Power on the ScopeMeter, and Press the key ”SAVE” “F1” to call back the menu about default configurations. Verify the default attenuation coefficient of the Probes to be 10X.
2. Turn the ScopeMeter Probe’s switch to 10X, and connect the ScopeMeter Probe to channel A. And connect the terminal of the ScopeMeter Probe to the self-check signal output.(at the right of the ScopeMeter)
3. Press the “AUTO” key, and can see the square wave in a few minutes, which frequency is 1KHz and Pk-Pk value is about 5Vpp.

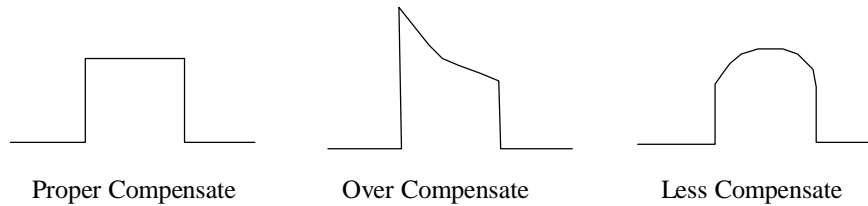
Compensating the Probe

When connect a probe to any input channel at the first time, please make the probe compensate to match the probe to the input channel.

1. Set the probe attenuation coefficient to be 10X in the channel menu and the probe switch to be 10X also, and connect the probe to channel A. If use the hook on the probe, make sure that it is close touching with the probe.
2. Connect the probe terminal to the ScopeMeter self-check signal, and Press “AUTO” key.
3. Check the shape of the waveform as “Over Compensate”, “Proper Compensate” or “Less

Compensate”;

4. If necessary, adjust the probe till “Proper Compensate”.



Using the Probe Safely

The finger guards in the probes ensure fingers to avoid electrical shock.

Warning.

To avoid electrical shock when using the probes, keep your fingers behind the finger guards on the probes.

To avoid electrical shock when using the probes, do not touch the metal part on the probe when connecting the probe to power.

Warning.

The ScopeMeter only applies to the occasion with voltage (DC) Peak less than 300V. Before make any measurement, make sure to connect the probe to the meter first.

Setting the Probe Attenuation Coefficient

The ScopeMeter probe has kinds of attenuation coefficients, which will influence the meter’s measuring range and bandwidth. If you want to change the probe attenuation coefficient, please select the probe types in “CH-A Input Menu” or “CH-B Input Menu”.

This setting is effective up to be changed.

Warning: the default setting on the probe attenuation coefficient is 10X.

Make sure that the switch setting of the probe has the same value with the probe option in the input menu, which is 1X or 10X.

Warning:

when the attenuation switch is set to be 1X, the ScopeMeter’s bandwidth is limited in the 6MHz range. You must set the switch to be 10X if you want to use the entire band.

Using the ScopeMeter

Setting the ScopeMeter

Setting Automatically

Perform an “Auto” key to optimize signals such as position, range, time base and triggering. This assures a stable display on nearly all waveforms. Please operate as the following steps if you want to execute this function.

1. Connect an unknown single signal through the Probe to port “A” to test.
2. Press the “auto” key, and the ScopeMeter will automatically adjust the range and time base to suit for displaying the waveform as proper magnitude and time base.
3. If you want to compare two input signals, please connect the reference signal to port “A” and connect the other signal to port “B”.
4. Press the “auto” key, and the ScopeMeter will automatically adjust the range and time base to suit for displaying the waveform as proper magnitude and time base. Please notice that the selected time base is selected according to the port “A” signal.

Press the “Auto” key can change between “AUTO” and “MANUAL” when measure Ohm (Ω), Continuity or Diode, and the representation of AUTO or MANUAL appears at the waveform parameters reading area.

Saving a Setting

Under the condition of presetting, the ScopeMeter will save Setups before close and recall the Setups automatically when startup.

Users can save ten setups in the ScopeMeter memories forever and can rewrite a setup when need.

