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Manual

Oscilloscope (Scope-Meter)

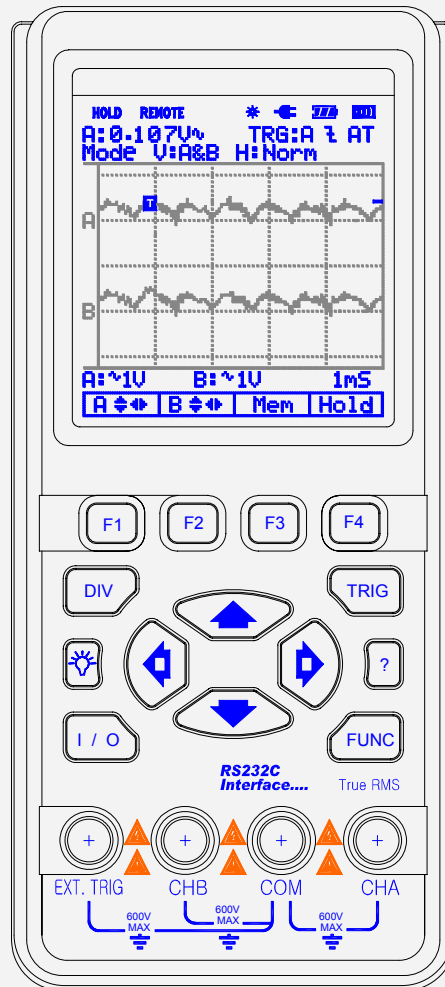


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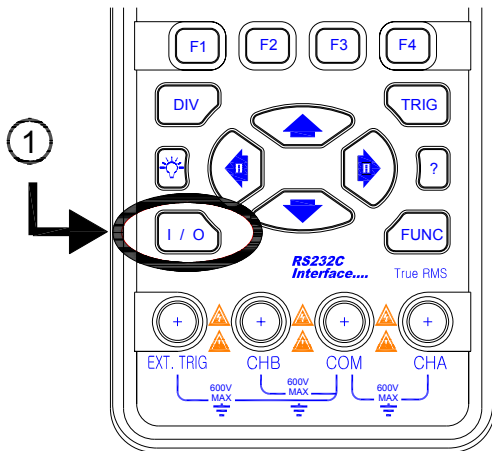
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1. Easy Manual



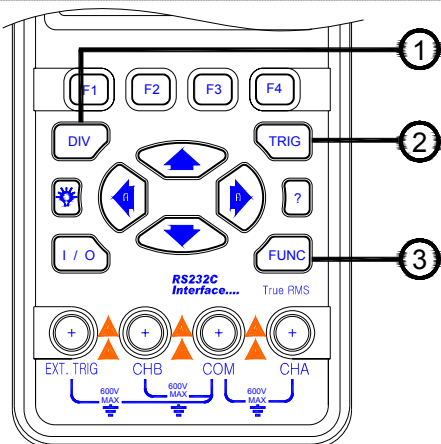
Front View

1.1 Turning on and off



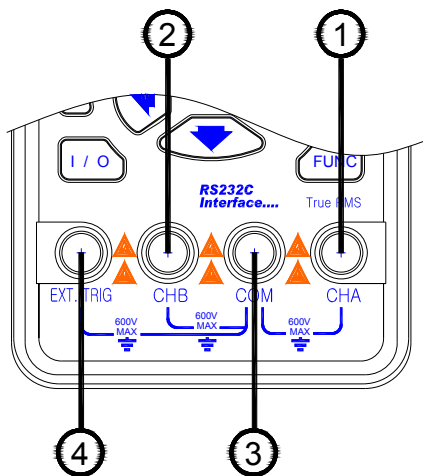
① Pressing this button for 1 to 2 seconds will turn the unit on.
Pressing this button again will turn the power off.

1.2 Division, Trigger and Function key



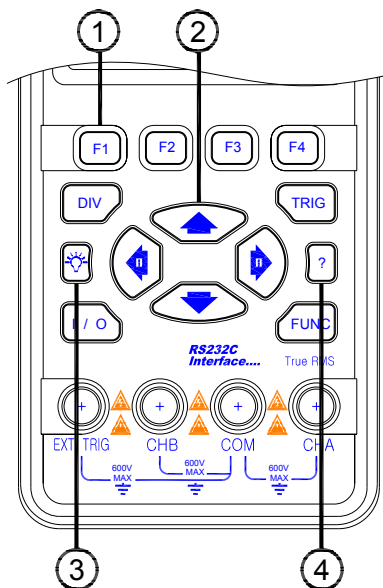
- ① **Division key:**
Adjusts vertical division or Horizontal division.
- ② **Trigger key:**
Adjusts Trigger level.
Selects Single shot mode.
Selects trigger setup.
- ③ **Function key:**
Selects Scope Setup.
Selects general setup.

1.3 Input Terminals



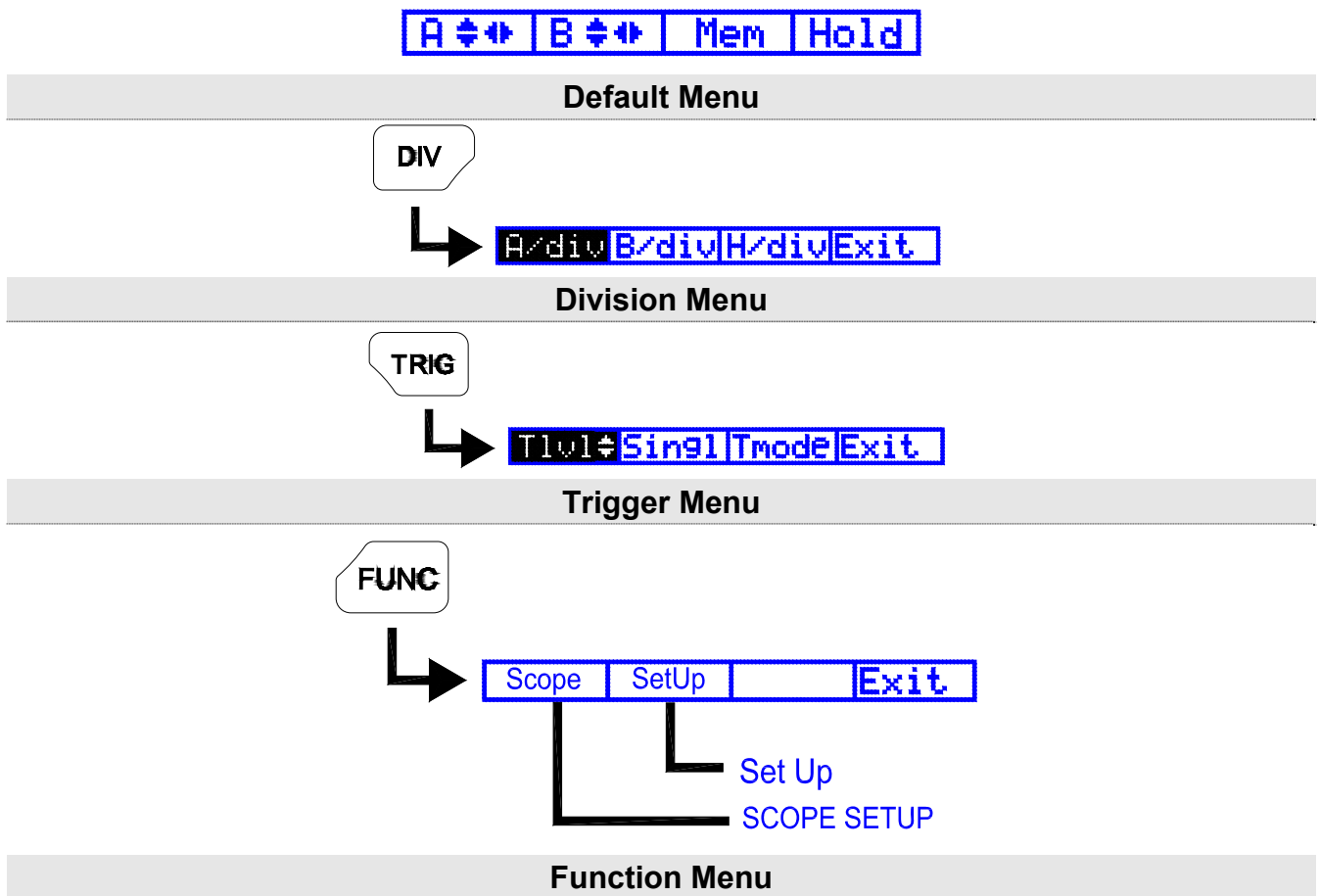
- ① **Channel A:**
You can always use the red channel A for all single input measurements possible with the meter.
- ② **Channel B:**
For measurements on two different signals you can use the channel B together with the Channel A.
- ③ **Common:**
You can use the black common as single ground for low frequency measurements and for ACV, DCV, Ohm, Continuity measurements.
- ④ **External trigger:**
The EXT. TRIG input accepts external trigger signals.

1.4 Command, Arrow, Backlight & Information key

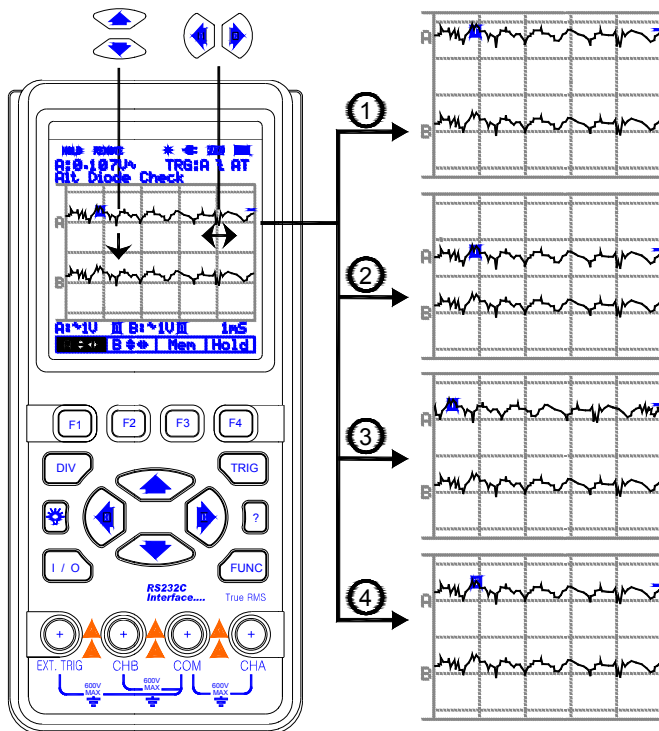


- ① **Command keys:**
These four keys are command buttons. They are labeled F1-F4. These keys will have various functions.
- ② **Four arrow keys:**
These keys serve as the primary means of navigating the instrument's menus and operating displays.
- ③ **Display back light:**
Press this button to turn on the backlight. To turn the back light off, press this button again.
- ④ **Information key:**
General information for the test tool is available.