Saving a Setup as following steps:

1. Press “**Save**” to open the save menu.
2. Select one of the items from “Setup 1” to “Setup 10” by pressing “ \uparrow ” “ \downarrow ” “ \leftarrow ” “ \rightarrow ”.
3. Press “**F4**” to confirm the present Setup saving to the selected item.

If there is a sign “ \blacksquare ” before the selected item, the new Setup parameters will cover the old ones.

If there is a sign “ \square ” before the selected item, the sign “ \square ” will become “ \blacksquare ” to show that the item memory has saved Setup parameters.

Recalling a Setup

Recalling a Setup as following steps:

1. Press “**Save**” to open the Save Menu.
2. Press “**Recall**” to open the Recall Menu.
3. Select one of the items from “Setup 1” to “Setup 10” by pressing “↑” “↓” “←” “→”.
4. Press “**F4**” to confirm the recalling Setup.

If there is a sign “■” before the selected item, the system parameters will change to the recall Setup status.

If there is a sign “□” before the selected item, the system parameters will not change.

Resetting the ScopeMeter

The ScopeMeter has been presetted on all norm operations before leaving factory. If you want to restore the settings as delivered from the factory, do the following:

1. Press “**SAVE**” on the panel to open Save menu;
2. Press “**F1**” on the panel to open Recall menu;
3. Press “**F1**” on the panel to select “Factory”;
4. Press “**F4**” on the panel to finish the resetting;

Making Measurements

Measurement Interface

There are four jack inputs at the top of the ScopeMeter, which sign as “A”, “B”, “ Ω ” and “COM”.

Port “A”: Use port “A” for all single input measurements possible.

Port “B”: Use port “A” and port “B” together for measurements on two different signals.

Port “ Ω ”: Use port “ Ω ” for single input measurement on Continuity, Ohm (Ω) and Diode.

Port “COM”: Use port “COM” as single ground for Continuity, Ohm (Ω) and Diode.

Using the Grid Display

This method can make a fast and direct estimate by the grid scale and ruler coefficient on simple measurement.

Measuring Time Parameters with Cursors

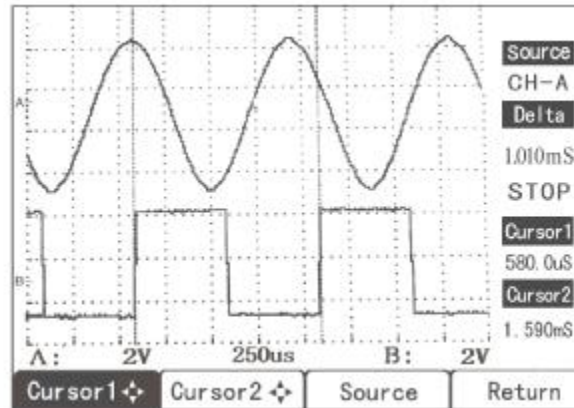
To use the cursors for a time measurement, do the following:

1. Press “**F4**” until the bottom menu in the screen is

Cursor 1	Cursor2	Source	Return
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2. Press “**F1**” to select Cursor 1;
3. Press “←” “→” to identify the position for Cursor 1;
4. Press “**F2**” to select Cursor 2;
5. Press “←” “→” to identify the position for Cursor 2;

Making cursor measurement on time-kind parameters as following figure



Then read out the time parameters of Cursor 1 and Cursor 2 and get the difference from Parameter area.

Measuring Voltage Parameters with Cursors

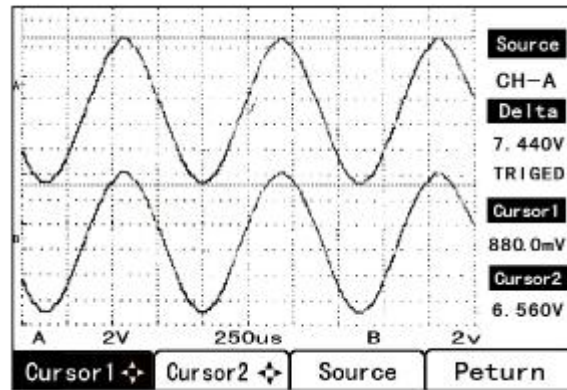
To use the cursors for a voltage measurement, do the following:

1. Press “**F4**” until the bottom menu in the screen is

Cursor 1	Cursor2	Source	Return
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2. Press “**F3**” time after time to select proper measurement source (A/B);
3. Press “**F1**” to select Cursor 1;
4. Press “↑” “↓” to identify the position for Cursor 1;
5. Press “**F2**” to select Cursor 2;
6. Press “↑” “↓” to identify the position for Cursor 2;

Making cursor measurement on voltage-kind parameters as following figure



Then read out the voltage parameters of Cursor 1 and Cursor 2 and get the difference from Parameter area.

Measuring Automatically

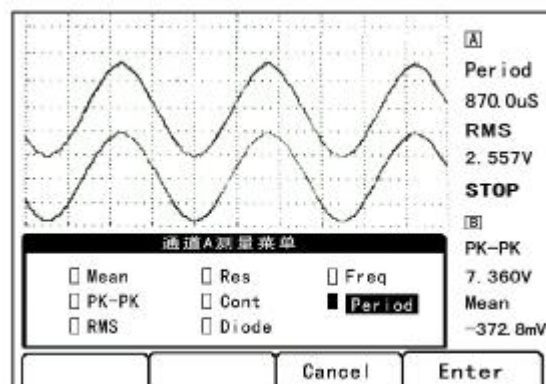
Parameters area displays the input waveform's automatically measuring data.

First, connect Probe of input A and B to the measuring signal, and connect the ground wires to the same ground potential.

To choose a period measurement for input A, do the following:

1. Press "A Measure" to open the channel A measure menu;
2. Press "↑" "↓" "←" "→" to move cursor to "Period" position.
3. Press "F4".

A channel measure menu interface is as the following figure



Observe that in A channel Parameter area, "Period" becomes the first parameter, and the

primarily first parameter moves to the second parameter's position.

To choose a "Pk-Pk" measurement for input B, do the following:

1. Press "**B Measure**" to open the channel B measure menu;
2. Press "**↑**" "**↓**" "**←**" "**→**" to move cursor to "Pk-Pk" position.
3. Press "**F4**".

Observe that in B channel Parameter area, "Pk-Pk" becomes the first parameter, and the primarily first parameter moves to the second parameter's position.

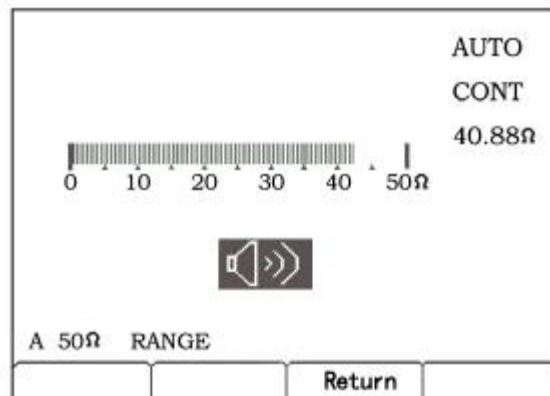
Measuring Ohm (Ω), Continuity and Diode

For Ohm (Ω), Continuity and Diode measurements, please use the shielded test leads from port " Ω " and "COM".

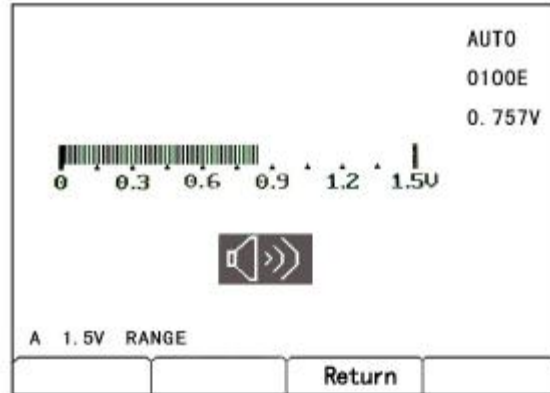
To make a Ohm (Ω) or Continuity measurement, do the following:

1. Press "A Measure" or "B Measure" to open channel A or channel B measure menu;
2. Press "**↑**" "**↓**" "**←**" "**→**" to move cursor to "Ohm (Ω)" or "Continuity" options. Press "**F4**" to enter the interface about Ohm (Ω) or Continuity.