1.5 Primary Menu Map



1.6 Positioning the waveform on the screen



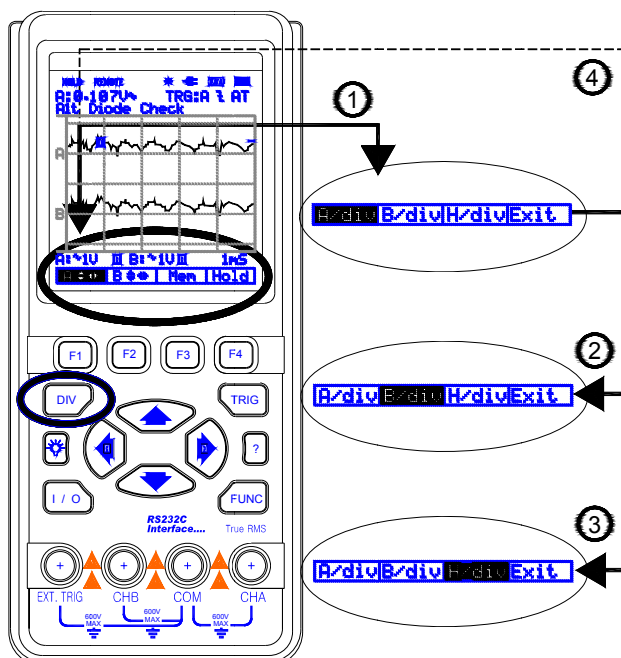
Pressing moves the waveform up.

Pressing moves the waveform down.

Pressing moves the waveform left.

Pressing moves the waveform right.

1.7 Division key map



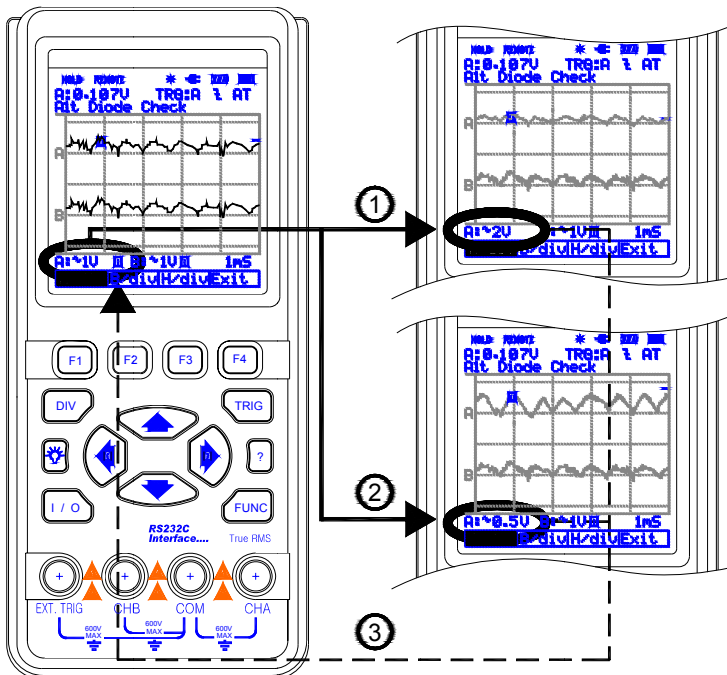
Pressing calls up the default division menu.

Press to control the Channel B Vertical Division.

Press to change the Horizontal Division.

Press to exit.

1.8 Changing Vertical (A/div or B/div) division

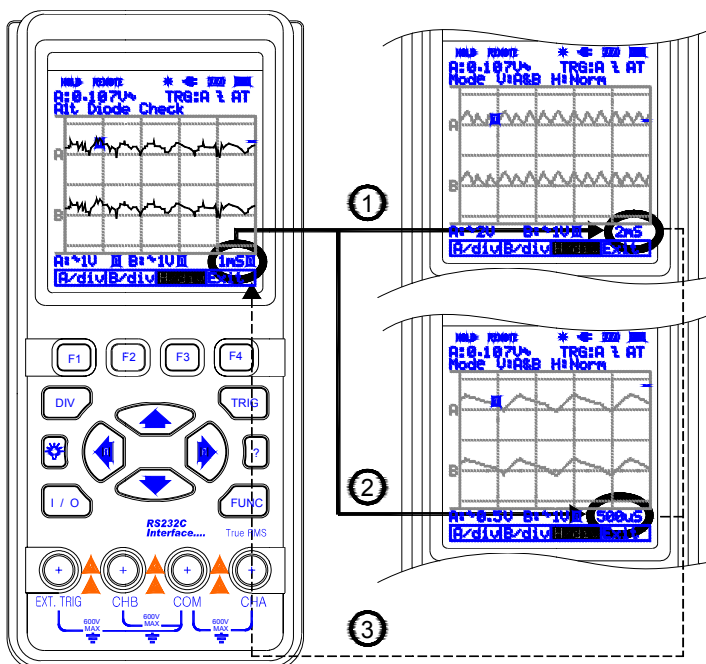


Pressing button increases CHA vertical division (A/div).

Pressing button decreases CHA vertical division (A/div).

Pressing or key will change Div from MANUAL to AUTO().

1.9 Changing Horizontal division

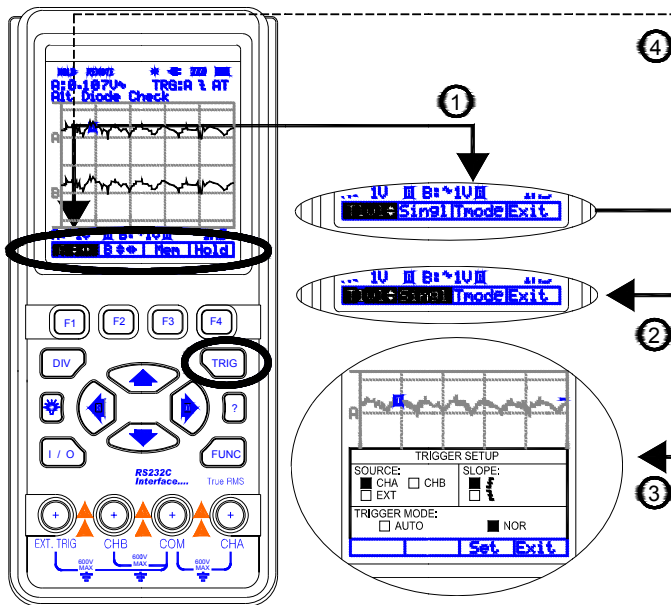


Pressing button increases Horizontal division (H/div).

Pressing button decreases Horizontal division (H/div).

Pressing or key will change Div from MANUAL to AUTO().

1.10 Trigger key map



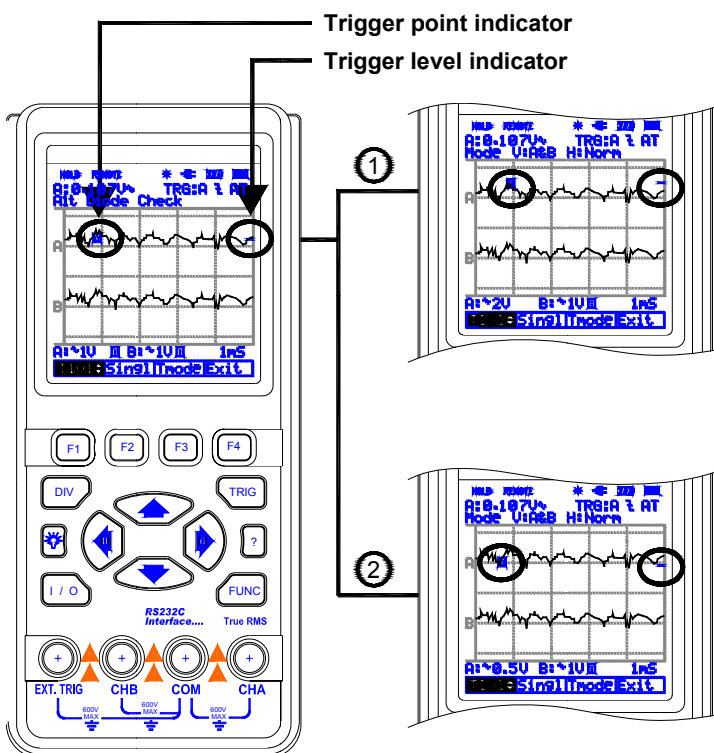
Press **TRIG** key to display the TRIGGER default menu.

Press **F2** key for Single shot mode.

Press **F3** key for TRIGGER SETUP.

Press **F4** to exit.

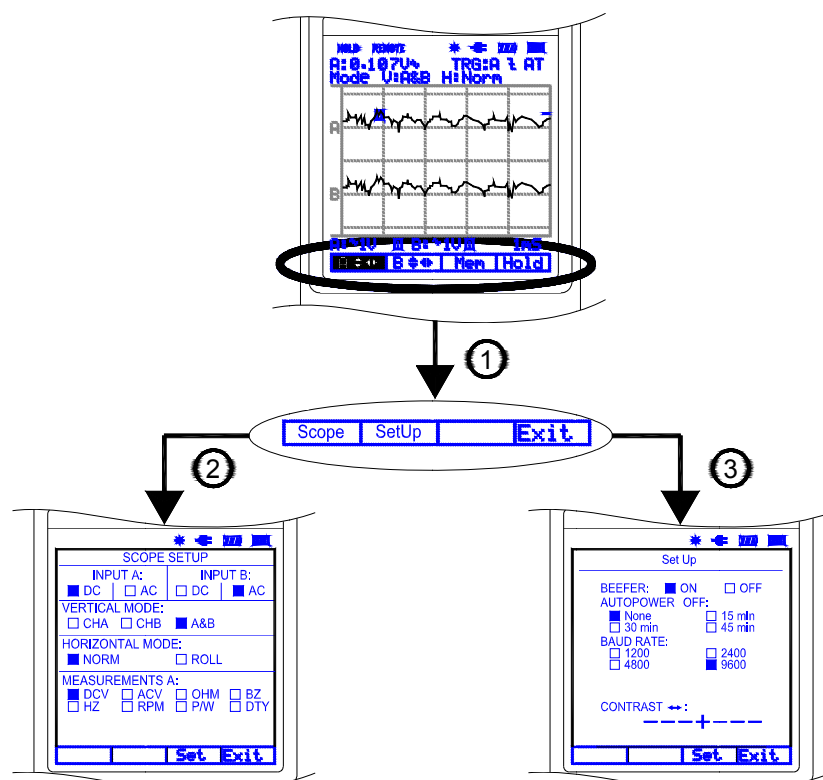
1.11 Trigger level control



Pressing **▲** button increases the Trigger level.