Continuity measure interface is as the following figure when the continuity status is on.



Measuring diode only need to select "Diode" option in measure menu, and the diode measure interface is as the following figure:



When enter into any measure interface about Ohm (Ω), Continuity or Diode, pressing “F3” can return to waveform measure interface.

Measuring And Positioning Waveform

Changing the Amplitude

Changing A, B channel’s range can change the waveform’s amplitude:

1. Press “V” to enlarge the waveform;
2. Press “mV” to reduce the waveform;

Available settings are from 5 mV/div to 20 V/div when using the Probe with 1X;

Available settings are from 50 mV/div to 200 V/div when using the Probe with 10X;

Changing the Time Base

Changing time base’s range can change the waveform’s number of display periods :

1. Press “s” to increase the number of periods;
2. Press “ns” to decrease the number of periods;

Available settings about time base are from 10 ns /div to 5 s /div.

Positioning the Waveform on the Screen

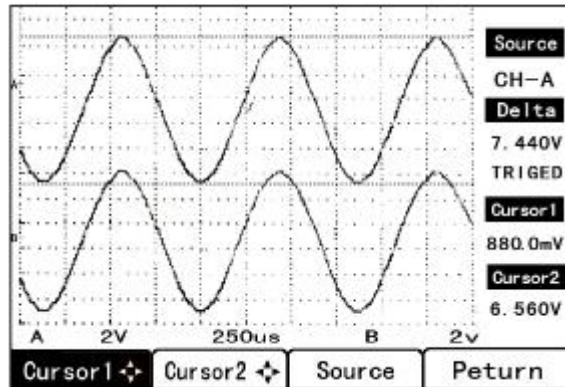
Considerable flexibility is offered in moving the waveform(s) around the screen.

1. Press “F4” repeatedly until the following main menu appears on bottom of the screen.

Channel A	Channel B	Trigger	Cursor
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2. Press “F1” to select Channel A;
3. Press “↑” “↓” “←” “→” to position the waveform on the screen.

The following figure shows the moving waveforms:



Observe that the trigger identifier moves on the screen following the waveform.

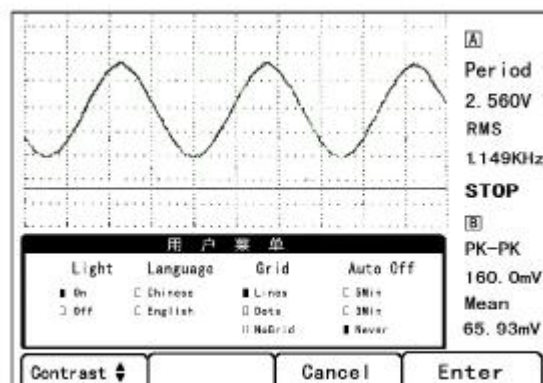
Selecting Coupling

AC-coupling is used to observe a small AC signal that rides on a DC signal. DC-coupling is used to observe whether signal has DC component.

To set channel A's DC-coupling, do the following:

1. Press "Input A" to open channel A input menu;
2. Press "↑" "↓" "←" "→" to move cursor to "DC";
3. Press "F4" to confirm channel A's DC-coupling.

Channel A's coupling selection menu is as the following figure:



The figure shows that channel A's coupling is "DC" coupling.
Channel B's coupling selection is in channel B input menu.

Triggering on a waveform

Triggering tells the ScopeMeter when to begin displaying the waveform steadily. You can select trigger signal and trigger mode, and define the condition for a new update of the waveform.

Trigger icons on the screen indicate the trigger level and slope.

Selecting Trigger Channel

Trigger Source, that is trigger channel, is selected in Trigger Menu. And trigger source can be channel A or channel B.

Setting Trigger Level and Slope

For quick operation, use the “AUTO” key to automatically trigger on nearly all signals.

To optimize trigger level and slope manually, do the following:

1. Press “F4” repeatedly until the following main menu appears on bottom of the screen.

Channel A	Channel B	Trigger	Cursor
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2. Press “F3” for trigger level and slope adjustment.
3. Press “↑” “↓” to adjust the trigger level continuously.
4. Press “←” “→” to trigger on either positive slope or negative slope of the chosen waveform.

Selecting the Trigger Mode

The Trigger Way can be selected as Normal, Auto, Single from the trigger menu.

Making a Single Acquisition

To catch single events, you can perform a single shot (One time screen update). To set up the ScopeMeter for a single shot on the input A waveform, do the following:

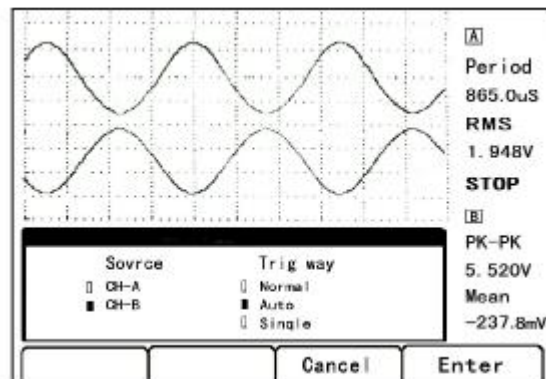
1. Connect the probe to the signal to be measured.
2. Press “Trigger” to open the trigger menu.
3. Press “↑” “↓” “←” “→” to move cursor to “CH-A”;
4. Press “F4” to confirm channel A triggering.
5. Press “↑” “↓” “←” “→” to move cursor to “Single”;
6. Press “F4” to confirm single triggering.
7. “READY” appears in the middle of the Parameter area to indicate that the ScopeMeter is

waiting for a trigger.

8. "TRIGED" appears in the middle of the Parameter area when the single acquisition is triggered.
9. Press "HOLD" to perform a next single acquisition.

In the trigger menu, select "Normal" or "Auto" to exit the single acquisition.

Trigger channel and trigger mode are selected in trigger menu. The following figure shows that trigger channel is "CH-B" and trigger way "Auto".



Freezing the Screen

You can freeze the screen (all readings and waveforms) at any time.

- 2 Press "HOLD" to freeze the screen, and "stop" appears in the middle of the A, B channel's Parameter area.
- 2 Press "HOLD" again to resume the readings.

Smoothing the Waveform

To smooth the channel A's waveform, do the following:

1. Press "Channel A" to open channel A's input menu.
2. Press "↑" "↓" "←" "→" to move cursor to "Smooth";
3. Press "F4" to beginning smoothing the waveform.

To smooth the channel B's waveform just need to open channel B's input menu and select the function "Smooth". You can use waveform smooth to suppress noise without loss of bandwidth.

The following figure is a sample of smoothing waveform of channel A, and you can change the “Normal” to “Smooth” in the menu.

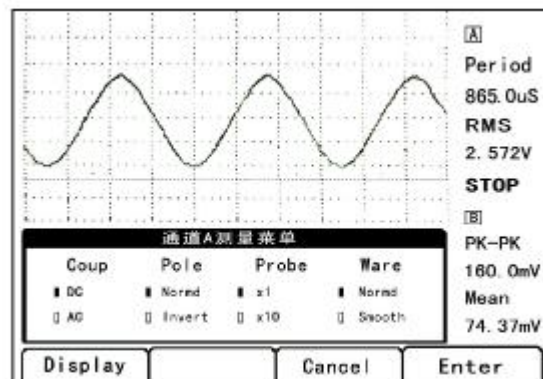
Reversing the Polarity of the Displayed Waveform

To invert the input A waveform, do the following:

1. Press “Channel A” to open channel A’s input menu;
2. Press “↑” “↓” “←” “→” to move cursor to “Invert”;
3. Press “F4” to confirm channel A’s waveform reversed.