Pressing **▼** button decreases the Trigger level.

12. Function key map



Press **FUNC** key to display the FUNCTION default menu.

Press **F1** key for SCOPE SETUP.

Press **F2** key for General SETUP.

Press **F4** to exit.

2. Introduction

2.1 Main Features

This Programmable Universal Scope Meter offers enhanced features that similar type test instruments on the market today don't have.

All the functions are designed to be very convenient to use. You can quickly get used to working with this METER and the great many functions integrated inside. This instrument features:

No	Features
1	PC interface for transferring measurement data and waveform.
2	Dual Channel and Auto Calibration.
3	Automatic setting for horizontal and vertical division.
4	DC to 5MHz (2405), 1MHz (2401) oscilloscope band width
5	Built-in auto ranging True-RMS digital MultiMeter

6	Auto ranging
7	Data hold and run mode.
8	Back light display and Low battery indication.
9	Display Type: Super-Twist 132 x 128 pixels.
10	Designed to comply with safety standard for UL3111, CSA C22.2 No.1010-1

2.2 Unpacking the Test Tool Kit

The following items are included in your test tool kit.

■ STANDARD

#	Description <Cont.>
1	Scope Meter <1>
2	Li-ion Battery (installed) <1>
3	AC Power & Rechargeable Adaptor <1>
4	Test Leads <2>
5	CD Users Manual (this book) <1>

■ OPTION

#	Description <Cont.>
1	Carrying case <1>
2	Holster <1>
3	PC interface Cable <1>
4	Scope Meter Software for Windows <1>

Note:

When new, the rechargeable Li-ion Battery is not fully charged.

The accessories may be changed to improve the product quality without notifying the customers.

2.3 Specification

2.31 General Specifications

- 1) Operational Temperature:
0°C to +50°C (+32°F to +122°F) at a relative humidity 75% or less
- 2) Storage Temperature:
-20°C to +60°C with a relative humidity of 75% less
- 3) Temperature Coefficient:
0.1 x (Specified Accuracy) per °C for temperature <18°C to >28°C
- 4) Max. Voltage between any Input and Ground: DC or AC 600Vrms
- 5) Basic DC Accuracy: 0.3%

- 6) Band width: 5MHz(2405), 1MHz(2401)
- 7) Meter AC Band width: 20kHz
- 8) Power Supply: Li-ION Battery 3.7V
- 9) Battery Life Time:
4 Hours without Backlight on,
3 Hours with Backlight on.
- 10) Battery Charge Time: About 3 Hours
- 11) Battery Charge:
Class-2 transformer, Input: 120-240V AC 50/60Hz, Output: 5V DC 1A
- 12) Display Type: Super-Twist 132 x 128 pixels
- 13) Equipment Dimensions:
90 mm (width) 195 mm (depth) 40 mm (height)
x x
- 14) Equipment Weight: 1.0 lbs. (480g) approx. without Holster

2.3.2 Technical Specification

1) Oscilloscope Function

(1) Horizontal

Sample Rate	50 MS/s (Single CH mode), 25 MS/s (Dual CH mode)
Record Length	512 single shot mode, 256 in all modes
Sample / Division	25
Modes	Single shot, Roll, Normal
Accuracy	0.01%
Sweep Rate	1uS to 5S in 1, 2, 5 sequence

(2) Vertical

Bandwidth	S2401: 1MHz, S2405: 5MHz
Resolution	8 Bit
Channels	Dual

Coupling		AC, DC
Input impedance		1 MΩ
Accuracy		3%±1Pixel
Max. Input Volts		DC or AC 600Vrms
Volt / Division	S2401	0.5 V to 500V in 1, 2, 5 sequence
	S2405	50 mV to 500V in 1, 2, 5 sequence

(3) Triggering

Type	CHA, CHB, External
Coupling	AC, DC
Slope	Rising (↑) or Falling (↓) edge
Internal Trigger Sensitivity	2 / 20 Division

(4) Waveform Memory

Waveform Memory	16 Shots

2) Digital MultiMeter Function

DC V

Model	Scope V/Div	DMM Range	Resol.	Accuracy	Imped.
S2405	50m, 0.1, 0.2	500mV	0.1mV	±(0.3%+3)	1 MΩ
S2401	0.5, 1, 2	5V	0.001V		
	5, 10, 20	50V	0.01V		
S2405	50, 100, 200	500V	0.1V	±(0.5%+5)	
	500	1000V	0.1V		

AC V

Model	Scope V/Div	DMM Range	Resol.	Accuracy (Hz)			Imped.
				50~450	0.45k~5k	5k~20k	
S2405	50m, 0.1, 0.2	300mV	0.1mV	±(0.75%)	±(2%+5)	±(3.5%)	1 MΩ

S2401 S2405	0.5, 1, 2	3V	0.001V	+5)		+5)	
	5, 10, 20	30V	0.01V				
	50, 100, 200	300V	0.1V				
	500	750V	0.1V	$\pm(1.2\%+5)$	$\pm(2.5\%+5)$	N/A	

The Voltage for more than 200V in Frequency range 5kHz to 20kHz: Not Specification

OHM

Scope Div	DMM Range	Resolution	Accuracy	Over Load Protection
1 k Ω	5 k Ω	0.001 k Ω	$\pm(0.5\%+5)$	600V DC or AC rms
10 k Ω	50 k Ω	0.01 k Ω		
100 k Ω	500 k Ω	0.1 k Ω		
1 M Ω	5 M Ω	0.001 M Ω	$\pm(0.75\%+10)$	

Continuity Buzzer

Test Voltage	Threshold	Over Load Protection
1.7V	100 digits	600V DC or AC rms

Frequency

Range	Resolution	Accuracy	Overload protection
100 Hz	0.01 Hz	$\pm(0.05\%+5)$	600V DC or AC rms
1 kHz	0.0001 kHz		
10 kHz	0.001kHz		
100 kHz	0.01kHz		
1 MHz	0.0001MHz		
10 MHz (2405)	0.001MHz		

The guaranteed range is below 5 MHz.

RPM

Range	Resolution	Accuracy
240 - 60,000	1 RPM	$\pm(0.05\%+5)$

Pulse Width

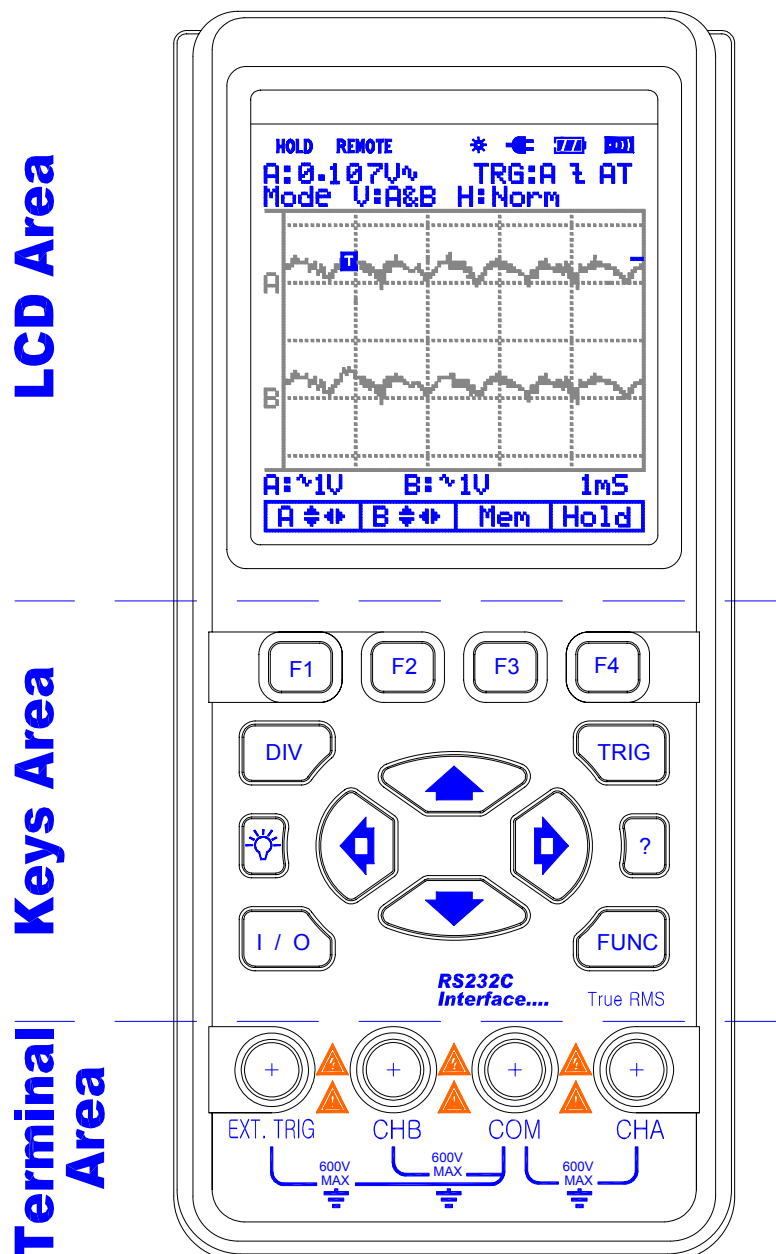
Range
2 μ S-500mS (Pulse Width > 2 μ S)

% Duty

Range
25% - 75%

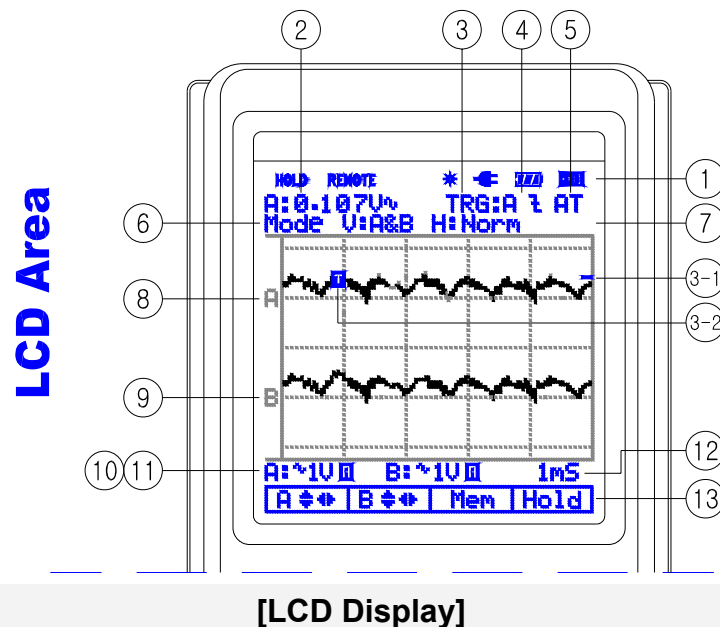
3. Product Description

In this chapter, the LCD, front panel buttons, controls and terminal are described.