A negative-going waveform is displayed as positive-going, providing a more meaning viewing perspective in some cases. Reversing the input B waveform is selected in channel B’s input menu.

Reversing the input A waveform can be selected from “Normal” to “Invert” in the following menu.



Saving and Recalling a waveform

You can save different waveforms to memory, and recall them again from memory. The ScopeMeter can provide six waveforms to save, and save waveforms when you want to use the present waveform for future reference. Save a Setup when you need the present operating configuration more often for you measurement.

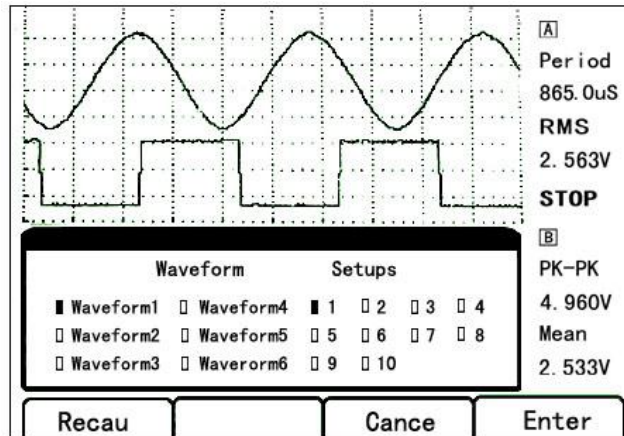
To save a waveform, do the following:

1. Press “Save” to open the save menu;
2. Press “↑” “↓” “←” “→” to select one of the items from “Waveform 1” to “Waveform 6”;

3. Press “F4” to confirm waveform data saving to the selected area.

The sign “■” before the selected item indicates that the item area has saved waveform data; the sign “□” before the selected item indicates that the item area has not saved waveform data.

The following figure shows waveform saving and setting.



To recall a waveform, do the following:

1. Press “Save” to open the save menu;
2. Press “↑” “↓” “←” “→” to select one of the items from “Waveform 1” to “Waveform 6”;
3. Press “F4” to confirm recalling the waveform data.

If there is a sign “■” before the selected item, the screen will be frozen after recalling. You can measure all kinds of parameters about the waveform and press “HOLD” to exit the recalling status.

If there is a sign “□” before the selected item, the screen will not change after recalling.

Waveform recalling can be got by pressing “F1” in the previous figure.

Clearing Memories

To delete all saved waveforms and settings, do the following:

1. Press “SAVE” to open save menu;
2. Press “F1” to open recall menu;
3. Press “F1” and “Factory” becomes reversed display.
4. Press “F4” and “Factory” recalls.

Clearing memories can be done by pressing “F1” and confirming key in the waveform recall

menu.

After factory settings recalled, waveform memories and setting memories will be cleared away.

Maintaining the ScopeMeter

Cleaning the ScopeMeter

Check often the ScopeMeter and probe according to the operation conditions. To clean the surface of the ScopeMeter, do the following:

1. Clean dusts on the surface of the ScopeMeter and probe with fluffy cloth. Do avoid abrasion on the transparent plastic of the display filter netting.
2. Clean the meter with a damp soft cloth. And also can use water liquor containing 75% cymene and alcohol to get better cleaning effect.

Carefully.

Do not use any erosive or chemic cleanout lotion to avoid damaging the ScopeMeter or probe.

Storing the ScopeMeter

Please do not store or placed the ScopeMeter in the place where has intense electromagnetic effect or exposes long-time to the sun.

The ScopeMeter's long-term store, which means six months since packaged, should not be over two years. If storing time is over six months, the ScopeMeter should be took out from the package box, and repackaged to store after checking out with power on.

Charging the Li Battery Pack

The new ScopeMeter is not fully charged when delivered to users. The new batteries must be charged and discharged completely two or three times, can get to a optimal performance.

Be sure to use the accessories about power adapter / charger to charge the ScopeMeter. A fully charge for the ScopeMeter needs 2-3 hours with power off, and charge speed will be decrease with power on.