3.1 LCD Area

The screen is divided into five areas: Indicator area, Reading area, Waveform area, Setting area and Menu area. Refer to Figure below.



- 1) Indicator
 - HOLD: Freezes display in the LCD
 - REMOTE: USB Output indicator
 - BACK LIGHT(★): Back light indicator
 - BUZZER(🔊): Buzzer indicator
 - Charging LINE(🔋): Charging Battery indicator
 - BATTERY(🔋): Low battery indicator
- 2) Primary Numerical Field (DMM Function)

Displays the numerical readings. Because only input A is on, you will see the input A readings only.
- 3) Trigger selection
 - Channel A, B and External
 - 3-1) Trigger level indicator
 - 3-2) Trigger Cursor
- 4) Trigger Slope
 - Rising or Falling edge
- 5) Trigger mode: Normal or AUTO
- 6) Channel mode status

Vertical mode: ▪ CHA ▪ CHB ▪ A&B

Horizontal mode: ▪ Normal ▪ Roll

7) Memory Address

- 0 to 15

8) Live Scope Display (Channel A)

Displays real time waveforms and freezes held captures.

9) Channel B

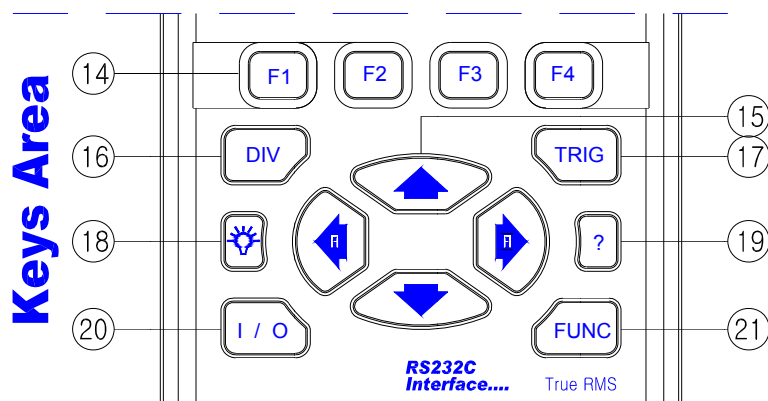
10) Channel A Vertical Division

11) Channel B Vertical Division

12) Horizontal Division (Time base)

13) Command Menu Field

3.2 Keys Area

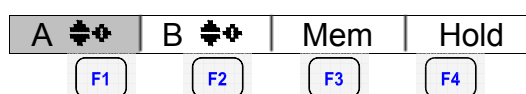


[Keys Area]

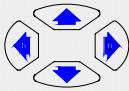
14) Command Menu keys

All Keys are command buttons. They are labeled F1~F4. These keys will have various functions.

Default (Command Menu)







15)



Arrow keys

Use the black arrow keys to highlight the item.

	The cursor to be changed is moved to up with this button. Pushing the button will increase the value or position.
	The cursor to be changed is moved to down with this button. Pushing the button will decrease the value or position.
	The cursor to be changed is moved to left with this button. Pressing this button changes Vertical division or horizontal division from MANUAL to AUTO.
	The cursor to be changed is moved to right with this button. Pressing this button changes Vertical division or horizontal division from MANUAL to AUTO.

16)

DIV

Division key

Set Channel A, B and Horizontal Division

DIV

A/div	B/div	H/div	Exit
F1	F2	F3	F4


17)

TRIG

Trigger key

Set Trigger level, Single mode and Setup

TRIG


Tlvl 	Singl	Tmode	Exit
F1	F2	F3	F4

F3

TRIGGER SETUP			
SOURCE:		SLOPE:	
■ CHA <input type="checkbox"/>		<input type="checkbox"/> f	
CHB		■ t	
<input type="checkbox"/> EXT			
TRIGGER MODE:			
<input type="checkbox"/> AUTO		■ NOR	
		Set	Exit
<input type="button" value="F1"/>	<input type="button" value="F2"/>	<input type="button" value="F3"/>	<input type="button" value="F4"/>

18)  Back light key

Activates Back Light for the LCD
Toggles backlight ON and OFF.

19)  Information key

Provides meter model number, firmware version, serial number, calibration date and manufacture date

20)  Power switch

Turns the instrument ON or OFF.

21)  Function Key

Set Scope, Auto Scope and Setup of the METER

FUNC

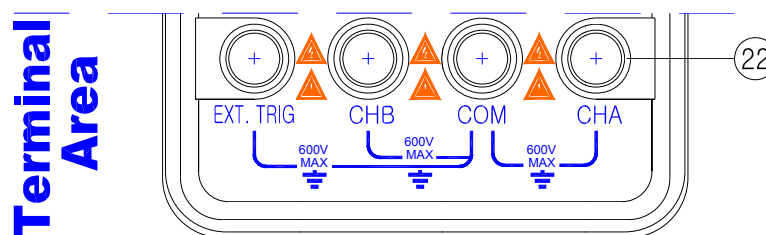
Scope	SetUp		Exit
<input type="button" value="F1"/>	<input type="button" value="F2"/>	<input type="button" value="F3"/>	<input type="button" value="F4"/>

▪ Scope Setup

FUNC → F1 (Scope)

SCOPE SETUP			
INPUT A:		INPUT B:	
<input checked="" type="checkbox"/> DC	<input type="checkbox"/> AC	<input checked="" type="checkbox"/> DC	<input type="checkbox"/> AC
VERTICAL MODE:			
<input type="checkbox"/> CHA	<input type="checkbox"/> CHB	<input type="checkbox"/> A&B	
HORIZONTAL MODE:			
<input checked="" type="checkbox"/> NORM		<input type="checkbox"/> ROLL	
MEASUREMENTS A:			
<input checked="" type="checkbox"/> DCV	<input type="checkbox"/> ACV	<input type="checkbox"/> OHM	<input type="checkbox"/> BZ
<input type="checkbox"/> HZ	<input type="checkbox"/> RPM	<input type="checkbox"/> P/W	<input type="checkbox"/> DTY
		Set	Exit
F1	F2	F3	F4

3.3 Terminal Area



[Terminal Area]

22) Terminals description

Look at the bottom of the METER. The METER provides 4 input jacks.

CHA: Channel A

You can always use the red channel A for all single input measurements possible with the Meter.

COM: Common

You can use the black COMMON as single ground for DCV, ACV, Ohm, Continuity, frequency and RPM measurements.

CHB: Channel B

For measurements on two different signals you can use the channel B together with the red channel A.

EXT. TRIG

External trigger.

4. Using the METER

4.1 Safely Using the Test Tool

4.1.1 Attention

Carefully read the following safety information before using the test tool.

4.1.2 Safety Precautions









Specific warning and caution statements, where they apply, will be found throughout the manual.

A Caution identifies conditions and actions that may damage the test tool. A Warning identifies conditions and actions that pose hazard(s) to the user.

Symbols used on the test tool and in this manual are explained in the next table.


Warning

To avoid electrical shock, use only specific power supply, Model (Power Adapter used as a Battery Charger).

	See explanation in manual
	Dangerous Voltage
	Double Insulation (Protection Class)
	Earth (Ground)
	Either AC or DC
	DC – Direct Current
	AC – Alternating Current
	Fuse

4.1.3 Powering the METER

Follow the procedure to power the Meter from a standard ac outlet.

	Power Adaptor is inserted in to AC outlet.
	Power Adaptor → the Meter.
	Turn the Meter on by pressing this button for about 3 seconds.

The meter powers up in its last setup configurations.

4.1.4 Changing Backlight

After power-up, the screen has a high bright display.

To save battery power, the screen has an economic brightness display when operated on the battery pack (no power adapter connected).

To change the brightness of the display, do the following:

	Brighten the backlight.
	Dim the backlight again.

The high brightness increases when you connect the power adapter.

Note

Using dimmed display lengthens maximum battery power operation time by about one hour.

4.1.5 Making Selections in a Menu

Subsequently follow steps to to open a menu and to choose an item.

	Open the FUNCTION menu.	Scope SetUp Exit													
	Open the Scope Setup menu.	<table border="1"> <thead> <tr> <th colspan="2">SCOPE SETUP</th> </tr> </thead> <tbody> <tr> <td>INPUT A: ■ DC □ AC</td> <td>INPUT B: ■ DC □ AC</td> </tr> <tr> <td colspan="2">VERTICAL MODE: □ CHA □ CHB ■ A&B</td> </tr> <tr> <td colspan="2">HORIZONTAL MODE: ■ NORM □ ROLL</td> </tr> <tr> <td colspan="2">MEASUREMENTS A: ■ DCV □ ACV □ OHM □ BZ □ HZ □ RPM □ P/W □ DTY</td> </tr> <tr> <td></td> <td></td> <td>Set Exit</td> </tr> </tbody> </table>	SCOPE SETUP		INPUT A: ■ DC □ AC	INPUT B: ■ DC □ AC	VERTICAL MODE: □ CHA □ CHB ■ A&B		HORIZONTAL MODE: ■ NORM □ ROLL		MEASUREMENTS A: ■ DCV □ ACV □ OHM □ BZ □ HZ □ RPM □ P/W □ DTY				Set Exit
SCOPE SETUP															
INPUT A: ■ DC □ AC	INPUT B: ■ DC □ AC														
VERTICAL MODE: □ CHA □ CHB ■ A&B															
HORIZONTAL MODE: ■ NORM □ ROLL															
MEASUREMENTS A: ■ DCV □ ACV □ OHM □ BZ □ HZ □ RPM □ P/W □ DTY															
		Set Exit													
	Use the arrow keys to highlight the item.														
	Select the proper item.														
	Exit.														

Key: → → → →

1) To choose a **Frequency** measurement for **CHA**, do the following:

	Plug the black test lead into the COM input jack.																																												
	Plug the red test lead into the CHA input jack.																																												
	Open the FUNCTION menu. <table border="1" style="margin-left: 40px;"> <tr> <td>Scope</td> <td>SetUp</td> <td></td> <td>Exit</td> </tr> </table>	Scope	SetUp		Exit																																								
Scope	SetUp		Exit																																										
	Open the Scope Setup menu. <table border="1" style="margin-left: 40px;"> <thead> <tr> <th colspan="4">SCOPE SETUP</th> </tr> </thead> <tbody> <tr> <td colspan="2">INPUT A:</td> <td colspan="2">INPUT B:</td> </tr> <tr> <td><input checked="" type="checkbox"/> DC</td> <td><input type="checkbox"/> AC</td> <td><input checked="" type="checkbox"/> DC</td> <td><input type="checkbox"/> AC</td> </tr> <tr> <td colspan="4">VERTICAL MODE:</td> </tr> <tr> <td><input type="checkbox"/> CHA</td> <td><input type="checkbox"/> CHB</td> <td colspan="2"><input type="checkbox"/> A&B</td> </tr> <tr> <td colspan="4">HORIZONTAL MODE:</td> </tr> <tr> <td colspan="2"><input checked="" type="checkbox"/> NORM</td> <td colspan="2"><input type="checkbox"/> ROLL</td> </tr> <tr> <td colspan="4">MEASUREMENTS A:</td> </tr> <tr> <td><input checked="" type="checkbox"/> DCV</td> <td><input type="checkbox"/> ACV</td> <td><input type="checkbox"/> OHM</td> <td><input type="checkbox"/> BZ</td> </tr> <tr> <td><input type="checkbox"/> HZ</td> <td><input type="checkbox"/> RPM</td> <td><input type="checkbox"/> P/W</td> <td><input type="checkbox"/> DTY</td> </tr> <tr> <td></td> <td></td> <td>Set</td> <td>Exit</td> </tr> </tbody> </table>	SCOPE SETUP				INPUT A:		INPUT B:		<input checked="" type="checkbox"/> DC	<input type="checkbox"/> AC	<input checked="" type="checkbox"/> DC	<input type="checkbox"/> AC	VERTICAL MODE:				<input type="checkbox"/> CHA	<input type="checkbox"/> CHB	<input type="checkbox"/> A&B		HORIZONTAL MODE:				<input checked="" type="checkbox"/> NORM		<input type="checkbox"/> ROLL		MEASUREMENTS A:				<input checked="" type="checkbox"/> DCV	<input type="checkbox"/> ACV	<input type="checkbox"/> OHM	<input type="checkbox"/> BZ	<input type="checkbox"/> HZ	<input type="checkbox"/> RPM	<input type="checkbox"/> P/W	<input type="checkbox"/> DTY			Set	Exit
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		Set	Exit																																										
	Highlight Hz (<input type="checkbox"/> Hz)																																												
	Select Hz (<input checked="" type="checkbox"/> Hz)																																												
	Exit.																																												

Key: → → → →

Observe that Hz is now the main reading.

4.1.6 Freezing the screen

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

	Default (Command Menu) Display: <table border="1" style="margin-left: 40px;"> <tr> <td>A </td> <td>B </td> <td>Mem</td> <td>Hold</td> </tr> </table>	A	B	Mem	Hold
A	B	Mem	Hold		
	Freeze the screen. Highlighted Hold appears at the bottom of the Command Menu area. <table border="1" style="margin-left: 40px;"> <tr> <td>A </td> <td>B </td> <td>Mem</td> <td style="background-color: #cccccc;">Hold</td> </tr> </table>	A	B	Mem	Hold
A	B	Mem	Hold		
	Resume your measurement <table border="1" style="margin-left: 40px;"> <tr> <td>A </td> <td>B </td> <td>Mem</td> <td>Hold</td> </tr> </table>	A	B	Mem	Hold
A	B	Mem	Hold		

4.1.7 Changing the Graphic Representation

1) Changing the vertical division

	Open the Command Menu.	<input type="radio"/> A/div	<input type="radio"/> B/div	<input type="radio"/> H/div	<input type="radio"/> Exit
	Change the vertical division. (CH A or CH B)				
	Increase the vertical division Div is changed to manual mode.				
	Decrease the vertical division. Div is changed to manual mode.				
	Change Div from Manual mode to AUTO mode.				

2) Changing the Time Base



	Open the Command Menu.	<input type="radio"/> A/div	<input type="radio"/> B/div	<input type="radio"/> H/div	<input type="radio"/> Exit
	Change the Horizontal division.	<input type="radio"/> A/div	<input type="radio"/> B/div	<input checked="" type="radio"/> H/div	<input type="radio"/> Exit
	Increase the number of periods. Div is changed to manual mode.				
	Decrease the number of periods. Div is changed to manual mode.				
	Change Div from Manual mode to AUTO mode.				

4.1.8 Acquiring the Waveform

	Open the FUNCTION menu.	<input checked="" type="radio"/> Scope	<input type="radio"/> SetUp	<input type="radio"/> Exit																																													
	Open the Scope Setup menu.	<table border="1"> <thead> <tr> <th colspan="4">SCOPE SETUP</th> </tr> </thead> <tbody> <tr> <td colspan="2">INPUT A:</td> <td colspan="2">INPUT B:</td> </tr> <tr> <td><input checked="" type="checkbox"/> DC</td> <td><input type="checkbox"/> AC</td> <td><input checked="" type="checkbox"/> DC</td> <td><input type="checkbox"/> AC</td> </tr> <tr> <td colspan="4">VERTICAL MODE:</td> </tr> <tr> <td><input type="checkbox"/> CHA</td> <td><input type="checkbox"/> CHB</td> <td colspan="2"><input type="checkbox"/> A&B</td> </tr> <tr> <td colspan="4">HORIZONTAL MODE:</td> </tr> <tr> <td colspan="2"><input checked="" type="checkbox"/> NORM</td> <td colspan="2"><input type="checkbox"/> ROLL</td> </tr> <tr> <td colspan="4">MEASUREMENTS A:</td> </tr> <tr> <td><input checked="" type="checkbox"/> DCV</td> <td><input type="checkbox"/> ACV</td> <td><input type="checkbox"/> OHM</td> <td><input type="checkbox"/> BZ</td> </tr> <tr> <td><input type="checkbox"/> HZ</td> <td><input type="checkbox"/> RPM</td> <td><input type="checkbox"/> P/W</td> <td><input type="checkbox"/> DTY</td> </tr> <tr> <td></td> <td></td> <td><input type="radio"/> Set</td> <td><input type="radio"/> Exit</td> </tr> </tbody> </table>				SCOPE SETUP				INPUT A:		INPUT B:		<input checked="" type="checkbox"/> DC	<input type="checkbox"/> AC	<input checked="" type="checkbox"/> DC	<input type="checkbox"/> AC	VERTICAL MODE:				<input type="checkbox"/> CHA	<input type="checkbox"/> CHB	<input type="checkbox"/> A&B		HORIZONTAL MODE:				<input checked="" type="checkbox"/> NORM		<input type="checkbox"/> ROLL		MEASUREMENTS A:				<input checked="" type="checkbox"/> DCV	<input type="checkbox"/> ACV	<input type="checkbox"/> OHM	<input type="checkbox"/> BZ	<input type="checkbox"/> HZ	<input type="checkbox"/> RPM	<input type="checkbox"/> P/W	<input type="checkbox"/> DTY			<input type="radio"/> Set	<input type="radio"/> Exit
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		<input type="radio"/> Set	<input type="radio"/> Exit																																														

Recording Slow Signals over a Long Period of Time

	Highlight ROLL MODE.
--	----------------------

		Set ROLL MODE.
		Exit.




Key:  →  →  →  → 






The roll mode function supplies a visual log of waveform activity and is especially useful when you measure lower frequency waveforms.

Note

ROLL MODE operates when the horizontal division is between 1s and 5s

Selecting AC-Coupling for INPUT A

		Highlight AC for INPUT A.
		Accept AC-coupling for INPUT A.
		Exit.

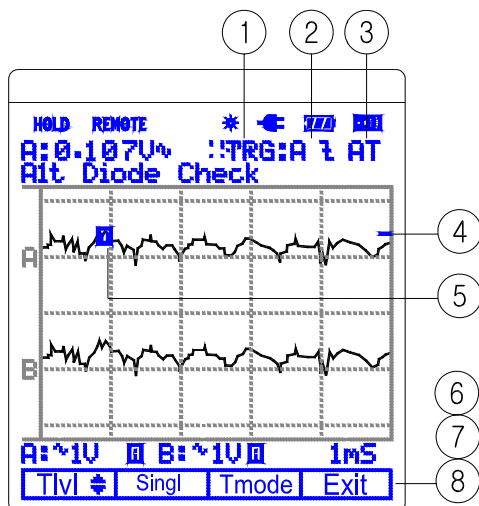
Key:  →  →  →  → 

Use AC-coupling when you wish to observe a small AC signal that rides on a DC signal.

5. Triggering on a Waveform

Triggering tells the METER when to begin displaying the waveform. You can select which input signal should be used, on which edge this should occur and you can define the condition for a new update of the waveform.

The right-top line of the LCD identifies the trigger parameters being used. Trigger icons on the screen indicate the trigger level and slope.



Screen with all Trigger Information

- (1) Trigger Channel: Channel A or B
- (2) Slope: rising or falling
- (3) Trigger mode: Trigger setting mode (Auto or Normal)
- (4) Trigger Level indicator
- (5) Trigger Cursor
- (6) Command Menu: Trigger level
- (7) Command Menu: Single shot
- (8) Command Menu: Trigger mode (Setup)

5.1 Setting Trigger level (on NORmal trigger mode)

	Open the Trigger menu	
 	Adjust the Trigger Level continuously. Observe the trigger icon on the second time division line indicates the trigger level.	
	Exit.	