The battery can be charged or discharged hundreds times, and invalidate at last. It needs to buy a new battery when the battery's work time shortens obviously.

Replacing and Disposing of the Li Battery Pack

Warning.

To avoid electrical shock, remove the test leads, probes and connected cables before replacing the battery pack. To replace the battery pack, do the following:

1. Disconnect the test leads, probes and connected cables.
2. Locate the battery access cover on the bottom rear. Loosen the screw with a crossed screwdriver.
3. Lift the battery access cover away, and take the battery pack out of the battery compartment. Remove the battery plug from the connector.
4. Install a new battery pack.
5. Reinstall the battery cover, and secure the screw.

Warning.

Do not throw the battery into water.

Carefully.

Do not dispose of this battery pack with other solid waste. Used batteries should be disposed of by a qualified recycler or hazardous materials handler.

Calibrating the ScopeMeter

Calibrating the ScopeMeter must be carried out by qualified personnel only. Please contact us.

Tips and Troubleshooting

Using the Tilt Stand

The ScopeMeter is equipped with a tilt stand in its back, allowing viewing from an angle. You can also use the tilt stand to hang the test tool at a convenient viewing position.

Changing the Display

Changing Backlight

Using either external power supply or battery pack can open the backlight of the LCD, and make the screen have a high bright display.

To open or close the backlight, do the following:

1. Press the “**USER**” key to open user menu;
2. Select the light option “**ON**” in the menu;
3. Press “**F4**” to turn backlight on, and the screen has a high bright display;
4. Or select the backlight option “**OFF**”;
5. Press “**F4**” to turn backlight off, and the screen is in an energy saving display status.

Adjusting the Screen Contrast

To adjust the screen contrast, do the following:

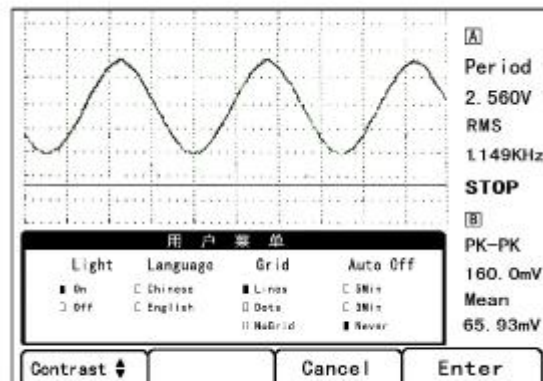
1. Press “**USER**” to open the user menu;
2. Press “**F1**” and “**Contrast**” in the menu becomes reversed display;
3. Press “**↑**” “**↓**” to adjust the contrast of the screen;
3. Press “**F3**” to exit this contrast adjusting status.

Setting the Grid Display Type

To choose a dotted grid, do the following:

1. Press “**USER**” to open the user menu;
2. Press “**↑**” “**↓**” “**←**” “**→**” to select grid type “**Dots**”;
3. Press “**F4**” to confirm dotted grid display.

There are two grid types: “**Lines**” and “**Dots**”. When select “**No Grid**”, the screen has no grid display.



Backlight, Contrast, Grid Type's selection and adjusting all can be operated in the precious user menu.

Setting the Power Down Timer

To avoid the ScopeMeter power-on long time without any operation, the power shutdown is set to 30 minutes after the last key press. To set the power shutdown to five minutes, do the following:

1. Press “**USER**” to open the user menu;
2. Press “**↑**” “**↓**” “**←**” “**→**” to select the meter Auto-Off option “5Min”;
3. Press “**F4**” to confirm the new power down time.

Auto Off is set in the user menu, and the Auto Off setting is “Never” in the previous figure.

Using Proper Ground

Incorrect grounding can cause various problems. Please make a proper grounding as the following guidelines:

- ☐ Use the short ground lead(s) when measuring DC or AC signals on input A and input B.

Warning.

Common terminal (including RS-232 “Ground”) in the internal instrument should be connected together. To avoid electrical shock or fire, use only one common connection or ensure that all connections to common terminal at the same potential.