Key: → →

5.2 Making a single acquisition

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

* Connect the probe to the signal to be measured.

	Open the default Trigger menu	
	Highlight Singl (SINGLE SHOT)	
	Test tool performs a single shot. (One time screen update)	
	Return to normal Trigger mode.	

Key: → →

5.3 Setting Trigger mode (Tmode)

	Open the Trigger menu																	
	Open the Trigger Setup	<table border="1"> <thead> <tr> <th colspan="2">TRIGGER SETUP</th> </tr> </thead> <tbody> <tr> <td>SOURCE:</td> <td>SLOPE:</td> </tr> <tr> <td><input checked="" type="checkbox"/> CHA <input type="checkbox"/></td> <td><input type="checkbox"/> f</td> </tr> <tr> <td>CHB</td> <td><input checked="" type="checkbox"/> z</td> </tr> <tr> <td><input type="checkbox"/> EXT</td> <td></td> </tr> <tr> <td colspan="2">TRIGGER MODE:</td> </tr> <tr> <td><input type="checkbox"/> AUTO</td> <td><input checked="" type="checkbox"/> NOR</td> </tr> <tr> <td></td> <td> </td> </tr> </tbody> </table>	TRIGGER SETUP		SOURCE:	SLOPE:	<input checked="" type="checkbox"/> CHA <input type="checkbox"/>	<input type="checkbox"/> f	CHB	<input checked="" type="checkbox"/> z	<input type="checkbox"/> EXT		TRIGGER MODE:		<input type="checkbox"/> AUTO	<input checked="" type="checkbox"/> NOR		
TRIGGER SETUP																		
SOURCE:	SLOPE:																	
<input checked="" type="checkbox"/> CHA <input type="checkbox"/>	<input type="checkbox"/> f																	
CHB	<input checked="" type="checkbox"/> z																	
<input type="checkbox"/> EXT																		
TRIGGER MODE:																		
<input type="checkbox"/> AUTO	<input checked="" type="checkbox"/> NOR																	
	Highlight the ITEM you want.																	
	Set the ITEM.																	
	Exit.																	

Key: → → → →

5.4 Setting AUTO Trigger Level

For quick operation, use the AUTO trigger mode to trigger on nearly all signals automatically. To optimize trigger slope manually, do the following:

	Open the Trigger menu	
--	-----------------------	--

Open the Trigger Setup		<table border="1"> <thead> <tr> <th colspan="2">TRIGGER SETUP</th> </tr> </thead> <tbody> <tr> <td>SOURCE:</td> <td>SLOPE:</td> </tr> <tr> <td> <input checked="" type="checkbox"/> CHA <input type="checkbox"/> CHB <input type="checkbox"/> <input type="checkbox"/> EXT </td> <td> <input type="checkbox"/> f <input checked="" type="checkbox"/> 1 </td> </tr> <tr> <td colspan="2">TRIGGER MODE:</td> </tr> <tr> <td colspan="2"> <input type="checkbox"/> AUTO <input checked="" type="checkbox"/> NOR </td> </tr> <tr> <td></td> <td></td> <td>Set</td> <td>Exit</td> </tr> </tbody> </table>		TRIGGER SETUP		SOURCE:	SLOPE:	<input checked="" type="checkbox"/> CHA <input type="checkbox"/> CHB <input type="checkbox"/> <input type="checkbox"/> EXT	<input type="checkbox"/> f <input checked="" type="checkbox"/> 1	TRIGGER MODE:		<input type="checkbox"/> AUTO <input checked="" type="checkbox"/> NOR				Set	Exit
TRIGGER SETUP																	
SOURCE:	SLOPE:																
<input checked="" type="checkbox"/> CHA <input type="checkbox"/> CHB <input type="checkbox"/> <input type="checkbox"/> EXT	<input type="checkbox"/> f <input checked="" type="checkbox"/> 1																
TRIGGER MODE:																	
<input type="checkbox"/> AUTO <input checked="" type="checkbox"/> NOR																	
		Set	Exit														
	Highlight AUTO.																
	Set AUTO.																
	Exit.																

Key: → → → →

5.5 Setting Normal Trigger mode

	Highlight NOR.
	Set NOR.
	Exit.

	Adjust the Trigger Level continuously. Observe the trigger icon on the second time division line indicates the trigger level.
--	---

Key: → → → →

5.6 Setting Trigger Slope

	Highlight f or 1.
	Set f or 1.
	Exit.

f or 1.	Trigger on either positive Slope or negative Slope of the chosen waveform.
---------	--

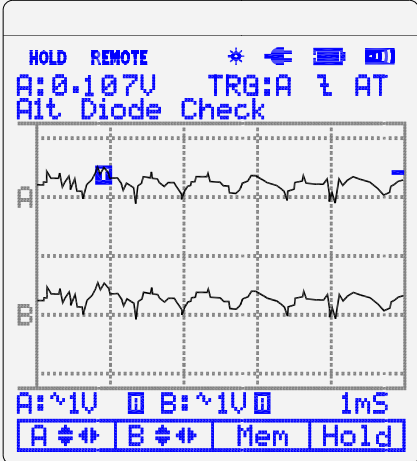




Key: → → → →

6. Storing and Recalling Screens

The meter can store setups and waveforms to memory for later recall. Sixteen (0-15) setup and waveform memories are available.

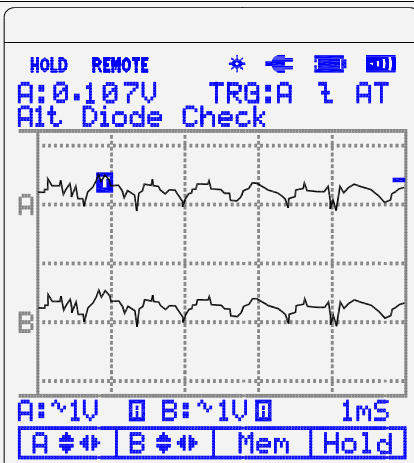




6.1 Storing Screen

To store a screen, do the following:

Default	
	Open the memory (Mem) menu 
	Memory field (M;0) appears at the top-right corner of the display area.
	Select the memory address you want to store in.
	Store the actual screen

6.2 Recalling Screen

To recall a screen, do the following:

	Default	
		Open the memory menu 
		Memory field (M;0) appears at the top-right corner of the display area.
		Select the memory address you want to recall from.
		View the saved screen.

The image is presented as a picture that can no longer be changed.

7. Remote Interface Operations

This section explains how to install the USB device driver.

If you have any questions after reading this information, please contact your local service representative.

Remote Interface is Optional.

7.1 USB HID Device Installation

7.1.1 System Requirements

Desktop or Laptop computer with:

- 1) The IBM PC or Compatible Computer.
- 2) The Windows operating system: Refer to the Readme file in CD-ROM.
- 3) The CD-ROM Drive
- 4) USB Port for Connection with Instrument

This is restricted to devices that have USB ports and for which the manufacturer of the computer guarantees the operation of the USB port.

Operating System

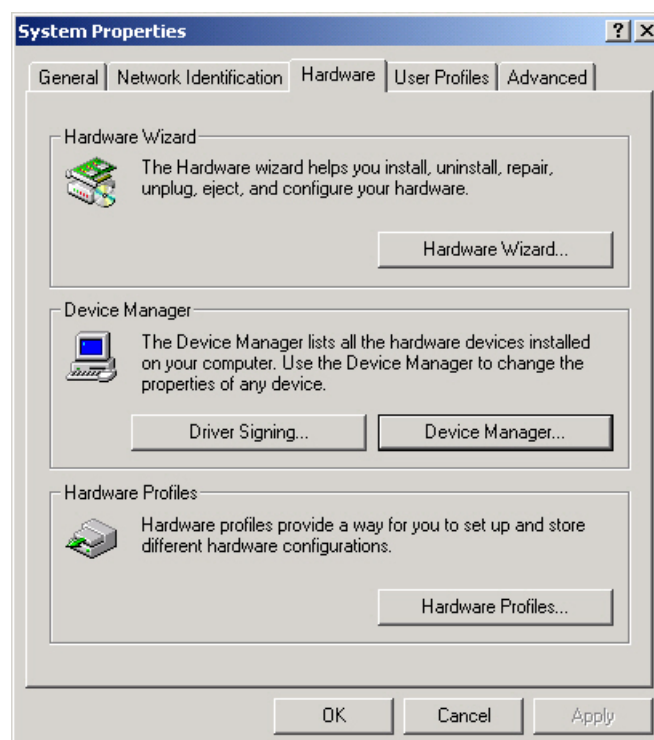
- Microsoft Windows 2K/XP/2K3 or above

7.2 Verifying the computer's USB port

- 1) Ensure that the USB HandyScope is plugged in.
 - 2) Pressing I/O key for 1 to 2 seconds will turn the unit on.
 - 3) Right click on the My Computer icon and open [Properties].
 - 4) Select the [Hardware] tab and click the [Device Manager] button to open [Device Manager].
 - 5) Check that [Human Interface Device] is displayed.
- * If [Human Interface Device] is not displayed, the USB device driver cannot be used.

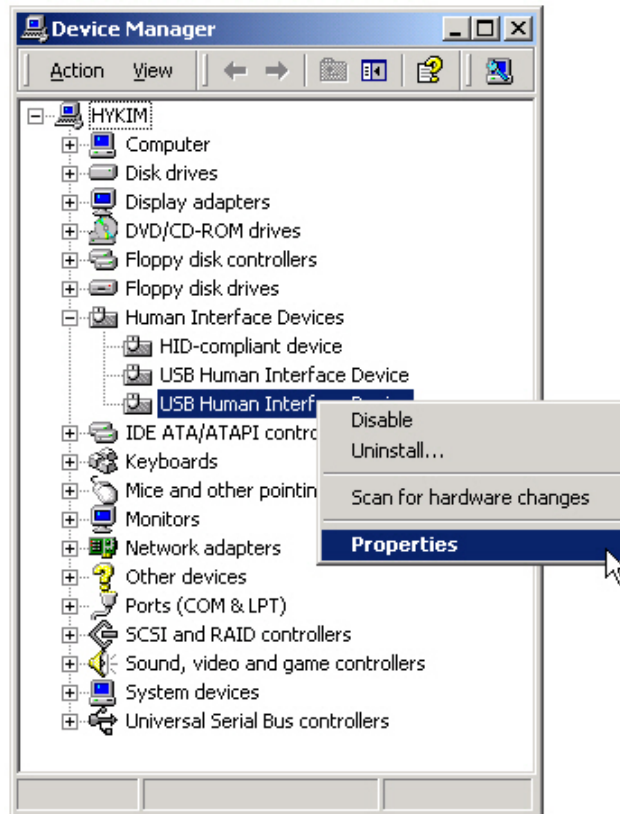
7.2.1 Installing the HID Device

- 1) Plug in the 4 Pin type into the USB port on the Meter, and connect the USB connector type on the other end of the cable to the host USB port in your PC.
- 2) Pressing I/O key for 1 to 2 seconds will turn the unit on.
- 3) The Windows operating system displays "Found New Hardware" and automatically installs the Human Interface Device (HID) driver. HID's do not require a custom USB driver. Support for HID's is built into Windows.
- 4) Review the status of the HID using the Device Manager.
- 5) Right click on My Computer to open the System Properties - Hardware dialog. Then click on Device Manager.



[Figure 1: System Properties]

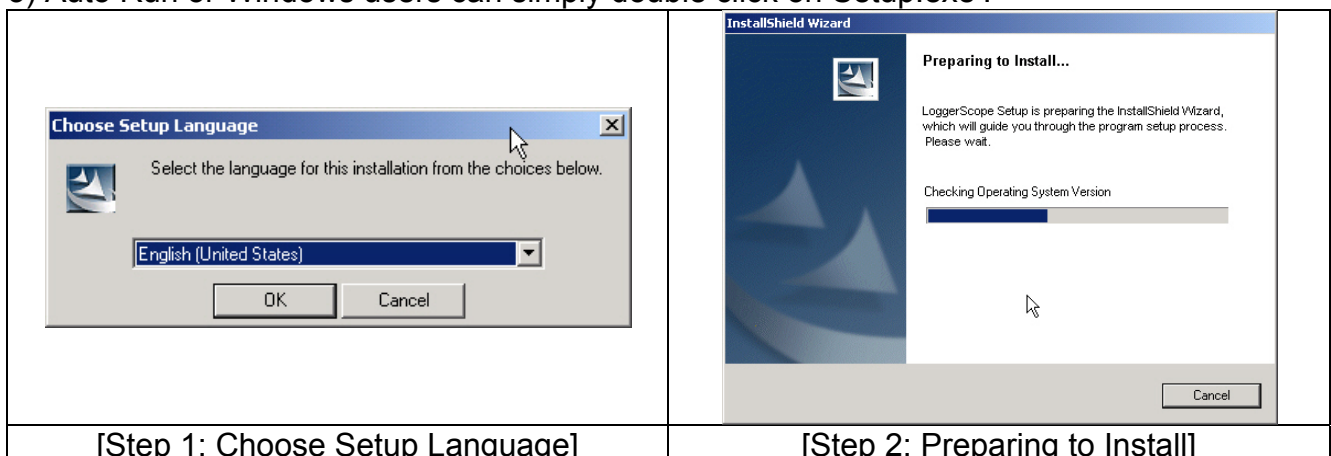
- 6) Right click on the Human Interface Device to open the Properties dialog which contains the description and status of the HID device.

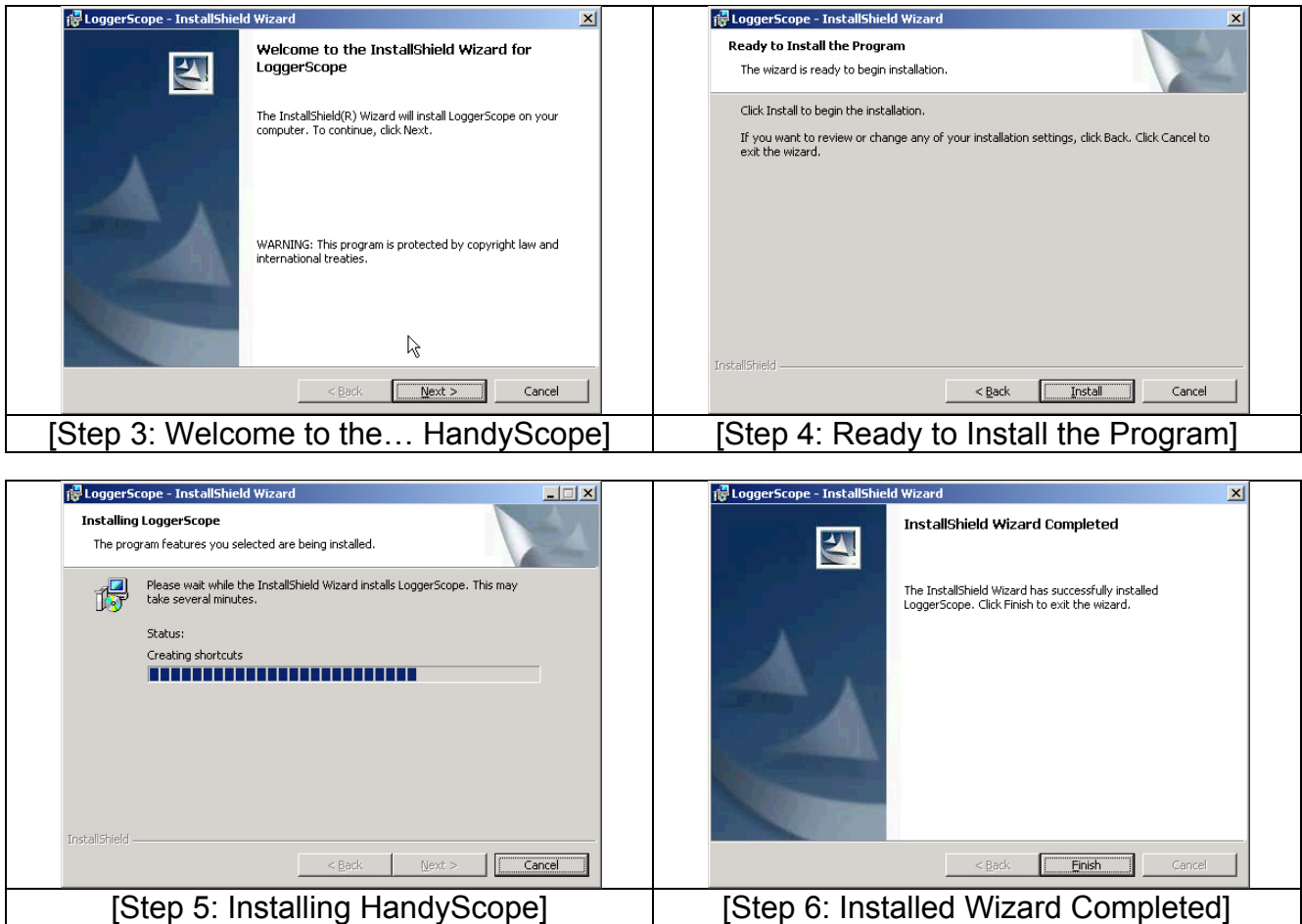


[Figure 2: Device Manager]

7.3 To install Windows Application Software

- 1) Insert the HandyScope software installation guide CD into the CD-ROM drive of your PC.
- 2) Open Windows® Explorer and double-click the CD-Rome drive.
- 3) Auto Run or Windows users can simply double click on Setup.exe’.

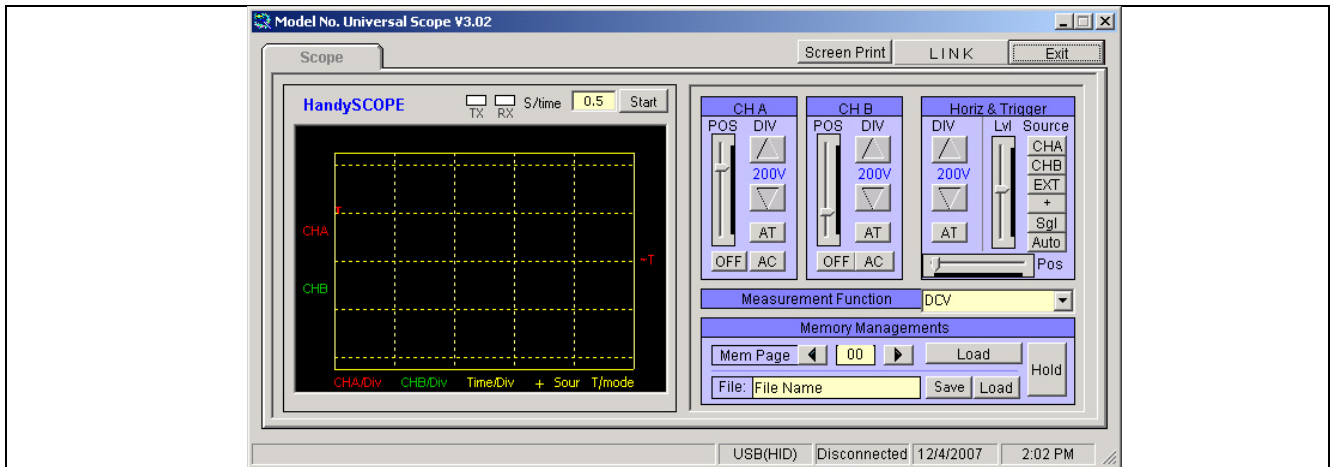




7.4 Running the Application Software

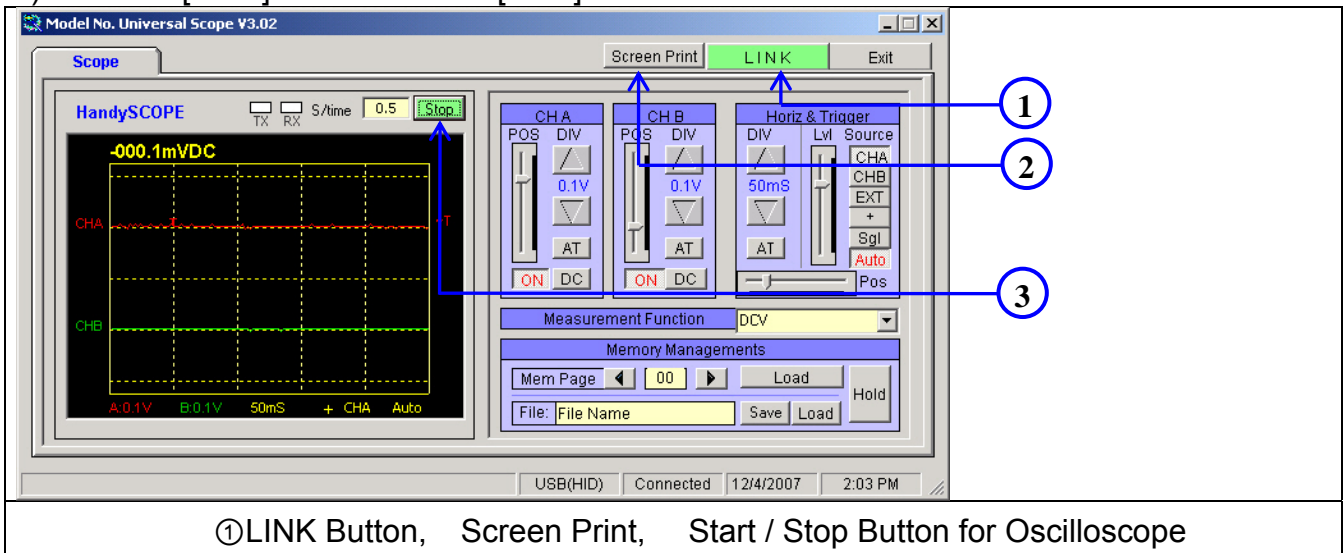
- 1) For using USB port your PC should have USB port. Connect USB cable to HandyScope at one end and to PC at other end.
- 2) Turn the HandyScope on.
- 3) **Click** [Start→Programs→HandyScope→HandyScope]