- ☐ Use the two test leads to port Ω and port COM for Ohm (Ω), Continuity and Diode measurement.

Solving RS-232 Communication Problems

RS-232 communication may cause problems. When experiencing communication problems, try the following remedies:

- ℓ Make sure that the interface cable is connected to the correct port on the compute. If necessary, use the 9 pin or 25 pin adapter.
- ℓ Make sure that the baud rate matches with the settings of the ScopeMeter.
- ℓ Reset the RS-232 parameters to defaults.

Specifications

Excepting other statements, all the specifications suit for the probes with 10X attenuation and EM120 digital ScopeMeter.

All the specifications are guaranteed except the “Typical” specification.

Specifications

Sample		
Sampling Modes	Real time sampling	Equivalent sampling
Max. Sample Rate	100MSa/s	2.5GSa/s

Input	
Input Coupling	DC, AC
Input Impedance	1M Ω \pm 2%, parallel connection to capacitance <2DpF
Probe Attenuation Coefficient	1X, 10X
Max. Input Voltage	300V (DC + AC Peak)
Channels Time Delay (Typical)	\leq 300ps
Channel Isolation	\geq 100:1

Vertical	
A/D Converter	8 bit resolution (for both channels simultaneously)
Vertical Sensitivity	5 mV/div – 20 V/div (BNC input) With 1-2-5 Steps
Real Time Bandwidth	20MHz
Rise Time (Typical on BNC)	17.5ns
Vertical Accuracy	\leq \pm (5% + 1 pixel)

Probe		
Options	X1	X10
Attenuation	\pm 5% at DC	\pm 5% at DC
Input Resistance	1M Ω \pm 2%	10M Ω \pm 2%
Input Capacitance	85pF - 115pF	14.5pF - 17.5pF
Compensate Range	Suits for the ScopeMeter with all 1 M Ω input resistance	25pF – 45pF
Bandwidth	DC >5MHz	DC >20MHz

Input Voltage	<150V DC	<300V DC
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※ The Specifications about different kinds of probes are according as their manual books.

Horizontal	
Waveform Interpolated	(sinx) / x, linear selective
Record Length	1K (per channel)
Horizontal Sensitivity	10ns/div – 5s/div With 1-2-5 Steps
Horizontal Accuracy	$\leq \pm (0.01\% + 1 \text{ pixel})$

Trigger	
Trigger Mode	Normal, Auto, Single
Trigger Polarity	Positive, Negative
Trigger Sensitivity	0.5 Grid

Measure	
Cursor	Voltage difference between cursors (ΔV)
	Time difference between cursors (ΔT)
Auto	Pk-Pk, Means, Frequency, Period
Ohm(Ω)	200 Ω , 2K Ω , 20K Ω , 200K Ω , 2M Ω $\pm (2\% + 2 \text{ words})$
	20M Ω , $\pm (3\% + 2 \text{ words})$
Diode	Included
Continuity	Beep in 50 Ω range (<50 Ω)

General Specifications

Display	
Size	60mm×80mm
Resolution	320×240 pixels
Color	Monochrome
Contrast	Adjustable
Backlight	Bootable

Calibrated Signals Output	
Output Voltage (Typical)	About 5V when loaded $\geq 1M\Omega$
Frequency (Typical)	1KHz

Power	
Battery Pack	Li-battery 3.6V, 2AH
AC Adapter	DC 5V, 2.5A
Power	< 5W

Environmental	
Temperature	Operating: 0°C ~ +40°C
	Storage: -20°C ~ +60°C
Refrigerant way	Natural Convection
Humidity	Below +40°C : ≤ 90% relative humidity
	+40°C ~ +50°C : ≤ 60% relative humidity
Altitude	Operating: 3,000 m
	Storage: 15,000 m

Mechanical Data	
Size	Length 222mm
	Width 114mm
	Height 50mm
Weight	Excluding pack < 0.7 kg
	Including pack < 1 kg

Interface	RS232, PC Software
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Adjusting Interval Time
Suggest the interval time is one year.