The HandyScope window will pop up as below

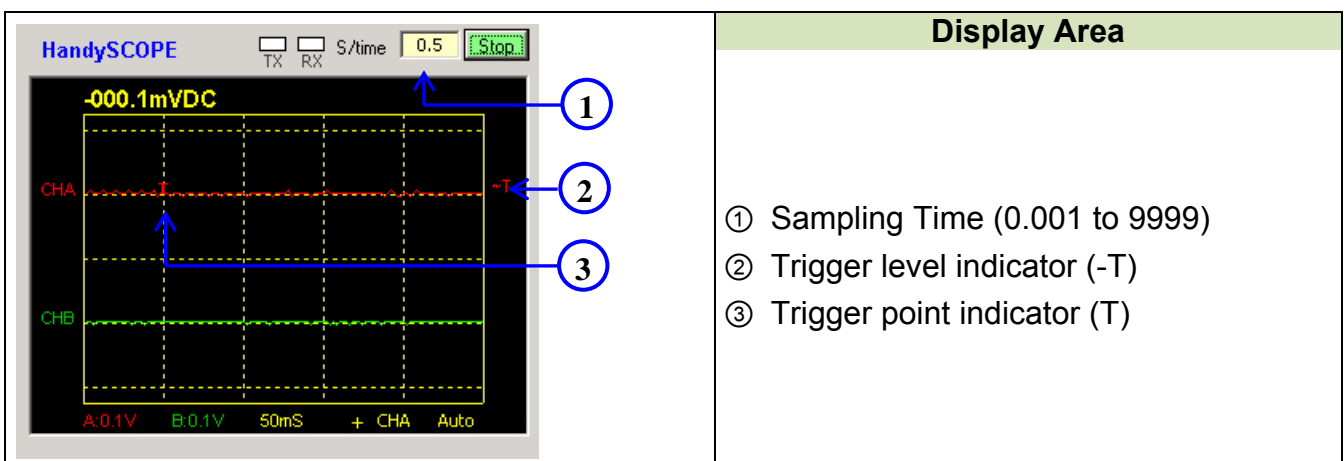


7.4.1 Oscilloscope Mode

1) Click the [LINK] Button and the [Start] Button.



①LINK Button, Screen Print, Start / Stop Button for Oscilloscope



Display Area

- ① Sampling Time (0.001 to 9999)
- ② Trigger level indicator (-T)
- ③ Trigger point indicator (T)

Control Panel Area	
<p>The screenshot shows the control panel of a PCE meter. It is divided into several sections: <ul style="list-style-type: none"> CHA (Channel A): Includes vertical position (POS), division (DIV) set to 50mV, and coupling (ON/OFF, DC) buttons. CHB (Channel B): Similar to CHA, with POS, DIV (50mV), and coupling buttons. Horiz & Trigger: Includes horizontal division (DIV), trigger level (Lvl), and source (Source) controls. Measurement Function: A dropdown menu currently set to DCV. Memory Managements: Includes Mem Page (00), Load, Save, and Hold buttons. File: A text field for File Name and Save/Load buttons. </p>	<ul style="list-style-type: none"> ④ Channel A (Vertical Position, Division, Auto, ON/Off and DC coupling) ⑤ Channel B (Vertical Position, Division, Auto, ON/Off and DC coupling) ⑥ Horizontal Division and Trigger (Horizontal Division, Auto, Trigger Level, Source and Position) ⑦ Measurement Function (DCV, ACV, OHM, BZ, Hz, RPM, Pulse Width and Duty) ⑧ Recalling Screens from Memory ⑨ Storing and Recalling Screens from PC Data

8. Maintaining the test tool

Warning!

- This section is very important for safety. Read and understand the following instruction fully and maintain your instrument properly.
- The instrument must be calibrated and inspected at least once a year to maintain the safety and accuracy.

8.1 About this Chapter

This chapter covers basic maintenance procedures that can be performed by the user and provides handling, cleaning, battery replacement, disassembly, and assembly instructions.

8.2 Static Safe Handling

Observe the following rules for handling static-sensitive devices:

1. Handle all static-sensitive components at a static-safe work area. Use grounded static control table mats on all repair meters, and always wear a grounded wrist strap. Handle boards by their nonconductive edges only. Store plastic, vinyl, and Styrofoam objects outside the work area.
2. Store and transport all static-sensitive components and assemblies in static shielding bags or containers. Static shielding bags and containers protect components and assemblies from direct static discharge and external static fields. Store components in their original packages until they are ready for use.

8.3 Cleaning the Meter

Warning!

To avoid electrical shock or damage to the meter, never allow water inside the case. To avoid damaging the meter's housing, never apply solvents to the meter.

If the meter requires cleaning, wipe it down with a cloth that is lightly dampened with water or a mild detergent. Do not use aromatic hydrocarbons, chlorinated solvents, or methanol-based fluids when wiping the meter.

8.4 Storing the Meter

If you are storing the Meter for an extended period of time, charge the LI-ION battery pack before storing. It is not necessary to remove the battery pack.

8.5 Calibration

The manufacturer may conduct the calibration and inspection. For more information, please contact the manufacturer.

8.6 Replacing and Disposing of the Li-ION Battery

Warning!

To avoid electrical shock, remove the test leads and probes before replacing the battery pack.

Caution

Handle the PCB Assembly by its edges or while wearing gloves; avoid contaminating the PCB Assembly with oil from your fingers.

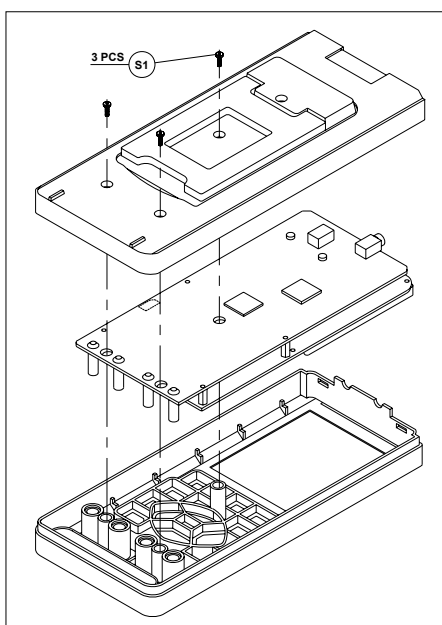
A contaminated PCB Assembly may not cause immediate instrument failure in controlled environments. Failures typically show up when contaminated units are operated in humid areas.

Note

This instrument contains a LI-ION battery pack. 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.

To replace the battery pack

1. Remove the Meter Case



Use the following procedure to remove the meter case.

Release the test leads

Disconnect the test leads and probes both at the source and at the meter.

Power OFF

Make sure the meter is turned off and unplugged from the power Adaptor.

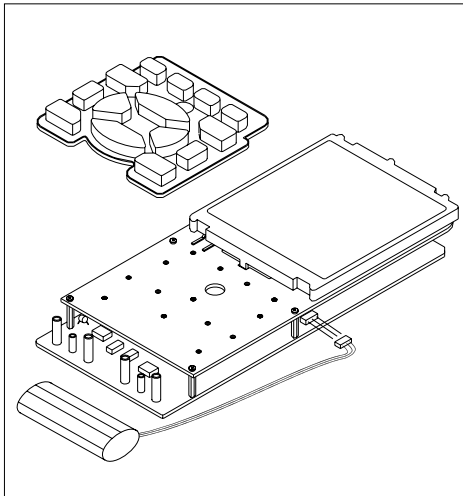
Remove Screw:

Remove the three screws from the bottom of the case. (3 pcs)

Remove the PCB Assembly:

Now remove the PCB Assembly by releasing the four snap retainers securing it to the case.

2. Remove Rubber key and Battery Pack



Rotate the PCB Assembly 180 degrees.

Remove Rubber Key:

Remove Battery Pack:
Remove the battery plug from the connector.

3. Install a new battery pack.
4. Reinstall the rear cover and secure the screws.

9. Appendices

9.1 Troubleshooting guide

If you experience trouble with your instrument, try these corrective actions before concluding that the instrument needs repair.

1. Make sure you are using fresh Li-ion battery or fully charged rechargeable battery pack. If you are using the AC/DC power adapter, make sure the adapter is plugged into an appropriate live power source.
2. If the buttons do not respond to your control or the contrast is set such that the display is unreadable, remove the power source while the instrument is on. Wait 15 minutes and then restore power and try operations.
3. If you still experience difficulty, check your connections and reread the usage instructions.
4. If meter is frozen while you control the trigger level:

If you set the trigger level to normal (NOR) mode, trigger level must be the same level of waveform. Meter does not trigger if trigger level set above or below waveform.

If you set the trigger level to Auto (AT) mode, you do not need to control the trigger level.

In rare cases, your instrument may require servicing. There are no user-serviceable parts inside the instrument. For service, return the instrument to your customer service center.

In this direction will find a vision of the measurement technique:
<http://www.industrial-needs.com/measuring-instruments.htm>

NOTE: "This instrument doesn't have ATEX protection, so it should not be used in potentially explosive atmospheres (powder, flammable gases)."